GROUNDWATER RESOURCES ASSOCIATION
OF CALIFORNIA

March 19, 2012

Ms. Jeanine Townsend (commentletters@waterboards.ca.gov)
Clerk to the Board
State Water Resources Control Board
1001 I Street, 24th Floor
Sacramento, CA 95814

Subject: Comment re: Low-Threat UST Closure Policy

Dear Ms. Townsend:

On behalf of the Groundwater Resources Association of California (GRA), please see the attached comments regarding the peer review comments to State Water Resources Control Board (State Board) Draft Low-Threat UST Closure Policy (Closure Policy) and the associated California Environmental Quality Act (CEQA) draft Substitute Environmental Document (SED). These comments were prepared by GRA's Technical Committee which is comprised of a volunteer team of groundwater professionals from public and private sector entities. GRA understands the challenge that the State Board is undertaking, standardizing and streamlining closures of underground storage tank (UST) fuel cases. We trust that the enclosed comments will assist the State Board in completing both the CEQA process that began with the Scoping Document and the final version of the Closure Policy.

If there is an opportunity or need where GRA may be of assistance, please do not hesitate to contact Kathy Snelson, Executive Director of GRA.

Sincerely,

Sarah Raker

Sarah Raker, PG, CHG
President

cc: Kathy Snelson, GRA Executive Director
John McHugh, Technical Committee Co-chair
Bill Motzer, Technical Committee Co-chair

Attachments: GRA Comment to draft Closure Policy, March 19, 2012
GRA's Comments to draft Closure Policy, November 8, 2011
OEHHA Comments to draft Closure Policy, circa November 2011

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Introduction

The Groundwater Resources Association of California (GRA) provides these comments on the State Water Resources Control Board (State Water Board) Draft Low-Threat Underground Storage Tank (UST) Closure Policy (Closure Policy), the associated California Environmental Quality Act (CEQA) Substitute Environmental Document (SED), and three supporting technical justification documents related to potential contaminant exposures via direct contact with soil, groundwater use, and vapor intrusion into buildings that overlie contaminated soil and groundwater. GRA applauds the State Water Board's effort to adopt a policy to clarify and provide a path toward site closure for regulatory staff and the parties responsible for the investigation and cleanup of UST sites. If adopted, the Closure Policy would not only guide closure decisions for UST sites that fit the low-threat criteria specified in the Closure Policy, but would also serve as a general road map to guide the investigation and cleanup of all UST sites. Because the Closure Policy would have a far reaching and profound effect on many aspects of the investigation, remediation, and closure of UST sites throughout California, the content of such a policy must be very carefully considered.

Background

The State Water Board published the draft Closure Policy, three supporting technical justification documents and the associated Scoping Document addressing CEQA elements of the policy in the summer and fall of 2011. GRA submitted comments to these documents in their comment letter to the State Water Board dated November 8, 2011 (see the attached letter).

The State Water Board made a request to California Environmental Protection Agency (CalEPA) on December 8, 2011 for a peer review of the Closure Policy (modified November 10, 2011), and the technical justification documents. The request was to review specific aspects of those documents and to address specific questions prepared by the State Water Board.

Documents to be peer reviewed included the following items:

- Low-Threat UST Closure Policy (November 10, 2011)
- Technical Justification for Groundwater Media-Specific Criteria
- Technical Justification for Vapor Intrusion Media-Specific Criteria
- Technical Justification for Soil Screening Levels for Direct Contact and Outdoor Air Exposure Pathways

Results of the peer reviews were published by the State Water Board on February 29, 2012.

A second peer review was conducted by the Office of Environmental Health Hazard Assessment (OEHHA) in 2011 but was not posted by the State Water Board on its website. It is not clear how these comments will be incorporated into the next version of the Closure Policy, if at all. Please see the attached comments from OEHHA.

The State Board published the latest version of the Closure Policy and three supporting technical justification documents, as well as the latest CEQA document, on January 31, 2012. It is unclear how this version is different from the version submitted to the peer reviewers.

This timeline summary is important because it shows:

- The comment period is short (January 31, 2012 to March 19, 2012);

- The latest version of the Closure Policy may be different than the one used by the CalEPA peer reviewers;

- The CalEPA peer review panel responses became available after publication of the latest version of the Closure Policy.

The peer reviewers submitted very pertinent statements that both support and question portions of the closure policy and technical justification documents. These statements should be carefully considered by the State Water Board so that the policy benefits from the vetting process conducted by an objective body of subject matter experts.

In addition to the comments submitted by GRA on November 8, 2011, GRA provides the following comments to the Closure Policy.

1. Page 2, second paragraph: "*This policy is based in part upon the knowledge and experience gained from the last 25 years of investigating and remediating unauthorized releases of petroleum from USTs. While this policy does not specifically address other petroleum release scenarios such as pipelines or above ground storage tanks, if a particular site with a different release scenario exhibits attributes similar to those which this policy addresses, the criteria for closure evaluation of these non-UST sites should be similar to those in this policy.*"

   The Closure Policy was developed for petroleum UST release sites. Other chemical releases or other release scenarios such as refineries, pipelines, terminals, tanker trucks, surface spills are should not be included in the Closure Policy.

2. The policy should address commingled plumes. Multiple source areas complicate the site conceptual models, and determination of plume lengths.

3. It would be helpful to have illustrations of each five "classes" of low-threat groundwater plumes similar to the illustrations provided for the vapor intrusion scenario.

GRA prepared detailed comments on the Closure Policy and the associated documents in their letter dated November 8, 2011 (see attached). These comments should be considered by the State Water Board for modification of the policy and the CEQA process documents. Important findings that need further consideration by the State Water Board include:

1. GRA believes that despite the State Water Board's best efforts to generalize and distill the evaluation of detailed site-specific data from various UST sites into simple closure criteria, it is impossible to say, a priori, that "cases that meet the general and media-specific criteria established in this policy satisfy the case closure requirements of Health and Safety Code section 25296.10" and State Water Board's Resolution 92-49, as stated on page 8 of the Closure Policy under the "Low-Threat Case Closure" heading. This is because of the wide natural variability between UST sites regarding contaminant plume evolution, vapor migration, nearest exposure receptors, and potential future development in terms of both new land use and new water-supply wells. By definition, every UST site will not meet the statistical norm or even the 95 percentile, and every UST site will not meet the assumed conditions of the transport modeling simulations conducted in support of the Closure Policy. To address these issues, GRA recommends that the Closure Policy be revised to emphasize the continued need for site-specific

interpretation and evaluation of all data and information to support rational UST site closure decisions.

2. While it is appropriate for the State Water Board to adopt a general policy on low-threat UST site closures, the level of detail and lack of flexibility in the Closure Policy leads GRA to recommend that the Closure Policy be shortened and simplified, eliminating the "media-specific" UST site closure criteria while retaining the general call for low-threat sites to be closed in an orderly manner. GRA believes that the media-specific criteria contained in the Closure Policy should not be part of a State Water Board policy, but rather should be included in a guidance manual and specifically, in the California LUFT Manual. Such an approach, where State Water Board policies remain general in nature, and details and specifics are relegated to regulatory guidance, will help ensure that State Water Board policies remain relevant and meaningful over a long period of time. While regulatory guidance can be more easily revised and updated on a periodic basis, State Water Board policies typically remain static for decades.

3. The State Water Board's scoping document did not properly evaluate environmental impacts because it failed to compare the proposed project's impacts with those under the current closure policy. Where a project proposes to alter an existing plan or policy document, a "two-baselines approach" is required. Further, under CEQA a lead agency is required to make a good-faith effort to disclose the environmental impacts of a project to decision makers and the public. By only analyzing existing conditions as the baseline, the scoping document limits the impacts the changes from the existing policy will have on the environment.

In conclusion GRA appreciates the intent of standardizing and stream-lining closures in the state of California. GRA also recognizes the State Water Board has made a considerable effort in this process. The Closure Policy as written has been reviewed by many parties to date including peer review entities. Those reviews indicate aspects of both 1) the fate and transport of the UST release chemicals and 2) the processes described in the Closure Policy are unclear or overly simplified. GRA concludes that the policy should **not** be approved by the State Water Board in its current form and therefore recommends that the policy be returned to staff for revision.

Office of Environmental Health Hazard Assessment Comments on the Proposed Low-Threat UST Closure Policy, 7-14-11

The Office of Environmental Health Hazard Assessment (OEHHA) was requested by the State Water Resources Control Board (SWRCB) Underground Storage Tank Program to review the proposed Low-Threat UST Closure Policy, 7-14-11.

In reviewing this policy, OEHHA staff focused on the technical issues in the Technical Justification for Soil Screening Levels for Direct Contact and Outdoor Air Exposure Pathways and the Technical Justification for Low-Threat Closure Scenarios for Petroleum Vapor Intrusion Policy on the actual policy. The main focus was on whether the methodologies used to determine screening criteria are appropriate and health protective. In this regard, we concentrated on the toxicological and risk assessment aspects. While concentrating on these aspects we did note issues in the policy and technical discussions that we felt may impact on the assumptions used to develop the health based screening criteria. Any comments we made that concern the content and use of the policy are not meant to question or to disagree with the intent of the policy. We strongly support the role of the State Water Resources Control Board in developing policies that speed the closure and reduce the cost of the contaminated petroleum underground storage tank sites while protecting public and environmental health.

