Health Consultation

HOOKSTON STATION SITE REVIEW
AND APPROVAL OF THE RISK ASSESSMENT

PLEASANT HILL, CONTRA COSTA COUNTY, CALIFORNIA

EPA FACILITY ID: CAD983662453

SEPTEMBER 30, 2006

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

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PLEASANT HILL, CONTRA COSTA COUNTY, CALIFORNIA

EPA FACILITY ID: CAD983662453

Prepared by:

California Department of Health Services
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

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Background and Statement of Issues

The California Department of Health Services (CDHS), Environmental Health Investigations Branch (EHIB), was requested, in a letter dated October 4, 2004, from the San Francisco Bay Regional Water Quality Control Board (RWQCB), to provide toxicology and risk assessment support for the Hookston Station Site in Pleasant Hill, Contra Costa County. Over the next 1.5 years, EHIB staff reviewed and commented on several versions of the site risk assessment, participated in meetings with the responsible parties and their consultants to discuss the areas of concern in the risk assessment, met with community leaders to share concerns about the risk assessment, and provided technical assistance at two community meetings. CDHS staff are funded through a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). CDHS summarizes the technical assistance that was provided for ATSDR's concurrence in this health consultation.

Overview of Site and Nature of Request

The Hookston Station site, located at 228 Hookston Road in Pleasant Hill, covers about 8 acres and was historically used for a rail line and station by the Southern Pacific Transportation Company (Figure 1). The land was developed for light industrial uses after 1965 (1). Environmental investigations have been conducted at this site since 1989. These investigations have found petroleum-based products and volatile organic chemicals (VOCs) in the soil and groundwater at the site. Some of the contaminants in the soil and groundwater originated from properties owned by others in the vicinity of the Hookston Station site (Figure 2). In 1993, an off-site investigation indicated that the shallow groundwater plume of VOC contamination had extended 2,000 feet down gradient from the site and had also contaminated the deeper aquifer zone (Figure 3). The groundwater contamination plume consists primarily of tetrachloroethylene (PCE), trichloroethylene (TCE), cis-1,2-dichloroethylene (cis-1,2-DCE), and 1,1-dichloroethylene (1,1-DCE). The groundwater contamination plume moves in the north and northeast direction under a large single-family and multiple-family residential community.

According to the 2000 census, 1,133 people live in 401 housing units in the neighborhood downgradient of the Hookston Station in the direction the groundwater is flowing (Figure 4) (2). The census block contains the following populations by race: white, 951; Asian alone, 65; two or more races, 74; some other race alone, 43. The census block contains 69 individuals of Hispanic or Latino descent, and 1,064 that are not Hispanic or Latino. The median household income for the census block is $85,190.

CDHS began its involvement at the Hookston Station site by reviewing and commenting on a November 2004 draft risk assessment that had been submitted by the responsible parties (3). Then CDHS reviewed and commented on a March 2005 draft risk assessment, in a letter dated March 28, 2005 (4). In a letter dated November 22, 2005, CDHS provided responses to an email from the responsible parties' consultant regarding the several issues raised in our comments on the risk assessment (5). In January and February 2006, CDHS provided additional review to revisions to the March 2005 risk assessment by email, approving the revisions and the risk assessment in March 2005.

Discussion

In the risk assessments, the consultant for the responsibility parties, the Center for Toxicology and Environmental Health (CTEH) analyzes a set of exposure pathways for the on-site receptors (construction worker, commercial/industrial worker) and off-site receptors (residents) (1). For the construction worker doing work on the site in the future, CTEH evaluated three potential pathways of exposure: inadvertent ingestion of chemicals in soil, skin contact with chemicals in soil, and inhalation of chemicals in dust or volatilizing from soil to outdoor air. In addition to these three pathways, CTEH evaluated inhalation of VOCs in indoor air for the commercial/industrial worker.

CTEH evaluated the following four pathways for off-site adult and child residents:

- Inhalation of chemicals in indoor air;
- Inhalation of chemicals in air released from lawn irrigation with groundwater;
- Skin contact, incidental ingestion, and inhalation of chemicals in backyard swimming pools using ground water (child resident only); and
- Inhalation of chemicals in air released from Walnut Creek surface water.

The following is a summary of the major comments submitted to RWQCB from CDHS about the draft risk assessments. More specific information can be found in the correspondence located in Appendix C (3-5).

- CDHS found the dose equations and calculations used in the draft risk assessments to be correct and the noncancer and cancer slope factors to be up to date and accurate.

- CDHS did not agree with the calculation of exposure pathways involving inhalation to be using only an average inhalation rate (November 2004 and March 2005) draft risk assessments. By taking this approach, the risk estimates for people breathing at rates higher than average are under represented by the calculations presented in the risk assessment. In order to conservatively estimate the risks that vapors pose to residents in the area, CDHS requested risks to be calculated for the upper percentile inhalation for adults and children.

- CDHS also commented that the doses and risks were based on limited site data. Indoor air data has only been collected one time in 16 houses, whereas it is recommended that at least two sampling events occur in different seasons because of the variation that can occur due to weather conditions (6). CDHS commented that it was essential that a second round of indoor air data be collected in the previously sampled homes to better characterize indoor air impacts from the Hookston contaminants. CDHS noted that indoor air data should be collected during two different seasons in any future investigations in the area in accordance with DTSC guidance (6).

- CDHS found the concentration contour lines for the ground water contamination on the figures in the site documents to be based on limited monitoring wells. CDHS suggested that additional investigations seem warranted.

- CDHS observed that the off-site soil gas had not been adequately characterized.

- CDHS found the risks presented in the risk assessment (November 2004 and March 2005) to range from acceptable risk according to regulatory policy (less than 1 in 1 million increased cancer risk) to potentially unacceptable risk (greater than 1 in a million increased cancer risk). In the risk assessment there are several exposures that exceed the 1 in 1 million increased cancer risk threshold including: on-site commercial/industrial worker inhalation cancer risk; on-site commercial/industrial worker cancer risk from soil exposure; on-site construction worker cancer risk from soil exposure; off-site resident breathing chemicals migrating and accumulating inside homes above the contaminated groundwater plume; and off-site residential cancer risk from exposure to VOCs volatilizing from the Walnut Creek. Given the limited data sets for some media and, in some cases, the less than conservative assumptions in the risk calculations, CDHS contends that these pathways represent risks that need to be addressed further.

- In the November 2004 and March 2005 draft risk assessments, CTEH states that these risks that they calculated are acceptable according to the US. Environmental Protection Agency (EPA). CDHS found that the risk estimates presented in those draft risk assessments might be described as falling in the "acceptable range" for risk; however, not all of the risk calculations considered a greater than average exposure. For example CDHS recommended that a range of breathing rates above the average should be considered for the inhalation pathway. Based on this information, CDHS did not agree with CTEH's assertion that the risks are all acceptable. This position is supported by guidance from DTSC where "acceptable risk is defined to be a risk which is no greater than 1×10^{-6}" (7). CDHS commented the risk assessment could not be considered final until it is amended to reflect the fact that some of the risks calculated for the site and off site fall into a range that require further consideration, and thus may need mitigation.

- CDHS also highlighted the need to assess each individual residence individually for indoor air impacts, noting that each residence is built over potentially different soil and groundwater conditions and may be constructed differently, thereby exerting a different effect on subsurface vapors. CDHS suggested that the investigation of the indoor air pathway begin in the area of most concentrated groundwater contamination and move out in all directions from there. CDHS recommended that the indoor air investigation be accompanied with extensive health education and community outreach to ensure that residents understand the implications for their health. CDHS suggested that the RWQCB must be involved in the planning of these outreach efforts and to the extent that resources allow, be involved in the contact with the residents, to ensure that the information is appropriate for one to make a decision about allowing or refusing sampling and possible mitigation.

