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GEOMATRIX

28 July 1997
Project 3182.01

Ms. Susan Hugo
Alameda County Health Department
Department of Environmental Health
Hazardous Materials Division
1131 Harbor Bay Parkway
Alameda, California 94502

Dr. Ravi Arulanantham
California Regional Water Quality Control Board,
San Francisco Bay Region
2101 Webster Street, Suite 500
Oakland, California 94612

Subject: Response to Aetna's Concerns Regarding the Proposed Long-Term Site Management Plan
Powell Street Plaza Site and Shellmound III
Emeryville, California

Dear Ms. Hugo and Dr. Arulanantham:

This letter responds to the 7 April 1997 letter prepared by Morrison & Foerster on behalf of Aetna Real Estate Associates, LLP (Aetna), to Ms. Susan Hugo of the Alameda County Health Care Services Agency (ACHCSA). The 7 April 1997 letter outlined two concerns regarding the proposed Long-Term Management Plan for residual petroleum hydrocarbons at the Powell Street Plaza site located in Emeryville, California (the site). The objective of this letter is to respond to the concerns outlined in the 7 April letter.

The first concern presented in the 7 April letter involves the need for removal of residual petroleum product at the site. The 7 April letter indicates that Aetna is unclear whether the closure for the site will be sought pursuant to the Containment Zone policy under State Water Resources Control Board Policy 92-49. Site closure is not sought under the Containment Zone policy. A long-term management plan has been prepared to manage the residual petroleum product in-place consistent with the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB). Guidance on Low Risk Fuel Sites for low risk groundwater cases. Guidelines for low risk groundwater cases and their application to the site are as follows:

1. The leak has been stopped and ongoing sources have been removed or remediated. Active product removal was conducted at the site between 1989 and 1990. The median thickness of product measured in the wells at the site since that time is less than 0.02 feet; the median thickness in most of the onsite wells is not measurable. Current product thickness measurements (PES, 1997a, Quarterly Monitoring Report, First Quarter 1997) indicate less than 0.02 feet of floating petroleum product in site monitoring wells. The residual product that remains in site soil has been characterized in the diesel hydrocarbon range and does not contain significant, if any, soluble constituents; thus, these hydrocarbons do not represent an ongoing source.

2. The site has been adequately characterized. Twelve on-site and four off-site wells have been installed to define the extent of residual product and dissolved petroleum hydrocarbons at the site. The site has been monitored on a quarterly basis since 1990. As described in the Risk Evaluation Report and Long-Term Management Strategy for Petroleum Hydrocarbons (Geomatrix, January 1997 [draft]), these wells adequately characterize the extent of petroleum hydrocarbons at the site.

3. The dissolved hydrocarbon plume is not migrating. Quarterly monitoring has been conducted at the site since 1990 and documents that the plume is not migrating (PES, 1997b, Quarterly Monitoring Report, Fourth Quarter 1996).

4. No water wells, deeper drinking water aquifers, surface water, or other sensitive receptors are likely to be impacted. A human health and ecological risk evaluation was conducted to evaluate these potential pathways for chemical exposure and concluded that the residual petroleum hydrocarbons at the site did not pose an unacceptable risk to human health or ecological life (Geomatrix, January 1997 [draft]).

5. The site presents no significant risk to human health. A human health and ecological risk evaluation was conducted and concluded that the residual petroleum hydrocarbons at the site did not pose an unacceptable risk to human health or ecological life (Geomatrix, January 1997 [draft])

6. The site presents no significant risk to the environment. As stated above, the human health and ecological risk evaluation concluded that the site did not pose an unacceptable risk to the environment, if the residual petroleum product is managed as proposed in the Long-Term Site Management Plan.

For sites meeting the low risk groundwater case, as the Powell Street site does, the RWQCB Guidance on Low Risk Fuel Sites recommends passive bioremediation. Quarterly groundwater monitoring has been conducted at the site since 1990 and shows that the plume is no longer migrating and that passive bioremediation is an effective remedial strategy.