Primary Comments

Technical Justification for Soil Screening Levels for Direct Contact and Outdoor Air Exposure Pathways

This technical justification document provided a brief but straightforward discussion on how screening levels were derived. In general, the discussion on why specific methods and parameters were used was too limited. The choices made were not unreasonable, but should be justified over other standard methods and parameters. Some typographical errors were identified that can lead to confusion and a calculation error was identified that seems to be important to the final screening levels. Specific comments on this document are below.

1. Three indicator compounds were selected to characterize the total petroleum hydrocarbon (TPH) group – benzene, naphthalene, and PAHs. The reasons for their selection are not clearly stated. Other petroleum hydrocarbons having longer aerobic biodegradation half-lives (e.g., ethyl benzene vs. benzene) were not selected. Better explanation on the representativeness of the compounds selected is needed.

2. There should be an explanation provided on why the *American Society for Testing and Materials (ASTM)* methodology was used to determine volatilization factors (VF) instead of US EPA's method. In Table 6, the *Width of source area parallel to wind, or groundwater flow direction* needs more justification than ASTM 1996. An explanation should be provided about why this value is applicable for all sites. An

explanation should also be provided about the use of ASTM values for the parameters and not US EPA default values which are developed for specific parts of the state and size of the site.

3. The Soil Screening Levels values for naphthalene: residential; commercial/industrial; and utility workers in Table 9 are incorrect if one uses the stated *Organic carbon partition coefficient* and *Diffusion coefficient in air* of 1500 mL/g and 0.06 cm^2/s, respectively, in Table 7. Actual *Organic carbon partition coefficient* and *Diffusion coefficient in air* used in the calculations were 1190 mL/g and 0.059 cm^2/s, respectively. There should be a careful review comparing the listed parameters to the ones used in the calculations.

4. The introduction on page 2 states, *"The volatilization algorithm commonly used in USEPA screening level equations can greatly overestimate the amount of contaminant volatilizing into outdoor air for volatile chemicals (OEHHA, 2005)."* OEHHA did not make such a statement in the referenced document. This reference to OEHHA should be removed.

5. Fig. 1. Conceptual Site Model should include Inhalation of Particles under Exposure Routes for Subsurface Soil. This pathway should be marked as complete for the Trench/Utility Worker Scenario.

6. In paragraph 3 of page 2 it is stated, *"The toxicity value used for the entire group of carcinogenic hydrocarbons is California's Office of Environmental Health Hazard Assessment (OEHHA) cancer potency value for benzo(a)pyrene."* It would have been preferable to use Potency Equivalence Factors for PAHs, This is where the cancer potency is assigned to individual PAHs based on their potency relative to benzo(a)pyrene. A list of Potency Equivalency Factors PAHs has been developed by OEHHA (1993). Applying only the BAP potency value to the groups of PAHs overstates the risk, and is more health conservative. If you have done it that way for simplicity perhaps that should be mentioned in the document.

7. On page 4, in paragraph 2 it is stated that, *"For the residential exposure scenario, it is assumed that the receptor is a child for 6 years and then an adult for 24 years. When calculating carcinogenic risk, the total intake of a chemical over a lifetime is used; therefore, the carcinogenic residential screening levels are protective of the combined child plus adult scenario."* This method has been commonly used. However, there is concern that children may be more sensitive than adults are to carcinogens. The U.S. Environmental Protection Agency has developed a methodology to formally account for this in assessing risk and so has OEHHA. OEHHA published its guidance in 2009 and we suggest that this be considered for use in developing the direct contact soil levels.

8. In paragraph 4, on page 4 it is stated that, *"...the exposure duration is assumed to be much shorter than in the other two scenarios; however, the chemical intake per*

day may be higher due to increased incidental ingestion." The possibility that daily intake through inhalation would also be increased could also be considered.

9. Starting in the last paragraph on page 4 there is a discussion of a rare case of residential exposure from excavation of soil for a swimming pool. It provides assumptions that will lower exposures but does not discuss how exposures can greatly increase for a short period of time. The rare case of exposure should be discussed, but perhaps a specific example is not needed.

10. Specific errors or omissions

    10.1. The $VF_{subsurface}$ equation was not provided in Table 5 with the other VF equations. In addition, the $VF_{subsurface}$ calculated values did not include the 1000x conversion factor so they are all too small and lead to Soil Screening Levels that are too large in Table 9.

    10.2. In Table 1, the equation for lnFadj contains an extra factor, AFa, which does not belong there.

    10.3. In Table 6, the variable symbol for *Outdoor air mixing zone height* should be "δ_{air}" and that for *Thickness of impacted soil* should be "d" so they are consistent with the equations.

    10.4. In Tables 8 and 9 the value for "PAH" at "5 to 10" and "Utility," respectively, is 7.5 mg/kg. This is different than the calculated value of 8 mg/kg.

    10.5. In the last paragraph on page 5 at the end of the second sentence the phrase, "as shown in figure 2," should be added.

Technical Justification for Low-Threat Closure Scenarios for Petroleum Vapor Intrusion Pathway

This technical justification document provides an overview of the reasons why bioattenuation of petroleum hydrocarbons allows for closure of the low-threat UST sites. The primary problems found in this discussion are that the important literature cited in the text does not appear to have gone through a peer review process and methods or reasons for choosing the ultimate criteria for the policy were not provided. Specific comments are provided below.

1. The last paragraph in the Executive Summary on page 2 states, *"The screening criteria may therefore not be applicable for non-retail (e.g., pipeline, manufacturing, and terminal) sites where significantly larger volume petroleum hydrocarbon releases may have occurred..."* It is suggested that the conditions making the policy non-applicable should be better described to avoid misinterpretation and misuse

(e.g., how large volume release is expected to prohibit the potential aerobic degradation).

2. The technical justification should more clearly state the difference between "high" (LNAPL) and "low" (dissolved-phase) concentration sources. The descriptions provided can be confusing.

   For example on page 2 for groundwater, it indicates that benzene <15 mg/L is in dissolved phase, while on page 3 it indicates that benzene >3 mg/L is LNAPL. In addition, on page 5 it states, *"A 10 mg/L benzene vapor source is consistent with a dissolved-phase source of benzene (or BTEX) of around 40 mg/L assuming equilibrium partitioning between soil-gas and groundwater and a Henry's Law coefficient of 0.25 for benzene (or BTEX)."* The above statements are contradictive. For example, benzene at 10 mg/L in groundwater cannot be present in dissolved phase and as LNAPL at the same time.

3. The technical justification requires more detailed information to make this policy transparent and to avoid misinterpretation and misuse. The screening criteria derivation, all assumptions, and the rationale should be provided to make this policy transparent.

   This technical justification presents screening criteria for the indoor inhalation of petroleum vapors migrating from the subsurface pathway. It refers to the results and conclusions of certain modeling simulations (Abreu et al. 2009), and on the conclusions resulting from statistical treatment of field data. The screening criteria derivation is not provided in sufficient detail. Although the rationale relied on statements in the referenced sources, the derivation of the selected screening criteria values, e.g., for TPH concentration in bioattenuation zone, O_2 concentrations, exclusion distances, and attenuation factor under scenario 4, is not clear. This creates difficulties in the interpretation of the screening criteria and potentially in the use of this policy.

   3.1. The document should clearly state the O_2 levels that permit aerobic biodegradation (characterizing *"no bioattenuation"* vs. *"bioattenuation zone");* how they were *"normalized"* (Abreu et al., 2009); how they correspond to the aerobic half-life degradation rates; and the basis for 4% O_2 content as a point of departure for different criteria under Scenarios 3 and 4. The sub-scenario (Scenario 3) title should omit *"without oxygen measurements"* part because aerobic biodegradation cannot be expected to always occur.

   Technical Background, Low Concentration Sources. The aerobic biodegradation is represented by the measurements of O_2 content in the subsurface soil and groundwater. The document does not provide the basis for 4% O_2 content as a point of departure for different criteria under Scenarios 3 and 4. Model studies described in section 3.1.1, on page 5, assume an average aerobic degradation half-life rate of 0.79 hr^{-1}. Further, the text states, *"Note,*

while a degradation rate of 0.75 hr^{-1} may seem high, the model only allows degradation in the regions where there is enough O_2 to support it. The model cutoff for allowing degradation was 1% O_2." One of the sub-scenarios under Scenario 3 lists the requirements for *"Bioattenuation Zone Without Oxygen Measurements or Oxygen < 4 %"*. This title implies that the existence of some level of aerobic degradation in the exclusion zone (Figure 4 shows modeling based on significant degradation even at O_2 levels lower than 1 %). However, Scenario 4 assumes *"No Bioattenuation Zone"* when the O_2 content is below 4% at the bottom of the 5 foot exclusion distance. While these assumptions are contradictive, it is clear that a *"bioattenuation"* zone providing adequate biodegradation should not be assumed to always exist. Therefore, it is important to describe:

- The relationship between $\%O_2$ content and biodegradation half-life rate, and all assumptions made;
- O_2 levels characterizing *"no bioattenuation"* vs. *"bioattenuation zone";*
- The basis for proposing different screening criteria below and above 4% O_2 should be supported by field data;
- The measurement of the O_2 content should be required under all scenarios.