- CDHS recommended active soil gas data be collected from areas outside of the central plume to confirm that VOC soil gas concentrations parallel groundwater plume VOC concentrations. If there is a good correlation, CDHS recommends that a series of active soil gas monitoring stations be established in the neighborhood to monitor the soil gas.

- CDHS expressed concern that there has been no documented effort to identify subsurface utilities that may present preferential migration pathways for VOCs from the Hookston

Station groundwater plume. CDHS recommends that major subsurface utilities be identified to determine if there are any additional properties in the area that may be at risk of exposure to soil gas contaminants via preferential soil gas pathways.

Many of CDHS's comments were addressed in the final risk assessment (1). Some of CDHS's comments such as more groundwater monitoring in the off-site area are going to be addressed as part of the feasibility study. CDHS approved the February 2006 risk assessment. The final risk assessment found exposures both on site and off site had risks that fall above the risk range where regulatory action could be required (1 in 10,000 to 1 in 1,000,000) (Tables 1 and 2).

ATSDR Child Health Considerations

ATSDR recognizes that infants and children may be more sensitive to exposures, depending on the substance and the exposure situation, than adults in communities with contamination of their water, soil, air, and/or food. This sensitivity is a result of several factors: 1) children may have greater exposures to environmental toxicants than adults because pound for pound of body weight, children drink more water, eat more food, and breathe more air than adults; 2) children play outdoors close to the ground which increases their exposure to toxicants in dust, soil, surface water, and in the ambient air; 3) children have a tendency to stick their hands in their mouths while playing without washing their hands, thus, they may come into contact with, and ingest, potentially contaminated soil particles at higher rates than adults (also, some children possess a behavior trait known as "pica" which causes them to ingest non-food items, such as soil); 4) children are shorter than adults, which means they can breathe dust, soil, and any vapors close to the ground; 5) children's bodies are rapidly growing and developing; thus, they can sustain permanent damage if toxic exposures occur during critical growth stages; and 6) children and teenagers may disregard no trespassing signs and wander onto restricted locations. Because children depend completely on adults for risk identification and management decisions, ATSDR is committed to evaluating their special interests at sites such as the Hookston Station site as part of the ATSDR evaluation of children's health.

The risk assessment for the Hookston Station addressed child exposure for each of the off-site exposure pathways: breathing contaminants in indoor air, breathing contaminants released from private well water used for irrigation purposes, swimming in a pool filled with water from a private well, and breathing chemicals released in Walnut Creek.

Conclusions

CDHS concludes that the final risk assessment for the Hookston Station site adequately addresses risk from several potential and completed exposure pathways. Currently, the site poses a public health hazard.

With the completion of the risk assessment, CDHS's assistance to the RWQCB ends. The risk assessment is now the basis for the next steps for cleanup: the Feasibility Study, the Remedial Action Plan and implementation so that the risks from these completed exposure pathways can be reduced or eliminated.

Public Health Action Plan

The Public Health Action Plan is a collection of activities intended to ensure that this health consultation provides a plan of action to mitigate and to prevent adverse effects on human health resulting from exposure to contamination from the Hookston Station site. Some activities have already been taken by CDHS, RWQCB, or the responsibility parties. Others activities are either ongoing or planned for the future.

Actions Completed

1. CDHS reviewed and commented on the November 2004 draft risk assessment for the Hookston Station site.
2. CDHS reviewed and commented on the March 2005 draft risk assessment for the Hookston Station site.
3. CDHS responded to comments from the responsibility party regarding our comments on the March 2005 draft risk assessment.
4. CDHS participated in a community meeting held in Pleasant Hill on June 2005.
5. CDHS reviewed and commented on draft revisions to the March 2005 draft risk assessment.
6. CDHS reviewed and approved another set of draft revisions to the March 2005 draft risk assessment.
7. CDHS participated in the planning and participated in the community meeting held on May 25, 2006.
8. The responsibility parties conducted indoor air sampling in 39 residences in August and September 2005; some of these had been previously sampled in 2004. This information was incorporated into the final risk assessment.
9. CDHS approved and the RWQCB accepted the risk assessment as revised in February 2006.
10. The responsible parties placed three soil gas monitoring probes in the downgradient neighborhood.
11. The responsible parties conducted soil gas monitoring in utility trenches and did not find the trenches to be acting as a conduit for soil gas migration.

Actions Ongoing

1. Under order from the RWQCB, the responsible parties will annually conduct indoor air sampling in 38 residences located within 100 feet of the 500 micrograms per liter (µg/l) TCE groundwater contamination (Figure 5).

Actions Planned

1. The responsible parties will install 45 passive soil-vapor sampling modules at the northern part of the eastern boundary of the site.
2. As part of the proposed clean-up option, four more groundwater wells will be added in the off-site area to monitor the effectiveness of a permeable reactive barrier and in-place chemical oxidation.

Preparer of Report

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Certification

The public health consultation for the Hookston Station site located in Pleasant Hill, Contra Costa County, was prepared by the California Department of Health Services under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It was completed in accordance with approved methodologies and procedures existing at the time the health consultation was initiated. Editorial review was completed by the Cooperative Agreement partner.

Chanisse Walcott, M.S.
Technical Project Officer, Cooperative Agreement Team
Division of Public Health Assessment and Consultation
ATSDR

The Division of Public Health Assessment and Consultation, ATSDR, has reviewed this health consultation and concurs with the findings.

Alan Yarbrough
Lead Environmental Health Scientist
Division of Public Health Assessment and Consultation
ATSDR

References

1. Center for Toxicology and Environmental Health, L.L.C. Baseline risk assessment, Hookston Station site. Prepared for Union Pacific Railroad Corporation and Daniel Helix; 2006 Feb. Available to the public at: California Department of Health Services, Richmond (CA).
2. Bureau of the Census. 2000 census population: Data for Block Group 3, Census Tract 3381, Contra Costa County. Washington: U.S. Department of Commerce. Available at: http://factfinder.census.gov/servlet/DTTable?_bm=y&-geo_id=15000US060133381003&-ds_name=DEC_2000_SF3_U&-_lang=en&-redoLog=true&-mt_name=DEC_2000_SF3_U_P001&-mt_name=DEC_2000_SF3_U_P006&-mt_name=DEC_2000_SF3_U_P007&-mt_name=DEC_2000_SF3_U_P008&-mt_name=DEC_2000_SF3_U_P053&-mt_name=DEC_2000_SF3_U_H001&-mt_name=DEC_2000_SF3_U_H030&-mt_name=DEC_2000_SF3_U_H034&-mt_name=DEC_2000_SF3_U_P087&-CONTEXT=dt. Last accessed: 2006 Aug 10.
3. California Department of Health Services. Letter from Dr. Marilyn Underwood to Stephen Hill, California Regional Water Quality Control Board, concerning revised comments from January 12, 2005. Richmond, California. February 15, 2005.
4. California Department of Health Services. Letter from Dr. Marilyn Underwood to Stephen Hill, California Regional Water Quality Control Board, concerning the baseline risk assessment, Hookston Station site, March 2005. Richmond, California. March 28, 2005.
5. California Department of Health Services. Letter from Dr. Marilyn Underwood to Stephen Hill, California Regional Water Quality Control Board, concerning the response to comments from Union Pacific Railroad email pertaining to inhalation rates. Richmond, California. November 22, 2005.
6. California Environmental Protection Agency, Department of Toxic Substances Control. Guidance for the evaluation and mitigation of subsurface vapor intrusion to indoor air (Interim final). 2004 Dec. Available to the public at: California Department of Health Services, Richmond (CA).
7. California Environmental Protection Agency, Department of Toxic Substances Control. Supplemental guidance for human health multimedia risk assessments of hazardous waste sites and permitted facilities. 1992 Jul (corrected and reprinted 1996 Aug). Available to the public at: California Department of Health Services, Richmond (CA).

