



California Regional Water Quality Control Board

San Francisco Bay Region



Linda S. Adams
Secretary for
Environmental Protection

1515 Clay Street, Suite 1400, Oakland, California 94612
(510) 622-2300 • Fax (510) 622-2460
<http://www.waterboards.ca.gov/sanfranciscobay>

Arnold Schwarzenegger
Governor

November 2, 2006
File No. 07S0156 (MRC)

San Francisco Bay Regional Water Quality Control Board Response to Comments on Feasibility Study for Hookston Station Site, Pleasant Hill, Contra Costa County (July 10, 2006)

This document summarizes comments received by Water Board staff on the Feasibility Study for the Hookston Station area that was submitted by the Hookston Station responsible parties on July 10, 2006, in response to Water Board Order No. R2-2004-0081 (site cleanup requirements), as amended.

For reference, we have numbered each comment sequentially as follows:

- Comments 1 through 48: Questions and Comments from Hookston Station Cleanup Plan Community Meeting - August 10, 2006.
- Comments 49 through 55: Comments from Lucy Goodell of the Colony Park Neighbor's Association dated August 29, 2006.
- Comments 56 through 59: Comments from Colleen Goya dated August 6, 2006.
- Comments 60 through 63: Comments from Amy Brownell dated August 31, 2006.
- Comments 64 through 66: Comments from Richard Nicoll, Mount Diablo Unified School District, dated August 30, 2006.
- Comments 67 through 71: Comments from Janet L. Wolff, on behalf of self and as trustee of the Welch Family Trust Residence: 1260 Trafalgar Court, Concord, California 94518, dated August 31, 2006

We have provided each of the public comments in italic type. Our responses immediately follow each comment. Tri-S Environmental, on behalf of Walnut Creek Manor, submitted comments to the Water Board in a letter dated 31 August 2006. Those comments will be addressed separately, as they are primarily related to the Remedial Investigation and Risk Assessment reports, not the FS. A list of acronyms appears at the end, after Comment 71.

Questions and Comments from Hookston Station Cleanup Plan Community Meeting - August 10, 2006

Remedial Technologies

1) *What will happen to TCE concentrations in the groundwater northeast (down gradient) of the PRB?*

Response: The PRB will reduce the concentrations of site-related VOCs in ground water passing through it. Concentrations of VOCs in groundwater already downgradient of the PRB will therefore be reduced by a combination of dilution, dispersion, and other natural degradation processes. We expect decreases in VOC concentrations to start nearest the PRB and propagate downgradient (northeastward) as cleaner groundwater moves down-gradient.

2) *The PRB will be difficult to implement. What will happen if it doesn't work?*

Response: PRBs have been shown to be implementable and effective at sites with conditions similar to the Hookston Station site. The RPs will perform a treatability study to verify the effectiveness of zero valent iron (the reactive component the PRB) to treat the VOCs in ground water before the PRB is installed. The PRB contractor will design the PRB to be effective for this application. The SCR will require monitoring and will allow the Water Board to require mid-course corrections (adaptations in the selected remedy or shifting to a different remedy) if the remedy does not appear to be performing as expected.

3) *Will the PRB be entirely underground?*

Response: Yes. The PRB is designed to treat ground water in place. Unlike pump-and-treat systems, there are no above-ground components and no maintenance activities associated with a PRB. There will be only temporary construction-related surface disturbance.

4) *Will there be a risk to residents from soil that is excavated during trenching?*

Response: A Health and Safety Plan will be prepared as part of the Remedial Design to address worker and resident health and safety. If a trenching method is used for the PRB installation, it is not anticipated that vapor concentrations will exceed permissible levels for short-term exposures, however, air monitoring during excavation will be performed to confirm this.

5) *How will the potassium permanganate be installed?*

Response: A water-based solution of chemical oxidant (e.g. potassium permanganate) will be injected using a specialized direct-push injection rig and a pump. The method essentially involves driving a metal rod to the desired depth and injecting the desired quantity of oxidant. The injections will all occur on the Hookston Station parcel only, away from the residential neighborhood.

6) *What are the effects of the oxidant on underground utilities? On the Kinder-Morgan pipeline?*

Response: The oxidant will only be injected into the B-Zone ground water, which is approximately 40 to 60 feet below ground surface. Underground utilities at the site are present at shallow depths (generally from 3 to 10 feet below ground surface). In addition, construction depths of the underground utilities will be reconfirmed with the utility companies prior to implementing the proposed remedial alternatives for the A-Zone and B-Zone. The Remedial Design will address the plan for identifying, marking, and temporarily relocating utilities as necessary.

7) *How is the groundwater “encouraged” to flow in to the PRB?*

Response: Ground water will flow through the PRB under the natural hydraulic gradient that exists in the treatment area because the PRB will be more permeable than the surrounding soils. No external forces (such as a pumping well) are needed to cause water to flow through the PRB.

8) *How will the arsenic in the soil at the Hookston Site be cleaned up?*

Response: As described in Section 6.3.1 of the FS, the single isolated location of elevated arsenic in soil (located at a depth of about 2 feet below ground surface on the Hookston Station parcel itself) would be addressed through the use of institutional controls to prevent future exposures. Section 6.3.1 of the FS describes the Soil Management Plan that will be prepared to address arsenic exposures to site workers. No current active cleanup would be performed.

9) *How is arsenic affected by the remediation (chemical oxidation, in particular)?*

Response: The remediation in the A-Zone and B-Zone ground water will not affect the single isolated location of elevated arsenic in soil (which is at the Hookston Station parcel itself).