3.2. According to the text and note 6, on page 8, benzene (an index chemical for TPHs) will be bioattenuated to 100 $\mu g/m^3$, if the benzene source (in groundwater) is in concentration *"from 0.1 mg/L to 15 mg/L"*, and is located 5 ft below the the foundation. This soil-gas *"screening"* concentration of 100 $\mu g/m^3$ is considered *"relatively conservative"* based on an indoor air risk-based concentration of 2 $\mu g/m^3$ (the authors apply a slab attenuation factor of 0.02). In Appendix 3, Scenario 3, Figure A presents a sub-scenario apparently based on the above field data analysis, namely screening criteria for exclusion distance of 5 feet between groundwater containing benzene at concentration <100 µg/L (0.1 mg/L). It should be noted that the cancer risk of inhaling 2 $\mu g/m^3$ of benzene under a residential scenario (30 years of exposure) is 2.4E-05. While the acceptability of a specific risk level is a risk management decision to be made by the SWRCB, the typical acceptable *de minimis* target cancer risk is 1.0E-06. Therefore, the expected bioattenuated concentration of 100 $\mu g/m^3$ (2 $\mu g/m^3$ indoors) should not be referred to as conservative. Additional discussion might be applicable to indicate why this residential exposure level is acceptable.

3.3. Sub-scenarios B and C are based on modeling simulations (and perhaps on the field data commented above under sub-scenario A), and require additional detail to support the proposed combinations of exclusion distances, benzene groundwater concentrations, soil TPH concentrations, and O_2 content.

3.4. Scenario 4 allows for applying a 1,000-fold factor to the benzene CHHSL values if the O_2 concentration at the bottom of the 5 foot exclusion distance is ≥ 4 %. According to Section 4.4 (pages 21-22), the screening criteria are based on the same modeling study (Abreu et al., 2009). The text states that *"the proposed*

vapor screening criteria of 5,000 µg/m^3 is very conservative", and that the 4% O_2 requirement *"is a very conservative level for biodegradation to occur."* The text should clarify the basis for these conclusions. The proposed 1,000-fold factor should, if possible, be verified by field data.

3.5. Scenarios 3 and 4. The rationale for the screening criterion for Total TPH in bioattenuation zone soil to *"contain Total TPH (TPH$_g$ and TPH$_d$ combined) less than 100 mg/kg throughout the entire depth of the attenuation zone"* should be provided. The only text related to this soil concentration level appears on page 3 (note 2), and on page 4 and states that *" <100 mg/kg is a good indication that there is a small or low concentration VOC source."* References to support this statement could be given, for example modeling or field data showing that this soil contamination will not affect the aerobic biodegradation of the vapors coming from the source located underneath (groundwater or soil).

3.6. The calculations on page 7, converting vapor phase concentrations, appear to be incorrect and should be double-checked.

On page 7 it states, *"The analyses indicate that "dissolved-phase" sources <6 mg/L benzene in groundwater (or ~ 24,000,000 µg/m^3 vapor phase equivalent[5]) are completely attenuated within distances of 5 ft. or less."* Footnote 5 states, *"Assuming a Henry's Law coefficient of 0.25 cm^3/cm^3 for benzene."* The vapor concentration at the groundwater source (assuming equilibrium) should be calculated as the product of the groundwater concentration and the Henry's Law coefficient (User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings, US EPA, 2004). Accordingly, *"~ 24,000,000 µg/m^3"* should probably read 1,500,000 µg/m^3. Similarly, *"7,500,000 µg/m^3"* should probably read 3,750,000 µg/m^3 in footnote 6, on page 8.

4. References provided:

4.1. The main article describing the modeling is cited under two separate publications – Abreu et al., 2009 and API, 2009. These publications appear to contain the same information by the same authors so only one should be cited.

4.2. The reference cited as what seems to be the primary source for much of the technical justification is Lahvis, 2011. This citation is not an article but a presentation to the Ministry of the Environment of British Columbia which was not available for review. The presentation was based on Davis, 2009 – article which seems to not have been peer-reviewed (LUSTLine Bulletin), and based in turn on the author's own database which is not publicly available. Other cited articles (DeVaull) are in press. The most important references used to support the methodology being used for the policy should come from peer reviewed literature. If this is not possible, there needs to be a discussion on why this information can be relied on to develop the methodology on which to base the policy.

4.3. The text refers to a non-existing guidance document, e.g., page 2 *"The materials referenced in this technical justification are consistent with the technical material being used to develop guidance by US EPA's Office of Underground Storage Tanks (OUST)'s Task Force on Petroleum Vapor Intrusion."* While US EPA may be developing such a document, it should not yet be cited.

4.4. The reference list is not consistent with the text. The list shows sources which are not cited in the text, e.g., Abreu et al., 2006; ITRC, 2007; Lahvis et al. 2010; Lahvis et al, 1999, Lahvis et al. 1996; McHugh et al., 2010; Potter et al., 1998. The text cites a reference not shown in the reference list - TPHCWG, 1998.

5. Minor errors or inconsistencies

5.1. In paragraph 2 on page 1 the part that states, *"(Note the CHHSL for benzene in soil gas is 83 µg/m^3.)"* should read: "(Note the **residential** CHHSL for benzene in soil gas, without engineered fill under the foundation, is **36** µg/m^3 and for **commercial**, without engineered fill under the foundation, is **120** µg/m^3.)" or "(Note the **residential** CHHSL for benzene in soil gas, with engineered fill under the foundation, is **85** µg/m^3 and for **commercial**, with engineered fill under the foundation, is **280** µg/m^3.)" The correct CHHSLs to cite depend on your scenario. Newer construction would likely have engineered fill under the foundation, while older construction may not.

5.2. On page 5 in paragraph 1, the sentence, *"Note, while a degradation rate of 0.75 hr^{-1} may seem high, the model only allows degradation in the regions where there is enough O_2 to support it,"* should probably have the degradation rate listed as **0.79 hr^{-1}** since this is the rate used throughout the document.

5.3. Also on page 5 in paragraph 1, the statement, *"A 10 mg/L benzene vapor source is consistent with a dissolved-phase source of benzene (or BTEX) of around 40 mg/L assuming equilibrium partitioning between soil gas and groundwater and a Henry's law coefficient of 0.25 for benzene (or BTEX)."* has a different Henry's law coefficient than is given in Table 7 of the *"Technical Justification for Soil Screening Levels for Direct Contact and Outdoor Air Exposure Pathways"* where the Henry's law constant is listed as 0.23.

5.4. In paragraph 2 on page 9, there are two sentences that say, *"In summary, field data from retail sites shows that for low concentration (e.g., dissolved-phase only) sources, benzene will be attenuated to below screening levels within 5 ft above the water table. Vapor intrusion risks would be rare to non-existent at these retail sites provided the water table does not come in contact with the building foundation."* This could be rewritten to be clearer. A suggestion is, "In summary, field data from retail sites **analyzed by Lahvis (2011)** show that for low concentration (e.g., dissolved-phase only) sources, benzene will be attenuated to below screening levels **(100 µg/m^3)** within 5 ft above the water

table. Vapor intrusion risks would be **low** at these retail sites provided the water table does not **rise above 5ft below the building foundation**."

Supplementary Comments

While reviewing the policy and technical justifications a number of questions came up that had to do with how well the site must be characterized before this policy can be followed. There are portions of the policy that suggest that the sites need to be well characterized before a low-threat closure can be done. However, there are no specific requirements provided, which raises concerns about how users will interpret the policy. In discussions with the SWRCB staff, we were told that this policy cannot be used until the site is fully characterized in a manner similar to the requirements of the LUFT Manual. We feel this should be more explicitly indicated in the policy. The following comments were developed based on our initial review and are included here to highlight our questions that arose based on our lack of understanding and that we feel will also occur with users of the policy.

Low-Threat UST Closure Policy 7-14-11

1. On page 2, the policy states, *"... if a particular site with a different release scenario exhibits attributes similar to those which this policy addresses, the criteria for closure evaluation of these non-UST sites should be similar to those in this policy."* This needs clarification and a list of the attributes to prevent misinterpretation and misuse.

2. On page 3, the policy provides "*General Criteria*" that must be satisfied by all candidate sites. It then expands on these criteria, one of which is: b. The unauthorized release consists only of petroleum. The expanded description of this criterion states, *"For the purposes of this policy, petroleum is defined as crude oil, or any fraction thereof, which is liquid at standard conditions of temperature and pressure, ..., including any additives and blending agents such as oxygenates contained in the formulation of the substances."* Some additives may not biodegrade. Therefore, it is incorrect to imply that any additive or blending agents will biodegrade to the same level as the selected representative petroleum compounds (benzene, naphthalene, and PAHs for direct contact; benzene for vapor intrusion). There should be some method to determine if any additive or blending agents may pose a hazard after the petroleum biodegrades.

3. Clarification or revision of the text is needed on page 7 to the last paragraph in the section,

   "*2. Petroleum Vapor Intrusion to Indoor Air*"
   "*Exception: Exposures to petroleum vapors associated with historical fuel*

system releases are comparatively insignificant relative to exposures from small surface spills and fugitive vapor releases that typically occur at active fueling facilities. Therefore, satisfaction of the media-specific criteria for petroleum vapor intrusion to indoor air is not required at active commercial petroleum fueling facilities, except in cases where release characteristics can be reasonably believed to pose an unacceptable health risk."