Appendix A—Glossary

Adverse Health Effect
A change in body function or the structures of cells that can lead to disease or health problems.

ATSDR
The Agency for Toxic Substances and Disease Registry. ATSDR is a federal health agency based in Atlanta, Georgia, that deals with hazardous substance and waste site issues. ATSDR gives people information about harmful chemicals in their environment and tells people how to protect themselves from contact with chemicals.

Background Concentration
An average or expected amount of a chemical in a specific environment. Or, amounts of chemicals that occur naturally in a specific environment.

Cancer Risk
The potential for exposure to a contaminant to cause cancer in an individual or population is evaluated by estimating the probability of an individual developing cancer over a lifetime as the result of the exposure. This approach is based on the assumption that there are no absolutely "safe" toxicity values for carcinogens. The U.S. Environmental Protection Agency has developed cancer slope factors for many carcinogens. A slope factor is an estimate of a chemical's carcinogenic potency, or potential, for causing cancer.

If adequate information about the level of exposure, frequency of exposure, and length of exposure to a particular carcinogen is available, an estimate of excess cancer risk associated with the exposure can be calculated using the slope factor for that carcinogen. Specifically, to obtain risk estimates, the estimated chronic exposure dose (which is averaged over a lifetime or 70 years) is multiplied by the slope factor for that carcinogen.

Cancer risk is the likelihood, or chance, of getting cancer. We say "excess cancer risk" because we have a "background risk" of about one in four chances of getting cancer. In other words, in a million people, it is expected that 250,000 individuals would get cancer from a variety of causes. If we say that there is a "one in a million" excess cancer risk from a given exposure to a contaminant, we mean that if one million people are exposed to a carcinogen at a certain concentration over their lifetime, then one cancer above the background chance, or the 250,000th cancer, may appear in those million persons from that particular exposure. In order to take into account the uncertainties in the science, the risk numbers used are plausible upper limits of the actual risk based on conservative assumptions. In actuality, the risk is probably somewhat lower than calculated, and in fact may be zero.

Completed Exposure Pathway
See Exposure Pathway.

Concern
A belief or worry that chemicals in the environment might cause harm to people.

Concentration
How much of a substance present in a certain amount of soil, water, air, or food.

Contaminant
See Environmental Contaminant.

Exposure
Coming into contact with a chemical substance. (For the three ways people can come in contact with substances, see Route of Exposure.)

Exposure Assessment
The process of finding the ways people come in contact with chemicals, how often and how long they come in contact with chemicals, and the amounts of chemicals with which they come in contact.

Exposure Pathway
A description of the way that a chemical moves from its source (where it began) to where and how people can come into contact with (or get exposed to) the chemical. ATSDR defines an exposure pathway as having five parts:
1. Source of Contamination
2. Environmental Media and Transport Mechanism
3. Point of Exposure
4. Route of Exposure
5. Receptor Population
When all five parts of an exposure pathway are present, it is called a Completed Exposure Pathway.

Groundwater
Water beneath the Earth's surface that flows through soil and rock openings, and often serves as a source of drinking water.

Hazardous Waste
Substances that have been released or thrown away into the environment and, under certain conditions, could be harmful to people who come into contact with them.

Plume
A line or column of air or water containing chemicals moving from the source to areas farther away. A plume can be a column or clouds of smoke from a chimney or contaminated underground water sources or contaminated surface water (such as lakes, ponds, and streams).

Point of Exposure
The place where someone can come into contact with a contaminated environmental medium (air, water, food, or soil). Examples: the area of a playground that has contaminated dirt, a contaminated spring used for drinking water, the location where fruits or vegetables are grown in contaminated soil, or the backyard area where someone might breathe contaminated air.

Population
A group of people living in a certain area or the number of people in a certain area.

Public Health Hazard
The category is used in PHAs for sites that have certain physical features or evidence of chronic, site-related chemical exposure that could result in adverse health effects.

Public Health Hazard Criteria
PHA categories given to a site which tell whether people could be harmed by conditions present at the site. The categories are:
1. Urgent Public Health Hazard
2. Public Health Hazard
3. Indeterminate Public Health Hazard
4. No Apparent Public Health Hazard
5. No Public Health Hazard

Risk Assessment
A process intended to calculate or estimate the risk for a given target system following exposure to a particular substance, taking into account the inherent characteristics of a substance of concern as well as the characteristics of the specific target system. The process includes four steps: hazard identification, dose-response assessment, exposure assessment, and risk characterization. It is also the first step in risk analysis. The results of the risk assessment drive decisions made in risk management.

Route of Exposure
The way a chemical can get into a person's body. There are three exposure routes:
1. Breathing (also called inhalation)
2. Eating or drinking (also called ingestion)
3. Getting something on the skin (also called dermal contact)

Source (of Contamination)
The place from which a chemical comes, such as a landfill, pond, creek, incinerator, tank, or drum. Contaminant source is the first part of an Exposure Pathway.

Toxic
Harmful. Any substance or chemical can be toxic at a certain dose (amount).

Toxicology
The study of the harmful effects of chemicals on humans or animals.

Volatile Organic Compound (VOC)
A chemical compound that evaporates (volatilizes) or changes from liquid to gas readily at room temperature.

Appendix B—Figures

Figure 1. Location of Hookston Station Site, Pleasant Hill, California (1)