10) *Are there other chemicals that are not being cleaned up?*

Response: The FS addresses all chemicals in ground water that are of a type that may have originated from the Hookston Station parcel. The proposed remedy will incidentally clean up some non-Hookston chemicals (e.g. PCE originating at the Vincent Road parcels). The proposed remedy will not clean up petroleum constituents originating at the Pittcock Petroleum site, but the Water Board will require Pittcock to clean these up under separate orders.

11) *Consider a more active cleanup, such as groundwater extraction and treatment or injection of zero-valent iron, down gradient from the PRB; or consider a phased approach with 1 or 2 quarters of monitoring to see if more aggressive cleanup is required.*

Response: The FS has evaluated ground water extraction under Alternative 6, which ranked lower than the recommended alternative based on long term effectiveness; reduction of toxicity,

mobility, and volume of contaminants; cost; and implementability. The Remedial Design will include a detailed performance and monitoring schedule, subject to Water Board approval. We expect it will take more than one or two quarters to observe meaningful changes in groundwater concentrations that would indicate if the selected remedy is performing as expected. The Final Site Cleanup Requirements will contain “re-opener” language in the event the selected remedy does not perform as expected.

12) *Continue (implement) remediation work in the core area, even while the barrier is being installed.*

Response: The initial pilot test phases of chemical oxidation in the B-Zone plume core area may occur prior to the installation of the A-Zone PRB. The Water Board’s final SCR will include a specific implementation schedule for the implementation tasks.

13) *What is zero-valent iron and what are the risks?*

Response: Zero-valent iron is elemental iron; for the purposes of this application, it is in granular form. The iron granules destroy dissolved volatile organic compounds (VOCs) in ground water, including common chlorinated solvents such as tetrachloroethene (PCE), trichloroethene (TCE), dichloroethenes (DCEs), and vinyl chloride (VC). The degradation process occurs without the involvement of microorganisms (abiotic), whereby chemical reactions on the surface of the granular iron cause the replacement of a chlorine atom (a halide) on an organic compound by a hydrogen atom (reductive dehalogenation). The reactions result in the net addition of two electrons to the organic compound, with the iron acting as an electron source. During the dehalogenation process, the halide on the compound (e.g., chloride) is replaced by hydrogen, resulting in the transformation of halogenated VOCs to ethene, ethane, methane and halide ions.

14) *What is potassium permanganate and what are the risks?*

Response: Potassium permanganate (KMnO₄) is a strong oxidizing agent. As an oxidizing agent it has the ability to add oxygen, remove hydrogen or remove electrons from an element or compound. As a strong oxidizer, KMnO₄ should be kept separated from oxidizable substances. Dilute solutions of KMnO₄ and water are not dangerous. KMnO₄ forms dangerous products upon contact with concentrated acids.

In addition to its use in environmental remediation, KMnO₄ has been used throughout the United States to treat drinking water supplies. KMnO₄ is recognized by its characteristic purple to pink color when made into a solution. In higher concentrations it is a dark purple color.

15) *Will the remedy leave more toxic residues?*

Response: No. The remedial technologies recommended in the FS break down TCE and its environmental breakdown (daughter) products completely to non-toxic residues.

16) *Does the proposed remedy clean up PCE?*

Response: PCE is the same class of chemical as TCE. The PRB and chemical oxidation processes are both effective for remediating PCE.

17) *Does the chemical turn into gas? Where does it go?*

Response: No, the chemical processes described in the FS do not create gas. The reaction between an oxidant, such as potassium permanganate, and dissolved TCE breaks the bonds between carbon atoms and removes chlorine atoms from the individual molecules resulting in the production of non-toxic byproducts (e.g., ethene). Similarly, the reaction between the iron in the PRB and dissolved TCE also results in the production of non-toxic byproducts. The small amounts of dissolved chlorine very slightly increase the groundwater salinity.

18) *Please include in the cleanup plan a case study of a site that has been cleaned up using a remedy similar to that being proposed.*

Response: Chemical oxidation and PRB remediation projects are numerous and well documented. Feasibility Studies do not typically include (nor are they required to contain) case studies from other sites. However, there are several good online resources that summarize remedial technology applications at other similar sites, including the following:

- PRB References:
 - <http://www.rtdf.org>
 - <http://www.eti.ca>
- Chemical Oxidation References:
 - http://www.itrcweb.org/gd_ISCO.asp
 - <http://www.epa.gov/tio/download/remed/chemox.pdf>

A recent PRB installation at Hill Air Force Base, which was designed specifically to shorten the timeframe of TCE vapor intrusion impacts to a residential neighborhood, is described in this article: <http://www.hilltopostimes.com/story.asp?edition=184&storyid=5275>

19) *Does the Water Board have any experience with PRBs? Please provide an example of a successful application of PRB technology.*

Response: The San Francisco Bay Regional Water Board has overseen the implementation of six zero valent iron PRBs since the mid-1990s (Alameda Point (former Naval Air Station), Alameda; Intersil Semiconductor, Sunnyvale; Fairchild/Applied Materials, Sunnyvale; Mohawk Site, Sunnyvale/Santa Clara; Moffett Federal Airfield, Mountain View; Travis Air Force Base, Fairfield). All PRBs appear to have functioned as designed. The most recent, a PRB that is 700 feet long and 20-35 feet deep, was installed at the Mohawk site in Sunnyvale, Santa Clara County. The average concentrations immediately downgradient from the PRB are below the

target concentration for total VOCs of 600 ug/l, indicating the zero-valent iron in the PRB is effectively reducing total VOC concentrations. Total VOC concentrations in monitoring wells located approximately 100 to 150 feet downgradient of the PRB have declined approximately 70 percent since the PRB was installed. The RPs use the quarterly monitoring data to refine the conceptual model of the PRB performance. For further information, this site is posted on GeoTracker (<http://geotracker.waterboards.ca.gov/>).