The text implies that small surface spills and fugitive vapor releases that typically occur at active fueling facilities are more significant than the historical fuel system releases and states there is no need for satisfaction of the media-specific criteria for petroleum vapor intrusion to indoor air at the active commercial petroleum fueling facilities from the historical fuel system releases. If this site is then given a uniformed closure letter, when will the site be re-evaluated if the retail property becomes a residential property?

4. The text on page 9, *"b. Monitoring Well Destruction"* seems to be in conflict with *"Resolution No. 92-49"* discussed on page 8.

   On page 9, revision or clarification is needed to the first paragraph, *"b. Monitoring Well Destruction – All wells and borings installed for the purpose of investigating, remediating, or monitoring the unauthorized release shall be properly destroyed prior to case closure unless a property owner certifies that they will keep and maintain the wells or borings in accordance with applicable local or state requirements."* This requirement seems to be in conflict with *"Resolution No. 92-49 does not require that the requisite level of water quality be met at the time of case closure; it specifies compliance with cleanup goals and objectives within a reasonable time frame."* How would the levels of benzene and MTBE in groundwater (required under site classes 2 and 4, on page 6) be monitored if the monitoring wells are destroyed when the site closure is implemented under the assumption of compliance with goals/objectives within a reasonable time frame?

5. The policy does not state and should clearly state when it should not be applied, e.g., the mixed releases of petroleum and other contaminants; non-retail sites (pipelines, refineries), etc. (For additional conditions please refer to the comments in the Vapor Intrusion section below.)

Technical Justification for Low-Threat Closure Scenarios for Petroleum Vapor Intrusion Pathway

The following comments were prepared because the policy was not clear that a full site investigation and characterization is required before this policy is applicable to the site closure. If the sites must first go through a full site investigation and characterization, these comments may not be useful.

1. If such conditions resulting in vapor intrusion exist, the site should be evaluated following a site-specific assessment approach. The site and the impacted off-site areas should be investigated to eliminate such conditions. Examples of such prohibitive conditions include:

   1.1. Seasonal groundwater fluctuations may move the contamination up into the exclusion zone (requires multiple groundwater elevation measurements);

   1.2. Presence of preferential pathways: gas stations are a special case since tanks are backfilled with clean gravel which provides no habitat for microorganisms and easy migration into the gas-station building;

   1.3. Presence of perched zones under the building which hold LNAPL or dissolved phase petroleum hydrocarbons close to the building foundation;

   1.4. Presence of dewatering pump with sump bringing contaminated water or vapors inside the building;

   1.5. Large building foundation and or pavement (typically installed on gravel) around the building may result in anoxic soil conditions;

   1.6. Presence of highly organic soils, e.g. peat may increase the O_2 demand to degrade its organic content thus limiting the petroleum hydrocarbons' degradation (requires measurement of the fraction of organic carbon);

   1.7. Clay soils have lower air permeability resulting in lower O_2 content and poorer aerobic conditions/degradation;

   1.8. The presence of methane should be analyzed for. Methane may be formed as a result of anaerobic degradation of petroleum hydrocarbons. It occurs more often at high volume concentrated (LNAPL) releases or where ethanol-blended gasoline has been released where the O_2 is exhausted. It may cause increases in the gas volume and gas pressure and move the petroleum hydrocarbon vapors towards the surface. It is degraded in aerobic conditions thus additionally decreasing the available O_2. Methan may cause an explosion in confined spaces.

2. All necessary sampling procedures and analytical methods (used to quantify the screening criteria and to investigate prohibitive conditions such as the ones described above) should be described or referred to in regulatory guidance documents.

   The policy should recommend procedures or refer to guidance documents describing sampling (e.g., number and location of samples) and analytical methods for the recommended screening criteria. The DTSC Guidance for the Evaluation

and Mitigation, 2004 should be followed to check for acute indoor hazards, and for preferential pathways. Methane should also be analyzed for. The policy should consider and describe conditions requiring confirmation sampling (e.g., under building foundations) to ensure the concentrations under the potentially impacted building are or will result in insignificant risk.

3. The policy should recommend a procedure demonstrating that the site-specific aerobic degradation attenuates the petroleum vapors to levels resulting in insignificant cancer risk and non-cancer hazard levels.

   The aerobic biodegradation depends on the availability of microorganisms in sufficient quantities to support the biodegradation process, and sufficient soil O_2 and water to create their habitat. The application of this policy should be contingent upon demonstrating that the site-specific aerobic degradation attenuates the petroleum hydrocarbons to levels resulting in insignificant cancer risk and non-cancer hazard levels. One way to do this is to collect on-site samples, e.g. in depth to prepare vertical concentration profiles for O_2, VOCs, and CO_2.

References cited by OEHHA.

Office of Environmental Health Hazard Assessment (OEHHA) 1993. Benzo[*a*]pyrene as a Toxic Air Contaminant. Part B. Health Effects of Benzo[*a*]pyrene. Air Toxicology and Epidemiology Section, Berkeley, CA.

Office of Environmental Health Hazard Assessment (OEHHA) 2009. Technical Support Document for Cancer Potency Factors: Methodologies for derivation, listing of available values, and adjustments to allow for early life stage exposures. Air Toxicology and Epidemiology Branch. Oakland, CA.

US Environmental Protection Agency (US EPA) 2004. User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings. Office of Emergency and Remedial Respnse. Washington , DC.

GROUNDWATER RESOURCES ASSOCIATION
OF CALIFORNIA

Celebrating 20 Years of Dedication to Groundwater

November 8, 2011

Mr. Kevin Graves
State Water Resources Control Board
Division of Water Quality
P.O. Box 100
Sacramento, CA 95812-0100

Subject: GRA Comments on *Low-Threat UST Closure Policy Scoping Document*

Dear Mr. Graves,

Submitted herewith for consideration by the State Water Resources Control Board (State Board) are comments from the Groundwater Resources Association of California (GRA) on the *Draft Low-Threat UST Closure Policy* (Policy), the associated *Low-Threat UST Closure Policy Scoping Document*, and supporting Technical Justification documents. These comments were prepared by GRA's Technical Committee which is comprised of a volunteer team of groundwater professionals from public and private sector entities. GRA understands the challenge that the State Board is undertaking in standardizing and streamlining closures of underground storage tank (UST) fuel cases. We trust that the enclosed comments will assist the State Board in completing both the CEQA process that began with the Scoping Document and the final version of the Policy.

I would also like to take this opportunity to offer the services of GRA's Technical Committee to assist or advise the State Board in its preparation or review of the Supplemental Environmental Document, the final Policy, and/or future groundwater-related documents. GRA's broad membership of over 1,200 professionals provides a wealth of technical and institutional knowledge of state-wide and local groundwater issues that the State Board may find to be a valuable resource. If there is an opportunity or need where GRA may be of assistance, please do not hesitate to contact Kathy Snelson, Executive Director of GRA.

Sincerely,

William Pipes
President

cc: Kathy Snelson, GRA Executive Director
John McHugh, GRA Technical Committee Co-chair
Bill Motzer, GRA Technical Committee Co-chair

Enclosures

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GRA Technical Committee Review of the State Water Resources Control Board's (State Water Board) Draft Low-Threat Underground Storage Tank (UST) Closure Policy (Closure Policy) and Low-Threat UST Closure Policy CEQA Scoping Document.

Introduction

The Groundwater Resources Association of California (GRA) provides these comments on the State Water Resources Control Board (State Water Board) Draft Low-Threat UST Closure Policy (Closure Policy), the associated CEQA Policy Scoping Document and three supporting Technical Justification documents related to potential contaminant exposures via direct contact with soil, groundwater use, and vapor intrusion into buildings that overlie contaminated soil and groundwater. GRA applauds the State Water Board's effort to adopt a policy to clarify and guide the path toward site closure for regulatory staff and the parties responsible for the investigation and cleanup of underground storage tank (UST) sites. If adopted, a State Water Board Low-Threat UST Site Closure Policy would not only guide closure decisions for UST sites that fit the low-threat criteria specified in the Closure Policy, but would also serve as a general road map to guide the investigation and cleanup of UST sites that have not yet attained the low-threat criteria specified in the Closure Policy. Because the Closure Policy would have a far reaching and profound effect on all aspects of the investigation, remediation, and closure of UST sites throughout California, the content of such a policy must be very carefully considered.

This comment letter provides general and detailed comments. In general, the CEQA Policy Scoping Document seems to mistakenly conclude that there will be no significant effect of adopting the Closure Policy. Also, the supporting Technical Justification documents appear to fail to adequately support certain aspects of the Closure Policy. The Technical Justification documents do not fully address the potential threats posed by MTBE and its significant breakdown product TBA, completely ignores other existing oxygenates/fuel additives (e.g., TAME, ETBE, DIPE) and the possibility that new fuel additives with greater volatility and or toxicity might be introduced in the future. Also, one of the reference documents that is relied upon and frequently cited in the Technical Justification documents is the revised Draft California LUFT Manual, which is still in draft public-comment form. GRA recommends that significant supporting documents for the Closure Policy (such as the LUFT Manual) should be final public documents.