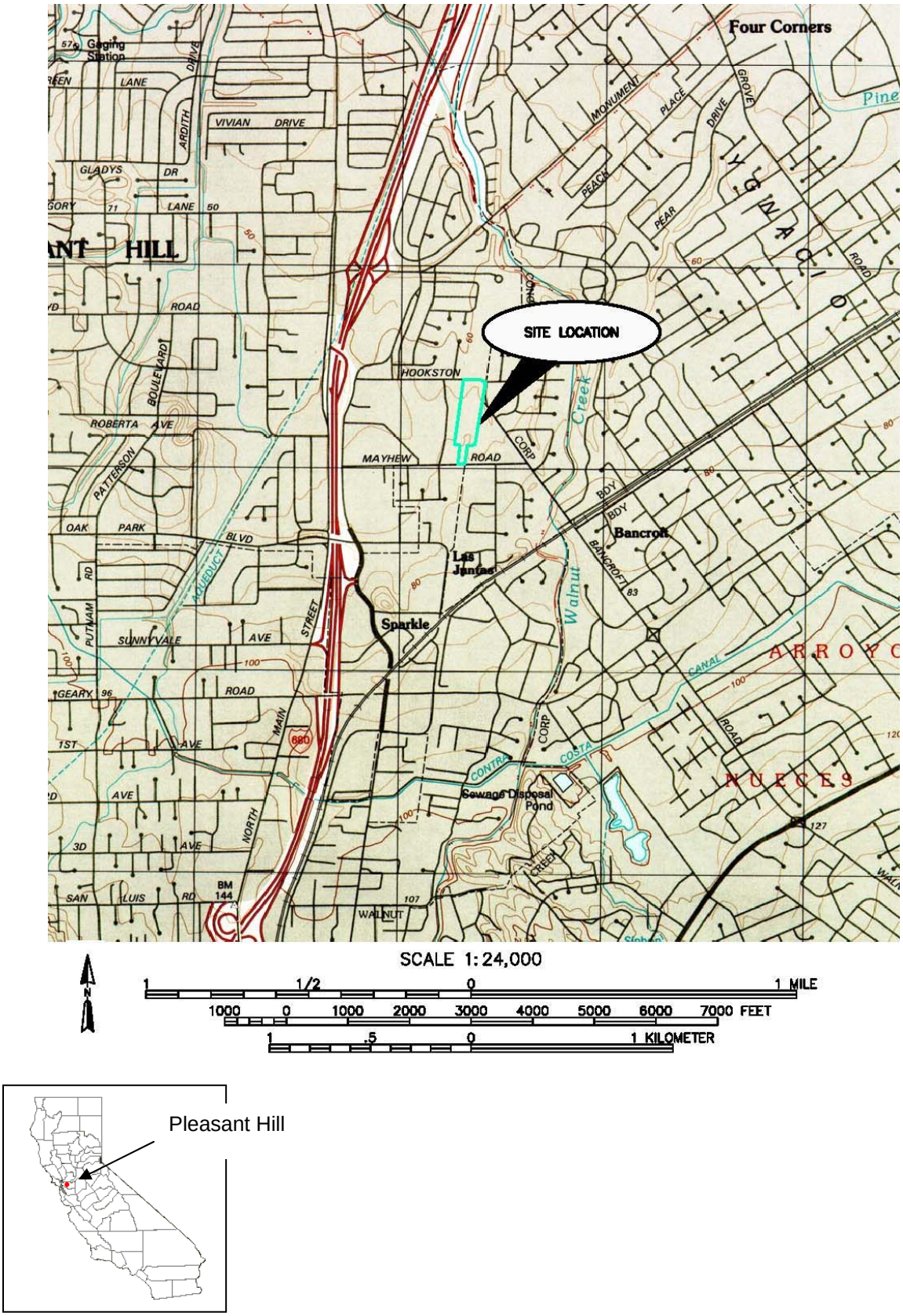

Figure 2. Trichloroethylene Concentrations in the Uppermost Groundwater Layer, Hookston Station Site, Pleasant Hill, California (1)

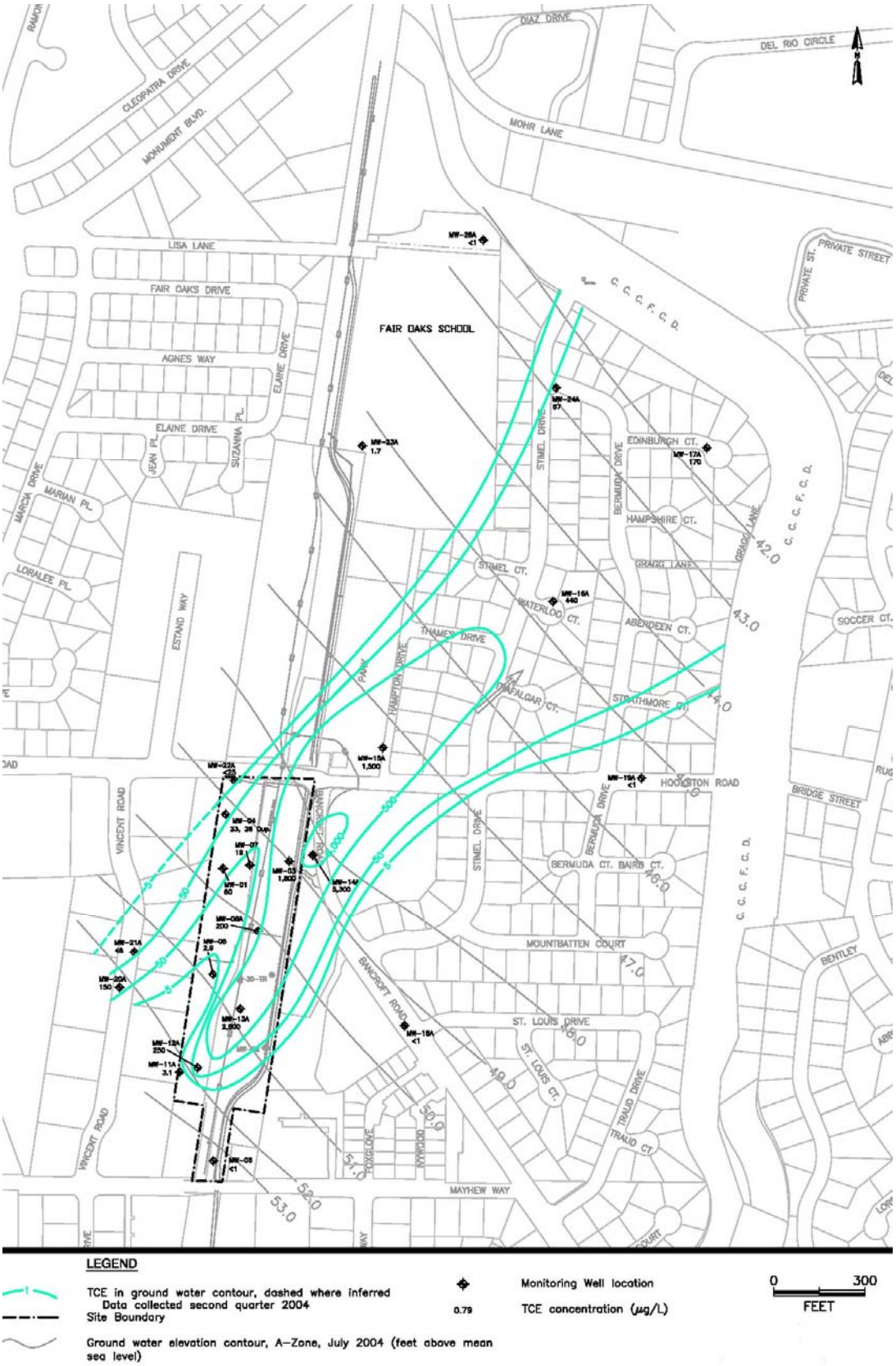

Figure 3. Aerial View of the Hookston Station Site and Two Other Sources of Groundwater Contamination Nearby, Pleasant Hill, California

Figure 4. Location of Census Tract 23381, Census Block Group 3 of the 2000 U.S. Census, Hookston Station Site, Pleasant Hill, California (2)