20) *Please address the potential explosive properties of potassium permanganate.*

Response: Dilute water-based oxidant solutions that may be used for this project, such as potassium permanganate, do not pose an explosive hazard.

21) *What is the effect of other chemicals (MTBE, petroleum, PCE) on the TCE and the performance of the PRB?*

Response: None of these chemicals impair the performance of the PRB. In addition, petroleum hydrocarbons enhance the degradation of PCE and TCE to lesser-chlorinated ethenes, such as 1,1-DCE and vinyl chloride. Zero valent iron is effective at treating dissolved chlorinated ethenes, such as TCE and PCE; however, it is not expected to be effective on petroleum hydrocarbons or MTBE.

22) *Will vinyl chloride replace TCE as the primary contaminant in the groundwater?*

Response: No. The PRB and potassium permanganate injection will be designed to completely degrade chlorinated compounds in the ground water to non-toxic residue. Vinyl chloride is not expected to be present within the downgradient treated water. We have not seen vinyl chloride created at other sites in our region where these cleanup technologies have been used for TCE.

23) *The cost of implementing and monitoring the Institutional Control to prohibit future well installation (e.g., County ordinance) should be included in the cost estimate and borne by the RPs instead of the County/taxpayers. Experience has shown that such costs may be substantial. They are not fully accounted for in the current cost estimates.*

Response: Because this Institutional Control is a common component to all of the remedial alternatives (other than the no-action Alternative 1), the costs associated with this task do not differentiate one alternative over another. The costs associated with this task will be negotiated between the County and the RPs. Further, the Water Code does not allow the Water Board to allocate “cleanup and abatement” costs among parties.

Monitoring

24) *Will there be more testing beyond (more frequent than) quarterly monitoring?*

Response: As described in Section 8.4.1 of the FS, ground water monitoring activities are proposed for 30 years following the completion of the construction of remedial actions. Monitoring will be conducted on a quarterly basis for the first 5 years for the A-Zone and for the first 3 years for the B-Zone. The long-term monitoring program will be set forth in the Final Site Cleanup Requirements. Additionally, a detailed performance monitoring program will be included in the Remedial Design, subject to Water Board approval.

25) *How do you know the technology is working?*

Response: Water quality monitoring will provide information on the effectiveness of the remedial measures. Ground water monitoring wells will be located upgradient and downgradient of the treatment areas. A detailed performance monitoring program will be included in the Remedial Design. The monitoring program will be designed to track performance, including concentrations over time.

26) *The proposed monitoring wells do not appear to be sufficient to determine that ground water is not flowing around the ends of the wall, rather through it as planned.*

Response: The PRB is not really a wall. It is constructed with materials that are more permeable than the surrounding soils. Because the PRB is more permeable, ground water should flow through the PRB and not around the ends of the PRB. A monitoring network using new and existing monitoring points in the immediate vicinity of the PRB (upgradient, downgradient, and at the ends of the PRB) will be used to evaluate its effectiveness. The locations of these monitoring points and monitoring frequency will be described in the Remedial Design, subject to Water Board approval.

27) *Consider more frequent monitoring (more frequent than quarterly), then reduce monitoring if things appear to be going well.*

Response: The monitoring schedule presented in the FS proposes more frequent monitoring during the initial several years following completion of the remedial actions, followed by less frequent monitoring. Because the remediation can only occur as fast as the speed of ground water flow, more frequent monitoring (e.g., monthly) will not necessarily provide a better understanding of remedial effectiveness. A more detailed monitoring program will be included in the forthcoming Remedial Design, subject to Water Board approval.

Indoor Air

- 28) *After the vapor mitigation systems are turned off (predicted 3-4 years in the Feasibility Study) what is the guarantee that the TCE levels inside the homes will not go back up?***

Response: Indoor air monitoring activities are currently being conducted in homes with vapor intrusion prevention systems on an annual basis. Indoor air monitoring activities will continue to be conducted within these homes after the vapor intrusion prevention systems are turned off to confirm TCE concentrations in indoor air do not increase above the cleanup goal. An effectiveness monitoring program for indoor air will be included in the Remedial Design, subject to Water Board approval

- 29) *Will there be “post-turn off” monitoring in the homes that have vapor intrusion prevention systems? What kind of assurance do the homeowners have that constant air testing will take place even after the time when the vapor mitigation systems are turned off?***

Response: Yes, indoor air monitoring will be conducted in residences after the vapor intrusion prevention systems are turned off. Details of this monitoring program will be included in the Remedial Design, subject to Water Board approval. Indoor air monitoring will also be included in the Self-Monitoring Program, which will be part of the final SCR adopted by the Water Board to assure implementation of the cleanup plan.

- 30) *Will more houses need vapor mitigation systems?***

Response: The Water Board has required the Hookston Station RPs to conduct annual indoor air sampling at selected homes in the residential neighborhood. The locations of these homes are based on ground water concentration data and the results of the initial indoor air sampling events. The Summer 2006 event ended October 15, with results to be reported by November 30, 2006. As described in Section 8.4.2 of the FS, the results of the annual indoor air sampling activities will determine the need for expanding the network of vapor intrusion prevention systems.