Most importantly, despite the State Water Board's best efforts to generalize and distill the evaluation of detailed site-specific data from various UST sites into simple closure criteria, it is impossible to say, a priori, that "cases that meet the general and media-specific criteria established in this policy satisfy the case closure requirements of Health and Safety Code section 25296.10" and State Water Board's Resolution 92-49, as stated on page 8 of the Closure Policy under the "Low-Threat Case Closure" heading. This is because of the wide natural variability between UST sites regarding contaminant plume evolution, vapor migration, nearest exposure receptors, and potential future development in terms of both new land use and new water-supply wells. By definition, every UST site will not meet the statistical norm or even the 95 percentile, and every UST site will not meet the assumed conditions of the transport modeling simulations conducted in support of the Closure Policy. To address these issues, GRA recommends that the Closure Policy be revised to emphasize the continued need for site-specific interpretation and evaluation of all data and information to support rational UST site closure decisions.

While it is appropriate for the State Water Board to adopt a general policy on low-threat UST site closures, the level of detail and lack of flexibility in the Closure Policy leads GRA to recommend that the Closure Policy be shortened and simplified, eliminating the "media-specific" UST site closure criteria while retaining the general call for low-threat sites to be closed in an orderly manner. We recommend that the media-specific criteria contained in the Closure Policy should not be part of a State Water Board policy, but rather should be included in a guidance manual and specifically, in the California LUFT Manual. Such an approach, where State Water Board policies remain general in nature, and details and specifics are relegated to regulatory guidance, will help ensure that State Water Board policies remain relevant and meaningful over a long period of time. While regulatory guidance can be more easily revised and updated on a periodic basis, State Water Board policies typically remain static for decades.

Draft Low-Threat UST Closure Policy General Comments:

1. **Alternate Approach** (Page 1, 2nd Paragraph)
"The State Water Board also recognizes that the technical and economic resources available for environmental restoration are limited, and that the highest priority for these resources must be the protection of human health and environmental receptors."

An alternate approach for the best management of available agency resources would be to prioritize all of the currently existing sites for allocation of limited resources based on the risk they pose. This would lead to allocating resources preferentially to cases that are likely to create the greatest harm. In fact this alternative when appropriately evaluated through CEQA might actually have more beneficial impacts to human health and the environment than prioritizing closures that generally pose less risk.

2. Importance of Groundwater
The scoping document and Closure Policy should include a discussion of the importance of groundwater in the State, the factors affecting and/or threatening the water quality of these waters in the State including leaks from USTs.

3. Existing Policies
Though the policy states that it is consistent with existing policies and Regional Water Board Basin Plans there appear instances where the Closure Policy is in conflict with these governing documents. For instance, it appears that the Closure Policy would be in conflict with existing policy Resolution 68-16 "Statement of Policy with Respect to Maintaining High Quality of Waters in California." Policy 68-16 states:

"Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained."

In addition, the Closure policy appears be in conflict with existing policy 88-63 "Adoption of Policy entitled Sources of Drinking Water." Policy 88-63 states:

"All surface and ground waters of the State are considered to be suitable, or potentially suitable, for municipal or domestic water supply and should be so designated by the Regional Boards[1] with the exception[2] of:
1. Surface and ground waters where:
a. The total dissolved solids (TDS) exceed 3,000 mg/L (5,000 uS/cm, electrical conductivity) and it is not reasonably expected by Regional Boards to supply a public water system, or
b. There is contamination, either by natural processes or by human activity (unrelated to the specific pollution incident), that cannot reasonably be treated for domestic use using either Best Management Practices or best economically achievable treatment practices, or
c. The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day."

There is also a potential that the Closure policy would be in conflict with existing policy 92-49 "Policies and Procedures for Investigation and Cleanup and Abatement of Discharges under Water Code Section 13304." Policy 92-49 states:

"4. WC Section 13304 requires that any person who has discharged or discharges waste into waters of the state in violation of any waste discharge requirement or other order or prohibition issued by a Regional Water Board or the State Water Board, or who has caused or permitted, causes or permits, or threatens to cause or permit any waste to be discharged or deposited where it is, or probably will be, discharged into the waters of the state and creates, or threatens to create, a condition of pollution or nuisance may be required to clean up the discharge and abate the effects thereof. This section authorizes Regional Water Boards to require complete cleanup of all waste discharged and restoration of affected water to background conditions (i.e., the water quality that existed before the discharge). The term waste discharge requirements includes those which implement the National Pollutant Discharge Elimination System;"

Policy 92-49 did put forth a "containment zone policy" that stated:

"26. It is not the intent of the State or Regional Water Boards to allow dischargers, whose actions have caused, permitted, or threaten to cause or permit conditions of pollution, to avoid responsibilities for cleanup. However, in some cases, attainment of applicable water quality objectives for ground water cannot reasonably be achieved. In these cases, the State Water Board determines that establishment of a containment zone is appropriate and consistent with the maximum benefit to the people of the State if applicable requirements contained in the Policy are satisfied. The establishment of a containment zone does not limit or supersede obligations or liabilities that may arise under other laws;"

And

"H. Consider the designation of containment zones notwithstanding any other provision of this or other policies or regulations which require cleanup to water quality objectives. A containment zone is defined as a specific portion of a water bearing unit where the Regional Water Board finds, pursuant to Section III.H. of this policy, it is unreasonable to remediate to the level that achieves water quality objectives. The discharger is required to take all actions necessary to prevent the migration of pollutants beyond the boundaries of the containment zone in concentrations which exceed water quality objectives. The discharger must verify containment with an approved monitoring program and must provide reasonable mitigation measures to compensate for any significant adverse environmental impacts attributable to the discharge."

Note the containment zone designation is an option available to dischargers instead of site closure; however it requires the discharger to both monitor groundwater quality and provide mitigation for significant adverse environmental impacts. The proposed Closure Policy will have neither of these conditions.

4. Future Conditions

The Closure Policy does not address future conditions that may redefine the understanding of the harm the fuel hydrocarbons present to health or the environment. Some of the conditions that may change are groundwater flow, chemistry of fuel, and the use of groundwater. These potential changes are described further in the specific comments below.

In the groundwater media specific section, the fourth paragraph describes how this Closure Policy relies on natural attenuation to completely remediate the contamination in a reasonable amount of time, of decades to hundreds of years as stated by the State Water Board, prior to the water being needed.

Draft Low-Threat UST Closure Policy Specific Comments

1. **Chemicals Representing Fuels**

List of chemicals chosen to represent fuels and the risk fuels pose should be quantitatively evaluated and presented. The threat to health and the environment posed by these chemicals is a function of prevalence, toxicity and fate and transport. The ranking of chemicals based on these criteria would provide a systematic and objective basis for indicator chemicals. Also the potential threat these chemicals pose should be evaluated for all beneficial uses. For example benzene is most toxic to humans but not necessarily to other life forms. Besides the initial chemicals present in fuel, degradation-by-products should also be included. Notably, TBA which forms from MTBE should be addressed in the Closure Policy. Furthermore the chemical composition of gasoline has changed in recent years to include more ethanol. Recent studies regarding the impacts of ethanol-blended, fuel formulations on plume migration and on degradation rates of other fuel constituents (Mackay et. al., 2006 and 2007) should be included in the analysis for low threat criteria as these studies show that the fuels constituents like MTBE may have a decreased biodegradation rate as ethanol is preferentially metabolized.

2. **Site Conceptual Model**

This policy recognizes that some petroleum-release sites may possess unique attributes and that some site specific conditions may make the application of policy criteria inappropriate. It is impossible to completely capture those sets of attributes that may render a site ineligible for closure based on this low-threat policy. This policy relies on an accurate and complete site characterization being performed and the use of the site conceptual model to identify the special attributes that would require specific attention prior to the application of low-threat criteria by all parties involved.

The last paragraph of the Criteria for Low-Threat Case Closure states the regulator must rely upon the site conceptual model to identify unique attributes that may render a site ineligible for closure based on the policy. There exists the potential that the responsible party or its agent may want to minimize the effort required to create the site conceptual model. Specifically they may be reluctant to search for and incorporate any unique site

attributes into the site conceptual model that may jeopardize closure. The policy limits the regulator to use the responsible party's, or its agent's, site conceptual model for identification of unique attributes. This appears to change the historic roles of responsibilities from the entity responsible for the contamination to the public as represented by regulators to adequately evaluate the contamination and justify why it is not a threat to the public and the environment. This situation should be rectified by modifying the paragraph to make the responsible party and its agent responsible for identification and incorporation of important (as determined by the regulatory agency) unique site attributes into the site conceptual model. Since site conceptual models can vary in quality and scope a standard should be used, such as ASTM E1689 - 95(2008) Standard Guide for Developing Conceptual Site Models for Contaminated Sites.

The description of conceptual model development on page 4 of the draft policy should be expanded to specify the need to identify all wells both active and inactive (not just pumping), located within the plume area where residual contamination is to be left in place (and a reasonable distance down gradient). Each identified well should be inspected and assessed for the potential for the well to act as a conduit for cross contamination of aquifers when not pumping, and when active to influence the transport of contaminants beyond the plume boundary. This assessment should include the review of administrative and operating data for the well including, but not limited to Driller Reports, permits for drilling and operating the well and well performance data. Where possible, well locations should be verified in the field and inspected. Specific data on each existing well should be gathered to support the assessment. The specific data for each inspected well should include, but not be limited to: the geographical coordinates (Latitude/Longitude and elevation using sub- meter accuracy Geographic Positioning System (GPS) technology); physical description as built with modifications; geophysical logs, static water level; the results of available pump tests (well drawdown); chemical sampling; and in well flow direction and velocity under non-pumping conditions.

