RESPONSE TO GENERALIZED PUBLIC COMMENTS ON THE FEBRUARY 2020 DRAFT SUPPLEMENTAL GUIDANCE: SCREENING AND EVALUATING VAPOR INTRUSION

Introduction

The Draft Supplemental Guidance: Screening and Evaluating Vapor Intrusion (VI) (Draft Supplemental VI Guidance) was released on February 14, 2020, for public comment. This written public comment period closed on June 1, 2020, and the California Environmental Protection Agency (CalEPA) VI Workgroup (Workgroup) consisting of Department of Toxic Substance Control (DTSC), State Water Resources Control Board (State Water Board), San Francisco Bay Regional Water Quality Control Board, Los Angeles Regional Water Quality Control Board, Santa Ana Regional Water Quality Control Board, and Office of Environmental Health Hazard Assessment staff, received a total of 575 public comments from 71 individual letters/emails. All 575 comments are provided in Attachment 1. Please note that the comments are presented in tabular format because not all the original comment letters were accessible to people with disabilities. Given our limited resources, we summarized the comments in the table to make as much content as possible accessible. Read-only copies of the 71 individual letters/emails in their original format can be accessed by emailing DWQ-vaporintusion@waterboards.ca.gov.

The Workgroup reviewed all 575 comments, categorized them based on the topic, and grouped the more significant into generalized comments. The Workgroup also revised the Draft Supplemental VI Guidance based on many of the comments received. The Final Draft Supplemental Guidance: Screening and Evaluating Vapor Intrusion (Final Draft Supplemental VI Guidance) was released February 2023. The responses for 24 generalized comments are presented below.

Comments and Responses

1. **Comment** – United States Environmental Protection Agency's (USEPA) attenuation factor (AF) of 0.03 is inappropriate for California. The final Supplemental VI Guidance should use the empirical AFs currently under development by DTSC and industrial stakeholders.

   Response – The Workgroup is aware of the strengths and limitations of USEPA's AFs. Strengths include a) a robust dataset of residential sites, b) climatic conditions representative of some regions of California, c) empirical subslab and indoor air paired data collected within 48-hours which address temporal and spatial variability, and d) formal peer review of process and outcomes. Furthermore, the USEPA approach has nationwide acceptance. Of 28 states with VI guidance, 24 use AFs equal to or more conservative than USEPA (as of March 2021). Limitations of the USEPA dataset include a) very few California sites are in the database,

b) 75 percent of residential homes in the database have basements but only 5 percent of homes in California have basements, c) USEPA did not evaluate commercial/industrial buildings due to insufficient data, and d) groundwater and indoor air paired measurements had poor spatial correlation.

The Workgroup is also aware that Shell Oil and Geosyntec have been developing a California-specific AF study published June 2021 (Lahvis, M.A. and R.A. Ettinger. 2021). In addition, DTSC has also been developing a California-specific AF study that is undergoing review by regulatory agencies. The Final Draft Supplemental VI Guidance may be revised in the future as additional peer reviewed publications become available. Based on the available publications at this time, USEPA AFs may be the most applicable for screening California VI sites.

To ensure protection of human health at the screening phase when data is typically limited, the guidance recommends using the USEPA AFs. Over 80% of states with VI guidance recommend USEPA's AFs, resulting in a standard of protection for human health. The Final Draft Supplemental VI Guidance allows alternative approaches to using USEPA's 0.03 AF when appropriate and provided there is adequate technical justification.

The Workgroup will use data collected and uploaded to GeoTracker through implementation of the Final Draft Supplemental VI Guidance to further evaluate VI behavior and potential future development of California-specific screening AFs. When data is evaluated, information from other existing studies will also be considered for inclusion in the analysis.

2. **Comment** – The document is too prescriptive, and unless more flexibility is added, would be an underground regulation.

   Response – The Final Draft Supplemental VI Guidance is only guidance, and not regulation or water quality control plan or state policy for water quality control. As set forth in Government Code section 11342.600, "'Regulation' means every rule, regulation, order, or standard of general application or the amendment, supplement, or revision of any rule, regulation, order, or standard adopted by any state agency to implement, interpret, or make specific the law enforced or administered by it, or to govern its procedure." The Final Draft Supplemental VI Guidance does not fall within this definition. The Final Draft Supplemental VI Guidance does not create a standard of general application because use of the guidance is not required. Further, even when the guidance is used, it does not preclude alternative approaches.

   The Final Draft Supplemental VI Guidance provides a balanced approach to screen buildings based on VI science and ensures potential health risks for building occupants are not underestimated. This Final Draft Supplemental VI Guidance does not impose any binding requirements or obligations on the regulated community. As expressly stated on the cover page, use of the Final Draft Supplemental VI Guidance is not required. Changes were made throughout the document to further clarify that the Final Draft Supplemental VI Guidance is not regulatory. Even when the Final Draft Supplemental VI Guidance is used, the guidance allows for flexible approaches and methodologies for evaluating exposure and recommendations that may be tailored to address site-specific concerns. In many places the Final Draft Supplemental VI Guidance notes factors that may be used to support site specific flexibility. In response to comments, language was added throughout the document to highlight areas of flexibility. For example, Step 4 was substantially rewritten to provide additional site-specific flexibility.

Governing agencies use guidance documents to support existing statutes especially when data gaps exist to support those statutes. Assembly Bill 422 (AB 422, Hancock 2007) amended Section 25356.1.5 of the California Health and Safety Code and added Section 13304.2 to the California Water Code. AB 422 requires that human and ecological exposure assessments prepared in conjunction with a response action, or approved pursuant to the "California Superfund Act," include reasonable maximum estimates of exposure to volatile chemicals that may enter existing or proposed buildings due to VI. Hence, the CalEPA Boards, Departments, and Offices (BDOs), and associated programs at the county level within the Certified Unified Programs Agencies, have a regulatory obligation to evaluate VI at sites in their jurisdictions. DTSC's 2011 Vapor Intrusion Guidance, the San Francisco Bay Regional Water Quality Control Board's 2014 Interim Framework for Assessment of Vapor Intrusion, and now this Final Draft Supplemental VI Guidance assist stakeholders in conducting these exposure evaluations. The intent of these documents is to communicate possible technical considerations for evaluating VI in California that apply the current scientific understanding of vapor transport.

Some comments asserted that the development of the Draft Guidance violated the Bagley-Keene Open Meeting Act (Bagley-Keene Act). The Bagley-Keene Act was not violated because it did not apply to the creation of the Final Draft Supplemental VI Guidance. As the guidance is not regulatory, and is not required to be used, its creation did not require consideration of adoption at a public meeting by a state board or commission. Although not required, the Workgroup conducted extensive public outreach to solicit feedback from a wide range of stakeholders, including the private industry, environmental advocacy, and academic sectors. These public outreach activities included, but were not limited to, two public staff meetings and a written public comment period.

3. **Comment** – Will sites be reopened with use of the USEPA AFs and process identified in the final Supplemental VI Guidance?

   Response – Please see the response to Comment 2 above. In addition, the Final Draft Supplemental VI Guidance does not recommend reopening closed sites nor is it the intent of the CalEPA agencies to reopen sites based upon USEPA's AFs. Site closure is based on site-specific considerations, multiple lines of evidence (LOEs) for all media of concern and agreed upon site closure goals/objectives between the responsible party, the lead agency, and contractor. Agencies may choose to reevaluate cases on a site-specific basis, especially if the land use becomes more conservative or if new information becomes available. Some aspects of this guidance may be used to inform these site-specific decisions. A new figure has been added in the introduction to clarify how this guidance may be used to evaluate new buildings for ongoing cases or if closed cases are reevaluated.

4. **Comment** – There is still inconsistency amongst CalEPA agencies, local agencies, and USEPA. Will CalEPA develop future policy or regulations to help ensure consistency?

   Response – The CalEPA agencies recognize some historical and current inconsistencies among our agencies in evaluating VI and potential health risks. To work towards increased consistency, CalEPA established the Workgroup in 2014/15 and championed development of the Draft Supplemental VI Guidance. Additionally, the CalEPA agencies recognize the importance of staff training, and ongoing coordination among BDOs on decisions moving forward. In the future, the CalEPA agencies may proceed with policy or regulations regarding VI, however a guidance document that supports a consistent data collection framework is appropriate to establish a robust and diverse California specific dataset. As a guidance document, the Final Draft Supplemental VI Guidance is a recommended path to help regulators, practitioners, and responsible parties meet the requirements of existing statutes under the California Health & Safety Code Section 25356.1.5, California Water Code Section 13304, and State Water Board Resolution 92-49.

5. **Comment** – How can site-specific data be used to inform risk management decisions, exit strategies, and cleanup goals?

   Response – In response to this feedback, the Workgroup expanded the scope of the document to provide more guidance on how site-specific data can be used after initial VI screening has been completed. Specifically, Step 4 includes:

   Guidance on refinement of initial risk assessments using site-specific data. This added information can be used to help better inform risk management decisions and VI risk-based cleanup goals.

   More information and criteria to help determine if additional VI evaluation is needed at low priority buildings. This information should clarify potential existing strategies for low priority buildings. However, it should be recognized that the ultimate exit strategy for low priority buildings will be case closure in many situations.

   More discussion of site-wide data and information that should be considered when making remedial action decisions based on VI risk.

   The Final Draft Supplemental VI Guidance provides a framework for the screening of sites upon the initial collection of VI data. The Workgroup intentionally left out guidance on specific case closure requirements because: 1) the oversight agencies have different authorities/statutes for closure processes, and 2) site closure should address all media and exposure pathways while this document focuses solely on VI. The Final Draft Supplemental VI Guidance includes additional information about site-specific VI investigations due to the number of comments on this topic from stakeholders.

6. **Comment** – Please provide more information about LOEs, especially which LOEs may be used to assess future VI risk at vacant lots and redevelopment sites.

   Response – VI evaluations have consistently relied on multiple LOEs. Step 2 outlines how multiple LOEs may be used for initial screening for both existing buildings and potential future buildings. For clarity, recommendations for vacant lots were moved into separate sections in both Step 2 and 4. Step 4 was significantly expanded to describe the factors influencing future VI risk, and to include a discussion of how to assess the future risk for existing buildings and open lots. Attachment 1 was added to address how multiple LOEs can be used to interpret the potential for VI.

7. **Comment** – Implementation of the final Supplemental VI Guidance will impact redevelopment of contaminated properties by increasing cost and time for investigation, uncertainty about mitigation, and cost of long-term operations and maintenance.

   Response – CalEPA is a strong supporter of redeveloping contaminated properties (brownfields) as restoring these properties has many benefits including protection of human health and opportunities to grow business and housing. CalEPA's primary goal is the protection of human health and therefore must ensure that redeveloping brownfields is done safely and in a manner that does not compromise the health of the future residents or occupants. As more information is learned about the risks associated with VI, more brownfields may need to conduct VI assessments. Use of the Final Draft Supplemental VI Guidance is optional. Where the guidance is used, however, it is expected to provide economies of scale, consistency, and predictability for redevelopment projects, which may reduce costs over time.

   Time and cost are very site-specific figures. If using older, outdated science on VI as a baseline, then in some cases, use of the guidance may result in a screening process that is more expensive and time intensive. Advances in science regarding VI and empirical evidence regarding past cleanup sites support that a more resource intensive screening process may be necessary to protect public health. In other cases, use of the Final Draft Supplemental VI Guidance is not expected to affect costs as it is consistent with guidance from USEPA and the San Francisco Regional Board that have been implemented for a number of years. To minimize unexpected delays that may have cost implications, developers should work with the lead agency starting early in the development process.

   Depending on the site, the benefit of evaluating potential impacts to human health may outweigh the costs of gathering extra screening data. As with many aspects of public health, these safeguards are important despite the cost to protect the health of the people who will live, work, and play in these structures.

8. **Comment** – Attachment 1 (Petroleum-Specific Considerations) should be revised to address the following issues: (1) use of setback distance-based screening; (2) reconciliation of the baseline soil gas AFs (0.03 in the Draft Supplemental VI Guidance versus 0.001 in 2012 Low-Threat Underground Storage Tank Case Closure Policy (LTCP)); and (3) use of the LTCP's bioattenuation factor (0.001) where appropriate.

   Response – The Workgroup revised Attachment 1 (see Attachment 2 (Petroleum-Specific Considerations) in the Final Draft Supplemental VI Guidance) to more closely align with the petroleum VI distance-screening and concentration-based screening approaches in the LTCP. The revisions included adding setback distance-based screening and use of bioattenuation factors.

9. **Comment** – Can site-specific inputs and average exposure concentrations be used in the health risk assessment and toxicity criteria and screening levels from USEPA, or other sources be used?

   Response – Step 4 has been expanded to discuss refining the risk assessment using site specific inputs or average exposure concentrations once more data has been collected after initial screening. Selection of toxicity criteria for risk assessment and for risk-based screening levels is established in California regulation and existing guidance, which is referenced in Step 2B.

10. **Comment** – Will the overall investigation of new sites and legacy sites be integrated into the screening process of the final Supplemental VI Guidance?

    Response – The Final Draft Supplemental VI Guidance is only a screening document. New sites may follow the recommendations within the Final Draft Supplemental VI Guidance. For legacy sites, if there is sufficient empirical data, then site-specific considerations should be made on a case-by-case basis. It is important to note that there are region-specific considerations when determining site-specific cleanup goals.

11. **Comment** – More information is needed in the final Supplemental VI Guidance on a) the use of modeling to determine site-specific cleanup goals, b) post-mitigation monitoring, and c) sewer pathway evaluations. Work plan templates should also be provided.

    Response – The request for additional guidance is beyond the scope of this document. The Final Draft Supplemental VI Guidance provides a framework for conducting VI assessments for buildings at sites with potential VI concerns and can be used at any phase of investigation or cleanup when a building VI assessment should be conducted. The CalEPA Agencies are committed to continued collaboration to update existing guidance, and to create documents and templates that will support and streamline site investigations and regulatory oversight of cleanup cases, as needed.

12. **Comment** – The Draft Supplemental VI Guidance appears to eliminate closing sites if soil vapor exceeds screening criteria, regardless of measured indoor air concentration and other LOEs. The final Supplemental VI Guidance should clarify whether the intent is to manage VI sites in perpetuity versus to allow closure and provide recommendations in accordance with the intent.

    Response – The intent of the guidance is not to eliminate the possibility of site closure, but to collect important building information and VI data to help practitioners and regulators make informed decisions about the current and future VI risk for a given building. Site closure and the development of cleanup objectives are beyond the scope of the guidance. All technical decisions should be based on multiple LOEs, including, where applicable, those developed through implementation of the Final Draft Supplemental VI Guidance.

    The Final Draft Supplemental VI Guidance highlights the importance of evaluating the potential for future VI in the event of changes to land use, building condition, subsurface conditions (e.g., grading, trenching/utility installation) and distribution of contaminants (e.g., plume migration resulting from placement of buildings/pavement). The importance of evaluating future VI risk is highlighted in the USEPA 2015 VI guidance. However, in the Draft Supplemental VI Guidance, the discussion in Step 4 (Current and Future Risk Evaluation and Management Decisions) was too brief considering the complexity of these evaluations. Step 4 was significantly expanded to describe the factors influencing future VI risk. Numerous, current and future VI risk scenarios are discussed along with potential response actions for each scenario.

13. **Comment** – Passive soil gas (PSG) sampling should be an accepted method and potentially preferred over active soil gas sampling. Long-duration, time-weighted average passive sampling is well established in the industry for indoor air or outdoor air applications. The very same technology has been demonstrated to be effective for soil gas applications.

    Response – For many years, passive soil gas sampling has been used for evaluating whether a contaminant release has occurred and characterizing the overall near-surface soil gas contamination distribution at a site. The PSG sampling method is described in the Active Soil Gas Investigations Advisory (CalEPA, 2015). However, the use of PSG techniques has not been verified or validated by any regulatory agency for use as a standalone method for human health risk assessment. A building may be "screened in" for indoor air sampling if PSG results in the vicinity of the building indicate significant contaminant concentrations. Conversely, PSG methods cannot be used as a sole line of evidence to “screen out” sites because results could be biased low due to several factors, including poor retention of analytes on the sampler, poor recovery of the analytes from the sorbent, starvation effect (uptake rate of sampler exceeds rate of delivery of vapors to the sampler), and uncertainty in uptake rate. The revised Final Draft Supplemental VI Guidance discusses the use of PSG sampling in Step 2 and provides information on how the results can be used to evaluate VI in Attachment 1 (Lines of Evidence).

Environmental Security Technology Certification Program (ESTCP) (ESTCP, 2014) and American Society for Testing and Materials (ASTM) (ASTM, 2017) revealed how PSG results are dependent on numerous factors both within and outside the control of the sampling personnel and how careful planning by experts in selecting the appropriate sampler and sampling parameters for specific contaminants and site conditions can improve accuracy. Employing active sampling methods (e.g., TO-15 and TO-17) is recommended to verify and field-calibrate passive samplers for accuracy (ASTM 2017; ESTCP 2014; DoD, 2019). Discussion of PSG sampler selection and use of PSG in combination with active sampling methods to provide higher quality and accuracy for risk assessment is outside the scope of the Final Draft Supplemental VI Guidance for screening evaluations.

14. Comment – Temporal variability is a serious issue. Two or three sampling events is unlikely to accomplish the level of confidence for reasonable maximum exposure (RME). CalEPA should either document that two or three sampling events are statistically meaningful or revise Steps 2 and 3 to overcome this profound challenge. Clarify what constitutes a "different season" for sampling.

Response – The goal of the repeated sampling events in Steps 2 and 3 of the Final Draft Supplemental VI Guidance is to sample under different conditions (e.g., seasonal, meteorological, ventilation) as a reasonable initial effort to characterize temporal variability. It would be unduly burdensome to collect the amount of sampling needed for a statistically meaningful estimate during the early stages of screening described in Steps 2 and 3. Consequently, the Final Draft Supplemental VI Guidance promotes the use of the maximum indoor air concentration as the exposure concentration for small data sets, or, when appropriate as described in Step 4, the use of a 95 percent upper confidence limit on the arithmetic mean (95% UCL). According to USEPA guidance, these are the appropriate exposure concentrations that should be used to estimate the RME.

The wide-ranging variability in seasons and in seasonal influences on factors influencing VI throughout California requires professional judgement of the site investigators to determine what constitutes seasonal differences for subsurface conditions and for VI in specific buildings. The guidance is revised to indicate that the determination of seasonal differences for soil gas sampling should consider average seasonal temperatures, precipitation (levels of rain/snow fall), or depth to groundwater. For indoor air sampling, the determination of seasonal differences should consider average seasonal temperatures. For sites without buildings, subsurface data (e.g., soil gas) are used to predict future risk and, by extension, sampling soil gas during different seasons would be used to characterize temporal variability.

15. **Comment** – Implementing the HVAC-Off sampling is problematic because inhalation exposures should be evaluated under typical use conditions, which is usually HVAC-On, and it is impractical to expect occupants to endure uncomfortable or unsafe conditions for long periods (e.g., 36 hours). The final Supplemental VI Guidance should be modified to indicate that this sampling should only be implemented when feasible and safe to do so and describe under what conditions it makes sense to evaluate a potential worst-case scenario (e.g., HVAC Off sampling).

    Response – The Draft Supplemental VI Guidance was revised in the Final Draft to clarify that the purpose of the evaluation of temporal variability in Step 3 (Indoor Air Investigation) is to understand if indoor air contamination concentrations vary over different seasonal, meteorological, and ventilation (e.g., HVAC operation, use of doors/windows) conditions. The HVAC-On and Off sampling approach was clarified to indicate that this should be performed only if it is safe and feasible to do so. In addition, more in-depth evaluation options (e.g., continuous monitoring, controlled pressure methods) were added to the new Attachment 1 (Lines of Evidence). These approaches or methods are mentioned as potential alternatives to HVAC-On/Off sampling in Step 3E (Evaluate Temporal Variability).

16. **Comment** – The Draft Supplemental VI Guidance overstates the amount of spatial and temporal variability thus driving up the recommended number of samples. The Conceptual Site Model (CSM) should be the primary tool to determine the appropriate number of samples.

    Response – Recent technical publications have highlighted the special and temporal variability of VI (McHugh et al., 2007; Eklund et al., 2008; Folkes et al., 2009; Luo et al., 2009; Holton et al., 2013; Pennell et al., 2013; USEPA, 2015a; Schuver, et al., 2018). The CSM remains the primary tool to determine the appropriate number and location of samples. As indicated in the introductions to both Step 3B (Conduct In-Depth Building Survey) and Step 3C (Evaluate Spatial Distribution), the results of the building survey should be used to design sample locations for Step 3C. Step 3C provides a generic sampling design for a small residential building (1,500 square feet or less floor space), single floor, single HVAC zone, and where the foundation is not segmented (e.g., grade beams). The recommended number of samples for spatial coverage is generally consistent with existing guidance (DTSC 2011a and USEPA 2015a). Application of these concepts to other types of buildings is described in the section entitled Application to Other Building Types. As indicated in the introduction, best professional judgment can be used and alternative approaches (e.g., reduced sampling) can be used but should be justified.

17. **Comment** – The timeframe for pairing soil gas and indoor air samples should be different than that for subslab to indoor air samples, which is 48 hours. Soil gas and indoor air samples collected within three months of each other are likely to be sufficient.

Response – Consistent with USEPA guidance, the timeframe for pairing should be short. The text is revised to indicate that, to provide the best comparison, soil gas samples should be collected concurrently with indoor air, ideally within 48 hours (USEPA, 2012b).

18. **Comment** – Revise the risk management decision framework discussed in Step 4 to be either more or less prescriptive.

    Response – The original table in the Draft Supplemental VI Guidance was removed. The revised Step 4 emphasizes using other site-specific considerations or LOEs in addition to the risk and hazard levels when determining appropriate response actions.

19. **Comment** – Use of models should be clarified and be used for screening of sites.

    Response – The Final Draft Supplemental VI Guidance Steps 1 through 3 focus on the preliminary screening of buildings for VI risk where the CSM is incomplete. Models should not be used for this initial screening. As empirical data is collected and the CSM is sufficiently developed, models may be used in Step 4 to help understand VI potential and as a line of evidence in developing site-specific screening levels, remedial action objectives, and cleanup goals. Site specific models should be calibrated or verified with site data (e.g., indoor air sampling). Attachment 1 (Lines of Evidence) describes the general use of models as a line of evidence, the information needed to develop a reliable site-specific model, and the limitations of available models (e.g., none address the vapor conduit pathway). Step 4 additionally describes how models can be used to evaluate future VI risk.

20. **Comment** – The Workgroup did not include sufficient stakeholder involvement in the development of the final Supplemental VI Guidance.

    Response – During the 5-year process of developing the Draft Supplemental VI Guidance, the Workgroup held focused stakeholder meetings with industry, non-governmental organizations, environmental justice advocates, academia, USEPA and the military to discuss the scope and intent of the guidance. The Workgroup also presented the scope and intent at various conferences and professional society meetings throughout development of the Draft Supplemental VI Guidance. In addition, the Workgroup released the Draft Supplemental VI Guidance for all stakeholders and other technical experts to provide constructive feedback to enhance the Final Draft Supplemental VI Guidance. Question and answer sessions were held in May 2020 during the public comment period. These were planned as in person events and converted to an electronic format due to concerns over COVID. The public comment period was also extended due to COVID.

    The presentations remain accessible through both the DTSC's and State Water Board's webpages:

    https://dtsc.ca.gov/vapor-intrusion/

https://www.waterboards.ca.gov/water_issues/programs/site_cleanup_program/vapor_intrusion/

21. **Comment** – The final Supplemental VI Guidance process conflicts with the National Contingency Plan (NCP) provisions.