- 31) *There appears to be a house outside the central core area that exceeds the screening level for TEC in indoor air. The Water Board should consider indoor air testing for homes beyond the core area.***

Response: On July 28, 2006, the Water Board directed the RPs to complete annual (summer season) indoor air sampling and analysis for homes that are generally located within 100 feet of the 500 micrograms per liter (ug/l) TCE groundwater iso-concentration contour in the A-Zone (based on historical data). This area is based on *Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air* (DTSC, February 2005), including the recommended 100-foot stepout beyond the footprint of the appropriate groundwater screening concentration. This area is subject to modification by Water Board staff, based on analytical results. The first two rounds of indoor air sampling covered a much larger area and did not find significant TCE

concentrations in indoor air outside the 500 ug/l TCE iso-concentration contour. Residents with specific concerns about their home should contact Mary Rose Cassa, the Water Board project manager.

32) *Was the second story/attic sampled in two-story houses?*

Response: Yes, it has been the practice to collect samples from the second floor of two-story homes. Although the second floor might not have been sampled in some two-story homes in the early phases of indoor air monitoring, the July 28, 2006, directive states that samples shall be collected from the second floor of two-story homes.

Schedule

33) *Please share with the public the reasoning behind the timeline for implementation of the cleanup so community members can be confident that the cleanup is occurring as quickly as possible.*

Response: The schedule proposed in the Feasibility Study represents the fastest time-frame that can reasonably be expected for completing these tasks in a manner that is safe, effective, and consistent with legal requirements. Water Board staff will work closely with the RPs to facilitate timely review of submittals. The installation of vapor intrusion prevention systems and well abandonments, initiated by the RPs several years ago, serve to eliminate exposures to TCE at concentrations above conservative theoretical risk-based screening levels.

34) *Can the entire process be speeded up?*

Response: Remedial construction efforts require significant planning, coordination, permitting, and approval durations to ensure that the project is completed in a safe and effective manner. Following approval of the Feasibility Study, the RPs must perform field and laboratory tests related to the selected remedial technologies in order to design the remediation systems. Based on the results of these tests, the RPs then will design the full remediation systems. The Regional Board must then review and approve this design with input from the community via the Working Group. Once the design is approved, the RPs must obtain a variety of permits, negotiate access agreements, and contract with vendors before any construction can commence. As stated in the response to Comment 33, the proposed schedule in the Feasibility Study represents the fastest timeframe that can reasonably be expected for completing these tasks in a manner that is safe, effective, and consistent with legal requirements. The Preliminary Implementation Schedule in the FS assumes concurrent implementation of several tasks. Some work, such as the bench-scale treatability study for zero-valent iron, is currently underway. Additionally, the RPs are evaluating the possibility of accelerating the B-Zone chemical oxidation work.

35) *How does the Water Board keep the Responsible Parties on schedule?*

Response: The Final Site Cleanup Requirements Order, which will be prepared pursuant to Water Board Section 13304 and adopted by the Water Board in early 2007, will include

requirements for milestone completion dates and final cleanup concentrations. The draft Order will be circulated for public comment and reviewed at a Community Working Group meeting prior to the Water Board hearing.

Pitcock Petroleum

36) *Will the Pitcock Petroleum plume be pulled into the Hookston Station cleanup system?*

Response: The proposed remedial alternative would not be designed to capture ground water contaminants from an off-site parcel. Even if the petroleum plume does flow passively into the PRB, it will not adversely affect the system's ability to remove TCE and related chemicals.

37) *Will the hydrocarbons from the Pitcock plume affect the TCE plume?*

Response: Hydrocarbons can increase biodegradation rates in dissolved solvent plumes and as such can have a positive effect on TCE plumes.

38) *Please clarify the impact of the Pitcock petroleum plume on the Hookston plume:*

- *Extent of overlap*
- *Difference between chemicals*
- *Source of chemicals*
- *Treatment options*

Response: In general, Pitcock Petroleum wells contain elevated concentrations of petroleum hydrocarbons, which include benzene, toluene, ethylbenzene, xylenes, and MTBE. The property has been operated as a bulk fueling facility since the 1950s; activities associated with bulk fueling at Pitcock Petroleum are the likely source for these impacts. The Pitcock Petroleum plume appears to parallel the Hookston plume, but has not been completely defined. Consequently, the complete extent of overlap (if any) has not been determined. Pitcock Petroleum is currently conducting investigation activities to further characterize the downgradient extent of their plume, which is dominated by the gasoline additive MTBE. The ground water plume originating from the Hookston Station Parcel consists of chlorinated volatile organic compounds, including TCE and associated degradation compounds. TCE is a solvent commonly used as a degreaser. Existing soil vapor, soil, and ground water data suggest the TCE was released in the southwestern portion of the Hookston Station Parcel, near the structure identified as 199 Mayhew Way.

The remedial measures proposed in the FS will address the chemicals originating from the Hookston Station Parcel. None of the chemicals associated with the Pitcock Petroleum plume will impair the performance of the PRB. In addition, petroleum hydrocarbons enhance the degradation of PCE and TCE to lesser-chlorinated ethenes, such as 1,1-DCE and vinyl chloride. However, the zero valent iron PRB is not expected to be effective on petroleum hydrocarbons or MTBE.

39) *What are the challenges to site investigation and cleanup at the Pitcock Petroleum site?*

Response: Thus far, gaining access to off-site locations (other property owners, publicly-owned property) has posed the most significant challenge.

40) *Has the Pitcock contamination extended to Len Hester Park?*

Response: We don't know yet, but we will find out soon. Based on recent sampling (GRIBI Associates; April 27, 2006), Water Board staff directed Pitcock Petroleum to implement additional investigation to attempt to delineate the northeast (downgradient) extent of the petroleum plume. Water Board staff approved a workplan on August 23, 2006 to advance nine additional borings in Len Hester Park. Results are due November 1, 2006. If the petroleum plume extends beyond Len Hester Park, we will require the RP to conduct additional sampling, which will likely take place in the public rights-of-way in Colony Park.