3. **Protection of Existing Wells** (Page 2, 2nd paragraph)

"a. The unauthorized release is located within the service area of a public water system
This policy is protective of existing water supply wells. New water supply wells are unlikely to be installed in the shallow groundwater near former UST release sites. However, it is difficult to predict, on a statewide basis, where new wells will be installed, particularly in rural areas that are undergoing new development. This policy is limited to areas with available public drinking water supplies to reduce the likelihood that new wells in developing areas will be inadvertently impacted by residual petroleum in groundwater. Case closure outside of areas with a public water supply should be evaluated based upon this policy and a site specific evaluation of developing water supplies in the area."

The first sentence "This policy is protective of existing water supply wells" is not completely true since the distance between the groundwater plume and supply wells –does not consider future changes in production rates from existing wells and the subsequent changes in groundwater direction and flow potentially creating conditions that would impact a supply well. Existing wells or well fields may produce water at a new rate due to cessation (based on water quality degradation or inefficient well performance), increased demand or increased production capacity (after well rehabilitation).

The third sentence though focused on rural areas is applicable to all areas: "*However, it is difficult to predict, on a statewide basis, where new wells will be installed, particularly in rural areas that are undergoing new development.*" Therefore the required "site specific evaluation of developing water supplies in the area" should be conducted for all case closures regardless of area.

Lastly the Closure Policy speaks only to water supply wells; however, other production wells exist and water impacted by petroleum releases may impair the quality needed by the operator. For example dewatering wells that discharge water to a water body, storm drain or sewer line may require additional treatment or be prohibited from discharge based on permit stipulations or regulatory direction.

4. **Justification for Closure Request** (Page 2, 5th paragraph)
"Periodically, or at the request of the responsible party or party conducting the corrective action, the regulatory agency shall conduct a review to determine whether the site meets the criteria contained in this policy." This sentence implies that a responsible party or their agent could request the regulator to review the site for closure under this policy even though sites conditions have not been met. This sentence should include a phrase which obligates the responsible party and their agent to have justified that the site qualifies with each of the general and media-specific criteria prior to requesting closure under the policy.

5. **Use/Citation of "In-Press" References**
The following references cited in the document only became available to us on November 7, 2011 too late to consider for the scoping document comment deadline, November 8, 2011.:

Kamath, R., J.A. Connor, T.E. McHugh, A. Nemir, M.P. Lee and A.J. Ryan, in press. Use of long-term monitoring data to evaluate benzene, MTBE and TBA plume behavior in groundwater at retail gasoline sites. Journal of Environmental Engineering. (Accepted for publication on June 15, 2011)

Williams, P.R.D., in press. MTBE in California's public drinking water wells: Have past predictions come true? Environmental Forensics. (Accepted for publication on June 4, 2011)

The use of technical references which are not available to reviewers in a timely manner does not allow the appropriateness of the references to the statements in the policy to be verified.

6. **References**
The list of technical reports/references is minimal and contains no important and critical references from the USGS or USEPA. Important references, such as the December 8, 1995, Walt Petit memo and Region 2's (San Francisco Bay) January 5, 1996, *Supplemental Instructions*, were omitted.
MTBE a chemical compound in fuels became a major problem to UST stakeholders in California during in the late 1990s yet important reference are missing from the policy – MTBE. At a minimum, the following MTBE references should be reviewed incorporated in the policy and as appropriate included in the references:

- The June 11, 1998, Lawrence Livermore National Laboratory (LLNL) report titled: *An Evaluation of MTBE Impacts to California Groundwater Resources.*
- The 1998 University of California, Davis report titled: *Impacts of MTBE on California Groundwater, a report to the Governor and Legislature of the State of California.*

- The October 13, 1998, memorandum from staff toxicologist Ravi Arulanantham, Ph.D. to Steve Morse, Chief of the Toxics Cleanup Division of the San Francisco Bay Regional Water Quality Control Board, titled: *Technical Rationale and Recommendation to Eliminate the Use of Methyl tertiary Butyl Ether (MtBE) and Similar Oxygenates to Maintain Existing and Future Groundwater Beneficial Uses.*
- Kolhatkar, R., J. Wilson, and L.E. Dunlap. 2000. *Evaluating Natural Biodegradation of MTBE at Multiple UST Sites.* In Proceedings of the Conference on Petroleum Hydrocarbons and Organic Chemicals in Ground Water. National Ground Water Association/API, Houston, TX, November 15-17. pp. 32-49.
- *MTBE Contamination in Groundwater: Identifying and Addressing the Problem.* May 21, 2002. House of Representatives, Committee on Energy and Commerce, Subcommittee on Environment and Hazardous Materials, Washington, DC.
- The June 8, 2005, document from the State Water Resources Control Board titled: *Guidelines for Investigation and Cleanup of MTBE and Other Ether-Based Oxygenates.*
- *USGS: http://sd.water.usgs.gov/nawqa/vocns/mtbe/bib/http://clu-in.org/contaminantfocus/default.focus/sec/Methyl_Tertiary_Butyl_Ether_%28MTBE%29/cat/Environmental_Occurrence/*

7. ***Risk is Understated*** *(page 2, 5th paragraph and page 7, 1st paragraph)*
"In the absence of site-specific conditions that demonstrably increase the risk associated with residual petroleum constituents, cases that meet the general and media-specific criteria described in this policy do not pose a threat to human health, safety or the environment and are appropriate for UST case closure pursuant to Health and Safety Code section 25296.10." **and** "Exposure to petroleum vapors migrating from soil or groundwater to indoor air may pose unacceptable human health risks. This policy describes conditions; including bioattenuation zones, which if met will assure that exposure to petroleum vapors in indoor air will not pose unacceptable health risks."

The statements are too definitive as uncertainty exists due to limited sampling of the subsurface and since the subsurface has some anisotropy and heterogeneity.

8. **Policy Not Applicable for Non-Petroleum Chemicals** (Page 3, 3rd Paragraph)
The unauthorized release consists only of petroleum should exclude chemicals that have been released from waste oil tanks that are not petroleum based such as chlorinated solvents. These chemicals have different subsurface behavior compared to fuel constituents therefore their presence makes the site ineligible for closure based on the policy.

9. **Free Product Removal** (Page 3 general criteria d.), *"At petroleum unauthorized release sites where investigations indicate the presence of free product, free product shall be removed to the maximum extent practicable."* Practicable is vague and needs a specific definition. The use of the word practicable without a clear definition will lead to varying interpretation, and a lack of consistency in the application of the policy.

10. ***Secondary Sources*** *(Page 4)*
"f. Secondary source removal has been addressed
"Secondary source" is defined as petroleum-impacted soil or groundwater located at or immediately beneath the point of release from the primary source. Unless site attributes prevent secondary source removal (e.g. physical or infrastructural constraints exist whose

removal or relocation would be technically or economically infeasible), petroleum-release sites are required to undergo secondary source removal to the extent practicable as described herein. "To the extent practicable" means implementing a cost-effective corrective action which removes or destroys-in-place the most readily recoverable fraction of source-area mass. It is expected that most secondary mass removal efforts will be completed in one year or less. Following removal/destruction of the secondary source, additional removal and/or active remedial actions shall not be required by regulatory agencies unless (1) necessary to abate a demonstrated threat to human health or (2) the groundwater plume does not meet the definition of low threat as described in this policy."

Basically this part of the policy indicates that impacted soil or groundwater beneath the point of release should be remediated unless it is infeasible to do so (technically or economically). This part of the policy is subject to interpretation. Many times when tanks are removed, new tanks are put in their place. Would the policy require the remediation or excavation of soil beneath existing tanks? What if a building is located over the "secondary source"? This part of the policy would seem to suggest that the decision of whether or not to remediate a site is dependent on how difficult it would be to perform that remediation rather than on whether or not that remediation would benefit the environment.

The decision to remediate a site should depend on whether or not that remediation is likely to benefit site conditions. Sites where groundwater concentrations show an increase over time or where vapor concentrations present an unacceptable risk are good examples of sites which warrant remediation.

*11. **Five Classes of Sites** (Page 6 paragraphs 1-5)*
"(1) a. The contaminant plume that exceeds water quality objectives is less than 100 feet in length.
b. There is no free product.
c. The nearest existing water supply well and/or surface water body is greater than 250 feet from the defined plume boundary."

We propose a fourth condition for class 1, - The surface water body or well will be sampled for chemicals of concern under the appropriate hydraulic conditions and that the test results contain no detectable petroleum constituents. An exception to this rule probably should be included in case adequate evidence exists that the detected petroleum constituents are from another release site and not from the subject site.

The five classes of sites are not consistently written. Class 1, 2 and 3 are written so that the sensitive receptor's (water supply well and/or surface water body) distance exceeds the plume length, which is logical in that it provides a buffer distance for attenuation. However Class 4 sets these two distances to be equal – no buffer.