    Response – The NCP is the underlying foundation for many of California's state statutes, regulations, and policies including the California Water Code, Health and Safety Code, California Code of Regulations, and State Water Board Resolution 92-49, which govern many of the site investigation and remediation efforts conducted for cleanup sites in the State of California. Many cleanup sites in California are not subject to provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, also known as Superfund), but the CERCLA process is typically followed. The Final Draft Supplemental VI Guidance supports existing California standards and multiple provisions of the NCP. Most support is for NCP sections 300.410 and 300.415. In fact, the Final Draft Supplemental VI Guidance was created to address perceived shortfalls of historic guidance documents to address sections 300.410 and 300.415 and necessary actions to identify a substantial threat to the public health. The efforts done to address the VI pathway information should be used to develop a CSM as part of the remedial site evaluation under section 300.420.

22. **Comment** – The Supplemental VI Guidance did not follow proper technical and peer review protocol.

    Response – The formal peer review requirement applies to only regulations and State Water Board policy that has the effect of regulation (Health and Safety Code 57004.). The Draft Supplemental VI Guidance is neither a regulation or a policy with the same force and effect as a regulation because its use is not required. However, a public comment process was provided to strengthen the document. The Workgroup presented the Draft Supplemental VI Guidance for public comment from February through June 2020. The Final Draft Supplemental VI Guidance was revised as appropriate based on the feedback. Additionally, the Draft Supplemental VI Guidance was provided internally to DTSC, State and Regional Water Boards, USEPA, and local agency staff for review and comment.

23. **Comment** – Can the risk assessment conducted according to the final Supplemental VI Guidance be used as part of a standard risk assessment that may include other exposure pathways, such as soil exposure?

    Response – Yes, the risk assessment conducted according to the Final Draft Supplemental VI Guidance can be used as part of a standard or “baseline” risk assessment. A comprehensive standard risk assessment that includes all potentially complete exposure pathways from all media (soil, outdoor air, groundwater) may be needed upon full characterization of the nature and distribution of contamination. The Final Draft Supplemental VI Guidance provides approaches for VI screening assessments at individual buildings (Steps 1 – 3) and considerations for site-specific VI assessments of human health risks (Step 4) that should be considered when developing the standard risk assessment for a site. For example, a VI screening assessment report may be an interim report that can be incorporated into a subsequent risk assessment report. The need for a comprehensive standard risk assessment that includes (or refines) an initial VI screening assessment should be determined for each project and set of objectives.

A standard or “baseline" risk assessment can be conducted in place of a VI screening assessment if sufficient information is available at each step of the evaluation process. However, assessing risk for current occupants of a building is a priority and a screening assessment can typically be conducted in a shorter time frame. Comparison with screening levels and information on the nature of the toxicity of the VFC(s) may provide sufficient information to determine the next steps at sites. In absence of current receptors or other urgent concerns, a more comprehensive risk assessment might be conducted in lieu of a screening assessment for future occupants of a currently unoccupied building or a future building.

24. Comment – There is concern that owners of properties adjacent to contaminated sites will be burdened with the evaluation of VI due to migrating vapors or underlying groundwater plumes.

Response – The parties responsible for the release have the obligation to evaluate the extent of contaminated soil, soil vapor, and groundwater on the property where the release occurred and onto neighboring properties as needed for complete delineation and remediation.

For any contaminated site undergoing investigation and/or remediation, a CSM is required by existing statutes under the California Health & Safety Code and California Water Code to determine the nature and extent of contamination for all media (soil, surface water, groundwater, and soil gas/vapor). For initial screenings, start with Step 1 for an evaluation of any on site and neighboring buildings. The presence of contaminated groundwater does not necessarily indicate there is a VI problem due to a number of limiting factors including depth to groundwater, presence of shallow clean groundwater overlying deeper contaminated groundwater, thickness of capillary fringe (wet zone above the groundwater), and soil type and stratigraphy. Shallow, unconfined, contaminated groundwater at high concentrations present the greatest concern for VI. The Final Draft Supplemental VI Guidance identifies that where there is a potential source (e.g. shallow contaminated groundwater), then steps should be taken to assess VI for a given building first by assessment of soil gas (if feasible) or straight to indoor air sampling for very shallow groundwater conditions (less than 5 feet below ground surface).

In situations where off-site VI is occurring, the responsible party should be directed by oversight agencies to conduct public participation efforts to inform neighboring properties of potential VI threat, to request property access to conduct soil gas and potential indoor air/sub slab soil gas sampling if needed, implement interim mitigation measures until current and future VI threat is eliminated, and ongoing operation and monitoring efforts. Off-site property owners have the right to deny or grant access to their property for these efforts with the exception if the property is used for a residential lease. In this situation, the oversight agency may direct the property owner through a statute or order to grant access or perform the assessment to ensure protection of building occupants.

When properties adjacent to a release are being redeveloped or where the source of the release is unknown, there may be a need to collect soil vapor samples beneath the property to evaluate whether a mitigation system is warranted to protect future building occupants. To facilitate development schedules, this may be on a separate schedule than the overall evaluation of a release as described above. In general, property owners are obligated to conduct environmental assessment of their own properties to facilitate redevelopment activity; however, this assessment does not typically extend to other downgradient properties. To the extent that the sampling recommendations in this guidance may put a burden on neighboring property owners during redevelopment, the protection of human health outweighs the costs of additional investigation and mitigation.

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ATTACHMENT 1: INDIVIDUAL COMMENTS FEBRUARY 2020 DRAFT SUPPLEMENTAL GUIDANCE: SCREENING AND EVALUATING VAPOR INTRUSION

All 575 comments are provided in the table below. Please note that the comments are presented in tabular format because not all the original comment letters were accessible to people with disabilities. Given our limited resources, we summarized the comments in the table to make as much content as possible accessible. Read-only copies of the 71 individual letters/emails in their original format can be accessed by emailing DWQ-vaporintusion@waterboards.ca.gov.

Row	Letter Type	Letter ID	Date of Submission	First Name	Last Name	Company or Agency	Comment ID	Topic[1]	Section[1]	Page Number(s)[1]	Comment
1	1. Formal/ Official	01	02/20/2020	Mark	Kram (Dr.)	Groundswell Technologies, Inc.	01.001	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	Use of a conservative default screening attenuation factor (e.g., 0.03) represents a proactive position that will most likely prevent public exposures. Representatives within the regulatory agencies are to be commended for maintaining this position in light of pressures exerted by industry practitioners lobbying for more lenient regulations. Uncertainties associated with models, with the sampling methods used to derive alternative attenuation factors, and with spatial and temporal variability can be formidable, particularly when advection caused by controlling factors is not considered during the majority of field efforts (including those used in studies to derive attenuation factors). The implications can be formidable, particularly if acute exposures are of concern, as samples used in these studies may have been collected during low risk conditions, which would have resulted in an attenuation factor underestimate.
2	1. Formal/ Official	01	02/20/2020	Mark	Kram (Dr.)	Groundswell Technologies, Inc.	01.002	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06c. Step 2B – Estimate Human Health Risk from Vapor Intrusion	15-17	There does not seem to be any mention of the need for determining the reasonable maximum exposure (RME) as recommended in USEPA (2015). Key VI experts are claiming that in order to meet RME requirements with a 95% level of confidence as specified in USEPA (2015), 58 randomly timed traditional samples would be required (Schuver et al., 2018). This would indicate a significant shortcoming for traditional time- integrated samples collected at random times (e.g., with a sampling schedule that does not consider critical controlling factors).

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3	1. Formal/ Official	01	02/20/2020	Mark	Kram (Dr.)	Groundswell Technologies, Inc.	01.003	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	20	It would be helpful to include pros/cons for each of the various methods mentioned in this document. For instance, traditional time-integrated samples such as canister and sorbent samples are prone to false negative and false positive results and are typically not capable of answering many critical questions (e.g., is the observed exceedance due to indoor sources or vapor intrusion?, where are the vapor entry points?, etc.). Similarly, while building depressurization is a potentially viable option under the proper conditions, this approach may not always represent exposure conditions, can be prone to short circuiting due to preferential pathways, can potentially over-estimate risks, and will probably not be representative when applied to large structures. Automated continuous monitoring can be useful for assessment and mitigation confirmation, and can be helpful for determining cause-and-effect relationships. However, in certain instances, it may not be capable of measuring all analytes of interest

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4	1. Formal/ Official	01	02/20/2020	Mark	Kram (Dr.)	Groundswell Technologies, Inc.	01.004	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	20	There should be a clear distinction made between a portable instrument such as a GC/ECD or a GC/MS (which are typically configured to measure VOC concentration at a single location at a specific time) and a multiplexed chemical analytical system capable of monitoring from multiple locations in a repeated sequence continuously over time and space to generate spatial and temporal data patterns. In the latter configuration, the multiplexed system can track the geospatial distribution of concentration dynamics along with weather data and differential pressure patterns, and all the data can be transmitted and processed in real-time via web dashboard. When concentration dynamics, spatial variability and controlling factors are evaluated via maps and stacked time series analyses, cause-and-effect relationships can be determined, indoor sources can be identified, and vapor entry points can be located (Kram et al., 2019). This information is typically derived within a few days of monitoring during a single field campaign. Sampling ports can be dedicated to concurrent indoor, outdoor and sub-slab monitoring locations as well as a calibration standard. This type of monitoring enables evaluation of impacts due to building manipulations (e.g., HVAC operation, sealing of drains or sumps, operation of sub-slab depressurization systems, operation of building depressurization systems, etc.). In addition, practitioners can implement automated alerts and engagement of building controls.

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5	1. Formal/ Official	01	02/20/2020	Mark	Kram (Dr.)	Groundswell Technologies, Inc.	01.005	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06c. Step 2B – Estimate Human Health Risk from Vapor Intrusion	15-17	Regarding the potential for acute risks posed by TCE as indicated by Johnson et al. (2003), industry practitioners have recently sponsored investigations to counter the claims regarding cardiac malformation potential associated with short term inhalation exposures. This is not directly addressed in the document, but it is anticipated that this debate will continue and perhaps be amplified in the coming months and years. Dr. Rich Kapuscinski (USEPA) has often referred to a vapor intrusion investigation performed by Forand et al. (2012), where the authors conclude: “Maternal residence in both areas was associated with cardiac defects. Residence in the TCE area, but not the PCE area, was associated with LBW and fetal growth restriction.” As such, while it is anticipated that regulators in California and elsewhere will be challenged by industry sponsored research efforts, it is recommended that the Forand article be referenced in this supplemental guidance to support the conclusion that women of child-bearing age should not be exposed to these chemicals via the vapor intrusion pathway.

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6	1. Formal/ Official	01	02/20/2020	Mark	Kram (Dr.)	Groundswell Technologies, Inc.	01.006	02. Executive Summary	02a. General Comments	vii	P.vii, Attenuation Factors – It appears that more work needs to be completed to evaluate how calculated AF values will depend upon diffusive flux versus advective flux during the indoor sampling event. By employing continuous chemical and pressure monitoring over the past few years, we have concluded that advection dominates the flow of vapors into buildings, and the timing and magnitude of this depends upon many natural (e.g., barometric pressure trend, temperature dynamics, wind, etc.) and anthropogenic (e.g., HVAC, windows/doors open or close, bathroom fans, etc.) controlling factors reflected in the differential pressure. This is consistent with what is stated in Section C of the Introduction (p.3). As such, while a conservative default screening AF value can serve to help evaluate buildings when no indoor concentration data is available, it behooves regulators to require the tracking of differential pressure across the slab when alternative "empirical" AF values are proposed. This will ensure that indoor concentration values used to calculate proposed alternative AF values are measured during upward flow of vapors from the soil into the building. Otherwise, calculated results could lead to an underestimation of exposure risk. In contrast, samples collected only during upward flow may be useful for evaluating acute risk, but can also overestimate long-term risk. It may be good to discuss/consider this critical point in the next iteration.

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7	1. Formal/ Official	01	02/20/2020	Mark	Kram (Dr.)	Groundswell Technologies, Inc.	01.007	02. Executive Summary	02a. General Comments	vii	P.vii, Four Step Process – In order to save time and expedite the evaluation of potential indoor VOC exposures, Step 2 in the process described (soil vapor assessment) could potentially be avoided. For instance, if a shallow groundwater VOC plume distribution has been characterized, or suspected sewer line conduit distributions are known, or if acute risks are possible, direct measurement of indoor concentrations can begin without haste to minimize exposure durations. Many have justified avoidance or delay of indoor testing based on their concern about the potential for indoor sources of VOCs. While indoor sources are common, these can be quickly identified and removed from consideration using continuous monitoring of the spatiotemporal concentration patterns along with differential pressure and discrete sample collection and confirmation. Direct measurement of indoor exposure concentrations to assess and mitigate potential risks should be the primary objective and therefore drive the VI risk management process. Another variation of an expedited approach includes rapid indoor and sewer cleanout screening throughout a neighborhood with discrete samples followed by automated continuous monitoring of those buildings meeting specific criteria (e.g., exceedance of minimum concentration threshold, knowledge of occupant health issues, etc.). This has been successfully implemented in neighborhoods where time-critical information was needed. For instance, in one recent situation, more than 3 dozen homes were rapidly evaluated within a few days (see: https://www.nrdc.org/onearth/after-children-began-getting-sick-dozens-parents-took- hard-look-their-towns-toxic-legacy; https://www.indystar.com/story/news/environment/2019/03/04/new-technology- tests-levels-dangerous-chemicals-franklin/2951953002/).

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8	1. Formal/ Official	01	02/20/2020	Mark	Kram (Dr.)	Groundswell Technologies, Inc.	01.008	02. Executive Summary	02a. General Comments	viii	P.viii, California VI Database – See comments above regarding 3) P.viii, California VI Database – See comments above regarding Attenuation Factors.
9	1. Formal/ Official	01	02/20/2020	Mark	Kram (Dr.)	Groundswell Technologies, Inc.	01.009	03. Flowchart (Steps)	03b. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	x	P.x, Flowchart Steps 3B and 3D – There should be an option to merge these two elements (e.g., spatial distribution and temporal variability) using high resolution methods such as automated continuous monitoring. Unlike time-integrated sampling methods (e.g., canister and sorbent samples), data patterns derived using high resolution automated continuous monitoring methods enable practitioners to answer key questions in a single field campaign. These questions include: • Is there an indoor risk exceedance? • Is the exceedance due to a previously unidentified indoor source, to vapor intrusion, or to both? • Where are the indoor sources located? • Where are vapor entry points located? • What can be done to most efficiently mitigate risks? • Did mitigation meet risk reduction objectives.Answering these key questions is possible within a few field days and enables expedited response (e.g., meets objectives as stated in Step 1A).
10	1. Formal/ Official	01	02/20/2020	Mark	Kram (Dr.)	Groundswell Technologies, Inc.	01.010	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05d. Step 1C – Selecting Sampling Approach: Soil Gas Screening or Indoor Air	1, 2, 10	P.1, Introduction – See Specific Comment #2 above regarding avoiding the need for (and delay caused by) soil vapor sampling (Step 2) versus immediately sampling indoors for sites meeting “VI candidate” criteria. It appears that this is implied in the second full sentence on P.2 and in Step 1C as described on P.10, but this could be better emphasized and promoted as an option in the Flowchart and in text.

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11	1. Formal/ Official	01	02/20/2020	Mark	Kram (Dr.)	Groundswell Technologies, Inc.	01.011	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	5-6	P.6, Introduction Section D1 – This is a very important section. The attenuation factor policy adopted represents a conservative position and should prevent public exposures.
12	1. Formal/ Official	01	02/20/2020	Mark	Kram (Dr.)	Groundswell Technologies, Inc.	01.012	04. Introduction	04g. F – California Vapor Intrusion Database	7, Attachment 4	P.7, Introduction Section F (and Attachment 4)– How should automated continuous monitoring data (chemical and physical data) be integrated into the California Vapor Intrusion Database and GeoTracker? It appears that a file upload feature may need to be developed, as some of the systems generate more than 140 analytical results per day. The data can be compiled into a csv formatted file, so perhaps this can be uploaded to GeoTracker for each monitoring location and analyte via an API. My team can be available to discuss requirements in greater detail.
13	1. Formal/ Official	01	02/20/2020	Mark	Kram (Dr.)	Groundswell Technologies, Inc.	01.013	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05d. Step 1C – Selecting Sampling Approach: Soil Gas Screening or Indoor Air	11	P.11, Step 1C – It could be helpful to add another bullet for acute risk drivers as justification for going directly to indoor air sampling (Step 3). It could also be helpful to note that neighborhoods can rapidly be screened for indoor risks using various field mobile techniques (e.g., field mobile GC/ECD, field mobile GC/MS, etc.).

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14	1. Formal/ Official	01	02/20/2020	Mark	Kram (Dr.)	Groundswell Technologies, Inc.	01.014	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distribution of Soil Gas Contamination	13	P.13, Step 2, Soil Gas Sampling Depths – There does not appear to be any consideration of dynamic vapor concentrations in shallow subsurface soils. Barometric pumping can significantly impact shallow subsurface concentrations (see: Kram et al., 2011 and 2013). Particularly for situations with shallow groundwater, it could be helpful to mention that soil vapor samples should be collected during a falling barometric pressure (which can induce upward flow of deeper soil vapors). In addition, for undeveloped land, it is possible to cover this with visqueen and monitor selected locations over time/space during a few barometric cycles to avoid false negative results and to derive a better understanding of the potential for future vapor intrusion risks.
15	1. Formal/ Official	01	02/20/2020	Mark	Kram (Dr.)	Groundswell Technologies, Inc.	01.015	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	20	P.20, Real-Time Monitoring – There should be a clear distinction made between a portable instrument such as a GC/ECD or a GC/MS (which are typically configured to measure concentration at a single location at a specific time) and a multiplexed chemical analytical system capable of monitoring from multiple locations in a repeated sequence continuously over time and space to generate spatial and temporal patterns. In the latter configuration, the multiplexed system can track the geospatial distribution of concentration dynamics along with weather data and differential pressure, and all the data can be transmitted and processed in real-time via web dashboard. When concentration dynamics, spatial variability and controlling factors are evaluated via maps and stacked time series analyses, cause-and-effect relationships can be determined, indoor sources can be identified, and vapor entry points can be located (Kram et al., 2019). This information is typically derived within a few days of monitoring during a single field campaign. Sampling ports can be dedicated to concurrent indoor, outdoor and sub-slab monitoring locations. This type of monitoring enables evaluation of impacts due to building manipulations (e.g., HVAC operation, sealing of drains or sumps, operation of sub-slab depressurization systems, operation of building depressurization systems, etc.).

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16	1. Formal/ Official	02	03/09/2020	Martin	Hamann	RPS Group	02.001	01. VI Supplemental Guidance General Comments	01b. Recommendations	3, 13, 14	There are numerous incorrect uses of the word “immediately” in the text. “Immediately” is a time-dependent word (I walk the dog immediately after getting home). The proper word should be “directly” (collect the sample directly under the concrete slab). The following locations are where the word IMMEDIATELY should be changed to DIRECTLY: Text page 3: “…relative to the subsurface immediately adjacent to the building…” Text page 13: “…sample depths immediately above the known or suspected…” Text page 13: “…that best represent conditions immediately below the building…” Text page 14: “…representative of concentrations immediately below the building…” Text page 14: “…represent anticipated conditions immediately below a future building…”
17	1. Formal/ Official	02	03/09/2020	Martin	Hamann	RPS Group	02.002	01. VI Supplemental Guidance General Comments	01b. Recommendations	14, 23, Attachment 1	The refences cited in the text are inconsistent. In most instances, they are correctly cited (e.g. “(Pennell et al., 2013)”), however, there are instances where there is no comma between the author(s) and date. Those should be corrected to include commas before the date and make them consistent throughout the document: Text page 14: (Schumacher et al. 2010; Shen et al. 2014). Both need a comma after “al.”). Text page 23: (Holton et al., 2015; McHugh et al. 2017b; Dawson et al., 2018). Needs a comma after “McHugh et al.” Attachment 1-1: (Davis, 2009; Lahvis et al. 2013; USEPA, 2013a). Needs a comma after “Lahvis et al.”

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18	1. Formal/ Official	03	3/20/2020	Matthew	Winefield	Winefield & Associates, Inc. - Contaminated Property Acquisitions	03.001	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	Default Attenuation Factor Must Be Replaced With California-Specific Values The DSVIG proposes to use USEPA's default soil vapor attenuation factor (AF; 0.03) for various purposes ranging from indoor air screening of existing buildings to risk management decisions for future buildings. The DSVIG appropriately acknowledges some of the shortcomings in the USEPA AF data base (very few California data; a limited number of buildings designed for commercial or industrial use; lack of site-specific outdoor air data; a limited number of paired indoor air and subsurface samples; see pages 7-8) and it commits to developing a California-specific data base. These statements implicitly recognize that a single default value based predominantly on data from sites in Colorado and New York cannot reasonably represent the VI conditions that exist at sites in California. In the best case, use of a 0.03 AF as interim policy would substantially increase the number of sites the state characterizes as "high risk" for purposes of vapor intrusion investigation, diverting limited regulatory and private resources from truly high-risk sites to lower risk sites. Adoption and field use of a final supplemental VI guidance document should be conditioned on completion of a California data base and development of California-specific AFs. If Cal-EPA must establish an interim statewide policy while it works toward this goal, it should utilize a range of values derived from the soon-to-be-completed DTSC data base (see next comment) and other relevant, published and peer reviewed sources.

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19	1. Formal/ Official	03	3/20/2020	Matth ew	Winefiel d	Winefield & Associates, Inc. - Contaminated Property Acquisitions	03.002	04. Introduction	04e. D – Vapor Intrusion Attenuati on Factors	vii, 5	DTSC's Data Base Should Be The Foundation For Any Interim Attenuation Factors The DSVIG invites many unanswered questions about how the California data base will be developed, in what timeframe, and whether this work will actually lead to California-specific values that supplant the default USEPA value. More importantly, it fails to acknowledge that this work is already underway at the Department of Toxic Substances Control (DTSC), which is nearing completion of a California AF data base using available data from EnviroStor that meets more rigorous data quality requirements and is far more representative of actual California sites than the USEPA data base. DTSC staff openly discussed their "Attenuation Factor Study" during USEPA's recent national brownfields conference in Los Angeles (December 2019). It should be foundational to any interim guidance and to a future statewide VI policy.

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20	1. Formal/ Official	03	3/20/2020	Matthew	Winefield	Winefield & Associates, Inc. - Contaminated Property Acquisitions	03.003	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	5, 21	Cleanup Goals Should Be Site-Specific The DSVIG states that cleanup goals should be site-specific and implies that the default attenuation factor of 0.03 is not required to support these decisions. However, no guidance is provided on how site-specific values can be developed. DTSC has stated that it is working on separate guidance to address this information gap, but this work is not acknowledged in the DSVIG. Furthermore, the DSVIG states that risk management decisions for future VI risk should be based on cumulative risk calculations using sub-slab vapor data and an attenuation factor of 0.03. The approach shown in Step 3 of the flow chart does not allow for site-specific assessments of cleanup goals. The ability to use site-specific data to make risk-based decisions for cleanup goals must be clearly delineated in the guidance.
21	1. Formal/ Official	04	4/2/2020	David	Frisbie (Dr.)	N/A	04.001	01. VI Supplemental Guidance General Comments	01a. General Comments		Proposed Supplemental Vapor Intrusion Guidelines will massively increase the flow of business, capital, and investment OUT OF and AWAY FROM California. Implementation of this set of standards would be a disaster. Please act rationally and in the best interest of the citizens and residents of California.