The 7 April letter further states that free product removal is "mandatory" whether or not the site is to be closed under the Containment Zone policy. This is incorrect. If the Board were to issue a Cleanup and Abatement Order, it would do so under the Authority of Section 13304 of the Water Code, which authorizes Regional Boards to order dischargers to "clean up the waste or abate the effects of the waste". The water code does not specify that in cases of small, non-migrating quantities of free product, cleanup or abatement can only be accomplished by removal of every molecule of free product, as Aetna seems to want.

Similarly Chapter 6.75 of the Health and Safety Code nowhere specifies that all free product must be removed in all cases regardless of risk and of current and probable future land uses. Rather, Section 25299.37(B) states simply that "corrective action" for petroleum releases from underground storage tanks "shall ensure protection of human health, safety and the environment". Like the Water Code, the UST corrective action provisions of the Health and Safety Code do not even mention, let alone require, free product removal.

The approach under consideration for Powell Street Plaza and Shellmound III meets both standards. With regard to the requirements of the Water Code, as described above, the effects of the waste have been abated and it is no longer an ongoing source for degradation to beneficial uses of waters of the state. With regard to the requirements of the Health & Safety Code, the results of the risk evaluation show that managing the residual petroleum product in place is protective of human health and the environment; the Long-Term Site Management Strategy provides procedures to ensure that safety (e.g., protection from fire or explosion hazards, or nuisance issues) is maintained.

The implementing regulations under the Health and Safety Code cited in the April 7 letter refer to free product removal, but do not make it mandatory. Section 2655 of Article 5, Chapter 16, CCR states:

> "The owner or operator shall comply with requirements of this section. The owner or operator shall remove free product *to the extent practicable, as determined by the local agency*, while continuing to take any actions required under Sections 2652 and 2654." (*emphasis added*)

Section 2655 allows local agencies discretion as to what is "practicable"[1]. Attachment A presents an evaluation of possible alternatives for addressing residual petroleum product at the site (excluding passive bioremediation). As presented in the attachment, the alternatives are either not feasible for site conditions or extremely costly while providing no further protection of human health, safety, or the environment. The results of the evaluation presented in Attachment A show that further product removal at the site is not practicable.

The second concern expressed in the 7 April letter regarded the effects of the residual petroleum product on the eventual redevelopment of the property. Continuing to conduct active remediation at the site is not likely to address this concern any better than passive bioremediation. As shown in Attachment A, costs to excavate remaining residual petroleum product is prohibitive. Other remedial alternatives, including continued passive removal of free-phase product as it accumulates in site wells or active bioremediation by adding nutrients and oxygen to the subsurface, would require many years to remove the residual petroleum product, requiring the same site management plan developed for passive bioremediation. Therefore, there would be no net benefit to human health or the environment using additional free product removal or active bioremediation.

As for land use restriction, we have proposed none. At most, leaving the remaining small quantities of free product as proposed might result in a restriction on the future use of the property for single family houses with backyards, but the possibility that these properties would ever used for such a purpose could not be more remote and hypothetical.

In summary, site closure with a site management plan is the appropriate regulatory approach for the site for the following reasons:

- The site meets the guidelines for low risk groundwater cases.
- California law does not require removal of free product, rather it requires the protection of human health, safety and the environment, which is accomplished by a risk management plan for the site.

[1] Although, we do not seek closure under the containment zone policy, we note that the policy, in its most recent form, includes virtually the same standard as the UST regulations "floating free product must be removed to *the extent practicable*" (*emphasis added*) See WRC B Resolution 9249, Section H 2 b (October 2, 1996)

- Analysis of remedial alternatives for the residual petroleum indicates prohibitively high costs to remove regulatory requirements for a long-term site management plan.
- Risk management is the most practical and cost-effective solution for the site.

We hope this aids in responding to Aetna's concerns. Please do not hesitate to call either of the undersigned should you have any questions.

Sincerely,

GEOMATRIX CONSULTANTS, INC.