12. **Nuisance Concerns**
Nuisance concerns are not accounted for in the policy. Clearly, nuisance concerns should be incorporated into any discussion regarding the release of contaminants to the waters of the state of California when the standard as stated in Resolution 68-16 is "a nuisance will not occur". Even resolution 92-49 with all of its flexibility written into it, as noted by the authors of the policy, references nuisance as a concern that may require clean up. RWQCB Region 2 ESLs shows the ceiling value (odor or taste) to be more restrictive than the drinking water goal or vapor intrusion goal for total petroleum hydrocarbons as gasoline and diesel, benzene, ethylbenzene, toluene, xylenes, and MtBE. Nuisance concerns should

clearly be incorporated into the media specific criteria for both groundwater and vapor intrusion.

13. **Appropriate Cases for Closure Under the Closure Policy** (page 6)
In each of the three media-specific criteria, one of the acceptable criteria is a site specific conditions analysis. This appears to bring back into the policy all of the sites with unique attributes that were already excluded, but could still be evaluated for low-threat closure based on site-specific conditions, back into the policy. These sites should be evaluated based on their unique attributes which required them to be considered for low-threat closure outside of the policy (i.e. exclusion clause). The policy was meant for the clear cut sites, not the unique ones.

14. **Petroleum Vapor Intrusion to Indoor Air** (page 7, 5th paragraph,)
The Exception listed at the end of the Petroleum Vapor Intrusion to Indoor Air media specific criteria should be limited to when the current fueling station's system is in the same place as the system that leaked. There are numerous examples of station reconfigurations where the service station building, which may be nothing more than a convenience store, is now located on top of or in close proximity to the former leaking tank pits or dispenser islands.

15. **Reasonable Time Frame** (Page 5)
"State Water Board Resolution 92-49, Policies and Procedures for Investigation and Cleanup and Abatement of Discharges under Water Code Section 13304 is a state policy for water quality control and applies to petroleum UST cases. Resolution 92-49 directs that water affected by an unauthorized release attain either background water quality or the best water quality that is reasonable if background water quality cannot be restored. Any alternative level of water quality less stringent than background must be consistent with the maximum benefit to the people of the state, not unreasonably affect current and anticipated beneficial use of affected water, and not result in water quality less than that prescribed in the water quality control plan for the basin within which the site is located. Resolution No. 92-49 does not require that the requisite level of water quality be met at the time of case closure; it specifies compliance with cleanup goals and objectives within a reasonable time frame."

Resolution 2009-0042 states:

"In previous decisions, the State Water Board, when determining a reasonable period, has considered all relevant factors including, but not limited to, existing and anticipated beneficial uses of water. If, for example, it will take 50 years to meet the requisite level of water quality, that may be a reasonable period if neither existing nor anticipated beneficial uses would be impacted during that time."

The policy cites Resolution 92-49 and makes the point that cleanup goals should be achieved within a "reasonable time frame." Resolution 2009-0042 also comments on the reasonable time frame issue. As difficult as it is, it would be helpful to propose some guidelines on what constitutes a reasonable time frame in order to avoid different interpretations and inconsistent application of the policy.

16. **Beneficial Use** (Page 5, 3rd paragraph)
"If groundwater with a designated beneficial use is affected by an unauthorized release, to satisfy the media-specific criteria for groundwater, the contaminant plume that exceeds

water quality objectives must be stable or decreasing in areal extent, and meet all of the additional characteristics of one of the five classes of sites listed below."

A clarification of the term "designated beneficial use" would seem to be needed. Does this include all current or future potential beneficial uses or only current and planned uses? In addition, for sites in areas which lack a "designated beneficial use" what is the closure criterion and does the closure criterion in this policy apply?

17. **Plume Lengths** (Page 6)
Designating specific plume lengths (100 feet, 250 feet, or 1,000 feet) is potentially problematic. Although it may be helpful to imagine that hydrocarbon and oxygenate impacts form a symmetric plume in groundwater, this is not always the case. The shape of a hydrocarbon plume as indicated by concentrations of Total Petroleum Hydrocarbons as gasoline and BTEX may be very different compared to the shape of a plume of MTBE concentrations in groundwater.

18. **Additional General Criteria**
A criterion of minimum depth to groundwater contaminated with high dissolved petroleum concentration or LNAPL should be included. Shallow groundwater with LNAPL extending off-site may be encountered during construction operations or may affect subsurface utility conduits. Sites with LNAPL or high dissolved petroleum at a depth of less than 20, 15 or 10 feet should not be closed to avoid safety or exposure risks to utility or construction workers. Although such exposure would likely be noted in the required Conceptual Site Model, the closure policy should emphasize concerns with shallow contaminated groundwater. Additionally migration of the petroleum products in utility lines may be unforeseen potentially leading to premature closure. Therefore an additional criterion for closure under this policy should be a utility survey and evaluation of the potential for fuel-affected water to migrate into the utility lines. If the potential is deemed reasonable then further investigation should be conducted.

19. **Cited Studies** (Page 1, Paragraph 4)
Several of the cited plume length studies, most notably Rice et al. (1995) and Buscheck et al (1996) did not present the actual data used to calculate the benzene plume lengths, and neither study included an evaluation of MTBE plume lengths. In the January 1997 *Response to U.S. EPA Comments on the LLNL/UC LUFT Cleanup Recommendations and California Historical Case Analysis*, LLNL stated, "They found that 90% of the plumes lengths determined, using best professional judgment, were less than 340 feet at the 10 ppb groundwater concentration limit, and less than 380 feet at the 1 ppb limit (SWRCB, 1996)." The chemical of concern was benzene – MTBE was not evaluated.

Low-Threat UST Closure Policy CEQA Scoping Document General Comments

<u>Comments on Environmental Issues and Impacts</u>
The Low-Threat UST Closure Policy Scoping Document indicates environmental factors that could potentially be affected by the State Water Board's adoption and implementation of the proposed Policy for Low-Threat UST Closure. In general, it seems short-sighted to view monitoring well destruction and onsite debris removal as the only issues pertinent to the "project's" implementation in *Section VI, Environmental Impacts* of the scoping document. Rather, it seems appropriate to evaluate environmental impacts associated with regulatory agencies allowing concentrations of petroleum hydrocarbons and associated additives in

excess of water quality objectives to remain in groundwater. By taking the extremely narrow view of the impact of the Closure Policy's implementation, the environmental factors checked in Section VI do not fully address all reasonable potential environmental impacts. The following comments illustrate our disagreement with environmental factors that have been checked off and discussed in the scoping document, as well as recommendations for consideration of additional environmental factors.

Environmental Impacts of the Closure Policy (Page 3, 4th paragraph)
"As a result, the effect of the proposed Policy is to change the timing of when the secondary environmental impacts associated with the closure of the site occur."

We respectfully disagree. The proposed policy sets forth specific criteria in which decisions would be made regarding whether residual petroleum products and additives could be left in place at a particular location. These criteria have not been widely adopted and are probably not applicable at all locations and hydrogeologic conditions. In addition, the policy does not require long-term monitoring to verify that the residual petroleum products and/or additives remain below the concentrations and at the locations deemed acceptable.

Low-Threat UST Closure Policy CEQA Scoping Document Specific Comments

1. **Hydrology and Water Quality**: By implementation of the Closure Policy, although the regulatory agency is not responsible for the presence of petroleum and associated additives in groundwater (i.e., what is currently considered to be the baseline condition), it would be responsible for allowing these contaminant concentrations in excess of water quality objectives to remain in groundwater - - at least until natural attenuation begins to reduce concentrations, which would be an undocumented phenomenon due to monitoring well destruction resulting from the decision to close the site. The fact that the Closure Policy would eliminate the chance that additional active remediation may occur under the current regulatory environment is an important physical and procedural consideration that should be addressed in the CEQA Scoping Document. While it is true this issue may be addressed in the Closure Policy as merely a difference in length of time until complete cleanup, this point should be addressed in the answers to the CEQA questions regarding biological resources (4), hazardous materials (8), and cumulative impacts (18b). Most notably, the response to "*Would the project violate any water quality standards?*" is "*Yes*", and should not be minimized with a conclusion of No Impact.

2. **Hydrology and Water Quality**: Another aspect on the policy's potential violation of water quality standards relates to potential human exposure to groundwater with residual contamination via future water supply scenarios. For instance, depending on hydrogeologic conditions and local groundwater extraction, residually contaminated groundwater may move within the shallow aquifer, or between shallow and deeper aquifers, resulting in currently unanticipated impacts to drinking, industrial, and/or agricultural water supplies. This movement may cause the spread of contaminated water horizontally beyond the identified plume boundaries and/or vertically to deeper aquifers, thereby impacting production wells with multiple screened intervals or screens that span multiple aquifers. In fact, water quality in these wells may be adversely impacted even during periods of low water demand (i.e., standby conditions).

3. **Land Use Planning:** Although implementation of the policy may not specifically conflict with an agency's *plan adopted for the purpose of avoiding or mitigating an environmental affect*, it could conflict with local land use and/or zoning decisions, and therefore should be

considered as causing an environmental impact. For instance, property values both onsite and offsite may decline due to the presence of a plume of petroleum hydrocarbons and associated additives that extends beyond site boundaries. In addition, workers may come into contact with this contaminated groundwater during construction at down gradient properties (possibly residential, industrial, or commercial) located within the groundwater plume, thereby necessitating development and implementation of procedures for the management and/or disposal of the contaminated groundwater. Determination of the financially responsible party for these actions will likely be protracted and costly in and of itself. If owners of properties within the groundwater plume cannot conduct activities on their property without the possibility of contacting the plume, then their land use is restricted. Mitigation of this scenario should be considered in the Substitute Environmental Document (SED), provided the SED is the vehicle for the State Water Board to address "environmental documentation" noted in the scoping notice.