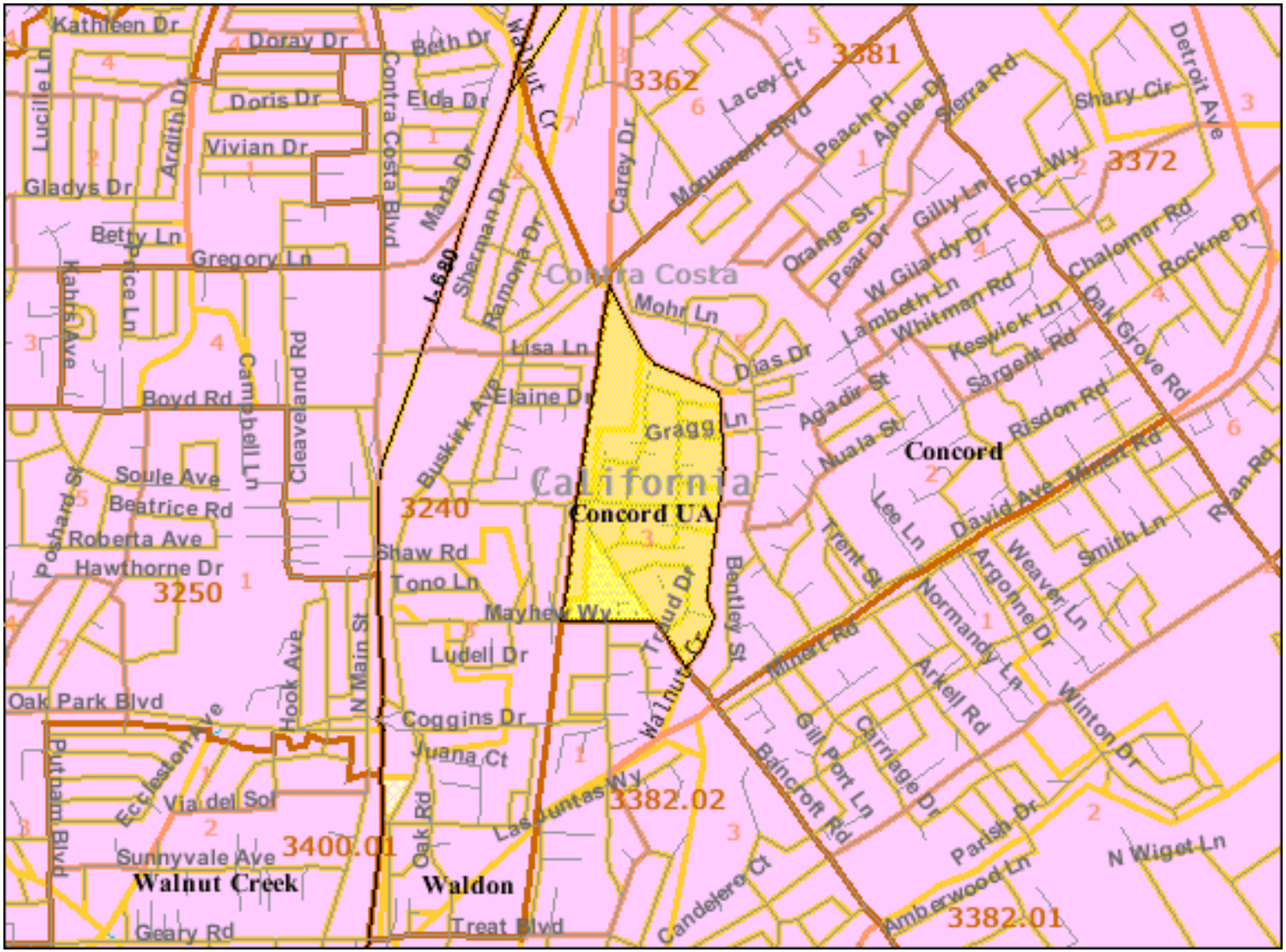

Figure 5. Area Designated for Annual Indoor Air Sampling, Hookston Station Site, Pleasant Hill, California (6)


LISA LANE
FAIR OAKS DRIVE
AGNES WAY
ELAINE DRIVE
FAIR OAKS SCHOOL
ESTAND WAY
PARK
ETHEL DRIVE
EDINBURGH CT.
HAMPSHIRE CT.
HILL CT.
WATERLOO CT.
THAMES DRIVE
ABERDEEN CT.
TRAFALGAR
STRATHMORE CT.
HOOKSTON ROAD
VINCENT ROAD
BANCROFT ROAD
BERMUDA DRIVE
BERMUDA CT.
BAIRD CT.
MOUNTBATTEN COURT
Indoor Air Sampling Area
ST. LOUIS DRIVE
C.C.C.R.R.
LEGEND
Hookston Station Parcel Property Boundary
TCE Detected in Indoor Air At a Concentration of 0.96 µg/m³ or Greater (risk-based cleanup goal)
TCE Detected in Indoor Air at Concentrations Below 0.96 µg/m³, or Was Not Detected Above Laboratory Reporting Levels
Vapor Intrusion Prevention System Installed
Indoor Air Sampling Area
Note: Figure is based on the maximum TCE concentrations detected in indoor air during 2004–2006.
0
350
FEET

Appendix C—Letters from the California Department of Health Services to the Regional Water Quality Control Board Regarding the Risk Assessment for the Hookston Station Site

State of California—Health and Human Services Agency
Department of Health Services

SANDRA SHEWRY
Director

ARNOLD SCHWARZENEGGER
Governor

February 15, 2005

Mr. Stephen Hill, Chief
Toxics Cleanup Division
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

Dear Mr. Hill:

RE: Revised comments from January 12, 2005

The California Department of Health Services (CDHS) Environmental Health Investigations Branch (EHIB) was asked by your agency to review and comment on the risk assessment being conducted on the Hookston Station site in Pleasant Hill. EHIB staff does not routinely review risk assessments according to federal (U.S. Environmental Protection Agency Superfund (USEPA)) or state (Department of Toxic Substances Control (DTSC)) methodologies. However, EHIB staff is familiar with accepted risk assessment practices and generally looks at site characterization information for health impact using similar exposure and risk assessment methodologies but does not strictly follow federal or state risk assessment protocols.

We provide the following general and specific comments on the Baseline Risk Assessment (BRA), Hookston Station, Pleasant Hill, California dated November 2004, prepared for Union Pacific Railroad Corporation and Daniel Helix, prepared by Center for Toxicology and Environmental Health, L.L.C. (CTEH).

General Comments

CTEH efforts to divide up plume contributions are inappropriate for this document. All references to the proportional allocation of risk presented in this document based on calculations presented in Appendix A need to be deleted (several examples on p. 23) from the body of the text and entered within Appendix A or completely removed from the document.

In the risk assessment, CTEH develops a reasonable set of exposure pathways for the on-site receptors (construction worker, commercial/industrial worker) and off-site receptors (residents).

For the construction worker doing work on the site in the future, CTEH evaluated three pathways of exposure: inadvertent ingestion of chemicals in soil, skin contact with chemicals in soil, and inhalation of chemicals in dust or volatilizing from soil to outdoor air. In addition to these three pathways, CTEH evaluated inhalation of volatile chemicals in indoor air for the commercial/industrial worker.

CTEH evaluated the following four pathways for off-site adult and child residents:

X Inhalation of chemicals in indoor air;
X Inhalation of chemicals in air released from lawn irrigation with groundwater;
X Skin contact, incidental ingestion, and inhalation of chemicals in backyard swimming pools using ground water (child resident only); and
X Inhalation of chemicals in air released from Walnut Creek surface water.

EHIB considers the dose equations and calculations to be correct and the non-cancer and cancer slope factors are up to date and accurate.

EHIB considers the exposure assumptions acceptable except for the inhalation rate for adults and child residents. In order to conservatively estimate the risks that vapors pose to residents in the area, EHIB would like to see risks calculated for the upper percentile inhalation for adults and children. Currently the BRA only estimates risks using average inhalation rates. Thus, the risk estimates for people breathing at rates higher than average will be under represented by the calculations presented in the BRA. Although the U.S. Environmental Protection Agency (USEPA) Exposure Factors Handbook recommends using 16.4 hours per day spent indoors, EHIB contends that a portion of the population may spend more time in their homes.