Amanda L. Spencer, R.G., P.E.
Senior Hydrogeologist

Tom Graf, P.E.
Vice President

ALS/TEG:ldu
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Enclosures: Attachment A

cc: Tom Gram, The Martin Group
David Cooke, Esq., Beveridge & Diamond
Kevin Graves, RWQCB

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ATTACHMENT A

ANALYSIS OF POSSIBLE ALTERNATIVES FOR FREE-PHASE PRODUCT REMOVAL POWELL STREET PLAZA SITE, EMERYVILLE

1.0 INTRODUCTION

The site under consideration is a developed area consisting of a very successful, one story shopping center (Powell Street Plaza), which includes a parking lot and surrounding landscaping. The shopping center was constructed in 1987 after the underground tanks installed by the previous owner, PIE Trucking, were removed by PIE. The site is underlain by approximately 8 feet of sandy clay fill on top of the natural young bay mud layer, found throughout the bay area. The water level at the site has historically varied from approximately 6 to 8 feet below ground level. Some free-phase product is currently found in the fill layer, although the thickness of the free-phase product is small. The most recent groundwater monitoring data recorded at the site indicate a median product thickness of less than 0.02 feet. The residual free-phase product at this site extends beneath approximately 90,000 square feet of existing buildings and approximately 45,000 square feet of parking lot.

2.0 OBJECTIVE OF ANALYSIS

The purpose of the analysis was to identify remediation technologies which might be implemented at the site to remove the existing free-phase product.

Alternative 1: Soil Excavation

Free-phase product removal could be achieved by excavating, and removing from site, the soil containing petroleum product. Implementation costs would include the provision of shoring to support the sides of the excavation, dewatering of the excavation and treatment of the extracted water with, for example, an on-site carbon treatment system, and backfilling the excavation with a combination of clean soil taken from the excavation and imported material. Soil containing petroleum product would be disposed of at a Class II facility and replaced with

clean backfill. Chemical tests completed during excavation activities would be required to determine which soil could be used as backfill and which would have to be disposed of off-site.

In order to remove all of the free-phase product at this site, the area of the excavation would extend under approximately 90,000 square feet of existing buildings. In order to complete the excavation, the shopping center would have to close, these buildings would have to be demolished and, to return the site to existing conditions, reconstructed following completion of the excavation. The complicated logistics, such as buying out the leases or relocating existing tenants, and high costs associated with demolition and reconstruction activities (approximately $80/square foot) make excavation of all soil containing free-phase product an impracticable solution at this site. If only the more easily accessible soil were to be excavated (estimated to be approximately one third of the soil affected by free-phase product), a site management plan would still be required on the property because of the free-phase product remaining under the buildings. Therefore, expenditures for the limited soil removal would provide no material benefit to human health protection or the environment.

Alternative 2: Bioslurping

Bioslurping combines vacuum-enhanced free-phase product recovery with bioventing to simultaneously recover free-phase product and remediate residual soil contamination in the vadose zone. A "slurp" tube is inserted into a small diameter well and attached to a vacuum pump. The vacuum pump extracts free product, groundwater and soil gas as a single process stream. The free-phase product is separated for recycling and the water and soil vapor are treated, if required. Pumping rates are generally low, minimizing the amount of groundwater extracted with the free-phase product and keeping water treatment costs to a minimum. When used at an appropriate site, bioslurping can significantly increase free-phase product recovery and can save time and money by recovering product, water and vapor simultaneously rather than in series.

At the site under consideration, the amount of free-phase product currently present is very small. As previously mentioned, the most recent groundwater monitoring data indicate a median product thickness of less than 0.02 feet. The use of a free-phase product recovery system for such a small amount of product is not appropriate. Bioslurping is considered to be a technically impracticable solution for this site.

Even if the amount of free-phase product were significantly greater than is currently reported, it is not clear that bioslurping would be an appropriate technology to use. For a vacuum-enhanced recovery system to be significantly more effective than simply pumping alone, the hydraulic conductivity of the soil should be in the range of 10^{-3} to 10^{-5} cms/sec (Nyer, et al., 1996). As extraction would be from the fill layer, anticipated to have a relatively high hydraulic conductivity (in the 10^{-2} to 10^{-3} cms/sec range), it would likely be difficult to produce enough vacuum to achieve the slurping action and lift liquid from the well.