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22	1. Formal/ Official	05	04/23/2020	Lahvis	Matthew	Shell Global Solutions (US) Inc.	05.001	01. VI Supplemental Guidance General Comments	01a. General Comments	5, Attachment 1, Attachment 4	Please find attached general comments prepared by Shell Global Solutions (US) Inc. on the California EPA's ("Agency") Draft Supplemental Guidance (SG) for Vapor Intrusion (VI). Our comments pertain primarily to the application of the SG at petroleum release sites. In this regard, the Agency's referral to the State Water Resources Control Board's Resolution 2012-0062 (Low-Threat Underground Storage Tank Case Closure Policy - LTCP) for VI screening at petroleum UST sites is most welcomed. As you are aware, there are numerous petroleum release sites (both UST and non-UST) that will, however, be managed under the proposed SG. For such cases, we recommend the Agency consider default to the VI strategies for risk assessment described in the ITRC or US EPA OUST guidance, which are based on latest science; or at a minimum, refer to the general bioattenuation approach and soil-gas criteria presented in Appendix 4 of the LTCP for consistency purposes. We also urge the Agency to refrain from issuing the SG until ongoing attenuation factor (AF) database studies are completed and documented later this year. These California-specific studies are likely to provide valuable insight on a more appropriate AF and identify the key data needed to improve VI risk assessment. Potentially delaying changes until sufficient "new" Geotracker data are available and analyzed will, in the interim, foster unnecessary data collection, divert limited resources from VI sites that matter most, and stifle future redevelopment. We hope you find these comments constructive and substantive in helping guide the Agency's further development of the SG.
23	1. Formal/ Official	05	04/23/2020	Lahvis	Matthew	Shell Global Solutions (US) Inc.	05.002	10. Attachment 1 – Petroleum Specific Considerations	10a. General Comments	Attachment 1	there are numerous UST sites where the LTCP criteria do not apply petroleum hydrocarbon vapor transport and VI are largely independent of site (UST or non-UST) type or governing regulatory body (UST or RCRA program) as recognized by the State Water Board in 2016 (Steenson, 2016)

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24	1. Formal/ Official	05	04/23/2020	Lahvis	Matthew	Shell Global Solutions (US) Inc.	05.003	10. Attachment 1 – Petroleum Specific Considerations	10a. General Comments	Attachment 1	screening sites based on concentration (groundwater, soil-gas) is not technically defensible and inconsistent with the latest science on petroleum VI (ITRC, 2014; US EPA, 2015a) attempts to estimate/quantify an attenuation factor from database studies on petroleum hydrocarbons have not been successful (McHugh et al., 2010)
25	1. Formal/ Official	05	04/23/2020	Lahvis	Matthew	Shell Global Solutions (US) Inc.	05.004	10. Attachment 1 – Petroleum Specific Considerations	10a. General Comments	Attachment 1	USEPA OSWER Guidance (US EPA, 2015b), which is referenced multiple times in the SG, recommends site-specific evaluation of non-UST petroleum sites using methods outlined in the USEPA Petroleum Guidance (USEPA, 2014a); that is, including the attenuation attributed to aerobic biodegradation.
26	1. Formal/ Official	05	04/23/2020	Lahvis	Matthew	Shell Global Solutions (US) Inc.	05.005	10. Attachment 1 – Petroleum Specific Considerations	10a. General Comments	Attachment 1	differences in petroleum VI guidance (LTCP vs. SG), in particular, the distance vs. concentration-based screening paradigm, is contrary to California EPA's desire to drive consistency in VI management across California and will foster ambiguity in risk-based decision making at petroleum release sites
27	1. Formal/ Official	05	04/23/2020	Lahvis	Matthew	Shell Global Solutions (US) Inc.	05.006	10. Attachment 1 – Petroleum Specific Considerations	10a. General Comments	Attachment 1	There are a substantial number of vapor forming organic chemicals, that, similar to petroleum constituents, are recognized through extensive testing by the Organisation for Economic Co-operation and Development (OECD) as "readily biodegradable" for which the recommended screening practice will be highly conservative and is likely to result in a high number of false positives (see - (http://www.oecd.org/chemicalsafety/testing/ and REFERENCES)

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28	1. Formal/ Official	05	04/23/2020	Lahvis	Matthew	Shell Global Solutions (US) Inc.	05.007	10. Attachment 1 – Petroleum Specific Considerations	10a. General Comments	Attachment 1	One of the most common site-specific sources of chlorinated VOC contamination involving the formerly acceptable discharge of separator water into sanitary sewer systems and the subsequent leakage of the dissolved-phase or solvent through leaky sewer lines (Schmidt, 2001) is not relevant for petroleum hydrocarbons
29	1. Formal/ Official	05	04/23/2020	Lahvis	Matthew	Shell Global Solutions (US) Inc.	05.008	10. Attachment 1 – Petroleum Specific Considerations	10a. General Comments	Attachment 1	The assumption of no VOC attenuation for crawl-space building foundation types is not accurate for petroleum hydrocarbons the floor of the crawlspace represents a 21% (or 92,000,000 mg/m3) concentration boundary condition for oxygen a "bioattenuation zone" (e.g., > 4% oxygen) will exist below the floor of the crawl space to varying depths depending on oxygen demand (hydrocarbon source concentration and depth) and soil type this "bioattenuation zone" will greatly limit the potential for VI given that hydrocarbons biodegrade at a ~ 3:1 molar ratio of oxygen to hydrocarbon
30	1. Formal/ Official	05	04/23/2020	Lahvis	Matthew	Shell Global Solutions (US) Inc.	05.009	10. Attachment 1 – Petroleum Specific Considerations	10a. General Comments	Attachment 1	RECOMMENDATION: Refer to the ITRC (2014) and US EPA (2015a) petroleum VI guidance for screening ALL petroleum release sites (akin to current referencing of the AF from US EPA (US EPA, 2015b) At a minimum, default to the approach defined in Appendix 4, Scenario 4 of the LTCP that allows for the characterization of a "Bioattenuation Zone" and, if appropriate, risk-based screening levels for key petroleum hydrocarbons based on a 1,000x bioattenuation factor (see - https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2012/rs2012_0016atta.pdf).

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31	1. Formal/ Official	05	04/23/2020	Lahvis	Matthew	Shell Global Solutions (US) Inc.	05.010	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	Technical justification to support the applicability for the recommended AF = 0.03 in California is not provided
32	1. Formal/ Official	05	04/23/2020	Lahvis	Matthew	Shell Global Solutions (US) Inc.	05.011	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	The US EPA (2015) AF study has recognized shortcomings with respect to the relevance for VI sites in California, namely applicability to commercial/industrial buildings, buildings w/ slab-on-grade foundations, and seasonal variability
33	1. Formal/ Official	05	04/23/2020	Lahvis	Matthew	Shell Global Solutions (US) Inc.	05.012	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	AF database studies based on analyses of existing Geotracker and EnviroStar data are currently underway and expected to be completed in 2020 to inform more rational, technically defensible AF values
34	1. Formal/ Official	05	04/23/2020	Lahvis	Matthew	Shell Global Solutions (US) Inc.	05.013	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	Preliminary results from these and other studies (DeVaull, 2008; Eklund and Burrows, 2009; Ettinger et al., 2018; Eklund et al., 2019) indicate that the proposed AF = 0.03 is approximately an order-of-magnitude too conservative and likely to a) initiate activities at a substantial number of sites for which no unacceptable VI risk exists b) drive lots of unnecessary characterization, c) divert limited resources from VI sites that matter most and d) stifle Brownfield and future redevelopment, in particular at commercial/industrial sites.
35	1. Formal/ Official	05	04/23/2020	Lahvis	Matthew	Shell Global Solutions (US) Inc.	05.014	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	The current AF database studies will also help identify the key variables affecting the AF and “critical” data needs for VI risk assessment; hence the prescriptive recommendations for site characterization proposed in the SG are premature

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36	1. Formal/ Official	05	04/23/2020	Lahvis	Matthew	Shell Global Solutions (US) Inc.	05.015	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	Any future revision of the AF based on the development and analysis of a database based on new Geotracker information will not occur for several years
37	1. Formal/ Official	05	04/23/2020	Lahvis	Matthew	Shell Global Solutions (US) Inc.	05.016	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	Potential retractions or revisions to the 0.03 AF that might be warranted within a few years after release of the guidance will be awkward for the Agency and will only demand additional (potentially unnecessary) time and resources
38	1. Formal/ Official	05	04/23/2020	Lahvis	Matthew	Shell Global Solutions (US) Inc.	05.017	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	RECOMMENDATION: Refrain from issuing the SG until after the current AF database studies are completed later this year. Revise the SG as relevant based on the results of these studies on the AF and key site data necessary to improve VI risk assessment. Do not wait until sufficient new Geotracker data are available to make potential changes to the SG, which may take several years and, in the meantime, a) drive lots of unnecessary characterization, b) divert limited resources from VI sites that matter most, and c) stifle Brownfield and future redevelopment.

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39	1. Formal/ Official	06	04/27/2020	Virgili o	Cocian ni	Schlumberger Technology Corporation	06.001a	04. Introduction	04b. A – Scope and Applicabil ity	vi-vii, 1-2	Scope. Recommend adding an explanation of how, and if, this guidance will be applied at sites where remedies and other risk management decisions have already been selected and implemented. Recommend adding an explanation of how, and if, this guidance will be applied at sites where a vapor intrusion (VI) investigation or the evaluation of VI investigation results (i.e., investigation report is finalized) have been completed. Recommend adding clarification on how guidance in this document is applied for a site led by United States Environmental Protection Agency (USEPA) Region 9 versus California Environmental Protection Agency (CalEPA), the Regional Water Boards and the Department of Toxic Substances Control [DTSC]).
40	1. Formal/ Official	06	04/27/2020	Virgili o	Cocian ni	Schlumberger Technology Corporation	06.001b	04. Introduction	04b. A – Scope and Applicabil ity	vi-vii, 1-2	Scope. Recommend adding an explanation of how, and if, this guidance will be applied at sites where remedies and other risk management decisions have already been selected and implemented. Recommend adding an explanation of how, and if, this guidance will be applied at sites where a vapor intrusion (VI) investigation or the evaluation of VI investigation results (i.e., investigation report is finalized) have been completed. Recommend adding clarification on how guidance in this document is applied for a site led by United States Environmental Protection Agency (USEPA) Region 9 versus California Environmental Protection Agency (CalEPA), the Regional Water Boards and the Department of Toxic Substances Control [DTSC]).

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41	1. Formal/ Official	06	04/27/2020	Virgili o	Cocian ni	Schlumberger Technology Corporation	06.002	08. Step 4: Concurrent and Future Risk Evaluation and Manageme nt Decisions	08b. Step 4A – Need for Risk Manage ment	28	Basis for using point of departure for risk management decisions. The risk management matrix (Step 4) identifies response actions even when risk estimates, based on maximum concentrations and conservative default criteria, are within acceptable USEPA risk thresholds (1 x 10-6 to 1 x 10-4 and HI < 1). Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), USEPA acknowledges action is generally not warranted when reasonable maximum exposure (RME) risk is within these acceptable thresholds. Consider that EPA OSWER Directive 9355.0 acknowledges action is generally not warranted when RME risks meet these targets. The National Contingency Plan (NCP) considers an action is needed when cumulative risk is greater than 1 x 10-4; however, it is acknowledged that if not enough information is available, a more restrictive value (e.g., 1 x 10-5 or 1 x 10-6) can be used at the discretion of the regulating agency. And it is acknowledged that 1 x 10-6 can be used as the "point of departure" and is commonly used as a conservative target during the investigation phases of a project. However, the DTSC should consider highlighting the considerations of the NCP/CERCLA process for using site-specific quantitative risk assessments and risk management criteria for determining response actions and exit strategies. Consider providing clarification for cases where no action is required with risk estimates that are greater than 1 x 10-6. The risk management decision framework (Step 4) allows for non-action when the VI risk is less between 1 x 10-6 and 1 x 10-4. In practice, this does not occur.

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42	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.003	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07e. Step 3D – Evaluate Temporal Variability	26	Prescriptive or inflexible requirements. The disclaimer and introduction acknowledge that “this guidance is not intended to provide prescriptive or inflexible requirement,” however, the SVIG appears to include prescriptive rules throughout each of the four primary data assessment steps. Examples include the decision criteria in the flowchart with only two options (“Yes” or “No”), the use of generic subsurface-to-indoor-air attenuations, collection of interior samples with HVAC system on an off, the guidance for collection of a minimum of 9 samples for any sized building, etc. Consider clarifying that the use of site-specific assumptions is acceptable for any step in the VI assessment process (i.e., when a Yes/No decision is being made). The collection of samples when HVAC systems are off is intended to reflect a “worst-case” (i.e., conservative) VI condition; however, the SVIG does not present additional methods that can be used to assess the most conservative conditions. The use of pressure control testing can more effectively induce near worst-case VI conditions in some spaces. The use of indicators, tracers, and surrogates can also help to understand the potential worst-case VI condition better. For many small structures, three indoor air, three sub-slab vapor, and three outdoor air samples are generally not required. Consider clarifying the minimum number of required samples could be adjusted up or down based on site-specific conditions.

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43	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.004a	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07d. Step 3C – Assess Risk from Contaminated Indoor Air and Subslab Soil Gas	25, 28	Conservatism and uncertainties. Recommend providing additional discussion on the uncertainties and conservatism in the guidance. This information will not only assist users in evaluating their sites but also help in communicating risk to the public. While there is language that implies flexibility in a few places in the body of the guidance, consider including language or a footnote in this step-process graphic recognizing value of flexibility and less prescriptive approaches to managing VI challenges (e.g., variability) in the guidance. For example, the use of a maximum detected concentrations from multiple samples that results in total risk estimates greater than 1 x 10-6 risk during Steps 3 and 4 is overly conservative. Consider clarifying the use of maximum concentrations versus RME concentrations.

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44	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.004b	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07d. Step 3C – Assess Risk from Contaminated Indoor Air and Subslab Soil Gas	25, 28	Also, uncertainty is not acknowledged and no new information (e.g., information published by the Department of Defense) incorporated, related to the short-term exposure hazards of TCE. Given the on-going debate over the scientific analysis of inhalation exposure developmental endpoint, consider acknowledging this debate.

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45	1. Formal/ Official	06	04/27/2020	Virgili o	Cocian ni	Schlumberger Technology Corporation	06.005	02. Executive Summary	02a. General Comment s	vi	Consistency versus complexity. Due to the variability in contamination, site, and building factors, the investigation of VI is complex. While it is understandable to investigate VI consistently, consider acknowledging the value (in both the cost and time to conduct an investigation) of allowing flexibility in the VI investigative approaches tailored to specific site (or building) conditions. The discussion in the SVIG acknowledges the many factors that contribute to variability in vapor intrusion sample data leading to "… the probability of false negatives increases…". While the concern for false-negative interpretations is appreciated, these factors equally contribute to false-positive interpretations that can unnecessarily affect the expenditure of resources. Consider acknowledging the need for balance between both false negatives and false positives.

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46	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.006	03. Flowchart (Steps)	03d. Step 3: Evaluate VI Using Concurrent Indoor Air, Subslab, and Outdoor Air	ix, 10-11	Lack of clear exit strategy. No exit strategy truly exists in the screening and evaluation approach laid out in the SVIG as each decision step leads to additional investigation (including assigning buildings as low priority buildings), mitigation and long-term monitoring or ultimately to remediation because current buildings can always change and construction of new buildings in the future will be a concern that need to be investigated. This can be problematic, given that residual soil gas (after remediation) typically remains at levels greater than soil-gas-to-indoor-air VISLs. As an example, Step 1C prescribes that either exterior soil gas (Step 2) or indoor air sampling (Step 3) is to be selected as an investigation strategy; however, the criteria listed and the flowchart “yes/no” structure provide no flexibility for other options. The best outcome is that a building is considered low priority under current land use scenarios based on indoor air sampling results (with additional investigation required), and an area without a building is considered low priority based on soil gas sampling results (with additional investigation required). The guidance needs to more clearly define “low priority” relative to a building and to provide the basis for concluding there is no VI concern and when further action is not required.

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47	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.007	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06c. Step 2B – Estimate Human Health Risk from Vapor Intrusion	15-17	Completion of a human health risk assessment. Given the addition of the risk characterization steps in the SVIG, along with the comparison to risk-based target levels, is there a need to conduct a standard or baseline human health risk assessment (HHRA) for VI pathways? Whether existing buildings are at a site or no buildings are occupied at a site? As noted, the "Risk from all potentially complete exposure pathways should be considered as part of the sitewide evaluation and is outside the scope of this document." Does that mean that the assessment following this SVIG can or should be used for assessing the risk from the VI exposure pathway in a standard or baseline HHRA?
48	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.008	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05c. Step 1B – Prioritizing Buildings for VI Evaluation	9	Step 1B, Prioritizing Buildings: Recommend clarifying what is meant by “greatest subsurface contaminant concentrations”, “most contaminated area”, “release areas”, and “release locations.” Also, answering “no” to the first question of Step 1B appears to indicate that further soil gas sampling is required. There can be cases were only groundwater is potentially impacted by contamination (downgradient plumes). Step 1B currently implies groundwater data cannot be used to exclude areas from further VI investigation. And please clarify the next step related to first question of Step 1B “Buildings within 100 feet of most contaminated areas (vadose zone or groundwater) or connected release location by preferential pathway (e.g., sewer utility)?” when soil gas had been delineated and there are no buildings within 100 feet of the most contaminated area.

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49	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.009	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05d. Step 1C – Selecting Sampling Approach: Soil Gas Screening or Indoor Air	10-11	Step 1C, Select Sampling Approach: Soil Gas Screening or Proceed Directly to Indoor Air Sampling. In practice, Step 1C appears to nearly always lead to indoor air sampling (Step 3). The lack of existing buildings would be the only time Step 2 would be conducted. Consider provided definitions of "release area," "near," "contaminated groundwater plume," and "significant contamination." Also, clarification of what is meant by "buildings connected to conduits intersecting significant contamination" is needed. Because most buildings have utilities, without a definition of a distance criterion or a definition related to the magnitude of contamination, all buildings at sites with detected concentrations could require proceeding directly to indoor air sampling (Step 3).
50	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.010	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05d. Step 1C – Selecting Sampling Approach: Soil Gas Screening or Indoor Air	10-11	Step 1C, Select Sampling Approach: Soil Gas Screening or Proceed Directly to Indoor Air Sampling. Consider allowing subslab sampling as an initial step to assess vapor concentrations beneath a building, and also as evidence to exist a VI investigation, if the risk estimates from subslab vapor are less than target cancer risk and noncancer hazard levels, even if Step 1C criteria are not met.

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51	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.011	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05d. Step 1C – Selecting Sampling Approach: Soil Gas Screening or Indoor Air	10-11, 18, Attachment 1	Steps 1C and 3. Investigation of sewers/preferential pathways. Given nearly all buildings will have utilities, Step 1C is readily interpreted that any building with utilities and a plume beneath the building is likely impacted by VI. Under the proposed approach, indoor sampling, and not exterior soil gas, would always seem to be needed to assess existing buildings. Consider also that nearly every structure has utility penetrations, yet VI occurs at concentrations of concern is only a small fraction of the buildings evaluated, suggesting the significance of a sewer VI pathway should be considered in that context as well. Consider also acknowledging the confounding influence of many background non-contaminant release compounds that can be expected to be present in sewer air. Consider acknowledging the importance of being able to distinguish if detections in sewer air that would drive an indoor air investigation are from a contamination release.
52	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.012	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05d. Step 1C – Selecting Sampling Approach: Soil Gas Screening or Indoor Air	10-11	Steps 1C and 2. Prescriptive nature for sampling indoor air when groundwater contamination is present. It appears the SVIG will require indoor air sampling for more buildings based on the presence of VFCs in soil or groundwater at a site. Consider clarifying the definition of a release area, a contaminated groundwater plume, a groundwater plume less than 5 feet below a building, and significant contamination (intersection a conduit). What defines what a "high" concentration or the distance to contaminated groundwater? Consider clarifying if release location is more accurately described by the intersection of a preferential pathway through soil or groundwater contamination. Consider the vagueness of this, and if guidance could be provided for what is considered significant.

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53	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.013	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distribution of Soil Gas Contamination	9, 12	Steps 2 and 3. Clarification of Screening versus Risk Evaluation. Consider clarification of "screening" versus "evaluation." The prioritization of buildings occurs in Steps 1 A, and 1B could be considered a screening step. Step 1C indicates using soil gas (Step 2) to assess the need for Indoor Air Sampling (Step 3) is a screening step. However, Step 2 is labeled as "Evaluate Vapor Intrusion Risk Using Soil Gas Data." Also, screening soil gas and other information to determine the need for indoor air sampling is mixed with assessing risks for future buildings. Step 2 appears to be a screening step to determine the need for indoor sampling and not a risk evaluation step to assess VI into a building (there is no exit strategy based on evaluation of soil gas sampling results). Consider discussing Step 2 as a risk-based screening step for existing buildings. The title could be "Step 2a: Risk-Based Screening - Using Soil Gas Data to Assess Need for Indoor Air Sampling." Consider including a separate process to address VI risks based on soil gas (or groundwater) data for future buildings by conducting a screening-level HHRA. The title could be "Step 2b: Screening-Level Risk Assessment of Future Buildings Using Soil Gas Data."

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54	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.014	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	19-23	Steps 2 and 3. Clarification of Risk Evaluation versus VI occurrence. Consider acknowledging the importance of obtaining analytical and non-analytical data to evaluate multiple lines of evidence (MLE) to determine VI occurrence before estimating VI risk. Consider indicating, between Steps 3B and 3C, the need for evaluation of multiple lines of evidence (including the complementary lines of sampling identified) to determine VI occurrence and whether the measured concentrations are due to vapor intrusion before assessing risks for existing buildings. In some cases, evidence exists to show the indoor air concentrations are not related to vapor intrusion. However, no decision step allows for not performing subsequent steps.

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55	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.015	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	Step 2. Assessing Vapor Intrusion for Nonresidential Scenarios. Empirical evidence exists that an AF of 0.03 is not appropriate for industrial buildings (Venable et al., 2015 https://clu-in.org/download/issues/vi/TR-NAVFAC-EXWC-EV-1603.pdf). The SVIG uses EPA (2015) attenuation factors in Step 2B. EPA (2015) relies on empirical attenuation factors from available field studies to derive target screening levels in soil gas and groundwater. The AFs used by EPA derivation focused on residential data. Recommend adding a more detailed presentation of the data, so that uncertainties in those factors can be better understood. It is reasonable and consistent with a CERCLA evaluation to use conservative metrics for screening; however, consider there is an empirical basis to assess (screen) using a non-residentially-based AF. The DoD has demonstrated, based on empirical data, that attenuation of sub-slab vapors is greater by 1 to 2 orders of magnitude in commercial/industrial buildings than the default AF based on residential buildings (Venable et al., 2015).

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56	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	6.016	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06c. Step 2B – Estimate Human Health Risk from Vapor Intrusion	17	Steps 2 and 3. Screening for existing buildings versus assessing risks for future buildings. Consider separating out current risk from future risk as currently the focus of the soil gas assessment approach (Step 2) is for existing buildings with assessment of future risk is included as an add-on or qualifying step. Specifically, Step 2 is: 1) assessing the potential for a VI concern for existing buildings that would lead to interior sampling and 2) assessing potential VI concern for future buildings. However, there are no decision steps specific to sites without buildings. Currently, the Step 2 outcomes are 1) repeat soil gas sampling (to assess the need for indoor sampling), 2) proceed to Step 3, and 3) classify as a low VI priority building. It is understood that this is a screening estimate to predict indoor air concentrations from soil gas based on conservative assumptions (max conc. & default AF) but consider the language can easily be misinterpreted to represent actual human health risk versus a conservative estimate to prioritize buildings for investigation based on subsurface source strengths and distances.
57	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.017	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06d. Step 2C – Evaluate Temporal Variability	17	Step 2c. Step 2C overlooks an option to bypass exterior soil gas to collect sub-slab vapor data. Another option is to use other technologies like tracers, indicators, and surrogates for estimating AFs (EPA VI Workshops from 2016 to 2020; Matrix for Selecting Vapor Intrusion Investigation Technologies, DoD 2019 /https://denix.osd.mil/irp/vaporintrusion) or the use of pressure control testing (Use of Building Pressure Cycling in Vapor Intrusion Assessment, DoD 2017/ https://denix.osd.mil/irp/vaporintrusion/) for inducing near worst-case VI with real-time monitoring.