Many of the doses and risks are based on limited site data. Indoor air data has only been collected one time in eleven houses; whereas it is recommended that at least two sampling events occur in different seasons because of the variation that can occur due to weather conditions (DTSC, 2005). EHIB recommends a second round of indoor air data be collected to better characterize indoor air impacts from the Hookston contaminants. In addition, some of the isopleths of ground water contamination seem to be based on limited monitoring wells. Additional investigations seem warranted. Finally, the off-site soil gas media has not been adequately characterized.

EHIB concludes that risks presented in the BRA range from acceptable risk according to regulatory policy (less than 1 in 1 million increased cancer risk) to potentially unacceptable risk (greater than 1 in a million increased cancer risk). While EHIB is most concerned with the residential inhalation exposure, there are several other exposures that exceed the 1 in 1 million increased cancer risk threshold including; on-site commercial/industrial worker inhalation cancer risk; on-site commercial/industrial worker cancer risk from soil exposure; on-site construction worker cancer risk from soil exposure; and off-site residential cancer risk from exposure to VOCs volatilizing from the Walnut Creek. Given the limited data sets for some media and, in

some cases, the less than conservative assumptions in the risk calculations, EHIB contends that these pathways represent risks that need to be addressed further.
CTEH states in the BRA that these risks are acceptable according to USEPA. While the risk calculations presented in the BRA fall in the "acceptable range" for risk, not all of the risk calculations include reasonable maximum exposure (RME) calculations. For example a range of breathing rates above the average should be considered for the inhalation pathway. Based on this information, EHIB does not agree with CTEH's assertion that the risks are acceptable. This position is supported by guidance from DTSC where acceptable risk is generally defined as risk which is no greater than 1 in 1 million (1 E-6). This document can not be considered final until it is amended to reflect the fact that some of the risks calculated for the site and off-site fall into a range that require further consideration, and thus may need mitigation.

Other than the two changes indicated above that need to be addressed for the document to be considered final, EHIB has several other comments that need to be addressed as the process of site investigation and remedial action take place.

In particular, EHIB highlights the need to assess each individual residence individually for indoor air impacts. Each residence is built over potentially different soil and groundwater conditions and may be constructed differently thereby exerting a different affect on subsurface vapors. Investigation of this pathway of exposure should begin in the area of most concentrated ground water contamination and move out in all directions from there. This investigation should be accompanied with extensive health education and community outreach to ensure that residents understand the implications for their health. The RWQCB must be involved in the planning of these outreach efforts and to the extent that resources allow, be involved in the contact with the residents, to ensure that the information is appropriate for one to make a decision about allowing or refusing sampling and possible mitigation.

EHIB recommends active soil gas data is collected from areas outside of the central plume to confirm that VOC soil gas concentrations parallel groundwater plume VOC concentrations. If there is a good correlation, EHIB recommends that a series of active soil gas monitoring stations be established in the neighborhood to monitor the soil gas. There are only 10 active soil gas sample locations in the off-site plume area located northeast of the Hookston Station Site comprising an area of over 30 acres. The soil gas data collected to date has been collected above the higher concentrations of the groundwater plume. These stations would also allow monitoring of soil gas proportions of trichloroethylene (TCE) daughter compounds (e.g., vinyl chloride) over time. Vinyl chloride is of particular importance in this area because it is relatively more toxic than TCE and it is a daughter compound of the reductive dehalogenation of chlorinated ethenes such as tetrachloroethene (PCE), TCE, 1,1-dichloroethene and cis- and trans- 1,2-dichloroethene.

EHIB is concerned that there has been no documented effort to identify subsurface utilities that may present preferential migration pathways for VOCs from the Hookston

Station groundwater plume. CDHS recommends that major subsurface utilities be identified to determine if there are any additional properties in the area that may be at risk of exposure to soil gas contaminants via preferential soil gas pathways.

Specific Comments

The surface water exposure pathway at Walnut Creek needs to be more clearly characterized. The BRA states (p.15) that "Direct contact with these chemicals in surface water is unlikely". Although wading or incidental contact with waters in the creek do not appear to be a likely occurrence, the BRA should provide some reasoning as to why this in unlikely. Is there limited access to the creek? Is it seasonal? What's the average depth of the creek? This sort of information may help support the premise that exposure to ditch water is unlikely and need not be assessed as an exposure risk.

Section 1.2 Objectives and Scope should mention that the BRA does not consider exposures that have occurred in the past. Because of limited off-site information about the area prior to 1993, it is not possible to quantitatively assess human health risks in the area. However, many cancers have a long latency period and based on the history of the Hookston Site, it is possible that some of these VOCs were in the groundwater for years before they were detected.

On page 22, second paragraph, third from last sentence states; "Also, recent evidence indicates that the substantial fraction of arsenic in soil that is ingested may not be absorbed from the gastrointestinal tract." While this may be true, CTEH should reference their source for this assertion.

Section 5.3.1 Uncertainties Related to Estimation of Exposure: EHIB suggests that the BRA include mention of the uncertainty about historical exposures prior to 2002 and associated risk to human health.

EHIB suggests adding indoor air sources in residences as another uncertainty associated with Indoor Air (p.24). In this same paragraph, EHIB requests a clarification in the second to last paragraph, "the permeability of nearby soil and the residence to vapors"…The use of the term permeable is appropriate for soil, but not for the residence. A more appropriate phrase would be preferential pathways as a result of cracks or openings that exist at the interface of the foundation and the soil.

Page 25: first paragraph, second to last sentence: recommend adding "causing vapors to be pulled into the residence" to the end of the sentence.

Table 3.2b has the child resident weight listed as 70kg. This appears to be a typo and should be corrected.

EHIB understands that the zone A groundwater data indicates most of the Zone A contaminants are intercepted by Walnut Creek. However, this was not expressed in the document. Further, images showing the plume stopped at Walnut Creek are misleading to residents to the northeast of Walnut Creek because if they see these figures without knowing there are deeper groundwater contaminants, they may assume that there are no plume concerns beyond the ditch. The plume contours should be extended beyond Walnut Creek in some fashion (e.g., dotted line). This image as it currently exists presents a misleading representation of the groundwater plume and should be modified to more accurately reflect real conditions.

It is CDHS' intention to provide a concurrence letter to the RWQCB when these issues have been adequately addressed in the BRA. The concurrence letter is contingent on our agreeing with the final Human Health Risk Assessment. CDHS-EHIB reserves the right to decline to write such a letter if our concerns are not addressed in the final Human Health Risk Assessment.

In an effort to keep abreast of events at the Hookston Site, EHIB requests that copies of all future correspondence between the responsible parties and community members be forwarded to the attention of Marilyn Underwood.

Please contact Marilyn Underwood at (510) 622-4415 (munderwo@dhs.ca.gov) or Greg Braun at (510) 622-4493 (gbraun@dhs.ca.gov) with any questions.