Alternative 3: Enhanced Bioremediation

It should be possible to enhance the natural degradation of the free-phase product by supplying oxygen into the subsurface soils. Oxygen may be supplied by inducing air from the atmosphere into the subsurface or by injecting an oxygen carrier substance into the subsurface. The former, commonly referred to as bioventing, is performed by forcing air into or vacuum inducing soil gas out of an array of vadose zone wells located in the region containing the product. The latter most commonly is performed by discharging hydrogen peroxide solution into an array of wells in the region containing the product.

Bioventing

It may be possible to enhance the natural degradation of the free-phase product at the site using bioventing techniques Although bioventing provides oxygen specifically to vadose zone soils, its use can be extended to soil below the existing water table by implementing an accompanying dewatering system. In order for bioventing to be successful in stimulating biodegradation, the area to be remediated must be oxygen deficient. Should this method be implemented, a soil-gas survey would be needed at the site to assess whether site conditions

are appropriate for the use of this technology. In addition, an on site pilot test would be required to obtain data with which to design the full-scale system. Specific data obtained from a pilot test would include an accurate estimate of the soil permeability; the appropriate spacing of air injection or extraction wells; and information to determine whether treatment of any off-gases is required.

The presence of buildings and the parking lot would not preclude the use of an extraction-based system per se. However, to clean-up the free-phase product beneath the buildings, it would be necessary to install extraction wells within the buildings. This presents both logistical and potential health problems. Based on our experience at other sites with similar geologic conditions, 50 or more wells would need to be installed within the shopping center buildings to provide sufficient coverage for bioventing. It would likely be extremely difficult to install all of the wells in the needed locations for bioventing to be successful in remediating the free product. These wells would have to be installed in tenants retail sales areas as well as storage area. In addition, the cost for an air monitoring program to confirm that chemically-affected air was not entering the building due to the bioventing activities could be prohibitive. Therefore, similar to excavation, the presence of the shopping center buildings makes bioventing impracticable.

Hydrogen Peroxide

Wells would also need to be installed inside the buildings if hydrogen peroxide were used to enhance bioremediation. Use of the wells inside the building for hydrogen peroxide would be even more disruptive to the building occupants than the bioventing system because the wells would need to be accessed frequently to deliver hydrogen peroxide injections. Again, the presence of the building makes this remediation approach impracticable.

Bioventing or hydrogen peroxide could be used to clean-up the free-phase product in subsurface areas not covered by buildings, but existing site restrictions, including a long-term risk management plan such as the plan currently proposed for the site, would still be required. Further, enhanced bioremediation of heavy fraction petroleum hydrocarbons, such as those

present at the site, is typically a slow process. It would likely require many years and significant cost ($1,000,000 or more) to complete product removal using enhanced bioremediation via bioventing or hydrogen peroxide solution. During this remedial period, all existing restrictions on the site, including a site management plan, would be required.

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Transmittal

Date	28 July 1997
To	Ms. Susan Hugo
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Project Number	3812.01 E
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Item	Description
1	Overview of California Laws Governing the Presence of Free Product and Guidelines for Decision-Making about Product Removal

Remarks:

Enclosed for your information is an analysis of California laws regarding the management of free product in groundwater. Please consider this information in your review of conditions at the Powell Street Plaza and Shell mound III sites in Emeryville, California as well as other sites where it may be applicable

From: Tom Graf

cc: Kevin Graves

GEOMATRIX

OVERVIEW OF CALIFORNIA LAWS GOVERNING THE PRESENCE OF FREE PRODUCT AND GUIDELINES FOR DECISION-MAKING ABOUT PRODUCT REMOVAL

Prepared by: Geomatrix Consultants, Inc.