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58	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.018a	04. Introduction	04f. E – Evaluation of Lines of Evidence	6	Steps 2, 3, and 4. Impact of multiple lines of evidence (MLE) and confounding factors on risk-based decision making. How does MLE, including any confounding factors, impact risk-based decision-making (for further sampling decisions [Step 2 to Step 3] and for risk management decisions [Step 3 to Step 4]).
59	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.018b	04. Introduction	04f. E – Evaluation of Lines of Evidence	6	Will MLE (confounding factors) truly allow for exit from process for current buildings? There are several places in the text that indicate that attribution to VI may be a justification not to proceed to Step 4.
60	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.018c	04. Introduction	04f. E – Evaluation of Lines of Evidence	6	Consider clarifying the use of MLE in making the risk-based decisions, for example, adding a decision step or qualifying statement to the flowchart.
61	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.018d	04. Introduction	04f. E – Evaluation of Lines of Evidence	6	Consider distinguishing between when VI is occurring and risks attributed to VI are less than risk management levels. There are cases where VI is occurring, but background sources result in higher, actionable risks while risk attributed to subsurface VI is not a concern (e.g., petroleum hydrocarbons).
62	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.018e	04. Introduction	04f. E – Evaluation of Lines of Evidence	6	Consider the SVIG warrants recognizing the fact that there are multiple layers of conservatism (toxicity values/exposure assumption/generic attenuation factors) in this screening analysis and allow for other site-specific MLE to be considered as part of risk management even at this screening step before jumping to Step 3. Accounting for site-specific factors as a screening estimate when scientifically defensible is appropriate for risk and resource management.

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63	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.018f	04. Introduction	04f. E – Evaluation of Lines of Evidence	6	Consider acknowledging that soil gas plume characterization could inform, as a lkne of evidence, that the conceptual site model of the potential for vapor intrusion for existing buildings to occur based on subsurface source strengths.
64	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.019	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07e. Step 3D – Evaluate Temporal Variability	26	Building pressure control testing. Consider the use of building pressure control testing to replace HVAC on and off testing. Consider other approaches such as pressure cycling that can be combined with real time monitoring can induce near worst case VI and avoid the need for multiple sampling rounds. Longer duration samples (passive/canister low-flow-controller) can also provide methods to manage variability.

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65	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.020	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	21	Step 3. Near slab/floor penetrations. How are the presence of floor penetrations, and concentrations collected from the penetrations, relevant for risk evaluation (the focus of Step 3)? Vapor entry points would generally be considered as part of the real time VFC screening and building survey (i.e., when assess if VI is occurring). Consider clarifying the value these lines of evidence to supplement breathing zone canister samples of indoor air.
66	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.021	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distribution of Soil Gas Contamination	13	Step 2A. Exterior Soil Gas Sampling. Consider in place of sampling closest possible to a building (Section 2A.3), a stepwise approach to collect sub-slab soil gas, not exterior soil gas. This stepwise approach would not collect indoor air data unless sub-slab data identified sufficient source strength to warrant further evaluation. It may be more cost-effective and may provide a better estimate of VI potential, to just collect the sub-slab sample to assess current risk for an occupied building.

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67	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.022	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06d. Step 2C – Evaluate Temporal Variability	17	Step 2C. Evaluate Temporal Variability. Consider clarifying how to address situations where the results of a subsequent sampling event if concentrations are lower than the previous event(s). Is it appropriate to average concentrations from the multiple events when comparing against the target risk criteria?
68	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.023	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07b. Step 3A – Conduct in Depth Building Survey	18	Step 3A. Identification and Resolution of Background Sources. As noted in Section 3A.2, in many cases, it can be challenging to fully resolve background sources. Please clarify what is meant by resolve (for example, does it refer to the removal of a source or is it to be considered as a line of evidence for determining if VI is occurring to removing data from risk estimate calculations?). Also, please clarify the situation if background sources cannot be fully identified and resolved. In many cases, once a background source is removed, any remaining concentrations are assumed to be associated with VI, but it could be that background sources were not fully identified and resolved. Consider adding that only an attempt to resolve background made be made since experience often shows background contribution to indoor air concentrations cannot be prevented nor quantitatively defined.

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69	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.024	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	20	Step 3. Prescriptive guidance related to the number and location of sample especially for large, complex buildings. Consider providing clarification on the basis for requiring three outdoor air sampling locations, including the placement of these samples. Consider clarifying if all of the indoor air sampling locations are breathing zone samples or if sampling a floor penetration is intended to be a breathing zone sample. Consider also including in the guidance flexibility regarding the number of samples per a site-specific conceptual site model (for example, compartmentalized areas vs. open warehouse areas). For example, consider a footnote to Step 3B to acknowledge flexibility in the number of samples based on the site-specific conceptual site model.
70	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.025	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06d. Step 2C – Evaluate Temporal Variability	ix-x, 17, 27	Steps 2C and 4. How are Low priority buildings addressed? Please clarify the need to address all buildings. Categorizing a building as “low priority” indicates it would need to be addressed at a later date. The flowchart should address all buildings, not just high priority buildings. For example, what if low priority buildings have not risk estimates greater than the target cancer risk or noncancer hazard levels?

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71	1. Formal/ Official	06	04/27/2020	Virgilio	Cocianni	Schlumberger Technology Corporation	06.026	10. Attachment 1 – Petroleum Specific Considerations	10a. General Comments	Attachment 1	Assessing vapor intrusion for petroleum VFCs. Assessing pVI is critical given that vapor forming petroleum hydrocarbons compounds (pVFCs) are generally pervasive at project sites. Consider clarifying how assessment of pVFCs are integrated into the SVIG. For example, how are risk estimates calculated for pVFCs? How are pVFCs which are detected indoors due to background sources addressed in risk estimate calculations (e.g., remove risk estimates for background pVFCs)? How to address biodegradation of pVFCs in subsurface media? How to address risks from pVFCs in exterior soil gas, subslab vapor, indoor air for pVFCs and combine those results with the non-petroluem VFCs? Consider clarifying how to incorporate carbon fractions, TPH mixtures (gasoline, diesel), or constituents (BTEXN)?
72	1. Formal/ Official	07	04/27/2020	Bart	Eklund	AECOM	07.001	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05b. Step 1A – When to Expedite VI Evaluations: Acute and Short-Term Hazard	1	Step 1A – Expedite VI Evaluations: Acute and Short-Term Hazard The various references given for trichloroethylene (TCE) are all several years old and rely in part upon a Johnson et al study that has been widely criticized and has not proved to be reproducible. More recent research is not referenced. Recommendation #1 – Include DeSesso, et al. (2019) in the list of relevant research related to short-term TCE exposures.

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73	1. Formal/ Official	07	04/27/2020	Bart	Eklund	AECOM	07.002	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distribution of Soil Gas Contamination	5, 14-15	Step 2 – Evaluate VI Risk Using Soil Gas Data The proposed attenuation factors are based on single-family residential buildings and are overly conservative for other building types. Further evaluation of the USEPA database indicate that the proposed attenuation factors are overly conservative even for residential properties (Yao, et al., 2018). The use of the proposed attenuation factors for other types of buildings is not defensible. There are significant differences in large industrial or commercial buildings compared with the buildings used to develop the proposed attenuation factors (Eklund and Burrows, 2009). This has been recognized and incorporated into some previous VI Guidance (Michigan DEQ, 2012). There also is relevant empirical evidence regarding attenuation factors based on over 50,000 data pairs indicating that an attenuation factor of 0.003 would still be conservative (Eklund, et al., 2019). Furthermore, it is our understanding that studies are currently underway to evaluate relevant data in California databases and identify defensible attenuation factors. It would be prudent to wait until these studies have been completed before incorporating any specific attenuation factor in the guidance. Recommendation #2 – Wait to issue the supplemental guidance until attenuation factor studies are completed later this year. Revise the supplemental guidance based on the results from those studies. It is our expectation that this will result in an attenuation factor of 0.003 or lower for sub-slab soil gas for large industrial/commercial buildings.

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74	1. Formal/ Official	07	04/27/2020	Bart	Eklund	AECOM	07.003	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distributi on of Soil Gas Contamin ation	5, 14-15	The figure used to illustrate the effect of slab capping (i.e., Figure 1B) is misleading. The figure combines two separate figures from a USEPA publication on conceptual site models but “mixes apples and oranges.” The USEPA document shows the effects of groundwater depth in Figure 8 of that document (USEPA, 2012). Rather than use that figure, the California draft document combines two figures produced for disparate scenarios. Unfortunately, one part of Figure 1B is taken from Figure 15 of the USEPA publication and shows the effects for a plume that is spatially very small relative to the size of the slab. Recommendation #3 – Redo Figure 1B of the guidance to accurately reflect the information in the source material, which should be adapted from Figure 8 of the USEPA document.
75	1. Formal/ Official	07	04/27/2020	Bart	Eklund	AECOM	07.004	08. Step 4: Concurrent and Future Risk Evaluation and Manageme nt Decisions	08d. Step 4C – Managin g Future Vapor Intrusion Risk	28	Step 4C – Manage Future Vapor Intrusion Risk The risk matrix indicates that mitigation or remediation are necessary if the sub-slab soil-gas data exceeds the risk criteria (HI >1 or >1E-04) based on an assumed attenuation factor of 0.03. For many buildings, however, the assumed attenuation factor may be several orders of magnitude more conservative than reality. The result will be to require expensive mitigation at sites where such actions are not warranted. Recommendation #4 – Delete the risk-based recommendations for managing future VI risk and instead indicate that future risk should be managed on a case-by-case basis. A case-by-case approach would be prudent no matter what attenuation factor is assumed.

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76	1. Formal/ Official	07	04/27/2020	Bart	Eklund	AECOM	07.005	10. Attachment 1 – Petroleum Specific Considerations	10a. General Comments	Attachment 1	Attachment 1 – Petroleum Specific Considerations The general approach of basing VI risk for petroleum hydrocarbons on groundwater or soil gas concentrations is not technically defensible and is contrary to the latest science and not consistent with California's Low-Threat Closure Policy (SWRCB, 2012). Aerobic biodegradation is expected to occur at any site with petroleum hydrocarbons and this fact has been acknowledged by the State (Steenson, 2016). The vast amount of empirical data indicates that essentially all petroleum hydrocarbon vapors are attenuated over relatively short distances. Therefore, a screening approach based on separation or exclusion distances should be employed. Recommendation #4 – Refer users to ITRC (2014) and USEPA (2015) guidance for screening all petroleum release sites (not just LUST sites).
77	1. Formal/ Official	07	04/27/2020	Bart	Eklund	AECOM	07.006	10. Attachment 1 – Petroleum Specific Considerations	10a. General Comments	Attachment 1	Regulators generally require that exterior soil gas data be collected at a depth of 5 ft. or greater below ground surface (bgs). This is based on concerns about intrusion of atmospheric air and subsequent dilution of the sample. This concern, however, has proved to be unfounded for current best practices involving collection of sample volumes of six liters or less. Shallower soil data would best reflect actual VI risk by taking into account any aerobic biodegradation in the near surface. Recommendation #5 – Specify that soil gas samples as shallow as 2.5 ft. bgs may be collected to demonstrate vertical attenuation. An impermeable cap at the ground surface (e.g., plastic sheeting or hydrated bentonite) can be used if desired to minimize potential for dilution of the sample by ambient air.

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78	1. Formal/ Official	07	04/27/2020	Bart	Eklund	AECOM	07.007	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11a. General Comments	10, Attachment 2	Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion The draft guidance indicates that there may be an issue for sewer lines that intersect impacted soils or impacted groundwater. The studies to date, however, indicate that sewer lines are mainly an issue when the sewer line is submerged in impacted groundwater. Sewer lines in the vadose zone will not be significantly affected by underlying groundwater or vapors from impacted soil (McHugh, Loll, and Eklund, 2017). Recommendation #6 – State in the guidance that the primary concern with sewers are sites where sewer lines are submerged in impacted groundwater.
79	1. Formal/ Official	08	04/30/2020	James	Wells (Dr.)	Everett & Associates, LLC	08.001	01. VI Supplemental Guidance General Comments	01a. General Comments		Chlorinated VOCs have posed a particular challenge considering their toxicity, persistence and relatively common occurrence at impacted sites. One of the biggest problems in this effort has been to address the highly variable nature of vapor intrusion and the many environmental and human factors (some of which—like soil moisture and building-specific air exchange rates—are not generally measured) which influence this variability. As discussed below, we believe the Draft Guidance could make this an opportunity to promulgate methodologies that more reliably address spatial and temporal variability and that encourages the regulated community to adopt more scientifically reliable methodologies.

80	1. Formal/ Official	08	04/30/2020	Jame s	Wells (Dr.)	Everett & Associates, LLC	08.002	04. Introduction	04e. D – Vapor Intrusion Attenuati on Factors	vii, 5	The Draft Guidance Does Not Improve Scientific Reliability or Reduce Uncertainty Compared to Current Methods One of the main themes of the Draft Guidance is to de-emphasize modeling predictions of indoor air concentrations (i.e., the Draft Guidance discourages the use of Johnson-Ettinger [J&E] modeling) and, instead, to rely on generic assessments (i.e., using an attenuation factor of 0.03 to estimate indoor air concentrations of VOCs from subslab or soil vapor data—regardless of depth—at all sites) followed up by limited empirical, site-specific data. CalEPA has yet to provide any evidence or analysis that this methodology is more scientifically valid than the modeling approach or other methodologies. As such, the methodology prescribed in the Draft Guidance has the appearance of being scientifically arbitrary (not better than other methods, just different). Not only do we need consistency in vapor intrusion investigations (which the Draft Guidance does provide), we also need better vapor intrusion investigations (which, in our opinion, the Draft Guidance does not provide). The de-emphasis of predictive modeling is especially problematic for estimating future vapor intrusion risk. There would seem to be no alternative to predictive modeling if responsible parties are required to estimate risks for uncertain future land uses and for buildings that do not yet exist. The Draft Guidance states that it “incorporates information from recent technical and regulatory publications that have highlighted the variable nature of vapor behavior” (p. vi) yet the reliance on a single generic attenuation factor essentially treats all sites the same and disregards the variable nature of vapor behavior, at least in the screening phase of an evaluation. The Draft Guidance replaces one arguably problematic methodology with another methodology that has problems of its own. The VI Guidance would be more valuable if it was revised to document that the new methodology is more reliable, more accurate, and/or more cost-effective. In our opinion, the use of generic attenuation factors of 0.03 for soil vapor and 0.001 for groundwater-to-indoor air is—if not a step backward, then certainly only—a step sideways for at

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											least three reasons. First, considering the nearly universal recognition of temporal and spatial variability in vapor intrusion, it is counter- intuitive to introduce a methodology that accounts for none of it while discouraging the use of an alternative methodology (J&E) that does, in fact, address many factors contributing to variability.

81	1. Formal/ Official	08	04/30/2020	Jame s	Wells (Dr.)	Everett & Associates, LLC	08.003	04. Introduction	04e. D – Vapor Intrusion Attenuati on Factors	vii, 5	Second, these generic attenuation factors are derived from US EPA's attenuation factor database, which has been shown to be extremely limited and possibly unreliable1 due to inconsistent QA/QC protocols from site to site and lax assumptions about what constitutes paired data. For example, pairs of indoor air and subsurface data are not necessarily contemporaneous (in some instances they may be separated by as much as a few months2) and groundwater samples can be up to 69 meters from the tested home or commercial building. Problems in the EPA database are especially apparent in the groundwater data, which makes a very significant assumption that source area soil vapor concentrations can be estimated from groundwater concentrations according to Henry's Law. As noted by Yao, et al., the paired groundwater and indoor air data in EPA's database don't really make scientific sense and "seems to call into question even the most basic aspects of our physical understanding of the soil transport problem in VI modeling," which is a nice way of saying that these data and/or the underlying assumptions about groundwater-to-indoor air attenuation factors are unreliable. Yao, et al. conclude that "the evidence points in the direction of the assumed groundwater source leading to a lower contaminant vapor concentration than calculated from Henry's law."3 There is a lack of scientific evidence that using a generic attenuation factor in real-world situations is a reliable methodology, and if this approach must be used, there is a lack of scientific evidence that 0.03 and 0.001 are the right numbers for California. There is even less scientific evidence that relying on a single attenuation factor for all sites, with their multitude of site-specific vicissitudes is a better methodology than J&E modeling or other possible assessment methods. For example, Derycke, et al., showed that newer buildings in their study had significantly greater attenuation than older buildings. In their work on school buildings in France, schools less than 50 years old had a median empirical subslab-to-indoor air attenuation factor of 0.0003 and the 95th percentile of the distribution of empirical attenuation factors was 0.0078: 100 and 4 times lower, respectively, than the value proposed in the Draft Guidance. We do not think it is in the interest of human health or economic efficiency to promulgate guidance that may be inaccurate by a factor of 100.

											CalEPA's initiative to develop a California-specific database for attenuation factors is to be applauded, but the sequencing seems to be out of order: perhaps CalEPA should build the database first, then finalize the Draft Guidance. We acknowledge that J&E is a simple, 1-dimensional model which has been shown at times to be an imperfect predictor of indoor air concentrations.4 We note, however, that the model is based upon a scientifically valid representation of the actual physics of soil vapor migration and air entry into buildings. There are obvious limitations to any 1-dimensional simulation of a 4-dimensional system (three physical dimensions plus time), but there is a long history in environmental science of productive use of relatively simple screening models to provide input for decision making. In contrast, the use of a single generic attenuation factor is contrary to the "variable nature of vapor behaviour" that CalEPA acknowledges in the Draft Guidance and that is affirmed by published studies and data from dozens of sites across California. We should be working to improve the models, not discarding an important tool in the "multiple-line-of-evidence" toolbox. Rather than discouraging the use of modeling, CalEPA could invest in efforts to improve the existing modeling tools to create a more robust modeling platform for vapor intrusion evaluations. 1 See, for example, Yijun Yao, Rui Shen, Kelly G. Pennell, and Eric M. Suuberg, 2013, Examination of the U.S. EPA's Vapor Intrusion Database Based on Models, Environmental Science & Technology, v. 47, pp. 1425−1433; and Derycke, Coftier, Zornig, Leprond, Scamps and Gilbert, 2018, Environmental Assessments on Schools Located on or Near Former Industrial Facilities: Feedback on Attenuation Factors for the Prediction of Indoor Air Quality, Science of the Total Environment, v. 626, pp. 754-761. 2 EPA, 2012, EPA's Vapor Intrusion Database: Evaluation and Characterization of Attenuation Factors for Chlorinated Volatile Organic Compounds and Residential Buildings, p. 4. 3 Yao, et al., 2013, op cit., p. 1430. 4 Neither the generic attenuation factor approach nor J&E address

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											the apparent upper limit on observed indoor air concentrations possibly due to absorption equilibria between indoor air and upholstered furniture and painted surfaces as noted by Yao et al. (2013) thus both approaches are vulnerable to overestimating indoor air concentrations for sites with high soil vapor or groundwater levels.
82	1. Formal/ Official	08	04/30/2020	James	Wells (Dr.)	Everett & Associates, LLC	08.004	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	The third concern with the attenuation factor methodology in the Draft Guidance is that it assumes essentially no attenuation of contaminants in soil vapor due to migration across the vadose zone (e.g., the 0.03 attenuation factor applies equally to subslab vapor, shallow soil vapor and deep soil vapor). This simplification is a consequence of CalEPA's reliance on modeling studies in the literature which show a capping effect in soil vapor profiles underlying structures with concrete foundations.5 This modeling-based assumption (of very little attenuation across the vadose zone under buildings) highlights an inconsistency in the theme in the Draft Guidance that modeling is to be discouraged. At minimum, CalEPA should provide real data to support its assumption that the phenomenon of capping develops at all sites and should assess the strength of capping as well as its variability with respect to things like climate, lithology (the capping simulations assumed homogeneous sandy soil under buildings which is not common in California) and building operation. The message in the current Draft Guidance seems to be that reliance on modeling is fine as long as it supports CalEPA's insistence on using generic attenuation factors but it is otherwise inappropriate. 5 CalEPA, Draft Guidance, Figure 1, p. 15.

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83	1. Formal/ Official	08	04/30/2020	Jame s	Wells (Dr.)	Everett & Associates, LLC	08.005	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06d. Step 2C – Evaluate Temporal Variability	17, 26	Guidance on Temporal Variability is Arbitrary We concur that temporal variability in the occurrence of vapor intrusion is a serious issue. We also agree that robust, site-specific data sets can be very important. A state-wide California guidance document is an ideal opportunity for providing statistically valid guidelines for how to address such variability. On page 17 the Draft Guidance states: “soil gas probes should be sampled at least twice, in different seasons…” And on p. 26, after the first round of indoor air testing, sampling “should be repeated for one or two additional events for a total of at least two events…” If the goal is to determine the reasonable maximum exposure or even average exposure, published studies6 have documented that two or three sampling events are exceedingly unlikely to accomplish this level of confidence. CalEPA should either document that these recommendations for two or three sampling events are statistically meaningful or it should revise these sections in a manner that takes steps to overcome this profound challenge of characterizing a highly variable phenomenon based on a few observation events. 6 Horton, Luo, Dahlen, Gorder, Dettenmaier and Johnson, 2013, Temporal Variability of Indoor Air Concentrations Under Natural Conditions in a House Overlying a Dilute Chlorinated Solvent Groundwater Plume, Environmental Science & Technology, v. 47, pp. 13347-13354.

84	1. Formal/ Official	08	04/30/2020	Jame s	Wells (Dr.)	Everett & Associates, LLC	08.006	08. Step 4: Concurrent and Future Risk Evaluation and Manageme nt Decisions	08a. General Comment s	27	Inadequate Guidance on Vapor Intrusion Risk that Falls in "Risk Management" Range Because of the requirement to use generic attenuation factors of 0.03 for soil vapor and 0.001 for groundwater, virtually all sites with chlorinated VOCs in the subsurface (even sites with very minor amounts) will be drawn into this program. Based on our experience at many VOC sites in California, a great many (perhaps most) will move through Steps 2 and 3 as laid out in the Draft Guidance and will be classified in Step 4 in the "risk management" range.7 The Draft document only provides the most general guidance related to what a responsible party should actually do for sites in this category. Similarly, the Draft Guidance lacks an explanation for how a responsible party—having carried out one or more of the potentially acceptable actions—would demonstrate that those actions8 were sufficient. In short, we fear that many, many sites will be drawn into the evaluation framework developed in the Draft Guidance but have no clear way from emerging out the other end in spite of responsible parties' best efforts. If one assumes that acceptable cleanup standards for subslab soil and/or soil vapor need to be back- calculated by applying the 0.03 attenuation factor to indoor air standards (e.g., San Francisco RWQCB Environmental Screening Levels [ESLs]), the standards for common chlorinated compounds such as PCE and TCE are so low as to be technically unachievable for a great many contaminated sites. For example, using this methodology, the subslab and soil vapor standard for PCE in a residential setting would be 15.3 ug/m3. We conducted a quick survey of VOC sites in the Los Angeles Region and found that the vast majority of sites that have completed remediation or have ongoing remediation have failed to achieve this extremely low level. Because the 0.03 attenuation factor is based on the 95th percentile of empirical data in the EPA database (which, itself, is flawed and incomplete as noted above) we know that the vast majority of sites would be safe from vapor intrusion at higher subsurface concentrations. The Draft Guidance would be improved if it provided clear guidance for how to demonstrate site safety in such circumstances.