Sincerely,

Marilyn Underwood, Ph.D.
Acting Chief, Site Assessment Section
Environmental Health Investigations Branch

Richard Kreutzer, M.D., Chief
Environmental Health Investigations Branch

State of California—Health and Human Services Agency
Department of Health Services

SANDRA SHEWRY
Director

ARNOLD SCHWARZENEGGER
Governor

March 28, 2005

Mr. Stephen Hill, Chief
Toxics Cleanup Division
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

Dear Mr. Hill:

RE: Comments on the Baseline Risk Assessment for the Hookston Station Site, Pleasant Hill, March 2005

The California Department of Health Services (CDHS) Environmental Health Investigations Branch (EHIB) was asked by your agency to review and comment on the risk assessment being conducted on the Hookston Station site in Pleasant Hill. EHIB staff does not routinely review risk assessments according to federal (U.S. Environmental Protection Agency Superfund (USEPA)) or state (Department of Toxic Substances Control (DTSC)) methodologies. However, EHIB staff is familiar with accepted risk assessment practices and generally looks at site characterization information for health impact using similar exposure and risk assessment methodologies but does not strictly follow federal or state risk assessment protocols.

We provide the following general and specific comments on the Baseline Risk Assessment (BRA), Hookston Station, Pleasant Hill, California dated March 2005, prepared for Union Pacific Railroad Corporation and Daniel Helix by Center for Toxicology and Environmental Health, L.L.C. (CTEH). There are several concerns CDHS expressed in our comments from our review of the November 2004 BRA draft that were not addressed in this version of the BRA.

General Comments

The current BRA appears to be complete and addresses the human health risks present or likely to be present as a result of the Hookston Station site, except for the consumption of contaminated groundwater. The consumption of contaminated groundwater pathway was addressed in the April 2004 Risk Assessment. CDHS did not review the April 2004 Risk Assessment.

In the BRA, CTEH develops a reasonable set of exposure pathways for the on-site receptors (construction worker, commercial/industrial worker) and off-site receptors (residents). For the construction worker doing work on the site in the future, CTEH evaluated three pathways of exposure: inadvertent ingestion of chemicals in soil, skin contact with chemicals in soil, and inhalation of chemicals in dust or volatilizing from soil to outdoor air. In addition to these three pathways, CTEH evaluated inhalation of volatile chemicals in indoor air for the commercial/industrial worker.

CTEH evaluated the following four pathways for off-site adult and child residents:

- Inhalation of chemicals in indoor air;
- Inhalation of chemicals in air released from lawn irrigation with groundwater;
- Skin contact, incidental ingestion, and inhalation of chemicals in backyard swimming pools using ground water (child resident only); and
- Inhalation of chemicals in air released from Walnut Creek surface water.

EHIB considers the dose equations and calculations to be correct and the non-cancer and cancer slope factors are up to date and accurate.

Currently the BRA only estimates risks using average inhalation rates. Thus, the risk estimates for people breathing at rates higher than average will be under represented by the calculations presented in the BRA. In order to conservatively estimate the risks that vapors pose to residents in the area, EHIB would like to see risks calculated for the upper percentile inhalation for adults and children. Although the U.S. Environmental Protection Agency (USEPA) Exposure Factors Handbook recommends using 16.4 hours per day spent indoors, a portion of the population spend more time in their homes.

Many of the doses and risks are based on limited site data. Indoor air data has only been collected one time in eleven houses; whereas it is recommended that at least two sampling events occur in different seasons because of the variation that can occur due to weather conditions (DTSC, 2005). It is essential that a second round of indoor air data be collected in the previously sampled homes to better characterize indoor air impacts from the Hookston contaminants. Indoor air data should be collected during two different seasons in any future investigations in the area in accordance with DTSC guidance (Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air, 2005) In addition, some of the isopleths of ground water contamination seem to be based on limited monitoring wells. Additional investigations seem warranted. Finally, the off-site soil gas media has not been adequately characterized.

EHIB concludes that risks presented in the BRA range from acceptable risk according to regulatory policy (less than 1 in 1 million increased cancer risk) to potentially unacceptable risk (greater than 1 in a million increased cancer risk). While EHIB is most concerned with the residential inhalation exposure, there are several other exposures that exceed the 1 in 1 million increased cancer risk threshold including; on-site commercial/industrial worker inhalation cancer

risk; on-site commercial/industrial worker cancer risk from soil exposure; on-site construction worker cancer risk from soil exposure; and off-site residential cancer risk from exposure to VOCs volatilizing from the Walnut Creek. Given the limited data sets for some media and, in some cases, the less than conservative assumptions in the risk calculations, EHIB contends that these pathways represent risks that need to be addressed further.

CTEH states in the BRA that these risks are acceptable according to USEPA. While the risk calculations presented in the BRA fall in the "acceptable range" for risk, not all of the risk calculations include reasonable maximum exposure (RME) calculations. For example a range of breathing rates above the average should be considered for the inhalation pathway. Based on this information, EHIB does not agree with CTEH's assertion that the risks are all acceptable. This position is supported by guidance from DTSC where "acceptable risk is defined to be a risk which is no greater than 1×10^{-6}" (DTSC Supplemental Guidance for Human Health Multimedia Risk Assessments). This document can not be considered final until it is amended to reflect the fact that some of the risks calculated for the site and off-site fall into a range that require further consideration, and thus may need mitigation.

EHIB highlights the need to assess each individual residence individually for indoor air impacts. Each residence is built over potentially different soil and groundwater conditions and may be constructed differently thereby exerting a different affect on subsurface vapors. Investigation of this pathway of exposure should begin in the area of most concentrated ground water contamination and move out in all directions from there. This investigation should be accompanied with extensive health education and community outreach to ensure that residents understand the implications for their health. The RWQCB must be involved in the planning of these outreach efforts and to the extent that resources allow, be involved in the contact with the residents, to ensure that the information is appropriate for one to make a decision about allowing or refusing sampling and possible mitigation.

EHIB recommends active soil gas data is collected from areas outside of the central plume to confirm that VOC soil gas concentrations parallel groundwater plume VOC concentrations. If there is a good correlation, EHIB recommends that a series of active soil gas monitoring stations be established in the neighborhood to monitor the soil gas. There are only 10 active soil gas sample locations in the off-site plume area located northeast of the Hookston Station Site comprising an area of over 30 acres. The soil gas data collected to date have been collected above the higher concentrations of the groundwater plume. Additional stations would also allow monitoring of soil gas proportions of trichloroethylene (TCE) daughter compounds (e.g., vinyl chloride) over time. Vinyl chloride is of particular importance in this area because it is relatively more toxic than TCE and it is a daughter compound of the reductive dehalogenation of chlorinated ethenes such as tetrachloroethene (PCE), TCE, 1,1-dichloroethene and cis- and trans-1,2-dichloroethene.

EHIB is concerned that there has been no documented effort to identify subsurface utilities that may present preferential migration pathways for VOCs from the Hookston Station groundwater plume. CDHS recommends that major subsurface utilities be identified to determine if there are any additional properties in the area that may be at risk of exposure to soil gas contaminants via preferential soil gas pathways.

Specific Comments

The surface water exposure pathway at Walnut Creek needs to be more clearly characterized. The BRA states (p.15) that "Direct contact with these chemicals in surface water is unlikely". Although wading or incidental contact with waters in the creek do not appear to be a likely occurrence, the BRA should provide some reasoning as to why this in unlikely. Is there limited access to the creek? Is it seasonal? What's the average depth of the creek? This sort of information may help support the premise that exposure to ditch water is unlikely and need not be assessed as an exposure risk.

On page 22, second paragraph, third from last sentence states; "Also, recent evidence indicates that the substantial fraction of arsenic in soil that is ingested may not be absorbed from the gastrointestinal tract." While this may be true, CTEH should reference their source for this assertion.

Table 3.2b has the child resident weight listed as 70kg. This appears to be a typo and should be corrected.