1.0 INTRODUCTION

Risk-based evaluations for site cleanup are becoming increasingly more common in California and provide a technically sound basis in determining the need for and scope of cleanup of petroleum-affected soil or groundwater. However, regulatory directive about the removal of "floating" free phase petroleum hydrocarbon product is most often excluded from these risk-based evaluations. Removal of the free phase product is routinely initiated without evaluating the need for or net benefit of the removal because it is believed or cited that it is a requirement of California laws. Free phase product removal has been required at sites where groundwater has not been significantly impacted and the presence of the product poses no significant risk to human health or the environment. Often this removal is very expensive, time consuming, and ultimately does not have a material impact on the protection of groundwater, surface water, or human health. Our review of applicable laws governing protection of groundwater, surface water, and human health show that there is flexibility in the procedures used to address free phase product which allows for discretion of the local regulating agencies. This paper provides an overview of the applicable laws, regulations, policies and guidelines governing petroleum hydrocarbon release sites, and presents a discussion and conclusions regarding guidelines for free product removal. Free phase product is defined herein as product that exists in a mobile phase in the subsurface such that it could flow to a recovery well or trench and collects in measurable thickness (>0.01 foot) in a well.

2.0 REGULATORY OVERVIEW

Cleanup and abatement of sites that have experienced releases of hazardous substances, including petroleum release cases, are governed by Division 7 (Water Quality) of the Water

Code and Chapter 6.75 (Petroleum Underground Storage Cleanup) of the Health and Safety Code (H&SC). These codes are the law upon which regulations and policies are based. The following discusses the applicable sections of the Water Code that address protection of water quality and the H&SC that address protection of human health and safety from releases of petroleum hydrocarbons, and the policies or regulations developed under each code.

2.1 WATER CODE

Sections 13140 (Adoption of Policy by State Board), 13240 (Adoption of Plans for Areas in Region), and 13304 (Cleanup and abatement order; ...) of Division 7 provide the fundamental law for maintaining quality of state waters (surface and groundwater). There is no specific mention of free product removal in the Water Code.

Section 13140 of the Water Code provides that the "state board shall formulate and adopt state policy for water quality control." Section 13240 of the Water Code calls for adoption of a water quality control plan by each region in California and states that "such plans shall conform to the policies set forth in Chapter 1 (commencing with Section 13000) of this division and any state policy for water quality control."[1]

Section 13304 provides the cleanup and abatement principles that need to be met by the state policy developed under Section 13140, and the water quality control plan developed by each region under Section 13240. These principles are set forth in paragraph (a) of Section 13304:

> "Any person who has discharged or discharges waste into the waters of this state ..., shall upon order of the regional board, clean up the waste or abate the effects of the waste, ..."

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[1] The plan adopted by each regional board establishes water quality objectives that will ensure the "reasonable protection of beneficial uses and the prevention of nuisance, however, it is recognized that it may be possible for the quality of water to be changed to some degree without unreasonably affecting beneficial uses." (Section 13241 of the Water Code). Section 13241 lists some of the factors that should be considered in developing the objectives, and include: past, current and future beneficial uses, environmental characteristics of the hydrograph unit under consideration, water quality conditions that reasonably could be obtained through the coordinated control of all factors affecting water quality, and, economic considerations

2.1.1 Policy Developed Under the Water Code

In accordance with Section 13140, the State Water Resources Control Board (SWRCB) developed Resolution 92-49 to implement Section 13304 of the Water Code. Resolution 92-49 describes policies and procedures for investigation, cleanup, and abatement of all types of discharges under Section 13304. Section III G of this policy allows for alternate cleanup levels to be implemented at sites, as long as the alternative cleanup levels will: "

1. Be consistent with maximum benefit to the people of the state;
2. Not unreasonably affect present and anticipated beneficial use of such water; and
3. Not result in water quality less than that prescribed in the Water Quality Control Plans and Policies adopted by the State and Regional Water Boards; and

H. Consider the designation of containment zones ...".

The policy does not call for the removal of free product unless a site operator or owner is attempting to meet the conditions of a containment zone (Section H.2.b, Resolution 92-49).