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											The implication seems to be that responsible parties must figure out some way of determining site- specific attenuation factors for their site, but are only allowed to do so in Step 4 of the Draft Guidance, after incurring the substantial cost of working their way through steps 1, 2 and 3. This is a highly inefficient and costly protocol. 6 Horton, Luo, Dahlen, Gorder, Dettenmaier and Johnson, 2013, Temporal Variability of Indoor Air Concentrations Under Natural Conditions in a House Overlying a Dilute Chlorinated Solvent Groundwater Plume, Environmental Science & Technology, v. 47, pp. 13347-13354. 7 USEPA has generally categorized sites with excess cancer risk between 1x10-6 and 1x10-4 and with a hazard index of less than 1.0 as falling into the “risk management” category. 8 The Draft Guidance lists a very wide range of potentially acceptable response actions: “none, institutional controls, additional investigation/sampling, monitoring, refine risk assessment, mitigation, remediation” (p. 28).

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85	1. Formal/ Official	08	04/30/2020	Jame s	Wells (Dr.)	Everett & Associates, LLC	08.007	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06c. Step 2B – Estimate Human Health Risk from Vapor Intrusion	15	Unclear Guidance Regarding Exposure Point Concentrations The Draft Guidance affirms that it should be considered a supplement to existing guidance, including DTSC's Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (also referred to as the 2011 "Vapor Intrusion Guidance" or VIG). The VIG notes (p. 2) that evaluations should include "reasonable maximum estimates of exposure" to VOCs that may enter existing or proposed buildings due to vapor intrusion. The requirement for 2 or 3 sampling events for indoor air does not appear designed to obtain "reasonable maximum exposure" levels. The Draft Guidance should explain what exposure point standards it is relying upon and document that the sampling requirements can achieve these goals. In summary, this guidance document is an opportunity to incorporate the latest research findings to assist responsible parties through the difficult process of characterizing vapor intrusion risk in a scientifically robust and economically reasonable manner. As it has done so often in the past on environmental matters, California could lead the way by providing statistically valid guidelines for how to address the difficult issue of spatial and temporal variability in real-world situations. We believe the Draft Guidance should be revised to come closer to this goal.

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86	1. Formal/ Official	09	05/08/20	Micha el	Marello	Environmental Management Strategies, Inc.	09.001	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distributi on of Soil Gas Contamin ation	12	Please provide additional guidance on when mitigation like a vapor intrusion barrier system would be an appropriate and approve remedy for a vapor intrusion condition. There is confusion on this issue and conflict between documents produced by the SFRWQCB and DTSC. An example is were a soil vapor plume from an unknown or uncontrollable off-site source (like a regional plume) has encroached onto a property where redevelopment is proposed (like into low cost housing) and soil vapor concentrations exceed residential health-based levels for potential vapor intrusion by all evaluation methods. Remediation is not possible with this type of common condition in urban areas.

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87	1. Formal/ Official	10	05/14/2020	Grego ry	Noblet	Path Forward Partners, Inc.	10.001	04. Introduction	04e. D – Vapor Intrusion Attenuati on Factors	vii, 5-6	1) Topic: Step 2: Evaluate Vapor Intrusion Risk Using Soil Gas Data Section: D2 Alternatives for Screening As discussed on Page 6, the Draft Guidance indicates that alternative approaches to the USEPA generic attenuation factor (AF) of 0.03 may be used if supported by adequate technical and site information. Prior to release of this guidance, Cal/EPA staff have attended multiple conferences over the past 3 years discussing components of this Draft Guidance. During these presentations Cal/EPA staff have emphasized that the material presented is merely guidance and alternative methods would be considered. During several of these presentations members of the audience including members of Path Forward have inquired on examples of acceptable alternatives to the USEPA AF. As the key components of the guidance, specifically the USEPA AF, have been applied on regulated sites for several years now by agencies including the SFBRWQCB, have any alternatives to the USEPA AF been accepted by the Cal/EPA, consistent with the flexibility discussed during previous meetings and in Section D2 of the Draft Guidance? If so, please provide examples of alternatives that may be considered for screening evaluations, particularly with respect to future buildings proposed for construction (see Comment 2).

88	1. Formal/ Official	10	05/14/2020	Grego ry	Noblet	Path Forward Partners, Inc.	10.002	04. Introduction	04e. D – Vapor Intrusion Attenuati on Factors	vii, 5	2) Topic: General Comments on Draft Supplemental Vapor Intrusion Guidance Section: Vapor Intrusion Attenuation Factors The Draft Guidance focuses on evaluating existing buildings using the generic AF of 0.03, which is based on empirical data relating to chlorinated solvents and older residential buildings. The Draft Guidance provides less direction on evaluating newer and proposed buildings of other types such as commercial office buildings and industrial warehouses, both of which are currently in great demand, are often built above legacy groundwater plumes, and have building characteristics that are very different from older residential structures. Newer buildings incorporate features that address potential preferential pathways (see next) and may incorporate other features such as higher ceilings and higher ventilation rates that also provide a benefit under the traditional (Johnson and Ettinger) vapor intrusion conceptual site model. The generic AF of 0.03 is overly conservative for modern buildings that are designed and constructed to building codes (e.g., plumbing and mechanical), and may result in the decision to implement vapor mitigation measures (e.g., sub-slab venting systems with associated ongoing monitoring) that are not actually warranted. The Draft Guidance describes cracked or punctured pipes, loose fittings, degraded toilet gaskets, and dry plumbing traps as causing preferential pathways into older buildings. It would be helpful to develop a standard list of modern building design practices that could be credited towards vapor mitigation. If such measures were integrated into a building thereby addressing potential preferential pathways, an AF based on the traditional (Johnson and Ettinger) vapor intrusion conceptual site model could presumably be justified. Under the traditional (Johnson and Ettinger) vapor intrusion conceptual site model, relevant site-specific factors such as depth to soil gas contamination, soil properties, building ventilation rate, and ceiling height could be incorporated into site-specific AFs. Can Johnson and Ettinger Model-based AFs (e.g., the CHHSL-based

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											DTSC-recommended AFs of 0.002, 0.001, and 0.0005; and/or site-specific AFs) still be used, if preferential pathways are addressed? If modeling is not recommended, what are other options to incorporate these variations that would be acceptable to Cal/EPA?
89	1. Formal/ Official	10	05/14/2020	Gregory	Noblet	Path Forward Partners, Inc.	10.003a	10. Attachment 1 – Petroleum Specific Considerations	10c. Using the Supplemental Guidance in Conjunction with PVI Guidance for Petroleum-Only Release Sites	Attachment 1, 1-1	3) Topic: Attachment 1 – Petroleum Specific Considerations Section: Attachment 1 – Petroleum Specific Considerations Please reconcile the apparently conflicting recommendations of the Draft Guidance and the Low-Threat Underground Storage Tank Case Closure Policy (LTCP) with respect to baseline (absent bioattenuation) soil gas-to-indoor air AFs. The LTCP provides soil gas screening levels, without and with bioattenuation, and states: "For the no bioattenuation zone, the screening criteria are the same as the California Human Health Screening Levels (CHHSLs) with engineered fill below sub-slab… 1000-fold bioattenuation of petroleum vapors is assumed for the bioattenuation zone." The soil gas CHHSLs were developed using the Johnson and Ettinger Model, and the "with engineered fill" model scenarios are the basis of the DTSC-recommended attenuation factors of 0.001 (residential buildings with 0.5 air exchanges per hour [ACH]) and 0.0005 (commercial buildings with 1 ACH). The soil gas CHHSLs were also based on then-current toxicity factors and exposure assumptions (i.e., were based on then-current indoor air screening levels), which have been since revised. The LTCP applies an additional bioattenuation factor of 0.001 to the CHHSL-based AFs of ~0.001 and ~0.0005 (the CHHSL AFs are chemical-specific).

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90	1. Formal/ Official	10	05/14/2020	Grego ry	Noblet	Path Forward Partners, Inc.	10.003b	10. Attachment 1 – Petroleum Specific Considerati ons	10c. Using the Supplem ental Guidance in Conjuncti on with PVI Guidance for Petroleu m-Only Release Sites	Attachment 1, 1-1	3) Topic: Attachment 1 – Petroleum Specific Considerations Section: Attachment 1 – Petroleum Specific Considerations The Draft Guidance discusses performing a “site-specific biodegradation assessment” in the context of Draft Guidance Step 2 (Evaluate Vapor Intrusion Risk Using Soil Gas Data); however, the discussion focuses on collecting the data needed to meet the bioattenuation zone criteria presented in the LTCP (e.g., sufficient oxygen in soil gas, low TPH concentrations in soil), but does not explicitly state how the data should be evaluated. Can we assume a “site-specific biodegradation assessment” conducted in the context of Draft Guidance Step 2 would justify the use of a 0.001 bioattenuation factor for petroleum compounds, provided the bioattenuation zone criteria of the LTCP (e.g., oxygen and TPH concentrations) are met? In the context of a site-specific biodegradation assessment, what are the appropriate baseline (absent bioattenuation) soil gas screening levels for petroleum compounds (i.e., what are the appropriate soil gas screening levels for petroleum compounds that the additional 0.001 bioattenuation factor should be applied to)? Should the obsolete indoor air screening levels be retained, or updated to current agency values? Should the baseline (absent bioattenuation) CHHSL-based AFs be retained; or updated to the generic AF of 0.03 and/or updated to site-specific values if justified through Johnson and Ettinger Modeling? The LTCP provides soil gas screening levels only for benzene, ethylbenzene, and naphthalene; can the biodegradation assessment also include other petroleum-related VFCs that are subject to aerobic bioattenuation? Do the baseline soil gas screening levels change if the release is from a UST or non-UST source?

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91	1. Formal/ Official	10	05/14/2020	Gregory	Noblet	Path Forward Partners, Inc.	10.004	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05b. Step 1A – When to Expedite VI Evaluations: Acute and Short-Term Hazard	9	4) Topic: Step 1A – Expedite VI Evaluations: Acute and Short-Term Hazard Section: Step 1A – Expedite VI Evaluations: Acute and Short-Term Hazard Step 1A of the recommended evaluation approach is to evaluate acute and short-term hazards including fire and explosion hazards; however, no guidance is cited with respect to evaluation of methane or other explosive compounds. We are familiar with two existing DTSC methane guidance documents, Advisory on Methane Assessment and Common Remedies at School Sites (2005) and Evaluation of Biogenic Methane: A Guidance Prepared for the Evaluation of Biogenic Methane in Constructed Fills and Dairy Sites (2010). The latter document presents a spreadsheet-based model for evaluating soil gas methane concentrations and differential pressures – this methane model contains programming errors that result in underprediction of methane transport to indoor air. Path Forward has submitted a technical memorandum to DTSC and SFBRWQCB that provides our detailed comments on the DTSC biogenic methane model (see attached).

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92	1. Formal/ Official	10	05/14/2020	Gregory	Noblet	Path Forward Partners, Inc.	10.005	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distribution of Soil Gas Contamination	11-12	5) Topic: Soil Screening for Potential Reuse Section: Step 2: Evaluate Vapor Intrusion Risk Using Soil Gas Data As discussed on pages 11 and 12 of the Draft Guidance, soil gas data are preferred over soil matrix concentrations due to several factors including uncertainty in predicting contaminant partitioning and laboratory reporting limits exceeding levels of concern for some vapor forming compounds (VFCs). In an effort to keep surplus soil from unnecessarily being disposed of in landfills, the exchange of soil between construction sites is a well-known and often used practice which typically follows guidance provided in the DTSC's Information Advisory, Clean Imported Fill Guidance. How does this Draft Guidance affect the screening of soil for potential on- or off-site reuse at sites that may or may not be a likely source of VFCs? Additionally, if the preference is to utilize soil gas data for this screening, how does the Cal/EPA recommend assessing stockpiled soil that has already been excavated? The current Cal/EPA Soil Gas Advisory emphasizes minimization of soil disturbance when sampling soil gas, which is unavoidable during soil excavation and stockpiling.
93	3. Informal: Water Boards	11	05/08/2020	Kerri	Okeefe	INTERNAL RWQCB-Region 6 Lahontan North Basin	11.001	01. VI Supplemental Guidance General Comments	01b. Recommendations	42	I think it would be nice if there were a glossary for acronyms. I know as a regulator, I don't always read the entire guidance document unless it is completely necessary. I often skim for what I am looking for and then read just that. If there were a glossary for the acronyms to refer to it would be even easier to search.

94	4. Informal: Questions	12	05/15/2020	Mark	Kram (Dr.)	Groundswell Technologies, Inc.	12.001	01. VI Supplemental Guidance General Comments	01b. Recommendations		I have listened to the videos and attended the 5/14/20 Q&A session associated with the Supplemental VI Guidance. Very nicely done! I noticed something in clip #4 that caught my attention. Monitoring differential pressure (DP) across the slab as well as barometric pressure (BP) is recommended during sampling events. Instead of recommending recording of a single value of the absolute BP, it could be better to recommend tracking the trend in BP, as this seems to be more important than the absolute BP value (which is what most document in their sampling log). For instance, as you know, a dropping BP can correspond to a naturally induced DP that results in upward advective flow of vapors. I believe this may be due to the pressure lag in the shallow subsurface pressure during the early portion of a drop in above-ground pressure (e.g., due to diurnal fluctuations or an approaching storm). This can result in a higher relative pressure in the shallow soil, which can induce upward advective vapor flux via establishment of a pressure gradient. The earth essentially “exhales” at that time, which results in vapor intrusion. This interplay between above-ground pressure and subsurface pressure can cause exposure dynamics. The draft guidance references Hosangadi et al. (2017), which provides a good example of this. On a related note, consistent with what Schuver and others are advocating for in their indicator, surrogate and tracer (IST) workshops and papers, timing of the sampling event is critical. For instance, it could be helpful to screen data to determine whether samples were collected during a drop in BP or during DP indicating upward advective flux. If sample timing is based on scheduling convenience (which is most common), the probability of estimating the reasonable maximum exposure (RME; as recommended by USEPA (2015)), or correctly estimating an “empirical” attenuation factor will be low. Schuver et al. (2018) claim that 58 randomly timed samples would be required to estimate RME with a 95% level of confidence. This is the rationale behind the IST concept – time the sampling event to more conservatively estimate potential risk. BP trend could potentially serve as one of those indicators.

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											Perhaps this could be discussed in the pending guidance. For instance, what if it was recommended that practitioners document the BP and DP time series patterns beginning a few hours before the sampling event started and ending at the time the event ended? The BP data is readily available on-line for most areas, or a local weather station can be deployed.

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95	4. Informal: Questions	12	05/15/2020	Mark	Kram (Dr.)	Groundswell Technologies, Inc.	12.002	15. General Comments on Vapor Intrusion	15a. General Comments		In the Q&A session yesterday, there was a question regarding whether a repeat sampling campaign was necessary if samples collected during an upward advective flux condition (e.g., based on DP) exhibited concentrations below risk thresholds. The response was that this may not represent worst case risk, and there was mention of the use of induced building depressurization. I have two related comments in response to this: Most samples used for risk related decisions are not collected during upward vapor flux. Just because it was collected during Winter does not mean it was collected while DP exhibited upward flux. As such, drawing conclusions based on season is not sufficiently precise, as it is still possible to underestimate risk if vapor intrusion was not occurring during the sampling event. As such, if practitioners document safe conditions during vapor intrusion events, this may be sufficient, provided the differential pressure meets specific criteria. The correlation between differential pressure and concentration was established in Hosangadi et al. (2017), however the coefficient was only about 0.6. As such, it could be helpful to document this via GeoTracker to see if we can identify sufficient DP values that increase confidence that risks are negligible. Building depressurization is not generally applicable for large buildings, as short-circuiting, preferential pathways, and other factors can result in misrepresentation. It is our opinion that monitoring over natural (e.g., BP dynamics) or normally induced conditions (e.g., HVAC operational schedules) combined with geospatiotemporal monitoring yields a superior representation of realistic exposure conditions.

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96	4. Informal: Questions	12	05/15/2020	Mark	Kram (Dr.)	Groundswell Technologies, Inc.	12.003	13. Attachment 4 – Guidance on Uploading Vapor Intrusion Information into GeoTracker	13a. General Comments	Attachment 4	One final comment: Can you please update GeoTracker to allow us to upload continuous monitoring data (e.g., concentration, BP trend, DP trend, etc.)?
97	2. Informal: DTSC	13	05/15/2020	Thomas	Booze	DTSC	13.001	01. VI Supplemental Guidance General Comments	01b. Recommendations	35	You may wish to check the correct form of Lilian Abreu's citation in your reference for "Abreu, D.V., and P.C. Johnson. 2005. Effect of Vapor Source-Building Separation and Building Construction on Soil Vapor Intrusion as Studied with a Three-Dimensional Numerical Model. Environmental Science & Technology 39, pp. 4550-4561." Her name is Lilain DV Abreu. Your citation may be correct but I've never seen her referred to as D.V. Abreu.
98	2. Informal: DTSC	13	05/15/2020	Thomas	Booze	DTSC	13.002	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distribution of Soil Gas Contamination	12	How is source defined? Several times we've heard statements like "the soil gas sample should be obtained from above the source and halfway between the source and the surface". Is the source the location of the original release, the area of highest concentration, the edge of a soil gas plume, 15' bgs, etc?

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99	3. Informal: Water Boards	14	5/14/2020	Jong	Han	INTERNAL RWQCB-Region 5 Fresno	14.001	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06c. Step 2B – Estimate Human Health Risk from Vapor Intrusion	16	1. On page 16, there are equations to calculate Cancer Risk and Hazard Quotient. Can you provide more detail on IUR, Rfc, ATc, ATnc? Can you also provide a few example calculations using these equations (especially for TCE and PCE)? Which chemicals we have to calculate Cancer Risk and which chemicals we have to calculate Hazard quotient? Can you provide actual numbers for SL from R2 water board and DTSC for calculation?
100	3. Informal: Water Boards	14	5/14/2020	Jong	Han	INTERNAL RWQCB-Region 5 Fresno	14.002	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	19	2. Unit conversions. In addition to microgram per cubic meter, we cab see ppmv, ppbv, microgam per liter units. PID readings are ppmv. Can you provide help to untrained person can understand these different units. We need to know molar volume, molecular weight, and gas equation (PV=nRT).

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101	3. Informal: Water Boards	14	5/14/2020	Jong	Han	INTERNAL RWQCB-Region 5 Fresno	14.003	10. Attachment 1 – Petroleum Specific Considerations	10d. Site-Specific Biodegradation Assessment	Attachment 1	3. I think Petroleum hydrocarbons IA issue treated too lightly in the Guidance when you have so many refinery and bulk plant site in the Valley. Are you sure the Low Threat Closure policy provide guidance for Petroleum UST and refinery IA issue? Please explain more why we have to address IA issues at refienries even with natural biodegradtion. Just because they are bigger than USTs?
102	1. Formal/ Official	15	05/19/2020	Lenny	Siegel	Center for Public Environmental Oversight, A project of the Pacific Studies Center	15.001	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	I am pleased to see that the draft Guidance sticks with EPA's default factors, at least until empirical studies demonstrate the superiority of other numbers. I support use of those attenuation factors, particularly at development sites where there is no indoor air to measure. The uncertainty due to the spatial and temporal variability of vapor intrusion supports the imperative of a protective approach.
103	1. Formal/ Official	15	05/19/2020	Lenny	Siegel	Center for Public Environmental Oversight, A project of the Pacific Studies Center	15.002	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	I am also pleased that the draft warns against using models, such as the Johnson-Ettinger model, to develop site-specific attenuation factors for initial site screening. I have seen numerous documents where those responsible for the environmental response go to great lengths to develop attenuation factors that minimize the need for mitigation and remediation, when they could just as easily have invested resources in mitigation and remediation.
104	1. Formal/ Official	15	05/19/2020	Lenny	Siegel	Center for Public Environmental Oversight, A project of the Pacific Studies Center	15.003	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distribution of Soil Gas Contamination	12	My biggest concern, one I have been expressing for 17 years, is the preference for using soil gas sampling—particularly exterior soil gas sampling—to determine whether to sample indoor air. Not only is exterior soil gas sampling a notoriously inaccurate predictor of indoor air contamination, compared to sub-slab soil gas, but there is a long history of investigators failing to fully delineate both soil gas and groundwater plumes.

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105	1. Formal/ Official	15	05/19/2020	Lenny	Siegel	Center for Public Environmental Oversight, A project of the Pacific Studies Center	15.004	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07b. Step 3A – Conduct in Depth Building Survey	18	Perhaps more important, stakeholders—the people who live, work, recreate, study, and pray at potential vapor intrusion sites—have long told me that they are uncomfortable with "all- clear" findings based on calculations instead of indoor air sampling. It's true that background sources—both indoor and outdoor—can create false positives for vapor intrusion, but there are now many accepted methods for distinguishing subsurface sources from other sources of vapor-forming chemicals.
106	1. Formal/ Official	15	05/19/2020	Lenny	Siegel	Center for Public Environmental Oversight, A project of the Pacific Studies Center	15.005	08. Step 4: Concurrent and Future Risk Evaluation and Management Decisions	08b. Step 4A – Need for Risk Management	28	I am also concerned about the indeterminate risk management approach for risk levels between an excess lifetime cancer risk of one in ten thousand (10-4) and one in a million (10-6). Decision-makers are offered a menu of risk-management approaches, including institutional controls, additional investigation/sampling, monitoring, refining risk assessment, mitigation, remediation, and "none." I believe that there should be a preference for action. Mitigation makes sense because the near certainty of protection against unacceptable exposure costs very little under most circumstances. Remediation is usually required because California has non-degradation laws for groundwater, which is usually the source of subsurface vapors.

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107	1. Formal/ Official	15	05/19/2020	Lenny	Siegel	Center for Public Environmental Oversight, A project of the Pacific Studies Center	15.006	01. VI Supplemental Guidance General Comments	01a. General Comments	30, Attachment 1	Finally, I appreciate the inclusion of new, valuable material on investigating large buildings, planning for future buildings, parking garage sampling, and sewer lines as a pathway.
108	1. Formal/ Official	16	05/20/2020	David	Daniels	Cardno	16.001	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06c. Step 2B – Estimate Human Health Risk from Vapor Intrusion	16	The draft Supplemental Guidance references the “current SF Bay Regional Water Board’s ESLs”. These ESLs used to be available of the SF Bay web site, but are now only available through email by request. Is there a plan to publish them again in the future? I find it beneficial to know there is a location where you can easily confirm the current ESLs and having them posted on a web site is helpful.

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109	1. Formal/ Official	16	05/20/2020	David	Daniels	Cardno	16.002	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	21	I would request clarification or additional information about co-located samples. Specifically, how to handle multiple sub-slab points in the same room where there is just one indoor air sample.

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110	1. Formal/ Official	16	05/20/2020	David	Daniels	Cardno	16.003	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	22	I would request additional information about how the applicable co-located secondary data is defined. There may be multiple groundwater (or soil gas) samples around the perimeter of a building. Is the intent that the sample be collected directly beneath the room or building or would a sample just outside the building be considered co-located.
111	2. Informal: DTSC	17	05/19/2020	Lance	McMahan	DTSC	17.001	01. VI Supplemental Guidance General Comments	01b. Recommendations		See notes below.

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112	1. Formal/ Official	18	05/26/2020	Annette	Walton	Stanford University Real Estate Office - LBRE	18.001a	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	The draft Guidance provides a roadmap for assessing potential vapor intrusion risk; however, it does not provide a narrative on mitigation approaches and leaves the onus on property owners to address issues they potentially did not cause. It suggests long- term obligations with no discernible exit strategy and does not present agency responsibilities of enforcing cleanup by responsible parties in parallel with owner- required mitigation. In some cases, especially considering legacy environmental sites, the agencies have failed to develop Remedial Action Objectives (RAOs) for sites with groundwater impacts that results in vapor intrusion. For groundwater, RAOs typically are focused on direct contact and ingestion exposure pathways. In other instances, the agencies have developed RAOs and have certified or approved remediation of sites with Volatile Organic Compounds (VOCs) in the subsurface where the focus of these RAOs is often solely focused on soil hot spot (source) remediation via extraction or soil vapor extraction with no consideration of the risk from off-gassing from groundwater. In many cases, the more important exposure is through from volatilization of VOCs from groundwater into overlying buildings. The potential for vapor intrusion has been a known issue for many years, and many developed and undeveloped properties may overlie VOC-impacted groundwater. As such, it is unclear why the regulatory agencies would develop a vapor intrusion guidance without also developing policies and regulations, and requiring revisions to RAOs, to remediate groundwater plumes and soil vapor such that the risk of vapor intrusion is lessened.