41) *What is the regulatory tool for Pitcock Petroleum?*

The Water Board has used Water Code section 13267 (requirement for technical report) to regulate the Pitcock Petroleum site. We use this tool for many contamination sites, including virtually all leaking underground storage tank sites.

General Concerns

42) *Would any Water Board employees or RPs live in our neighborhood (given the health dangers)?*

Response: The existence of groundwater contamination in the vicinity is just one of many factors that people consider when deciding where to live. Interim actions already taken by the RPs (installation of vapor intrusion vapor prevention systems and well abandonments) have eliminated current exposures to harmful TCE levels. Planned cleanup actions will eliminate the source of TCE vapor intrusion to homes, so buyers of homes in this neighborhood will not face any health dangers from the groundwater contamination

43) *What is the status of identifying a responsible party for the release at Vincent Road and Mayhew Way and getting them to clean up the PCE?*

Response: The Water Board has already required three parties near Vincent Road to perform site investigation work, which has identified a likely source of PCE near the boundary between two properties. Additional site investigation is needed at both properties, and we are in the process of requiring this additional work. The Water Board will name responsible parties based on the results of a fuller site investigation.

44) *What is the status of the proposed investigation at 999 Bancroft Road?*

Response: The owner of 999 Bancroft Road refused to provide access. The Hookston Station RPs conducted the remainder of the investigation as approved by Water Board staff in May 2006. The results indicated there is no need at this time to pursue investigation on the 999 Bancroft property as an additional source area. See <http://www.waterboards.ca.gov/sanfranciscobay/sitecleanupdocs.htm> for details.

45) *There should be coordination with the County Health Department regarding historic and future impacts to public health from the plume. A health survey of past and present should be maintained over the course of the remediation process.*

Response: The Water Board does not conduct epidemiological (health) studies. It is up to the California Department of Health Services or the County Health Department to determine if such studies are appropriate and, if so, implement them. Both agencies are aware of the community's concerns.

46) *Since there is no evidence of cancer caused by PCE and TCE, are my neighbors and I in Colony Park the ones who will become your statistical base during the next 30 years of cleanup?*

Response: While there may be no evidence of cancer caused by PCE and TCE in Colony Park, there is considerable evidence that these chemicals do cause cancer. As stated above, epidemiological studies are the responsibility of the County Health Department.

47) *Who hires the contractors?*

Response: It is the responsibility of the RPs to hire qualified consultants to carry out the cleanup. The consultants may elect to hire subcontractors for specialty work. The Water Board's site cleanup requirements order requires that the RPs' contractors have appropriate qualifications.

48) *Will residents living close to the trench have more input in the process?*

Response: Water Board staff will work closely with residents who live close to construction activities to make sure the residents know what to expect regarding construction and schedule and to ensure residents' concerns are heard and addressed.

Comments from Lucy Goodell of the Colony Park Neighbors Association dated August 29, 2006:

49) *We would like the plan to include specific benchmarks in time (1 year after implementation?) to determine whether or not sufficient degradation is occurring under our homes to meet the three to four year expected decrease in vapor intrusion to acceptable levels.*

Response: Specific deadlines will be established in the Site Cleanup Requirements. Ground water and soil vapor data will be collected during quarterly monitoring events following the completion of the remedial measures. These data will be evaluated to confirm the PRB is reducing TCE concentrations in A-Zone ground water. The timeframes for cleanup are estimated and should not be considered absolute. As described in the introduction to Appendix I (Ground Water Modeling) of the FS, the computer models were constructed as a tool to compare the relative effectiveness (e.g., spatial impact and timeframes for VOC concentration reductions) of active remediation systems that were being evaluated within the FS.

50) *We would like to know how adaptable the selected alternative is. If the plan comes up short of expectations within the benchmark time period can course corrections be made to get the remediation back on track?*

Response: The selected alternative the PRB could be extended if groundwater flow patterns change or if performance monitoring indicates the PRB is not performing as expected. For the chemical oxidation component, injection points could be added or additional injection events could be added. However, we don't expect very rapid changes in contaminant concentrations following startup of the cleanup technologies, so we will need to observe system performance for several quarters before considering adaptive changes. The vapor intrusion prevention systems have been implemented along with water well abandonments to eliminate exposures to TCE at concentrations above conservative theoretical risk-based screening levels. The vapor intrusion prevention systems are adaptable in that they are relatively easy to install and have readily adjustable operating time periods. The vapor intrusion prevention systems eliminate the residential exposure to TCE in indoor air at concentrations above the risk-based cleanup goals pending reduction of TCE in A-Zone ground water.

51) *There was no consideration of an alternative combining in situ treatment with pump and treat.*

Response: In general, these two technologies (in-situ treatment and "pump and treat") are incompatible and it would make no sense to combine them on a particular site. Regarding the A-Zone, PRBs are designed to clean up groundwater under natural groundwater flow conditions. Increasing the flow through the PRB with an extraction system could have the negative effect of reducing contact time with the zero-valent iron, therefore potentially limiting the effectiveness of the PRB. Although "pump and treat" is technically implementable, the low permeability soils in the A-Zone would require an extensive well network with no guarantee that the wells would be effective in drawing and treating water in the areas between the wells. Siting of wells is strongly controlled by access. Using public rights-of-way generally assures ready access, but may not allow favorable positioning for optimum well performance. Table 5-2 of the FS describes some of the other reasons why groundwater pumping was not retained for further analysis in the FS.