2.2 HEALTH AND SAFETY CODE

Chapter 6.75 of the H&SC provides law that further defines what is meant by "abate the effects of the waste" as presented in Section 13304 of the Water Code and states that "(a)ny corrective action conducted pursuant to this section shall ensure protection of human health, safety, and the environment." (Section 25299.37). The H&SC does not explicitly address free phase product removal.

"Corrective action" is defined in Section 25299.14 of the H&SC as "evaluation and investigation of an unauthorized release, initial corrective action measures, as specified in the federal act, and any actions necessary to investigate and remedy any residual effects remaining after the initial corrective action." The federal act is defined in Section 25299.16 of the H&SC as Subchapter IX (commencing with Section 6991) of Chapter 82 of Title 42 of the United States Code (USC) Section 6991 of Chapter 82 of Title 42 of the USC does not require free

product removal as a part of corrective action. As under the H&SC, corrective action under the USC is to be performed to "protect human health and the environment."[2]

2.2.1 Regulations Developed Under the H&SC

Section 25299.77 ("Adoption of implementing regulations") of Chapter 6.75 of the H&SC provides that the SWRCB will adopt regulations that implement the laws presented in Chapter 6.75. Chapter 16 (Articles 5 and 11) of Title 23 of the California Code of Regulations (CCR), the underground storage tank regulations, are the regulations adopted by the SWRCB to implement Chapter 6.75. It is in these regulations that free product removal is discussed.

Section 2655 (Article 5, Chapter 16, Title 23 CCR) describes free product removal requirements and states that when free product is encountered, the site owner or operator "shall remove free product to the maximum extent practicable, as determined by the local agency ..." (Section 2655.a). This section continues on to provide guidelines for mechanisms and procedures to be used in free product removal such that: 1) the product is removed in a manner that minimizes the spread of contamination (Section 2655.b); 2) the main objective of the selected free product removal system is to abate free product migration (Section 2655.c); and 3) flammable products are handled in a safe manner consistent with state and local requirements (Section 2655.d).

Article 11 states that free product removal can be done as a part of the interim remedy of a corrective action program to abate or correct the actual or potential effects of an unauthorized release and defines a corrective action as:

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[2] The United States Environmental Protection Agency (U.S. EPA) developed an EPA Streamlined Implementation for UST Corrective Action in March 1993 (EPA 510-F-93-011, March 1993). The directive "provides guidance and examples of how agencies (primarily state UST programs) have used and can use the flexibility in the federal regulations to improve the efficiency and effectiveness of their programs and make cleanups faster, cheaper, and more effective." In this directive, the U.S. EPA provides risk assessment as a possible approach for documenting that site-specific conditions do not warrant further cleanup (page 13).

"any activity necessary to investigate and analyze the effects of an unauthorized release; propose a cost-effective plan to adequately protect human health, safety, and the environment and to restore or protect current and potential beneficial uses of water; and implement and evaluate the effectiveness of the activity(ies)."

2.2.2 Local Guidelines Developed Under the H&SC

On a more local scale, the Regional Water Quality Control Board - San Francisco Bay Region (RWQCB) has developed guidelines to assist in the implementation of the above regulations and the laws provided in the H&SC and Water Code. These guidelines provide definitions for "low risk" fuel release sites to assist in determining appropriate response actions that are consistent with the laws and regulations regarding petroleum hydrocarbon cleanup. The low risk guidelines follow the mandate of Chapter 6.75 of the H&SC (Section 25299.37) and require evaluation of site data in terms of providing protection for human health, safety, and the environment. Free product is evaluated based on its potential to be a continuing source of degradation to groundwater. The evaluation process for determining whether free product would be considered a continuing source at a particular site is described in the "Fact Sheet - Questions and Answers on the Interim Guidance on Low Risk Petroleum Hydrocarbon Cleanups" prepared by the RWQCB. Free product that presents an ongoing source is addressed as cited in Section 2655 of Article 5, Chapter 16 of Title 23 of the CCR, e.g., "removed to the extent practicable.".