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113	1. Formal/ Official	18	05/26/2020	Annet te	Walton	Stanford University Real Estate Office - LBRE	18.001b	04. Introduction	04b. A – Scope and Applicabil ity	vi-vii, 1-2	The draft Guidance provides a roadmap for assessing potential vapor intrusion risk; however, it does not provide a narrative on mitigation approaches and leaves the onus on property owners to address issues they potentially did not cause. It suggests long- term obligations with no discernible exit strategy and does not present agency responsibilities of enforcing cleanup by responsible parties in parallel with owner- required mitigation. In some cases, especially considering legacy environmental sites, the agencies have failed to develop Remedial Action Objectives (RAOs) for sites with groundwater impacts that results in vapor intrusion. For groundwater, RAOs typically are focused on direct contact and ingestion exposure pathways. In other instances, the agencies have developed RAOs and have certified or approved remediation of sites with Volatile Organic Compounds (VOCs) in the subsurface where the focus of these RAOs is often solely focused on soil hot spot (source) remediation via extraction or soil vapor extraction with no consideration of the risk from off-gassing from groundwater. In many cases, the more important exposure is through from volatilization of VOCs from groundwater into overlying buildings. The potential for vapor intrusion has been a known issue for many years, and many developed and undeveloped properties may overlie VOC-impacted groundwater. As such, it is unclear why the regulatory agencies would develop a vapor intrusion guidance without also developing policies and regulations, and requiring revisions to RAOs, to remediate groundwater plumes and soil vapor such that the risk of vapor intrusion is lessened.

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114	1. Formal/ Official	18	05/26/2020	Annet te	Walton	Stanford University Real Estate Office - LBRE	18.002a	04. Introduction	04b. A – Scope and Applicabil ity	vi-vii, 1-2	Dual remediation systems that capture soil gas and groundwater should be installed at sites that are under agency oversight where necessary to reduce the concentrations in the environment and eliminate the risk of vapor intrusions. Orders, remediation goals, and remediation systems should be re-evaluated and changed to fix this problem so that interior building modifications are not necessary. Unfortunately, the vapor intrusion guidance is possibly transferring liability and responsibility to building owners to provide mitigation measures to address vapor intrusion from off-site or historical groundwater plumes that they potentially did not cause. Remediation efforts and RAOs should be reassessed to tie the responsible party to any future sampling or mitigations efforts until a site is properly remediated. There are mechanisms in place for such reassessments, for example such as 5-year reviews for sites under O&M Agreements.
115	1. Formal/ Official	18	05/26/2020	Annet te	Walton	Stanford University Real Estate Office - LBRE	18.002b	04. Introduction	04b. A – Scope and Applicabil ity	vi-vii, 1-2	Dual remediation systems that capture soil gas and groundwater should be installed at sites that are under agency oversight where necessary to reduce the concentrations in the environment and eliminate the risk of vapor intrusions. Orders, remediation goals, and remediation systems should be re-evaluated and changed to fix this problem so that interior building modifications are not necessary. Unfortunately, the vapor intrusion guidance is possibly transferring liability and responsibility to building owners to provide mitigation measures to address vapor intrusion from off-site or historical groundwater plumes that they potentially did not cause. Remediation efforts and RAOs should be reassessed to tie the responsible party to any future sampling or mitigations efforts until a site is properly remediated. There are mechanisms in place for such reassessments, for example such as 5-year reviews for sites under O&M Agreements.

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116	1. Formal/ Official	18	05/26/2020	Annet te	Walton	Stanford University Real Estate Office - LBRE	18.002c	04. Introduction	04b. A – Scope and Applicabil ity	vi-vii, 1-2	Dual remediation systems that capture soil gas and groundwater should be installed at sites that are under agency oversight where necessary to reduce the concentrations in the environment and eliminate the risk of vapor intrusions. Orders, remediation goals, and remediation systems should be re-evaluated and changed to fix this problem so that interior building modifications are not necessary. Unfortunately, the vapor intrusion guidance is possibly transferring liability and responsibility to building owners to provide mitigation measures to address vapor intrusion from off-site or historical groundwater plumes that they potentially did not cause. Remediation efforts and RAOs should be reassessed to tie the responsible party to any future sampling or mitigations efforts until a site is properly remediated. There are mechanisms in place for such reassessments, for example such as 5-year reviews for sites under O&M Agreements.

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117	1. Formal/ Official	18	05/26/2020	Annet te	Walton	Stanford University Real Estate Office - LBRE	18.003a	04. Introduction	04b. A – Scope and Applicabil ity	vi-vii, 1-2	It is not clear who is responsible for implementing the process described in the draft Guidance. Is it the agencies? Who prioritizes “buildings in proximity to source contamination for a VI assessment”? Is this an agency responsibility? The Guidance should state clearly that potential Responsible Parties and their consultants who are qualified and licensed, are required to conduct on- and off-site investigation sampling. The Responsible Parties should have the onus of stepping through the four-point evaluation process. And, although it is stated in the Guidance that it should be used in conjunction existing California mitigation guidance documents, in many instances the agency are imposing long-term obligation instead of to the Responsible Party but to owners or developers. It’s not clear in the guidance if it only tied to existing orders or does it include off-site migration where the groundwater plumes have traveled? Does the guidance provide recommendation as to when the guidance should be followed and when to implement such sampling programs? That is, is it tied to a specific order and related property remediation efforts; a real estate transaction; an inquiry to an agency by a concerned citizen?

Row	Letter Type	Letter ID	Date of Submission	First Name	Last Name	Company or Agency	Comment ID	Topic[1]	Section[1]	Page Number(s)[1]	Comment
118	1. Formal/ Official	18	05/26/2020	Annet te	Walton	Stanford University Real Estate Office - LBRE	18.003b	04. Introduction	04b. A – Scope and Applicabil ity	vi-vii, 1-2	It is not clear who is responsible for implementing the process described in the draft Guidance. Is it the agencies? Who prioritizes "buildings in proximity to source contamination for a VI assessment"? Is this an agency responsibility? The Guidance should state clearly that potential Responsible Parties and their consultants who are qualified and licensed, are required to conduct on- and off-site investigation sampling. The Responsible Parties should have the onus of stepping through the four-point evaluation process. And, although it is stated in the Guidance that it should be used in conjunction existing California mitigation guidance documents, in many instances the agency are imposing long-term obligation instead of to the Responsible Party but to owners or developers. It's not clear in the guidance if it only tied to existing orders or does it include off-site migration where the groundwater plumes have traveled? Does the guidance provide recommendation as to when the guidance should be followed and when to implement such sampling programs? That is, is it tied to a specific order and related property remediation efforts; a real estate transaction; an inquiry to an agency by a concerned citizen?
119	1. Formal/ Official	18	05/26/2020	Annet te	Walton	Stanford University Real Estate Office - LBRE	18.004a	04. Introduction	04b. A – Scope and Applicabil ity	vi-vii, 1-2	It is unclear how the Vapor Intrusion Guidance program will roll out to notify potential impacted properties that there is a potential risk of exposure from vapor intrusion on their property. Is DTSC requiring Responsible Parties to notify all building and homeowners that their properties require sampling? Is there direction in the guidance for this issue?

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120	1. Formal/ Official	18	05/26/2020	Annet te	Walton	Stanford University Real Estate Office - LBRE	18.004b	04. Introduction	04b. A – Scope and Applicabil ity	vi-vii, 1-2	It is unclear how the Vapor Intrusion Guidance program will roll out to notify potential impacted properties that there is a potential risk of exposure from vapor intrusion on their property. Is DTSC requiring Responsible Parties to notify all building and homeowners that their properties require sampling? Is there direction in the guidance for this issue?
121	1. Formal/ Official	18	05/26/2020	Annet te	Walton	Stanford University Real Estate Office - LBRE	18.005	07. Step 3: Indoor Air Investigatio n – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distributi on	20	Soil gas and vapor intrusion is complex, and its pathway can be impeded by the soil's lithology and depth to groundwater. Before we proceed down this path of indoor and soil gas sampling, the lithology and depth to groundwater should be assessed first. There may be no need to look at sewers as possible conduits if the soil has a high clay content (silt and clays are predominant beneath a structure) and groundwater is greater than 25 feet below ground surface.

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122	1. Formal/ Official	19	05/27/2020	Ann	Verwiel	ToxStrategies, Inc.	19.001	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05b. Step 1A – When to Expedite VI Evaluations: Acute and Short-Term Hazard	9	There should be a footnote on the statement about short-term effects of TCE at low concentrations that indicates that while this has driven much of the regulatory action on vapor intrusion, the science behind the conclusion that TCE causes fetal cardiac effects is disputed. Perpetuating the myth based on a flawed study that cannot be reproduced and is not supported by numerous other scientific studies is a failure of independent thought resulting in an extraordinary waste of economic resources. The time and effort spent to be protective regardless of the validity of the science just in case the flawed study might have some merit is a shame. This is even more egregious given the realities demonstrated by the corona virus about what real risk and harm can be.
123	1. Formal/ Official	19	05/27/2020	Ann	Verwiel	ToxStrategies, Inc.	19.002	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11a. General Comments	vii, 1, 4, 23, Attachment 2	On page vii, the guidance is specific about sewers being of potential concern when they intersect contaminated soil or groundwater that may be off-gassing chemicals. But that caveat needs to be added to all mentions of sewers as a potential conduit. It is missing on page 1, page 4, and page 23. Also the introduction to Attachment 2 should include a reference to the need for sewer pipes to be in proximity to source areas to serve as a significant source to indoor air. Additionally, the list of studies in Attachment 2 on pages 2-2 and 2-3 should mention depth to groundwater or proximity to soil and groundwater contamination in the summary of the studies. Only in the case of the land drain at Hill AFB is this mentioned. (Also, the odorous compounds example (#3) and the CIPP story (#7) are not relevant to vapor intrusion from environmental sources and should be removed or classified separately. The odorous materials are already in the sewer and don't represent the migration of vapors outside the sewers into the sewers.)

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124	1. Formal/ Official	19	05/27/2020	Ann	Verwiel	ToxStrategies, Inc.	19.003	14. Attachment 5 – Building Survey and Indoor Air Source Screen Forms	14a. General Comments	34	Podium-style parking garages appear to be added to the category of Building III as an after-thought and are quite different than below-grade parking structures, which seem to be the focus of this section. Given that podium style structures create a void between the subsurface and the occupied spaces in the building, the issues are quite different and podium-style parking garages should be a separate category. As stated in the guidance, podium-style construction may include vapor conduits, such as elevator shafts, stairwells, and utilities. But similar to sewer preferential pathways, the importance of these conduits is related to proximity to source areas. For example, in off-site buildings where the only source is groundwater at 25 feet or greater, podium style garages with potential conduits less than 10-feet bgs would not create the opportunity for significant vapor intrusion. If the agencies believe potential conduits under any circumstances could be an issue, they should provide studies supporting their conclusions. So similar to sewers, podium-style construction should only be considered a potential concern for vapor intrusion if the potential vapor conduits intersect or are in close proximity to a source area (~10 feet vertically, ~100 feet laterally). Additionally, there are construction methods that can seal these potential conduits in new buildings. There should be an exemption from sampling indoor air in living spaces above podium construction if conduits avoid areas with elevated soil vapor and/or preventative measures are used in areas where that can't be avoided.

125	1. Formal/ Official	19	05/27/2020	Ann	Verwiel	ToxStrategies, Inc.	19.004	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distribution of Soil Gas Contamination	13	The goal of the soil gas sampling on undeveloped properties should be to understand variability in soil gas concentrations (nature and extent), which is critical to evaluating vapor intrusion. The level of effort need not be the same for a deep groundwater source compared to a discrete soil or shallow groundwater source. Regardless of the intention for this guidance, it is likely to be used as a strict requirement rather than simply guidance and could result in unnecessary sampling or insufficient sampling as currently written. The frequency of sampling soil gas for future buildings (sampling every potential future building or ground floor unit on page 13) seems inconsistent when you compare the number of samples required for a proposed commercial development (one large building) compared to apartments (many small units). I have seen data for large buildings where concentrations in indoor air for the portion of a large building near the subsurface source were clearly higher than for the rest of the building. This could be missed if only one soil gas sample is collected for large buildings. Also, proposed developments can change drastically over time so relying on the proposed building configuration at any point in time may not address the final building configuration and should only supplement a baseline of gridded sampling. So, it would seem more consistent and appropriate to have a single rule-of-thumb for all proposed developments/vacant lots (e.g., 100-foot grid centers within 100-feet laterally of a shallow groundwater plume or known soil contamination in addition to source-specific samples). If appropriate, there should be a detailed discussion of possible reasons for adjusting this frequency for site-specific conditions (e.g., VOC source depth or geology information). The guidance should discuss that a smaller number of samples may be appropriate for a diffuse groundwater source at depth (> 20 feet bgs or below the likely future building depth). The role of geology in the sampling strategy should also be discussed as not all areas are simply layered geology but have clay and sand lenses that can be important to vapor intrusion. More detail and examples in these areas will help practitioners and regulators better implement these guidelines.

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126	1. Formal/ Official	19	05/27/2020	Ann	Verwiel	ToxStrategies, Inc.	19.005	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	Section D1, page 5. Rather than focus only on circumstances when models may not be useful, there should be some discussion of when models may be helpful, particularly for properties that have not been developed. It is fine to decide models are not appropriate for screening sites, but the utility of models for evaluating some circumstances where screening levels are exceeded should also be discussed. This is particularly true because the screening assessment is based on sub-slab attenuation factors being applied to soil gas data. Models can be adjusted to address variations in building conditions (second bullet) and would be applicable if preferential pathways (conduits in contact with or very near impacted soil or groundwater) are not present (third bullet). Also, the first bullet relies on EPA data that is not sufficiently comprehensive (e.g. compared to data being collected for Geotracker) to really understand the reason for the variability. I've looked at 8 years of annually collected data at residences and the results for the chemicals of interest are remarkably consistent. During the online meeting, models were referenced as a possible line of evidence after screening, but that is not reflected in the text of the document.

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127	1. Formal/ Official	19	05/27/2020	Ann	Verwiel	ToxStrategies, Inc.	19.006	09. Application to Other Building Types	09b. Building I – Large Buildings and Multistory Buildings	31	I.A – page 31 - Recommending sampling every ground floor unit in an apartment building or strip mall without limits seems extreme for evaluating vapor intrusion risk. If there are no preferential sewer conduits (e.g., those near a soil or groundwater source), the number of samples would be better tied to a specific floor area or proximity to sources. More discussion is required so this recommendation is not carried out as the only appropriate approach. The number of samples could be tied to the recommendation in a subsequent bullet that if initial sampling shows more than an order of magnitude variation, additional sampling would be required. The reality is that ability to get access to occupied units is limited (maybe 50% success rate), which should be mentioned in as well. If the rationale for offering sampling to tenants in all existing units is a public relations step rather than purely scientific that should be explicitly stated. That way the same approach would not appear necessary for an unoccupied new building or unoccupied apartments. When recommending sampling on floors above the ground floor of a multi-story building, the necessity of samples is tied to the proximity of conduits to the vapor source. That caveat should be mentioned in the bullets.

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128	1. Formal/ Official	19	05/27/2020	Ann	Verwiel	ToxStrategies, Inc.	19.007	15. General Comments on Vapor Intrusion	15a. General Comment s		The chart in the presentation materials that shows the 3-fold order-of-magnitude variation in indoor air concentrations from the work by Johnson et al should not continue to be used to demonstrate the potential variability related to measurements in indoor air. The design of that house with a landdrain directly connected to the vadose zone near a shallow groundwater source is not typical. This atypical feature lead directly to the highly unusual results. When using the information from the earlier publications, this caveat should be clearly stated rather than creating confusion that this amount of variability could occur under any circumstances. There are other studies that are more useful in capturing the range of indoor air concentrations with changes in temperature, barometric pressure, and other factors.
129	1. Formal/ Official	20	05/28/2020	Todd	Olson	The Olson Company	20.001a	04. Introduction	04b. A – Scope and Applicabil ity	vi-vii, 1-2	The success of in-fill housing developments in California will depend on avoiding the imposition of unnecessary costs. This argues for more refined vapor intrusion guidance that provides site specific clean up goals using models and other screening tools that are representative of actual site conditions and are specific to California. Deficiencies in the guidelines will make redevelopment of urban brownfields much more time consuming and expensive; serving as a major barrier to resolving California's affordable housing crisis. In particular, testing inside sewers, drains, electrical pipes, or other large pipes concurrently with indoor air and subslab sampling to determine if they bring toxic vapors inside buildings creates a burden on all projects across the state, not just housing. The guidance needs to provide more specific language describing the significance thresholds and when the testing would be required, not just when conduit air is likely to be impacted.

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130	1. Formal/ Official	20	05/28/2020	Todd	Olson	The Olson Company	20.001b	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	The success of in-fill housing developments in California will depend on avoiding the imposition of unnecessary costs. This argues for more refined vapor intrusion guidance that provides site specific clean up goals using models and other screening tools that are representative of actual site conditions and are specific to California. Deficiencies in the guidelines will make redevelopment of urban brownfields much more time consuming and expensive; serving as a major barrier to resolving California's affordable housing crisis. In particular, testing inside sewers, drains, electrical pipes, or other large pipes concurrently with indoor air and subslab sampling to determine if they bring toxic vapors inside buildings creates a burden on all projects across the state, not just housing. The guidance needs to provide more specific language describing the significance thresholds and when the testing would be required, not just when conduit air is likely to be impacted.
131	1. Formal/ Official	20	05/28/2020	Todd	Olson	The Olson Company	20.002	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	5	We understand the attenuation factor has not been formally adopted; however, it is causing confusion amongst the various individual case managers who have implemented it as law. This is causing substantial delays in projects or adding cost, making the homes financially infeasible to construct. These financially infeasible projects had approved residential entitlements, but have now reverted to commercial or industrial uses, eliminating them from the housing stock permanently. This, in turn also has the unfortunate consequence of lowering land values; thereby, placing a financial burden on landowners across the state. With such serious consequences, any changes to vapor intrusion attenuation factors should be based on California-specific data and use the best available science. Until that time, maintaining the existing attenuation factor of 0.001 for new residential construction is appropriate.

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132	1. Formal/ Official	21	05/29/2020	Kristene	Wilder	Brown and Caldwell, Inc.	21.001	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	8, 20	Note 8 (page 20) states passive sampling for soil gas is undergoing research and not recommended as a sole line of evidence for soil gas screening. This note should be revised as passive soil gas sampling can produce reliable concentrations if the uptake rate is sufficiently slow (see Beacon samplers).

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133	1. Formal/ Official	21	05/29/2020	Kristene	Wilder	Brown and Caldwell, Inc.	21.002	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	5	Attenuation factor for groundwater does not include USEPA AF for groundwater of 0.0005 where fine-grained vadose zone soils are present. Typically, “fine soil type” is considered to be soil with 50% or more passing the No. 200 (0.075 mm) sieve, consistent with the Unified Soil Classification System definition for fine-grained soil. In addition, site-specific AFs are not permitted. If preferential pathways are insignificant conduits for vapor migration or can be ruled out, site specific AFs should apply with sufficient evidence to support alternative AFs. Tracer compounds or radon have been used successfully to accurately calculate attenuation for individual buildings or foundation pours differing in age within a single building footprint. These AFs are extremely conservative and are useful for screening out sites. However, using them along with the maximum observed soil gas concentrations for estimating risk is unrealistic. There is no flexibility the AFs to account for site-specific conditions associated with reduced vapor migration, such as very dense soil. The HERO model is no longer allowed, which eliminates the option to generate a more site-specific prediction prior to advancing to an intrusive in-building investigation.

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134	1. Formal/ Official	21	05/29/2020	Kristene	Wilder	Brown and Caldwell, Inc.	21.003	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distribution of Soil Gas Contamination	12	Now having experienced the world of COVID-19, accessing residences and other buildings will be more difficult. Suggest adding a exterior soil gas/conduit sampling step to rule out/in sewer pathways. Sample fill at the edge of a slab to determine if that is the primary pathway or not. Mitigation can then be properly designed with the potential of never entering a private residence and risking exposure to COVID. Additionally, soil gas sampling within 10 feet of a building usually requires access agreements that take time. Suggest intermediate steps to sample soil gas at the property edge when access agreements may be premature or require significant time to procure or include HERO modeling to determine the likelihood of risk in order to prioritize access requests. Allowing modeled or other site specific AFs would limit contact during social distancing times.
135	1. Formal/ Official	21	05/29/2020	Kristene	Wilder	Brown and Caldwell, Inc.	21.004	08. Step 4: Concurrent and Future Risk Evaluation and Management Decisions	08d. Step 4C – Managing Future Vapor Intrusion Risk	29	Existing and future risk and prioritization should also take into account whether groundwater plume concentrations are increasing or decreasing or stable. Structures may be down gradient of an elongating plume and could be included or if concentrations are declining structures may be lower priority. It is unclear what the risk management for future buildings in currently vacant sites would be. There is a potential that a vacant site could never be cleared of SVI concerns, since the default AFs are so conservative. An I/C requiring both a vapor barrier and sub-slab system, as well as post-construction sampling, could render many properties unattractive or unsaleable. What is the real estate and business impact?

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136	1. Formal/ Official	21	05/29/2020	Kristene	Wilder	Brown and Caldwell, Inc.	21.005	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07e. Step 3D – Evaluate Temporal Variability	25	The recommendation in Section 3D.1 to collect indoor air samples after HVAC has been turned off for 36 hours is not practical. Residences in either the hot or cold times of years will not only be uncomfortable for residences, but is also potentially dangerous during times of extreme heat. This recommendation should be removed or the language should be changed to recommend the HVAC off sampling only if it is safe and feasible to do so.

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137	1. Formal/ Official	22	5/29/2020	Henry	Avila	Donahue Schriber Realty Group	22.001a	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	It is our experience that many of the proposed aspects in this new document are overly conservative and burdensome, and affecting our ability as a responsible property owner to complete real estate transactions in California. Too much decision-making is being put on the local agencies, leading to significant inconsistency in application between properties. The guidance essentially recommends starting with a set of overly conservative assumptions, then attempts to convince a local agency and/or lender that they should put their neck on the line and agree that the mountains of (costly) data we generated warrant the use of less-than-overly-conservative values. Even if successful in accomplishing this, local agencies still cover their backs and require deed restriction and/or ongoing monitoring, which only erodes value to the property in question. It is recommended that DTSC make the evaluation process more uniform and less site-specific, to take some of the onus off local agencies. It is also recommended that we begin with less conservative assumptions so that we can more easily (quicker and less expensively) identify and clear low threat properties. If these issues are not addressed, these policies will dramatically hurt real estate investment and development in California. CalEPA VI Guidance should seriously consider impacts on California real estate development projects and the unintended consequences on blighted communities, where rehabilitation projects will no longer be economically feasible because of this proposed guidance.