Regarding the B-Zone, in situ treatment typically is not combined with extraction technologies, unless the treated water is going to be re-injected – a difficult and problematic process. The reason for not combining in situ and "pump and treat" is that the extraction system would result

in removing whatever substance was injected into the ground water (e.g., potassium permanganate).

- 52) *Primary concern to our neighborhood is contamination already in the ground water below our homes. Concern for this matter was reflected at the meeting at Fair Oaks School where several people suggested remediation within the neighborhood in addition to the permeable reactive barrier. We don't see how the permeable barrier can be really effective in the hot spots beyond stopping the plume from spreading and getting worse. The concept of meaningful natural degradation and attenuation of TCE has not occurred in the last 13 years on the plume. Can we realistically expect this as a means of degrading the TCE in the hot spots under the houses just by virtue of stemming the additional flow from upgradient?***

Response: Natural degradation and attenuation of TCE has been taking place, and is one reason why the plume has not been expanding. Installing the PRB will help to cut off the source of TCE upgradient from Colony Park, resulting in increased rates of attenuation and degradation. In addition, vapor intrusion prevention systems will be installed in those homes that exceed conservative risk based screening levels. Risk reduction over “hot spots” can be immediately achieved through the installation of such a system. See also the response to Comment 19, regarding Water Board experience with PRBs.

- 53) *To what extent has the Water Board or ERM had prior experience with the use of iron? It is an expensive project to see if it works when we know pump and treat does work and is more effective.***

Response: See response to Comment 19 regarding Water Board experience with PRBs.

ERM has designed and overseen construction of many PRBs in the United States and Europe. Some examples are listed below.

Location	Contaminant	Type of PRB
South Georgia	Pesticides	Carbon; Funnel and Gate
McGregor, Texas	Perchlorate	Series of Bio-Trenches (mixture of compost, soybean oil, and nutrients)
Washington	BTEX	Peat Moss
San Antonio, Texas	Chlorinated VOCs	Iron
Los Alamos, New Mexico	VOCs and Radionuclides	Multi-Media

Location	Contaminant	Type of PRB
Lake City, Missouri	Chlorinated VOCs	Iron
Kansas	Chloroform	Iron and EHC
Shaw, South Carolina	Chlorinated VOCs	Iron
New Hampshire	BTEX, Ketones, Chlorinated VOCs	Aerobic (calcium sulfate injection) and Anaerobic (ethanol and lactate injection) Bio-Trench
Belgium	Chlorinated Solvents	Bi-Metallic Pd-Coated Iron “Cartridge” System

BTEX = Benzene, toluene, ethylbenzene, and xylenes

VOC = Volatile organic compounds

The RPs intend to retain a highly qualified remediation construction contractor (other than ERM, as they are not construction contractors) that has performed PRB installations at numerous sites.

- 54) *We request that the Permeable Reactive Barrier be constructed in a way that allows the iron mixture to be replenished if needed.***

Response: The PRB will be constructed such that it can be augmented in the future if necessary.

- 55) *Guidelines state that air sampling should be conservative. We believe that 12-hour indoor air sampling yields more conservative results than 24-hour sampling. A longer sampling period increases the likelihood of diluting the results due to doors and windows being opened. Some assumptions about indoor air testing are based on different conditions on the East Coast compared to California. Vapor intrusion on the East Coast may be worst in the winter months. In that season 24-hour sampling might be reasonable due to significantly colder temperatures that discourage leaving doors and windows open. Indoor air sampling programs should consider and be developed with local atmospheric conditions in mind. Land use should also be considered. Residential indoor air monitoring should have a conservative approach. The risk factors of TCE are currently being re evaluated; there are differences of opinion. A conservative approach should be taken if only for this reason. Findings indicate that winter is not the worst period for vapor intrusion in California. We would want the houses to be kept closed as much as possible during the sampling in order to capture maximum risk and that can be managed better during a 12-hour period.***

Response: This comment appears to be associated with the annual indoor air sampling program that was initiated in August 2006, which is not associated with the FS. These issues were addressed by the Water Board in a letter entitled, “Requirement for Offsite Indoor Air Sampling –

228 Hookston Road, Pleasant Hill, Contra Costa County,” dated 28 July 2006. The intent of the sampling is to determine average daily concentrations of the monitored compounds descriptive of long-term exposure to vapors migrating from the sub-surface to indoor air, rather than to evaluate a worst-case scenario. Samples collected over a 24-hour period will more accurately account for occupant use patterns over the course of the day. Consistent with *Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air* (DTSC, February 2005), we conclude that indoor air samples collected over a 24-hour period will more accurately describe the representative indoor air concentrations over a long-term chronic exposure.

Comments from Colleen Goya dated 6 August 2006:

- 56) *The alternatives involve selection of different technologies or combinations of technologies aimed at remediating the contaminated zones A and B. These alternatives are evaluated based on the 9 criteria established as standards for such situations. The evaluations and the criteria, however, seem to be missing a discussion of how adaptable the various alternatives are as remedial solutions.***

How flexible and adaptable is each alternative, especially the recommended alternative #4? Is it adaptable to potential changes in the plume size and location? The FS seems to assume a static size and location that is not affected over time. What if monitoring results show poor progress in expected levels of remediation? Is there a fallback plan and are there contingencies for changing remediation methods or technologies if needed?

Response: See response to Comment 50, regarding adaptability.