3.0 DISCUSSION

As described above, California law regarding the cleanup and abatement of waste is provided in the Water Code and the H&SC. Both the Water Code and the H&SC provide for policies and regulations, respectively, to be prepared to uphold the laws stated in these codes. Therefore, the purpose and intent of policy regarding the cleanup and abatement of discharges of waste is to implement the law as written in Section 13304 of the Water Code. The Water Code does not require the removal of free product; the code requires the cleanup or abatement of discharges of waste. The policy developed pursuant to the Water Code (Resolution 92-49)

to uphold the laws regarding cleanup and abatement of hazardous substance release sites does not call for free phase product removal, except that free-floating product removal is required as a condition of designation as a containment zone.

Likewise, the H&SC does not state that free phase product in the subsurface needs to be removed as a matter of the law. Rather the law as written in the H&SC (Chapter 6.75) requires corrective action at petroleum release sites to protect human health, safety and the environment. The intent of the regulations governing petroleum hydrocarbon release cleanups provided in Articles 5 and 11 of Chapter 16 of Title 23 of the CCR is to uphold the law as written in the H&SC. Regulations presented in Article 5 (Chapter 16, Title 23) of the CCR states that free product needs to be removed to the extent practicable, as determined by the local agency. The article does not present a definition of "practicable", allowing the local regulating agency discretion in determining the most appropriate procedures to maintain the law (i.e., the protection of human health, safety, and the environment.) Article 11 (Chapter 16, Title 23, CCR) does not call for free product removal; rather it states that a corrective action should protect human health, safety, and the environment and restore or protect current and anticipated beneficial uses of water.

It appears clear that the requirement for removal of free phase product per policy or regulations is to protect human health, safety, the environment, and beneficial uses of waters of the state. Some types of free phase petroleum product (e.g., heavy fraction petroleum hydrocarbons such as oil, or degraded diesel or degraded gasoline) may be present in the subsurface without presenting a threat to human health, safety, the environment and beneficial uses of waters of the state. Regarding the protection of human health, enough data are available from either projects or the literature to establish that oils and degraded fuels usually pose no significant risk to human health This finding is the basic tenet of risk-based approaches. Regarding safety issues, these oils and degraded fuels provide little potential for explosion or flammability Regarding protection of the environment (e.g., surface water), oils and degraded fuels are usually of sufficient viscosity that they are no longer migrating significantly in the subsurface and have reached steady-state conditions. Regarding protection

of the beneficial uses of waters of the state, heavy fraction petroleum hydrocarbons typically do not contain many, if any, soluble constituents and degraded gasoline or diesel may no longer contain soluble fractions, because these constituents tend to degrade most rapidly. Because little or no soluble fraction remains in these petroleum hydrocarbons, they do not constitute a current or continuing source that could degrade groundwater quality. This has been recognized in the guidelines for "low risk" petroleum hydrocarbon cleanups prepared by the RWQCB.

4.0 CONCLUSION

Based on this overview, it does not appear that the law requires removal of free phase product if it can be demonstrated that the presence of the free phase product does not and will not adversely affect human health, safety, or the environment. The regulations promulgated to uphold the law allow local agencies discretion in how to best maintain the law.

If it is demonstrated that the presence of free phase product in the subsurface:

- is no longer acting as a continuing source that can degrade groundwater;
- is not an unacceptable risk for human or ecological health;
- is not migrating significantly such that it presents a current or potential future nuisance to a surface water body; and
- other potential nuisance issues or fire hazards have been addressed; then

the laws regarding petroleum hydrocarbon releases have been met and free product removal is not needed. The risks associated with the presence of these residual free phase petroleum hydrocarbons can be addressed in a site management plan which presents procedures for minimizing access or contact with the petroleum hydrocarbons, and mitigating potential nuisance issues such as secondary migration along utility trenches. This approach allows state and federal resources (e.g., UST fund and regulatory agencies' staff time) to be used to the

maximum benefit of the people of the state of California by focusing efforts on sites that do pose a potential threat to human health, safety, or the environment.