Indirect land use impacts are mentioned in the Project Description of the Scoping Document; however, the impact of the Closure Policy implementation currently ignores many aspects of future (re)development that will likely occur throughout California as a result of closing UST sites with the proposed policy. If the policy is approved, development could have impacts for conversion of agricultural and farming land adjacent to soon-to-be-closed sites under this policy (2e), housing (13), public services (14), recreation (15), traffic (16), and utilities (17) individually or cumulatively (18b). Clearly the closure of multiple sites in close proximity and within a short timeframe could cause a dramatic (and cumulative) increase in redevelopment over a similarly short timeframe.

Comments on Reasonable Alternatives and Mitigation Measures to be addressed in the SED:

4. Notices of public scoping meetings and scoping document availability - - as well as the scoping documents themselves - - provided by Certified Regulatory Programs ("CRP," such as the State Water Board) typically inform appropriate agencies and interested persons that the CRP (1) intends to prepare a SED, and (2) is seeking input on significant environmental issues, reasonable alternatives, and mitigation measures that should be addressed in the SED. Although the scoping notice for the Proposed State Water Board's Closure Policy solicits input for the second topic, it does not specifically state the State Water Board will be preparing a SED based on comments that are due by November 8, 2011, ***or*** that a SED will include reasonable alternatives and mitigation measures associated with implementation of the policy. Rather, the scoping notice states " . . . *the State Water Board has scheduled public scoping meetings . . . to gather input from public agencies and interested persons on the scope and content of the environmental documentation to be prepared for this project."* This text is vague and leaves the reader uncertain about what "environmental documentation" actually means, and what the State Water Board intends to do with public input on the scoping document. The actual scoping document for the proposed policy is also vague with respect to public input and whether any SED will be developed. Provided the State Water Board will be preparing a SED and addressing at least some of the public comments due by November 8, 2011, the SED should certainly include reasonable alternatives and mitigation measures associated with policy implementation.

5. **No Action Alternative:** The State Water Board should consider the No Action Alternative in the SED. As such, the No Action Alternative would mean the State Water Board would not adopt and implement a low-threat UST closure policy. As with the proposed closure policy, contamination due to petroleum hydrocarbons and associated

additives in excess of water quality objectives would remain in groundwater after primary and secondary source removal was completed. However, the site would not automatically be closed, and groundwater monitoring and reporting to the appropriate agency would continue based on a reasonable frequency determined by the regulatory agency. The advantage of this No Action Alternative is that UST sites would not be closed without the benefit of determining the rate of natural attenuation processes, and if natural attenuation is truly stabilizing or decreasing the size of the groundwater plume over some reasonable time. With this alternative, Regional Water Boards and/or local agencies would continue to implement their current procedures for determining if a site that has not met water quality objectives is ready for closure (i.e., source removal, cleanup to the extent practicable (which needs definition), demonstration of the rate of natural bioattenuation, demonstration of plume stability or shrinkage, assurance the responsible party will record a covenant to restrict land use, and recommendation for closure to the appropriate governing body).

Another advantage is that regional and local agencies most knowledgeable about natural conditions, existing and future planning efforts, and politics in their areas can make site closure determinations based on specific data rather than prescribed criteria that may not address all important factors existing at or in the vicinity of a UST site. The disadvantage to this No Action Alternative is that UST sites will remain open longer than if all appropriate regulatory agencies begin implementing the Closure Policy immediately after its adoption by the State Water Board, although determination of how much longer they remain open is difficult to estimate. Another disadvantage is that UST site closure may be inconsistently determined throughout the State, and thus may subject responsible parties to more expense in some areas of California. In short, this alternative allows regional and local regulatory agencies to continue to determine when sufficient data have demonstrated a site is reasonably and justifiably ready for closure even if water quality objectives have not yet been achieved.

6. **Evaluation by Threat:** Another alternative that should be considered in the SED is establishing a UST site closure policy based on evaluation of threat (by using the general framework of criteria already included in the policy) ***and*** verification of low-threat/low risk conditions over specific timeframes. For example, this alternative would require a responsible party to provide monitoring data to the appropriate regulatory agency at a specific frequency for a specific period of time (e.g., two years of quarterly monitoring data, or a variation in duration and/or frequency) following primary and secondary source removal to demonstrate natural attenuation at the site is capable of reducing concentrations of petroleum hydrocarbon and associated additives to acceptable levels. If contaminant concentrations have not satisfied water quality objectives after the prescribed timeframe, regulatory agencies would then need to determine (1) if the site satisfies low-threat/low risk conditions, (2) is a likely candidate for natural attenuation, and (3) whether institutional controls could be implemented to justify closure at that time. The advantage of this alternative is that regulatory agencies would have data to support the efficacy of site-specific natural attenuation to reduce contaminant concentrations at a specific UST site. It is likely these data already exist for many UST sites where regulatory agencies have reduced monitoring over time. It is also possible that natural attenuation monitoring of appropriate parameters for sites where such information hasn't been collected could be obtained relatively cheaply and quickly. The disadvantage of this alternative is that UST sites may remain open longer than if all appropriate regulatory agencies begin closing UST sites in accordance with the policy immediately after its adoption by the State Water Board, although determination of how much longer they remain open is difficult to estimate.

Comments on Cumulative Impacts:

7. The Scoping Document does not address potential future environmental impacts that could occur if significant and specific notification to various land use permitting agencies is not required to address residual contamination. For instance, the result of closing sites with residual contaminants in groundwater could increase exposure to residual contamination at potentially higher concentrations than would occur under current site closure scenarios.

8. As you know, petroleum hydrocarbons are composed of a complex combination of chemicals; however, the Closure Policy evaluates scenarios in which only benzene and MTBE are addressed. This appears to be a gross oversimplification and goes against guidance from various regulatory agencies to evaluate the cumulative impacts (18b) of contamination in a risk-based decision making process. In particular, the exclusion of toluene, ethylbenzene, total xylenes, and fuel oxygenates seems to go against years of training offered by the State Water Board in evaluating these plumes. The CEQA scoping document fails to address this issue.

9. The draft Closure Policy does not adequately take future groundwater use into account. For instance, it does not address the potential for natural phenomena (such as earthquakes and drought) or political decisions (such as changes in pumping scenarios due to drought) that could occur while the residual contamination continues to exceed water quality objectives. In the San Francisco Bay area, for example, a majority of drinking water is transported through pipelines that traverse several major known faults that have a high probability (~70%) of experiencing a large-magnitude earthquake within the next 30 years. In the event of a significant earthquake or drought, inactive supply wells could suddenly be needed, or new wells may be installed. In these types of scenarios, with implementation of the policy as it currently exists, the resulting changes to groundwater flow dynamics in areas with residual UST contaminants that significantly exceed water quality objectives could have significant impacts on drinking water supplies.

10. **Hazards and Hazardous Materials**: The policy references various studies and institutional knowledge gained over the last 20 years. For this specific reason, it seems to fail to recognize that fuel formulations have and will continue to change over time. In fact, ethanol is being blended into gasoline at higher percentages today than at any time in the specific time period referenced in the policy. This lack of accounting for future, and currently ongoing, fuel formulation changes and potential impacts that will have on contaminant behavior in the subsurface could lead to a similarly disastrous situation as when MtBE was introduced. The CEQA scoping document is clearly lacking in this respect.

11. Alternatives Evaluation:

The first paragraph of the Preamble references the obvious impact the UST Cleanup Fund's recent problems have had on the development of this policy. This is in contrast, and an apparent conflict of interest, to the actual mission of the State Water Board which is "to preserve, enhance and restore the quality of California's water resources, and ensure their proper allocation and efficient use for the benefit of present and future generations." The substitute environmental document (SED) should then evaluate as an alternative the separation of these two functions away from each other and the State Water Board. The second paragraph implies the best way to use available resources is to eliminate the low threat sites. An equally feasible and potentially more appropriate alternative, which should also be evaluated in the SED, would be to actually prioritize all of the currently existing sites for allocation of these limited resources based on need from the top (most needy) down. Finally, the Preamble contains a list of reports that have been produced regarding

California's UST Program. To be fair, the response to the reports and more recent studies regarding plume length in relation to newer fuel formulations should also be included. In particular, responses to the LLNL report which took exception to several points beyond just the lack of fuel oxygenates and more recent studies regarding the impacts of ethanol-blended releases on increased plume migration and degradation rates should be included as references.

References

Mackay, D. M., N. R. de Sieyes, M. D. Einarson, K. P. Feris, A. A. Pappas, I. A. Wood, L. Jacobson, L. G. Justice, M. N. Noske, K. M. Scow and J. T. Wilson). Impact of Ethanol on the Natural Attenuation of Benzene, Toluene and o-Xylene in a Normally Sulfate-Reducing Aquifer. Environmental Science and Technology, 40:19, 6123-6130, 2006.

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