- 57) *I am concerned about other source of plume contamination coming from mixed sources mentioned in the FS. Will Alternative #4 be complicated by those additional contamination sources-does this remedy preclude any other approaches to address the other contaminants?***

Response: We foresee no conflict between the cleanup technologies proposed by the Hookston Station RPs and the contaminants originating from non-Hookston sources. The types of remedial systems proposed to address the Hookston Station parcel will be effective on the VOCs emanating from other sources (other than Hookston Station). While the Hookston Station remedial measures are not intended to address the VOCs from other sources, to the extent that such VOCs from other sources have commingled with VOCs which may have originated from Hookston Station, they will be addressed by the Hookston Station remedial measures. The methyl-tertiary butyl ether (MTBE) plume emanating from the Pitcock Petroleum facility at 220 Hookston Road will not be treated by the PRB. The downgradient extent of the MTBE plume is currently being investigated by Pitcock Petroleum, and Pitcock will also need to develop a remedial strategy to address the plume.

- 58) *I would like to see the FS directly address the adaptability of the remedial alternatives, perhaps as part of the criteria of "implementability."***

Response: In accordance with the National Oil and Hazardous Substance Pollution Contingency Plan (NCP), the "Implementability" criteria in an FS takes into account "the ease of undertaking additional remedial action," to the extent they are required. This includes an assessment of the adaptability of the alternative. The Hookston Station FS was developed consistent with the NCP. See also the response to Comment 50 above.

- 59) *The proposed timeframe for the next phases through the start of actual remediation work feels discouragingly long. Is there any way to speed this process up?***

Response: The schedule for implementation of the remaining remediation components is as fast as reasonably can be expected in order to complete the remediation in a manner that is safe, effective, and in accordance with legal requirements. Water Board staff will work closely with the Hookston Station RPs to facilitate timely document review. The installation of vapor intrusion prevention systems and private well abandonments initiated several years ago by the Hookston Station RPs several years ago serve to eliminate exposures to TCE at concentrations above conservative theoretical risk-based screening levels. See also responses to Comments 33-35, above.

Comments from Amy Brownell dated 31 August 2006:

- 60) *The timeframe that is projected for reduction of the portion of the plume downgradient from the PRB seems like an aggressive schedule. Unfortunately, the homeowners who have been impacted by this plume have been potentially (depending on the configuration of their home, crawl space etc) exposed to unacceptable levels of vapors for a long time. So any possibility to speed up the cleanup under the impacted homes should be considered. To this end, an active treatment, such as injection of the ZVI slurry at appropriately spaced intervals starting from the outer edges of the downgradient plume and going inward would be well worth the expense. I would suggest a pilot test to see whether it is feasible and workable to inject the solutions into the A Zone underneath the neighborhood.***

Response: All residents living in homes containing concentrations of TCE above conservative theoretical risk-based screening levels have been offered free installation of vapor intrusion prevention systems. These systems, which are an integral component of the recommended alternative (Alternative 4), will address any near-term indoor air exposures. Direct injections of bioremediation amendments or chemical oxidants in the A-Zone were evaluated within the FS, which concluded that such injections would not be feasible because of the discontinuous nature of the shallow sand stringers in which A-Zone ground water is found. In addition, the locations in which such downgradient injections could occur would be limited to public rights-of-way downgradient of the highest concentration area due to access constraints, and therefore could not be applied uniformly throughout the impacted area.

- 61) *Please make sure all costs associated with Institutional Controls and particularly the cost of a county ordinance or county requirements for tracking the Soil Management Plan for the arsenic soils are included in the cost estimates. The RPs should be paying all the costs of the Institutional Control; they shouldn't be passed on to any governmental agency. If there will be costs associated with the Institutional Controls that will have to be passed on to future property owners/developers then the RPs should develop, write and assist governmental agencies in implementing permitting or other schemes that will set up programs to reimburse the county or cities or whatever governmental agencies will have to implement the systems that track the Institutional Controls.***

Response: See response to Comment 23.

- 62) *Please make sure there are sufficient monitoring wells around the PRB to verify that you are getting appropriate capture and treatment of the core of the plume.***

Response: A preliminary monitoring program was proposed in the FS. The RPs will propose a more detailed performance monitoring program as part of the Remedial Design. The Water Board will ensure that the monitoring program is appropriate for demonstrating remedial effectiveness. The site cleanup requirements order will specify monitoring and reporting requirements.

- 63) *Make sure the monitoring schedule to prove the effectiveness of the treatment is very aggressive at the beginning of the cleanup implementation, especially if you do not add any extra treatment downgradient of the PRB. Once the treatment is proven effective, then monitoring could be reduced.***

Response: The RPs will propose a detailed performance monitoring program as part of the Remedial Design. The Water Board will ensure that the monitoring program is appropriate for demonstrating remedial effectiveness. The site cleanup requirements order will specify monitoring and reporting requirements.

Comments from Richard Nicoll, Assistant Superintendent, Mount Diablo Unified School District, dated 30 August 2006:

- 64) *Will there be a contingency plan in the event that groundwater goes around the PRB instead of through it? If groundwater goes around the PRB to the west, then contaminated groundwater will be more directly up gradient of the MDUSD school property.***

Response: The PRB will be more permeable than the surrounding soil, and therefore ground water flow will be directed toward the PRB, and will not be re-directed around the PRB. Hydraulic monitoring will be proposed in the Remedial Design to ensure that the PRB is intercepting the ground water plume it is designed to treat. The Water Board will ensure that the monitoring program is appropriate for demonstrating remedial effectiveness. The site cleanup

requirements order will include contingent tasks that would allow the Executive Officer to require preparation of a contingency plan in the event that the Executive Officer concludes that the existing cleanup plan is not working properly.