The 1997 Toxicological profile for TCE does not list the typical background concentration as 0.5 – 2.7 µg/m3. This reference is incorrect. Further, CDHS recommends that it be explicitly stated whether the background ranges used are indoor or ambient air samples.

It is CDHS' intention to provide a concurrence letter to the RWQCB when these issues have been adequately addressed in the BRA. The concurrence letter is contingent on our agreeing with the final Human Health Risk Assessment. CDHS-EHIB reserves the right to decline to write such a letter if our concerns are not addressed in the final Human Health Risk Assessment.

Because CDHS is concerned that the public receives clear information about their health risks, CDHS requests that all public outreach efforts and materials be provided to CDHS so that we may understand how data and information are being provided to the community near the Hookston Station Site. EHIB requests that copies of all past, present, and future correspondence between the responsible parties and community members be forwarded to the attention of Dr. Marilyn Underwood. This information will streamline any outreach we may undertake and help ensure that people in the area have clear and concise information about what is happening at the site and in their neighborhood.

Please contact Marilyn Underwood at (510) 622-4415 (munderwo@dhs.ca.gov) or Greg Braun at (510) 622-4493 (gbraun@dhs.ca.gov) with any questions.

Sincerely,

Marilyn Underwood, Ph.D.
Acting Chief, Site Assessment Section
Environmental Health Investigations Branch

Richard Kreutzer, M.D., Chief
Environmental Health Investigations Branch

State of California—Health and Human Services Agency
Department of Health Services

California Department of Health Services

SANDRA SHEWRY
Director

ARNOLD SCHWARZENEGGER
Governor

November 22, 2005

Mr. Stephen Hill, Chief
Toxics Cleanup Division
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

RE: Response to comments from the October 31, 2005 email from Union Pacific Railroad (UPR) pertaining to inhalation rates used in the Baseline Risk Assessment (BRA) for the Hookston Station Site.

Dear Mr. Hill:

The California Department of Health Services (CDHS) Environmental Health Investigations Branch (EHIB) was asked by the Regional Water Quality Control Board (RWQCB) to comment on an email from Mike Grant of UPR dated October 31, 2005 that was a response to the RWQCB's September 9, 2005 conditional approval letter regarding the March 4, 2005 Baseline Risk Assessment (BRA). Below we have excerpted comments from the email and have provided responses to the comments. References for our responses are provided at the end of this letter.

Comment from UPR: The Water Board has asked that additional inhalation rate calculations be provided in the BRA report. As set forth below, however, the existing calculations comply with Regional Board and EPA requirements, and any additional calculations would more appropriately be considered as part of the Feasibility Study.

CDHS Response: The appropriate place to assess risk is in the risk assessment, not the feasibility study. The BRA contributes to the site characterization and subsequent development, evaluation, and selection of appropriate response alternatives. Because there is a completed inhalation exposure pathway at the Hookston Site, the assessment of that pathway is of critical importance for the remedial process and should be as complete as possible to accurately target clean up goals.

Comment from the UPR: When the Water Board met with Union Pacific and Dan Helix in 2004 to define the scope of the BRA, the Water Board specified to, and specifically approved the use of the EPA inhalation rates that appear in the current draft report.

***CDHS response**: CDHS agrees that the current inhalation rates are average inhalation rates that are appropriate for addressing average inhalation exposures. However, the USEPA Risk Assessment Guidelines (EPA, 1989) specifically state that within the BRA exposure assessment, reasonable maximum exposure (RME) estimates should be developed for both current and future land-use assumptions. As expressed in the 1989 Risk Assessment Guidelines; "the intent of the RME is to estimate a conservative exposure case (i.e., well above the average case) that is still within the range of possible exposures."*

Including average inhalation rates provides additional context to the risks posed and is an acceptable practice within the risk assessment community. However, it is not done at the expense of an upper range of inhalation rates. For example, the Office of Environmental Health Hazard Assessment (OEHHA) Air Toxics Hot Spots Risk Assessment Guidelines recommend a default breathing rate of 393 L/day-kg, which translates into 27.51 m^3/day for a 70 kg individual. The USEPA recommends using 20 m^3/day for adults based on 8 hours resting and 16 hours of light activity per day (Region IX PRG standard default exposure factors and EPA OSWER Directive 9285:6-03). Both of these default inhalation values represent the upper quartile of the range of inhalation rates.

Risk assessment convention is to use 10 m^3/day for children. However, USEPA does recommend using site specific breathing data for children to construct relevant exposure scenarios, if possible. Because there is limited breathing data expressly for 3 year olds in either USEPA or OEHHA guidance, perhaps the most appropriate inhalation target for the upper bounds of the child population could be derived from the same data that is used to develop the average. Table 5-11 of the 1997 USEPA Exposure Factors Handbook lists an average daily inhalation rate of 8.3 m^3/day for 3-5 year olds (this is the value currently used in the BRA). This same table lists an inhalation rate for "active" 3-5 year olds as 10.96 m^3/day. This is quite close to the industry standard of 10 m^3/day. If the PRP does not wish to use either of these numbers in their estimation of risk, then the burden of proof is on them to argue an alternative, yet plausible, upper bound for inhalation rates based on real data collected in the exposed community.

Comment from the UPR: The BRA inhalation rates yield theoretical risk estimates that are above the threshold for considering the indoor air exposure pathway in the Feasibility Study (FS).

***CDHS response**: CDHS agrees that a completed exposure pathway has been identified in the BRA. However, in addition to identifying completed exposure pathways, the extent of the health risks is important to determine corrective actions needed to prevent or minimize exposure risks.*

Comment from the UPR: This analysis presents reasonable maximum exposures, and is conservative in estimating the theoretical risk from exposure to indoor air.

***CDHS response**: No. The estimate does not include RMEs for inhalation. An upper range for inhalation rates must be included in the BRA exposure dose calculations for RMEs to be addressed in this pathway.*

Comment from the UPR: Because the objective of the BRA is to determine which exposure pathways should be considered in the Feasibility Study, the current draft report provides the correct tool to accomplish that objective in conformance with the scope of work directed by the Water Board.

CDHS response: More specifically, the objective of the BRA is, at a minimum, to quantitatively evaluate the cumulative risk to human health posed be exposure to contaminants derived from the subject site in air, soil, and ground water; both on-site and off-site. The current BRA evaluates the risk to people breathing at average rates, but people with higher breathing rates are not adequately assessed in the current BRA.

The following references are cited in this letter:

EPA, 1989. Risk Assessment Guidance for Superfund, Volume I – Human Health Evaluation Manual (Part A) Interim Final, (U.S. Environmental Protection Agency Office of Research and Development, EPA/1-89/002, December 1989)

EPA, 1991. Standard Default Exposure Factors, *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual Supplemental Guidance*, (U.S. Environmental Protection Agency Office of Solid Waste and Emergency Response, Toxics Integration Branch, Washington, DC, OSWER Directive 9285.6-03)

EPA, 1997. Exposure Factors Handbook, Volume I. General Factors, (U.S. Environmental Protection Agency Office of Research and Development, EPA/600/P-95/002Fa, August 1997)

http://www.epa.gov/region09/waste/sfund/prg/files/04usersguide.pdf
(See Exhibit 4-1: Standard Default Factors)

Please contact Marilyn Underwood at (510) 622-4415 (munderwo@dhs.ca.gov) with any questions.

Sincerely,

Marilyn Underwood, Ph.D.
Acting Chief, Site Assessment Section
Environmental Health Investigations Branch

Richard Kreutzer, M.D., Chief
Environmental Health Investigations Branch