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139	1. Formal/ Official	22	5/29/2020	Henry	Avila	Donahue Schriber Realty Group	22.002	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	I am very concerned that CalEPA's Vapor Intrusion Guidance document will result in unattainable soil and ground water cleanup levels compared to current practices (which are already the most strict in the nation), and as noted, making commercial and residential development cost prohibitive. This proposed VI Guidance will reduce certain soil and groundwater clean-up limits by over 95%, to the point where no remediation technology can achieve the new standards and with this understanding will only further devalue legacy commercial properties, with no incentive to reinvest in them. There are also questions surrounding the developmental practice of this proposed VI Guidance as there is no current public health crisis prompting this proposed VI Guidance, because the 2011 CalEPA DTSC specifications for VI management have been significantly protective of human health and the environment. Also, the new VI Guidance is based on empirical US EPA data from only six (6) locations throughout the State. Nonetheless, CalEPA has begun enforcing new standards while VI research continues.

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140	1. Formal/ Official	22	5/29/2020	Henry	Avila	Donahue Schriber Realty Group	22.003a	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	Further, the idea of "closed projects" can be reopened will result in blighted properties. Until now, issued No Further Action letters were the "gold standard" for commercial development, using defensible, site-specific analyses. The absence of reliance on NFAs will thwart debt financing for thousands of projects statewide, exacerbating blight and the housing crisis in our communities statewide, as developers will be unable to buy, finance, and insure sites in the absence of steadfast No Further Action letters. Even though the VI Guidance is still being developed and no public participation has occurred, local environmental agencies have been told to stop using existing clean-up criteria/practices, and cost have doubled overnight. There are approximately 200,000 contaminated sites in California. Many of these sites could be converted to commercial/residential facilities with appropriate remediation, but CalEPA's new VI Guidance will scare away brownfield investors, and general investment, because the "how clean is clean" question is being obfuscated. Please address these concerns as the VI Guidance policy continues to develop. CalEPA cannot exacerbate an already emergency situation by further hampering housing and commercial development in our great state.

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141	1. Formal/ Official	22	5/29/2020	Henry	Avila	Donahue Schriber Realty Group	22.003b	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	Further, the idea of “closed projects” can be reopened will result in blighted properties. Until now, issued No Further Action letters were the “gold standard” for commercial development, using defensible, site-specific analyses. The absence of reliance on NFAs will thwart debt financing for thousands of projects statewide, exacerbating blight and the housing crisis in our communities statewide, as developers will be unable to buy, finance, and insure sites in the absence of steadfast No Further Action letters. Even though the VI Guidance is still being developed and no public participation has occurred, local environmental agencies have been told to stop using existing clean-up criteria/practices, and cost have doubled overnight. There are approximately 200,000 contaminated sites in California. Many of these sites could be converted to commercial/residential facilities with appropriate remediation, but CalEPA’s new VI Guidance will scare away brownfield investors, and general investment, because the “how clean is clean” question is being obfuscated. Please address these concerns as the VI Guidance policy continues to develop. CalEPA cannot exacerbate an already emergency situation by further hampering housing and commercial development in our great state.

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142	1. Formal/ Official	22	5/29/2020	Henry	Avila	Donahue Schriber Realty Group	22.003c	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	Further, the idea of “closed projects” can be reopened will result in blighted properties. Until now, issued No Further Action letters were the “gold standard” for commercial development, using defensible, site-specific analyses. The absence of reliance on NFAs will thwart debt financing for thousands of projects statewide, exacerbating blight and the housing crisis in our communities statewide, as developers will be unable to buy, finance, and insure sites in the absence of steadfast No Further Action letters. Even though the VI Guidance is still being developed and no public participation has occurred, local environmental agencies have been told to stop using existing clean-up criteria/practices, and cost have doubled overnight. There are approximately 200,000 contaminated sites in California. Many of these sites could be converted to commercial/residential facilities with appropriate remediation, but CalEPA’s new VI Guidance will scare away brownfield investors, and general investment, because the “how clean is clean” question is being obfuscated. Please address these concerns as the VI Guidance policy continues to develop. CalEPA cannot exacerbate an already emergency situation by further hampering housing and commercial development in our great state.

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143	1. Formal/ Official	22	5/29/2020	Henry	Avila	Donahue Schriber Realty Group	22.004	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	We object to the use of the EPA Attenuation Factors due to the following: New AF data set is not representative of commercial properties in California. New requirements are overly conservative resulting in excessive assessment and remedial costs. New requirements result in unattainable cleanup goals. Cost of developing new data set for AF shouldn't fall on the private sector. It is our recommendation to continue using the DTSC developed AFs until the new data set supports switching to something more conservative.
144	1. Formal/ Official	22	5/29/2020	Henry	Avila	Donahue Schriber Realty Group	22.005	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06c. Step 2B – Estimate Human Health Risk from Vapor Intrusion	16	Given that the current risk of developing cancer from general life is upwards of 3x10-1, we would recommend modifying the risk management framework for VI such that no response action is required beginning at 1x10-4.

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145	1. Formal/ Official	23	05/29/2020	Brian	Culnan	Safety-Kleen Systems, Inc.	23.001	04. Introduction	04e. D – Vapor Intrusion Attenuati on Factors	vii, 5	Many comments discussed in the question/answer sessions were focused on the change in attenuation factor to be consistent with EPA 2015 guidance (0.03). While much of the discussion was directed toward the conservative nature of the default attenuation factor established by EPA, little was discussed on the low toxicity numbers developed by Office of Environmental Health Hazard Assessment (OEHHA). In many cases, OEHHA have modified Federal toxicity data which results in a lower screening level. While EPA recommends a 0.03 AF, when used with Federal toxicity data, yields a less conservative risk factor than those used in California, either through OEHHA, RSLs, or ESLs. Therefore, the risk hazard assessment is skewed too low. Assuming California will adopt the EPA recommended AF of 0.03, based on emprical data, the VI guidance should also adopt less conservative toxicity data to establish VI screening levels, again to be consistent with EPA guidance.
146	1. Formal/ Official	23	05/29/2020	Brian	Culnan	Safety-Kleen Systems, Inc.	23.002	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11g. Cleanout Sampling	10, Attachment 2	If a sewer line transects a soil contamination or vapor contamination source before entering a building, samples can be collected from a sewer access point, such as a cleanout port to ascertain whether the sewer line is compromised and could be a potential pathway to indoor air. This should be a line of evidence approach used before defaulting to indoor air sampling as the guidance suggests. If cleanout sampling verifies acceptable screening levels are met in the sewer line itself, which should represent worse case conditions in the sewer conduit, there should be no need to sample indoor air, on the basis of the sewer line location relative to the contaminant source alone. Sewer line bedding can also be evaluated via soil gas sampling near the sewer line.

Row	Letter Type	Letter ID	Date of Submission	First Name	Last Name	Company or Agency	Comment ID	Topic[1]	Section[1]	Page Number(s)[1]	Comment
147	1. Formal/ Official	23	05/29/2020	Brian	Culnan	Safety-Kleen Systems, Inc.	23.003	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07e. Step 3D – Evaluate Temporal Variability	26	Indoor air sampling with both HVAC on and off is problematic under most sampling circumstances, whether residential or industrial. Plus the time in between for equilibrium to occur is unrealistic in most situations. HVAC systems are typically always on, and therefore, represent conditions when the building is occupied. If, during the initial survey to prepare for indoor air sampling, it is determined that the HVAC system is not always on, then arrangements can be discussed for sampling with the system on and off. Otherwise, conduct the sampling under normal building operating conditions.

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148	1. Formal/ Official	24	05/29/2020	Loren	Lund	Jacobs	24.001a	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	The introduction of the Draft Supplemental Guidance states, "this guidance is not intended to provide prescriptive or inflexible requirement." There are many areas where additional flexibility should be incorporated into the guidance, including how the guidance is applied to historical and on-going investigations; use of alternative and next-generation investigation methods; use of site-specific soil gas-to-indoor air attenuation factors (AFs); incorporating site-specific assumptions, and the impact of background sources when evaluating the completeness of the vapor intrusion (VI) pathway; rapid action response requirements; and evaluation of preferential pathways. Three examples in the guidance where it is too prescriptive or inflexible include: 1) samples must be collected during HVAC-on and HVAC-off conditions; 2) a minimum of nine samples are to be collected in small (1,500 sq. ft.) structures during a single sampling event; and 3) the "yes/no" structure in the flowchart for Steps 1C, 2B/C, and 3C of the four-step process and prescribing specific outcomes in the flowchart. Specific comments are also provided on each of these topics.

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149	1. Formal/ Official	24	05/29/2020	Loren	Lund	Jacobs	24.001b	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	The introduction of the Draft Supplemental Guidance states, “this guidance is not intended to provide prescriptive or inflexible requirement.” There are many areas where additional flexibility should be incorporated into the guidance, including how the guidance is applied to historical and on-going investigations; use of alternative and next-generation investigation methods; use of site-specific soil gas-to-indoor air attenuation factors (AFs); incorporating site-specific assumptions, and the impact of background sources when evaluating the completeness of the vapor intrusion (VI) pathway; rapid action response requirements; and evaluation of preferential pathways. Three examples in the guidance where it is too prescriptive or inflexible include: 1) samples must be collected during HVAC-on and HVAC-off conditions; 2) a minimum of nine samples are to be collected in small (1,500 sq. ft.) structures during a single sampling event; and 3) the “yes/no” structure in the flowchart for Steps 1C, 2B/C, and 3C of the four-step process and prescribing specific outcomes in the flowchart. Specific comments are also provided on each of these topics.

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150	1. Formal/ Official	24	05/29/2020	Loren	Lund	Jacobs	24.002a	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2, 27	The Draft Supplemental Guidance does not provide sufficient guidance on closing VI sites or exiting the VI investigation process laid out in the flowchart. This deficiency is essential as most VI sites in California are “mature” (i.e., in long-term monitoring/mitigation or remedial action). At best, a building is considered a “low priority” for current VI based on indoor air data, and an area without buildings is considered to be “low priority” based on soil gas data. The guidance needs to define “low priority” and provide the basis for concluding there is no VI concern as an exit strategy. For example, the California Environmental Protection Agency (CalEPA) identifies “none” as the “potential response action” in Step 4, which can and should be used to justify an exit strategy for no further action (NFA) for the “low priority” buildings or areas. The guidance should clarify integration with DTSC VI Mitigation Advisory (DTSC, 2011) or VI Public Participation Advisory (DTSC, 2012). Also, the Draft Supplemental Guidance does not address or provide allowance for historical and on-going VI evaluations, or sites undergoing long-term monitoring, mitigation, or remediation. CalEPA should consider including alternate investigation methods in the Draft Supplemental Guidance. Reference: California Environmental Protection Agency (CalEPA) Department of Toxic Control Substances (DTSC). 2011. Vapor Intrusion Mitigation Advisory. Final, Revision 1. October. California Environmental Protection Agency (CalEPA) Department of Toxic Control Substances (DTSC). 2012. Vapor Intrusion Public Participation Advisory. Final. March.

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151	1. Formal/ Official	24	05/29/2020	Loren	Lund	Jacobs	24.002b	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2, 27	The Draft Supplemental Guidance does not provide sufficient guidance on closing VI sites or exiting the VI investigation process laid out in the flowchart. This deficiency is essential as most VI sites in California are “mature” (i.e., in long-term monitoring/mitigation or remedial action). At best, a building is considered a “low priority” for current VI based on indoor air data, and an area without buildings is considered to be “low priority” based on soil gas data. The guidance needs to define “low priority” and provide the basis for concluding there is no VI concern as an exit strategy. For example, the California Environmental Protection Agency (CalEPA) identifies “none” as the “potential response action” in Step 4, which can and should be used to justify an exit strategy for no further action (NFA) for the “low priority” buildings or areas. The guidance should clarify integration with DTSC VI Mitigation Advisory (DTSC, 2011) or VI Public Participation Advisory (DTSC, 2012). Also, the Draft Supplemental Guidance does not address or provide allowance for historical and on-going VI evaluations, or sites undergoing long-term monitoring, mitigation, or remediation. CalEPA should consider including alternate investigation methods in the Draft Supplemental Guidance. Reference: California Environmental Protection Agency (CalEPA) Department of Toxic Control Substances (DTSC). 2011. Vapor Intrusion Mitigation Advisory. Final, Revision 1. October. California Environmental Protection Agency (CalEPA) Department of Toxic Control Substances (DTSC). 2012. Vapor Intrusion Public Participation Advisory. Final. March.

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152	1. Formal/ Official	24	05/29/2020	Loren	Lund	Jacobs	24.003	02. Executive Summary	02a. General Comments	v	The urgency to protect building occupants from the short-term effects of trichloroethene (TCE) is stated as an impetus for the formation of the workgroup that authored the Draft Supplemental Guidance, but information related to TCE and rapid-action response is poorly addressed in the guidance. No information is provided in the Draft Supplemental Guidance complementing the DTSC VI Mitigation Advisory (DTSC, 2011) or VI Public Participation Advisory (DTSC, 2012), which would influence the mitigation and risk communication aspects of TCE rapid action. The investigation approach proposed in the four-step process is lengthy, and if the strategy is to address concerns about acute health risks from TCE, CalEPA should consider revising the guidance to be more responsive to the challenges and differing expert opinions about the need and/or process for addressing potential rapid action at TCE at VI sites. Acknowledging the TCE developmental debate, while still identifying this endpoint for conservatism in the guidance, would also allow for further flexibility and professional judgment. Incorporating a summary of the latest scientific evidence regarding TCE short-term toxicity communicates the conservatism and uncertainties incorporated in assessing VI as well as the uncertainties related to TCE toxicity assessments, and enhances the likelihood of making more defensible and site-specific risk management decisions. References: California Environmental Protection Agency (CalEPA) Department of Toxic Control Substances (DTSC). 2011. Vapor Intrusion Mitigation Advisory. Final, Revision 1. October. California Environmental Protection Agency (CalEPA) Department of Toxic Control Substances (DTSC). 2012. Vapor Intrusion Public Participation Advisory. Final. March.

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153	1. Formal/ Official	24	05/29/2020	Loren	Lund	Jacobs	24.004	02. Executive Summary	02a. General Comment s	viii	The Executive Summary of the Draft Supplemental Guidance states that an objective is to collect data to support the derivation of California-specific attenuation factors, which this guidance does accomplish; however, whether this objective or the guidance as a whole is relevant to VI at mature sites is not clear.
154	1. Formal/ Official	24	05/29/2020	Loren	Lund	Jacobs	24.005	02. Executive Summary	02a. General Comment s	vi	The Executive Summary cites the high variability in the subsurface and indoor air concentrations leading to the potential for increased false-negative outcomes or the underestimation of the potential that VI in indoor air as a basis for preparing the Draft Supplemental Guidance. The “false negative” argument is more appropriately addressed in two parts: first, the identification of a VI pathway and second, the assessment of potential exposures to volatile organic compounds (VOCs) in indoor air from a complete VI pathway. Addressing the false-negative decision for pathway identification (i.e., a pathway is complete when investigation results conclude it is incomplete) involves looking for concordance among multiple lines of evidence. Addressing the false-negative decision for inhalation exposure (i.e., exposures are unacceptable sampling results conclude they are acceptable) involves identifying the upper end of the distribution of indoor air concentrations. These two decisions are considerably different and involve different investigation and assessment methods. This difference should be stated clearly in the guidance.
155	1. Formal/ Official	24	05/29/2020	Loren	Lund	Jacobs	24.006	03. Flowchart (Steps)	03a. General Comment s	ix	The four-step process for VI assessments appears to be intended for newly discovered sites or buildings and is not well suited for many VI sites in California, which are already in an investigation phase, are undergoing mitigation or long-term monitoring, or are undergoing remedial action. For these sites, the point of departure is the last step in the four-step process. Not addressing these mature VI sites is a weakness in the Draft Supplemental Guidance.

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156	1. Formal/ Official	24	05/29/2020	Loren	Lund	Jacobs	24.007	03. Flowchart (Steps)	03a. General Comments	ix	The four-step approach does not satisfactorily integrate the use of emerging or alternative technologies in VI and preferential pathway investigation methods. Next-generation technologies to consider integrating include: 1) complete an initial step, including only subslab soil vapor or indoor air sampling to assess VI potential within a structure, even if Step 1C criteria are not met (consistent with Step 6 of DTSC 2011 Guidance, which states, "Monitoring subslab soil gas is potentially less costly than monitoring indoor air quality."); 2) application of indicators and tracers to evaluate air mixing, flow, and exchange (see EPA VI Workshops from 2016-2020; https://iavi.rti.org/workshops.html); 3) building pressure cycling to induce near worst-case VI (Use of Building Pressure Cycling in Vapor Intrusion Assessment (DoD, 2017, / https://denix.osd.mil/irp/vaporintrusion/); or 4) a detailed HVAC engineering evaluation to determine conditions appropriate for sampling (Matrix for Selecting Vapor Intrusion Investigation Technologies (DoD, 2019, / https://denix.osd.mil/irp/vaporintrusion/). References: California Environmental Protection Agency (CalEPA) Department of Toxic Control Substances (DTSC). 2011. Vapor Intrusion Mitigation Advisory. Final, Revision 1. October. U.S. Department of Defense (USDOD). 2017. DoD Vapor Intrusion Handbook Fact Sheet Update No: 004: Use of Building Pressure Cycling in Vapor Intrusion Assessment. August. https://denix.osd.mil/irp/vaporintrusion/ U.S. Department of Defense (USDOD). 2019. DoD Vapor Intrusion Handbook Fact Sheet Update No: 007: Matrix for Selecting Vapor Intrusion Investigation Technologies. July. https://denix.osd.mil/irp/vaporintrusion/

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157	1. Formal/ Official	24	05/29/2020	Loren	Lund	Jacobs	24.008	03. Flowchart (Steps)	03a. General Comments	ix	The flowchart lacks a strategy for achieving a NFA determination for the VI pathway. NFA determinations should be considered based on the following: Use of a "no" response to Step 1B in the flowchart such that groundwater data are used to exclude buildings or areas from further consideration. Adding or modifying portions of Steps 2 and 3 where soil gas, subslab soil gas, or indoor air concentrations are compared to applicable screening criteria and multiple rounds of data demonstrate sufficient characterization of temporal variability. Adding or modifying portions of Steps 2 and 3 where "Yes or No" decisions are made to determine the need for assigning buildings or areas as low priority or the need for additional investigation or action by incorporating site-specific attenuation information. Replacing the "low priority" risk management decision in Step 4 with "NFA."
158	1. Formal/ Official	24	05/29/2020	Loren	Lund	Jacobs	24.009	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	The Draft Supplemental Guidance uses "screening" in many different ways, including "screening buildings," "AFs for screening," "screening risk assessment," "and "VI screening," which creates confusion when evaluating the potential for VI into a building versus estimating VI exposure risk. Identifying Steps 1 and 2 of the Supplemental Guidance as screening would provide clarification as they rely on conservative and default assumptions (e.g., AF) and clarify that site-specific conditions (e.g., AF, clean water lens, current and future land use) can be adapted at any step in the evaluation process.
159	1. Formal/ Official	24	05/29/2020	Loren	Lund	Jacobs	24.010	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	Section A - Scope and Applicability – states that cleanup goals, remedial strategies, and closure criteria are outside the scope of this guidance. However, and as previously noted, most VI sites in California are mature sites in terms of investigation and remediation; therefore, this Draft Supplemental Guidance provides little guidance for mature sites by excluding these topics.

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160	1. Formal/ Official	24	05/29/2020	Loren	Lund	Jacobs	24.011	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	It is important to acknowledge that a soil gas-to-indoor air attenuation factor (AF) of 0.03 used in Step 1B is not appropriate for evaluating commercial and industrial buildings (for example, Venable et al., 2015). Default AFs are also not likely appropriate for mature sites with robust data sets where site-specific AFs are calculated. The final Supplemental Guidance should incorporate the use of alternative AFs based on building type and/or site-specific information/calculations in both the screening and risk assessment processes. Also, the lateral inclusion distance of 100 feet (Step 1B) from the source of the release is overly conservative for most non-residential buildings (see Venable et al., 2015). Reference: Venable, P., et al. 2015. Technical Report: A Quantitative Decision Framework for Assessing Navy Vapor Intrusion Sites. TR-NAVFAC-EXWC-EV-1603. June. https://clu-in.org/download/issues/vi/TR-NAVFAC-EXWC-EV-1603.pdf).

161	1. Formal/ Official	24	05/29/2020	Loren	Lund	Jacobs	24.012	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05c. Step 1B – Prioritizing Buildings for VI Evaluation	9, 10	Step 1B of the Draft Supplemental Guidance relates to prioritizing buildings for investigation based on proximity to contamination, transport via conduits, and occupancy/receptor. CalEPA needs to define or clarify what is meant by “most contaminated area” and “release locations.” There is no reference to a vapor intrusion screening level (VISL) for soil gas or groundwater; therefore, it is unclear how to define the most contaminated area. For example, apply a factor (e.g. 100-times, 1,000-times) to the VISL to define the “most contaminated area” or “release location?” Answering “no” to the first question of Step 1B is likely to be interpreted as a requirement that soil gas data be collected. This should be clarified since “vadose zone or groundwater” data are used to identify buildings that require investigation. The prescriptive nature of Step 1B implies groundwater data cannot be used to exclude buildings or areas from further consideration in a VI investigation. Furthermore, there is no exit strategy associated with Step 1B when there are no “buildings within 100 ft. of the most contaminated area.” Except for the absence of existing buildings, it is difficult to understand under what circumstance Step 1C would not lead directly to indoor air sampling (Step 3). Without defining what is meant by “near” and “contaminated groundwater,” it could be interpreted that any building within or beyond 100 ft of detectable concentrations of VOCs in groundwater would require directly sampling indoor air (Step 3). Note that the Department of Navy has identified a quantitative decision framework for assessing VI potential that quantitatively defines “near” and “contaminated groundwater” and incorporates these and other relevant lines of evidence (e.g., building characteristics) to identify and prioritize buildings for VI evaluation (Venable et al., 2015). The Draft Supplemental Guidance discussed the need to evaluate preferential pathways but it is unclear regarding the criteria which determine “intersecting significant contamination” (Step 1C). Because most buildings have utilities, it could be interpreted that all buildings within an unidentified distance will eventually intercept contamination and require proceeding directly to indoor air sampling

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											(Step 3). The potential influence of preferential pathways and conduits on VI is important, as well as the evolving science, which identifies preferential pathways as the source of indoor air VFCs in only a small percentage of cases. Clarification regarding the definition of “significant contamination” is recommended, as is flexibility in the use of professional judgment when assessing VI via preferential pathways. Reference: Venable, P., et al. 2015. Technical Report: A Quantitative Decision Framework for Assessing Navy Vapor Intrusion Sites. TR-NAVFAC-EXWC-EV-1603. June. https://clu-in.org/download/issues/vi/TR-NAVFAC-EXWC-EV-1603.pdf).
162	1. Formal/ Official	24	05/29/2020	Loren	Lund	Jacobs	24.013a	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06c. Step 2B – Estimate Human Health Risk from Vapor Intrusion	v, 15	The introduction on page v notes that the document”…does not provide guidance on the sampling required for all media (soil, vapor, and groundwater) to determine the nature and extent of contamination.” However, Step 2 provides prescriptive guidance on sampling to “evaluate the spatial distribution of soil gas,” which is the definition of nature and extent.

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163	1. Formal/ Official	24	05/29/2020	Loren	Lund	Jacobs	24.013b	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06c. Step 2B – Estimate Human Health Risk from Vapor Intrusion	v, 15	For sites with impacted groundwater, it is unclear when the evaluation of soil gas data (Step 2) would not lead directly to indoor air sampling (Step 3), particularly when risk estimates are based on the maximum concentration "just above the subsurface source" using conservative screening levels based on a generic AF. Even when a groundwater source is remediated to Maximum Contaminant Levels (MCLs), soil gas at the capillary fringe typically remains at levels greater than conservative soil gas to indoor air screening levels (i.e., greater than 1 x 10-6 or non-cancer hazard index greater). The science of VI does not support concluding a complete VI pathway when groundwater is at or below MCLs.
164	1. Formal/ Official	24	05/29/2020	Loren	Lund	Jacobs	24.013c	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06c. Step 2B – Estimate Human Health Risk from Vapor Intrusion	v, 15	Evaluating human health risks using maximum concentrations (Step 2B.1) is inconsistent with risk assessment guidance (USEPA, 1989, 1991a). Maximum concentrations should not be used for purposes of establishing the basis for action based on a baseline risk assessment (EPA, 1989, 1991a), developing site-specific cleanup levels (EPA, 1991b), or risk communication (EPA, 1989, 1999). The reasonable maximum exposure (RME) scenario (USEPA, 1989) should be used for this purpose. This step should clarify the purpose of making this risk determination.