- 65) *The planned location for PRB is in the vicinity of the highest detected concentrations of chlorinated compounds in soil vapor. Will air be monitored during the installation of the PRB? Will there be a plan to stop or adjust the scope of work if air quality is adversely impacted during installation of the PRB? Can this work be scheduled to occur when school is not in session?***

Response: The Health and Safety Plan, which will be presented in the Remedial Design, will include a plan for air quality monitoring during any remediation construction work and a plan for adjusting work processes if elevated concentrations of vapors are encountered. For perspective, the highest concentrations observed in soil vapor are approximately 50,000 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$), which is equivalent to approximately 10 parts per million by volume (ppmv). The Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) for short term construction exposure to TCE is ten times this concentration (100 ppmv), which also coincides with TCE's approximate odor threshold. Given the dilution of vapors that occur during trenching operations, it is unlikely that any person would be exposed to unacceptable levels of TCE during any construction efforts.

- 66) *Will air be monitored in the area surrounding the residences when SVE is used to prevent contaminated vapors from entering houses? And/or, will the vapors be treated before they are discharged to the atmosphere?***

Response: Soil vapor extraction is not a selected remedial action for Hookston Station. However, low flow vapor extraction is performed under the barrier component of the vapor intrusion prevention system. The concentration of VOCs discharged to the outdoor air is very low, and dilution renders the concentrations negligible. Ambient air sampling in the Colony Park neighborhood is currently being conducted as part of the annual indoor air sampling program and quarterly soil vapor monitoring events, and was also conducted during the 2004 and 2005 indoor air sampling events. Since the installation of the first vapor intrusion prevention system in May 2004, 26 ambient air samples have been analyzed. TCE was not detected in any of those ambient air samples. Therefore, elevated concentrations of TCE are not expected in ambient air as a result of the vapor intrusion prevention systems.

Comments from Janet L. Wolff, on behalf of self and as trustee of the Welch Family Trust Residence: 1260 Trafalgar Court, Concord, California 94518, dated 31 August 2006:

- 67) *The Cleanup Plan presented by the Calif. Regional Water Quality Control Board is not agreed to as the final resolution or even short term clean-up remedy to return the property to a condition that provides acceptable health, safety, usability and property value for the following reasons:
The remedial action proposed in the Feasibility Study only addresses the Hookston Station site and does not address the effects, impacts or other conditions that may be***

occurring from adjacent identified plumes; e.g., from the Cull [sic] property site, or Pitcock Petroleum site. There is not assurance that this treatment may, if done in an isolated manner as proposed, exacerbate the effects of the other plumes. This assurance must be made as well, and assurance that action to resolve these other sites must also be taken.

Response: While the Hookston Station remedial measures are not intended to address VOCs from such other sources, to the extent such VOCs from other sources have commingled with VOCs which may have originated from Hookston Station, they will be addressed by the Hookston Station remedial measures. Under state law, the Water Board cannot require the Hookston Station RPs to clean up contamination originating at other properties. We will require other parties to clean up non-Hookston contamination once we identify those parties with sufficient certainty.

The remedial systems proposed for the Hookston Station Parcel will neither exacerbate nor treat the methyl-tertiary butyl ether (MTBE) plume emanating from the Pitcock Petroleum facility at 220 Hookston Road. The downgradient extent of the MTBE plume is currently being investigated by Pitcock Petroleum, and Pitcock will also need to develop a remedial strategy to address the plume.

68) *The proposal to install a permeable reactive barrier with treatments that would only treat the TCE plume that presently resides under that barrier, and then relying only on the slow process of natural attenuation, does not address the down gradient (northeast) existence of the plume. More aggressive and direct treatment of this area, rather than reliance on a lengthy period of natural attenuation needs to be implemented.*

Response: See responses to Comments 51 and 52, above.

69) *The February 2006 C.T.E.H. Toxicology Report for the Baseline Risk Assessment, pages 39 and 40, states that there exists a cancer risk exposure for the Colony Park neighborhood and therefore 'needs further study'. The remedial action proposed by the Feasibility Study is not based on this 'further study' and therefore cannot be deemed acceptable as an acceptable specification for the proposed clean-up plan. Simply stated: the proposed Clean-up Plan is based on incomplete information.*

Response: There is no statement in the referenced report that calls for further study, evaluation, or sampling of the Hookston Station site or surrounding neighborhood. The Water Board believes that the characterization work was sufficient to prepare both the *Baseline Risk Assessment* and the *Feasibility Study*.

70) *The proposed Clean-up Plan provides for the injection of chemical oxidants into the ground and the health and safety effects of these chemicals, proximity to underground pipes, utilities, Kinder Morgan high-pressure pipeline. PG&E distribution center, etc., have not been addressed.*

Response: See response to Comment 6.

- 71) *Finally it has not been sufficiently explained as to why the clean-up site for the Hookston Station site needs to be in Len Hester Park, rather than the site of the source of the toxic contamination?*

Response: The final alignment of the PRB will be determined in the Remedial Design. The location in Len Hester Park was initially selected based on the low density of underground utilities beneath the park, compared with the high density of underground utilities located at the Hookston/Bancroft Road intersection and along this former railroad right-of-way. The park is also closer to the affected residential neighborhood, and therefore the benefits gained from the PRB cleanup will be realized sooner than if the PRB were constructed closer to or on the Hookston Station parcel.

Acronyms

FS	Feasibility Study
PRB	Permeable Reactive Barrier
RP	Responsible Party
SCR	Site Cleanup Requirements
VOC	Volatile Organic Compound