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165	1. Formal/ Official	24	05/29/2020	Loren	Lund	Jacobs	24.013d	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06c. Step 2B – Estimate Human Health Risk from Vapor Intrusion	v, 15	Given perceived concerns that have been raised about health risks from acute exposures to TCE from VI, the stepwise process outlined in the Draft Supplemental Guidance seems to unduly prolong the VI investigation process. If one soil vapor sampling event identifies a source strength sufficient to impact indoor air at concentrations greater than rapid-action criteria, repeating the event to evaluate temporal variability (Step 2C) might delay moving forward to Step 3, particularly in a rapid-action response scenario. This is another example of a situation where professional judgment might be encouraged. While the Draft Supplemental Guidance does acknowledge the importance of professional judgment, the prescriptive nature of the guidance does not encourage investigators to apply professional judgment. References: U.S. Environmental Protection Agency (EPA). 1989. Risk Assessment Guidance for Superfund, Volume I - Human Health Evaluation Manual. Part A: Baseline Risk Assessment. EPA/540/1-89/002. December. U.S. Environmental Protection Agency (EPA). 1991a. Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions. OSWER DIRECTIVE 9355.0-30. April 22. U.S. Environmental Protection Agency (EPA). 1991b. Risk Assessment Guidance for Superfund, Volume II - Human Health Evaluation Manual. Part B: Development of Risk-based Preliminary Remediation Goals. EPA/540/R-92/003. December. U.S. Environmental Protection Agency (EPA). 1999. Risk Assessment Guidance for Superfund, Volume II - Human Health Evaluation Manual. Part A: Community Involvement in Superfund Risk Assessments. EPA 540-R-98-042. March.

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166	1. Formal/ Official	24	05/29/2020	Loren	Lund	Jacobs	24.014	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07d. Step 3C – Assess Risk from Contaminated Indoor Air and Subslab Soil Gas	23	The title of Step 3C – Assess Risk from Contaminated Indoor Air and Subslab Soil Gas - is misleading for current land use (i.e., existing occupied buildings) as a key component of this step is not an assessment of health risk but a determination of whether the VI pathway is complete. Consider acknowledging the importance of obtaining analytical and non-analytical data to evaluate multiple lines of evidence (MLE) to determine if VI is occurring before estimating risk in Step 3C. For example, consider indicating, after Step 3B, the need for evaluation of MLE (including the complementary lines of sampling identified) to evaluate if VI is occurring. In some cases, evidence exists to show the indoor air concentrations are not related to VI. However, none of the decision steps in Step 3 allows for not performing subsequent steps.

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167	1. Formal/ Official	24	05/29/2020	Loren	Lund	Jacobs	24.015	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07e. Step 3D – Evaluate Temporal Variability	25	Similar to Step 3C, Step 3D supports the evaluation of the completeness of the VI pathway and is not intended for assessing human inhalation exposures or estimating human health risks. Inhalation exposures for current land use should be assessed under the typical use of the building, meaning with the HVAC system in operation. Performing an indoor air sampling event with HVAC off is useful for VI pathway identification and in some cases, may be useful for identifying worst-case exposure conditions. However, indoor air sampling data collected under HVAC off conditions are not representative of human exposures under normal operating conditions and, thus, unsuitable for use for risk assessment purposes (see the comment on Step 3C).

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168	1. Formal/ Official	24	05/29/2020	Loren	Lund	Jacobs	24.016	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07b. Step 3A – Conduct in Depth Building Survey	18	Background sources are addressed in the Draft Supplemental Guidance only briefly; however, interpreting background sources is a key factor in determining if VI is occurring. Background sources are not always identified and resolved. It is recommended that the final Supplemental Guidance acknowledge that professional judgment is appropriate in addressing the uncertainty associated with attributing indoor air concentrations to VI. CalEPA should consider incorporating “when feasible” in the recommendation to locate and remove indoor sources of vapor forming chemicals (VFCs), and to acknowledge that even when indoor sources of VFCs are found and removed, this does not mean indoor air detections are not related to unidentified background sources. Further, additional discussion should be included related to the assessment of outdoor background sources on indoor air. Indoor air detections may be falsely attributed to the VI pathway even when indoor air concentrations are within three-times outdoor air concentrations (Appendix C of NYDOH [2006] Final Guidance for Evaluating Vapor Intrusion) or equal to or greater than subslab concentrations because background indoor sources can also be detected in the subslab. Reference: New York Department of Health (NYDOH). 2006. Final Guidance for Evaluating Vapor Intrusion. October.

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169	1. Formal/ Official	25	05/29/2020	Eric	Epple	Arcadis, U.S. Inc.	25.001	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	Arcadis does not agree that the default attenuation factor of 0.03 for soil vapor should be used regardless of building size and usage. The default attenuation factor of 0.03 is overly conservative for large commercial buildings and is likely not representative of potential vapor intrusion exposure risk. The use of site- specific attenuation factors should be used if adequate data is available and a less conservative default attenuation factor should be considered for larger commercial buildings. Note, several states allow for the use of separate generic attenuation factors for large commercial buildings included in state specific guidance such as 0.001 used by Oregon Department of Environmental Quality in the Guidance for Assessing and Remediating Vapor Intrusion in Buildings (Oregon DEQ 2010) and 0.002 used by Hawaii Department of Health in the Soil Vapor and Indoor Air Sampling Guidance (Hawaii DOH 2017).
170	1. Formal/ Official	25	05/29/2020	Eric	Epple	Arcadis, U.S. Inc.	25.002	13. Attachment 4 – Guidance on Uploading Vapor Intrusion Information into GeoTracker	13e. IV. GeoTracker Vapor Intrusion Database	Attachment 4	Instructions are provided for uploading vapor intrusion (VI) data to the GeoTracker database for the evaluation of site-specific soil vapor attenuation compared to United States Environmental Protection Agency (EPA) default attenuation factors. Please provide additional details on how this data will be evaluated and provide a timeline for this evaluation.

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171	1. Formal/ Official	25	05/29/2020	Eric	Epple	Arcadis, U.S. Inc.	25.003	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07e. Step 3D – Evaluate Temporal Variability	26	Arcadis agrees that seasonal variability should be evaluated during a vapor intrusion investigation. However, several logistical challenges would likely inhibit the ability for practitioners to collect samples within a subject building initially with the associated heating ventilation and air conditioning (HVAC) system normally operating and a second event 36 hours later with the HVAC system turned off. Specific language should be included to proceed with the approach only if feasible and vapor intrusion evaluation should primarily be completed under normal HVAC operation unless sub-slab or crawl space soil vapor concentrations indicate a potential exposure risk. Alternatively, a second seasonal event could be conducted when the HVAC system is normally shut down. This would provide for two sampling events that represent seasonal variability (with HVAC on and off) under normal exposure conditions.
172	1. Formal/ Official	25	05/29/2020	Eric	Epple	Arcadis, U.S. Inc.	25.004	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06c. Step 2B – Estimate Human Health Risk from Vapor Intrusion	16	The Draft Supplemental Guidance does not provide a process for establishing cleanup goals. Screening levels are typically used to initially evaluate and determine next steps, but are not cleanup goals. The Guidance states that if the estimated cancer risk is between 1 x 10-6 and 1 x 10-4, mitigation measures can be used. This can be interpreted as cleanup goals can use the 1 x 10-6 and 1 x 10-4 point departure range if mitigation measures are included in the remediation plan. Arcadis feels that additional clarity on cleanup goals should be included.

Row	Letter Type	Letter ID	Date of Submission	First Name	Last Name	Company or Agency	Comment ID	Topic[1]	Section[1]	Page Number(s)[1]	Comment
173	1. Formal/ Official	25	05/29/2020	Eric	Epple	Arcadis, U.S. Inc.	25.005	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06c. Step 2B – Estimate Human Health Risk from Vapor Intrusion	16	The Draft Supplemental Guidance recommends that several data points be collected as part of the VI investigative process. Yet, the Guidance also recommends using the maximum detected concentration, regardless of location, for either a screening level or baseline risk evaluation. The screening levels and risk equations incorporate highly conservative assumptions such as either 25 or 26 years of a non- depleting source concentration. This essentially means that the maximum concentrations never reduces for the entire exposure duration. In addition, both DTSC and USEPA risk assessment guidance documents stress the importance of using representative concentrations in risk quantification. Arcadis believes that if a site is adequately characterized, representative concentrations instead of the maximum concentrations should be used as appropriate. Otherwise, risk-based decision making could rely on overly conservative assumptions leading to unnecessary expenditures. Representative concentrations would still provide adequate and conservative health protection to current and future receptors.
174	1. Formal/ Official	25	05/29/2020	Eric	Epple	Arcadis, U.S. Inc.	25.006	04. Introduction	04e. D – Vapor Intrusion Attenuati on Factors	6	Additional details on the data quality objectives should be provide. Currently, the Draft Supplemental Guidance provides references concerning DQOs. However, these references are not specific to DQO's. Arcadis feels that a short statements on verifying the analytical reporting limits are equal to or below applicable screening levels should be included. In addition, the Draft Supplemental Guidance should discuss when certified clean canisters and tubing for TO-17 should be used.

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175	1. Formal/ Official	25	05/29/2020	Eric	Epple	Arcadis, U.S. Inc.	25.007	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07a. General Comments	18	Arcadis feels that the Draft Supplemental Guidance should provide information of the various air analytical methods. Consistent with the comment concerning DQO's, the discussion should include that the TO-15 reporting limit for naphthalene is higher than the residential soil gas screening level. TO-17 should be used for sites where residential screening for naphthalene is needed.
176	1. Formal/ Official	25	05/29/2020	Eric	Epple	Arcadis, U.S. Inc.	25.008	01. VI Supplemental Guidance General Comments	01b. Recommendations	35	Several of the references in the reference section are not the most current versions of the documents. Updates to DTSC Notes 3 and 4, and the USEPA Regional Screening Levels should be made.

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177	1. Formal/ Official	25	05/29/2020	Eric	Epple	Arcadis, U.S. Inc.	25.009	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	20	Clarification should be provided with regard to the sub-slab soil vapor installation and sampling and timing with indoor air sampling. The current Draft Supplemental Guidance includes a recommendation that soil vapor samples should be collected after indoor air sampling to prevent cross contamination. This recommendation should also include that soil vapor sampling points should not be installed prior to indoor air sampling as this may also cause cross contamination from the drilling and installation.
178	1. Formal/ Official	25	05/29/2020	Eric	Epple	Arcadis, U.S. Inc.	25.010	09. Application to Other Building Types	09d. Building III – Above-Grade or Below-Grade Parking Structures	34	Parking garage sampling may not be representative of potential vapor migration due to likely background volatile organic compound (VOC) impacts from vehicles present. Active ventilation may mitigate the space, but potential detections that may be present in indoor air samples are likely present due to vehicle exhaust within the structure. Investigation of sub-surface soil vapor impacts should be used as a potential line of evidence for current and future exposure scenarios. If sub-surface soil vapor sampling is not feasible, indoor air sampling of above commercial or residential spaces may be considered.

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179	1. Formal/ Official	26	05/29/2020	Markus	Niebanck	Amicus Strategic Environmental Consulting	26.001a	04. Introduction	04b. A – Scope and Applicability	vi, 1	The Draft "Supplemental Guidance: Screening and Evaluating Vapor Intrusion" (DSVIG) makes a foundation for the creation of needed process certainty. Unfortunately, a fundamental attribute of the DSVIG, the Attenuation Factor (AF, as defined in the DSVIG as: "… the reduction in VFC concentrations that occurs during vapor migration in the subsurface, coupled with the dilution that can occur when the vapors enter a building and mix with indoor air (Johnson and Ettinger, 1991)"), is based on an outdated and preliminary EPA data set that for the reasons described below cannot be relied on for the development of sound California technical guidance or policy. The DSVIG does not evaluate the derivation of the EPA attenuation factor or its applicability to California, and as a consequence blindly accepts an AF that is two orders of magnitude stricter than current practice. Due to the fact that California has also adopted its own (non- EPA) extremely conservative toxicity values for certain VOC, reflexive reliance on the EPA AF creates guidance that is orders of magnitude more strict than any in practice elsewhere in the United States.

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180	1. Formal/ Official	26	05/29/2020	Markus	Niebanck	Amicus Strategic Environmental Consulting	26.001b	04. Introduction	04b. A – Scope and Applicability	vi, 1	The Draft "Supplemental Guidance: Screening and Evaluating Vapor Intrusion" (DSVIG) makes a foundation for the creation of needed process certainty. Unfortunately, a fundamental attribute of the DSVIG, the Attenuation Factor (AF, as defined in the DSVIG as: "… the reduction in VFC concentrations that occurs during vapor migration in the subsurface, coupled with the dilution that can occur when the vapors enter a building and mix with indoor air (Johnson and Ettinger, 1991)"), is based on an outdated and preliminary EPA data set that for the reasons described below cannot be relied on for the development of sound California technical guidance or policy. The DSVIG does not evaluate the derivation of the EPA attenuation factor or its applicability to California, and as a consequence blindly accepts an AF that is two orders of magnitude stricter than current practice. Due to the fact that California has also adopted its own (non- EPA) extremely conservative toxicity values for certain VOC, reflexive reliance on the EPA AF creates guidance that is orders of magnitude more strict than any in practice elsewhere in the United States.

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181	1. Formal/ Official	26	05/29/2020	Markus	Niebanck	Amicus Strategic Environmental Consulting	26.002a	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	This is unwise, unnecessary, and threatens development projects underway and ensures the abandonment of many currently on the drawing board. In the past California has led the nation in the development of sound and progressive environmental policy. Here, if the numbers were accurate, California could again create cutting edge policy for others to follow. That it would come at some economic cost would be balanced, as economic development should not be promoted at the expense of public health. But, for the reasons described below, the DSVIG is not based on an accurate or applicable AF. With no disrespect intended EPA or the members of the CalEPA workgroup, the AF relied upon in the DSVIG must be replaced by one calculated accurately, using a defensible and legitimately peer-reviewed data set. We can do better. We must do better.

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182	1. Formal/ Official	26	05/29/2020	Markus	Niebanck	Amicus Strategic Environmental Consulting	26.002b	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	This is unwise, unnecessary, and threatens development projects underway and ensures the abandonment of many currently on the drawing board. In the past California has led the nation in the development of sound and progressive environmental policy. Here, if the numbers were accurate, California could again create cutting edge policy for others to follow. That it would come at some economic cost would be balanced, as economic development should not be promoted at the expense of public health. But, for the reasons described below, the DSVIG is not based on an accurate or applicable AF. With no disrespect intended EPA or the members of the CalEPA workgroup, the AF relied upon in the DSVIG must be replaced by one calculated accurately, using a defensible and legitimately peer-reviewed data set. We can do better. We must do better.

183	1. Formal/ Official	26	05/29/2020	Markus	Niebanck	Amicus Strategic Environmental Consulting	26.003	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	The EPA Database complied in 2012 upon which the EPA AF is based was at the time "preliminary" in nature. It is now out of date and no longer even close to present-day data quality. With all due respect to EPA staff who at the time worked hard to produce an AF of utility and value, the resultant 2012 AF is not applicable in 2020 and must be revised. From their 2015 document, EPA describes their database as follows (emphasis added): A.3.1 EPA'S VAPOR INTRUSION DATABASE (EPA 2012A) The information in EPA's Vapor Intrusion Database: Evaluation and Characterization of Attenuation Factors for Chlorinated Volatile Organic Compounds and Residential Buildings (EPA 2012a) is used to derive recommended attenuation factor values for use in evaluating subsurface sample concentrations collected as part of vapor intrusion investigations. EPA's vapor intrusion database consists of numerous pairings of concentrations in indoor air and subsurface samples (groundwater, sub-slab soil gas, exterior soil gas, and crawlspace vapor) from actual sites. It represents the most comprehensive compilation of vapor intrusion data for chlorinated hydrocarbons (CHCs) available at this time. If a reader did not dig deeply into the referenced 2012 EPA's Vapor Intrusion Database: Evaluation and Characterization of Attenuation Factors for Chlorinated Volatile Organic Compounds and Residential Buildings (EPA Database Report) they would be led to believe that its data set is robust, work that undoubtedly must include data from hundreds of sites from across the country with samples collected using state-of-the-art methods and analytical results subjected to strict quality assurance validation protocol. Unfortunately, this is not the case. In fact, Phillip Dixon, one of the peer reviewers of the draft 2012 document observed (emphasis added): I commend the authors for compiling a detailed database and making it available for the risk assessment community. My review focuses on the statistical aspects of the document, primarily the

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											estimation of attenuation factors. The analysis of attenuation factors is characterized as a 'preliminary analysis' in both the document title and introduction. Hence, my comments are primarily suggestions for a more thorough analysis. My comments are organized by the general and specific questions asked in the charge, followed by a few detailed comments on the text. Mr. Dixon's observation of the wording was appropriate – the data set does indeed present itself as preliminary – it is neither nationally comprehensive nor internally robust. Interestingly, in apparent response to Mr. Dixon's observation, the final 2012 EPA Database Report simply drops the words 'preliminary analysis' from the title and introduction. It is not unusual for later work to rely upon earlier work as a foundation to build upon – but it is critically important that the relevance and appropriateness of prior studies be thoroughly examined to ensure present-day applicability. Here, there is no record that the DSVIG workgroup conducted an evaluation of the 2012 EPA database or its applicability with respect to the calculation of an accurate AF for California guidance/policy.

184	1. Formal/ Official	26	05/29/2020	Markus	Niebanck	Amicus Strategic Environmental Consulting	26.004	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	Table 1 entitled "Summary of information in EPA's vapor intrusion database" from the 2012 EPA Database Report is attached to this letter. As shown, the table presents fundamental case attributes for each of the 41 sites that comprise the database, such as soil type, building use, foundation type (general, not specific foundation attributes), media sampled and analytes. Table 1, however, does not show other meaningful case attributes presented in Appendix C (Vapor Intrusion Database Site Information) to the Database Report, attributes that are critically important in terms of data relevance and applicability, including: Sample date. Sample collection methodology has evolved substantially over the years, and sampling conducted in the 1990s can reasonably be seen as of potentially lesser quality, as techniques such as sample train design and leak testing had not yet become a standard component of the sample collection process. In fact, EPA acknowledges the evolution of the practice in their 2015 document, writing in the introduction (emphasis added): To help assess the subsurface vapor intrusion pathway, the Office of Solid Waste and Emergency Response (OSWER) released in November 2002 for comment EPA's Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils ("Draft VI Guidance"). Since the Draft VIGuidance was released, EPA's knowledge of and experience with assessment and mitigation of the vapor intrusion pathway has increased considerably, leading to an improved understanding of and enhanced approaches for evaluating and managing vapor intrusion. In addition, EPA received hundreds of comments from the public since 2002 on the Draft VI Guidance, on a public reviewdraft issued in April 2013, and on emerging practices and science considerations. Screening for indoor sources of contamination (chemicals, building materials). As underscored in the CalEPA DSVIG, an examination of VI risk at sites of potential concern must include an examination of structural interiors for the presence of products/materials that may contain similar chemistry to the subsurface contaminants. Absent

											such screening, an investigator cannot reliably attribute the indoor air measurement of chemicals of concern exclusively to a subterranean source. In their 2015 report, EPA states: “To determine if a subsurface vapor source(s) is (or are) responsible for indoor air contamination, EPA recommends that such background sources of site-specific analytes be identified and distinguished from vapor- forming chemicals arising from vapor intrusion.” Type of case (exclusively petroleum versus chlorinated VOC such as PCE and TCE). Clearly, petroleum hydrocarbon cases provide no CVOC-relevant data. Data quality. In Appendix C to the Database Report EPA offers information on the provenance and “quality” of case data. A significant fraction of cases are identified as being of either “low” or “medium” quality, and much of the data is derived from conference materials or published papers (not first-hand EPA case data). The attached spreadsheet shows the EPA Table 1 database cases with the above criteria added and highlighted. As shown, when non-relevant cases are excluded (petroleum sites, low-quality data cases, cases with no indoor screen, and cases with data collected before 2000), the total potentially relevant database count reduces from 41 to 16, with only three California cases in the adjusted data subset and all of these located within a single mid-sized Northern California city (Mountain View). It should also be noted that when corrected for cases that lack sub-slab samples the total relevant case count goes to nine total with one in California, and when additionally corrected for cases with no evaluation of sewer/utility connections as preferential pathways for vapor intrusion (a significant contributory feature the evaluation of which the CalEPA workgroup identifies as very important to the accurate determination of VI), the case count in the EPA database goes to zero.

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185	1. Formal/ Official	26	05/29/2020	Markus	Niebanck	Amicus Strategic Environmental Consulting	26.005	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	In the 2020 DSVIG Section D-1 Recommended Attenuation Factors for Screening, the CalEPA workgroup states: USEPA empirically-derived AFs as shown in Table 1 (USEPA, 2015a) should be used for the screening of sites in California. These conservative AFs are protective of public health under most building occupancy scenarios and should be used for the initial screening of sites. Site- specific AFs based on mathematical models, such as the Johnson and Ettinger model, are not recommended for the screening described in this Supplemental Guidance for the following reasons: Current VI models with scientifically defensible input parameters cannot predict the range of results observed in empirical VI studies (Derycke, et al., 2018; USEPA, 2012b); Current VI models do not address how buildings change over time as they are modified, damaged, age, or as ventilation and/or HVAC operation change; and An increasing number of studies are showing that preferential pathways can contribute to VI (Pennell et al., 2013; Guo et al., 2015; Jacobs et al., 2015 and2016; Kastanek et al., 2016; McHugh et al., 2017a and 2017b; McHugh and Beckley, 2018; and Wallace et al., 2017), but current VI models do not consider this pathway. This cautionary instruction by the workgroup regarding models such as Johnson & Ettinger is noteworthy, as the EPA database upon which the recommended attenuation factor is based doesn't appear to account for these conditions either.

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186	1. Formal/ Official	26	05/29/2020	Markus	Niebanck	Amicus Strategic Environmental Consulting	26.006	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	Finally, during the first DSVIG on-line forum on May 14, a submitted question asked if the workgroup had evaluated the peer review incorporated as Appendix A to the 2012 Database Report, particularly as it pertained to the treatment of low and medium quality data. Robin Davis, peer reviewer of the 2012 report, had commented: While the discussion is understandable, the application is objectionable because: 1) the document admits that data quality at some sites is low, sites may not be well-characterized, and source strengths beneath buildings may not be known. Poor site characterization is often the case for CVOCs... In response, the group representative indicated that they had not exhaustively reviewed the 2012 report or its peer review, instead offering their observation that 47 states were relying upon the 2012/2015 work and that this was essentially good enough for them.

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187	1. Formal/ Official	26	05/29/2020	Markus	Niebanck	Amicus Strategic Environmental Consulting	26.007	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	Recommendation 1 The EPA data set ranges in age from 1991 to 2007, with only three cases containing data more recent than 2005. At the time the EPA data was collected there were no online tools such as the cutting-edge California Geotracker of Envirostor. There is ample and accessible current paired data from sites across California; the DSVIG evaluates none of this. Given the deficiencies in the EPA data set described above and given the easy access to an abundance of high-quality, recent, California-specific data, the DSVIG effort must be paused until a reliable attenuation factor can be calculated. The DSVIG itself describes modifications being made to the California on-line resources to facilitate collection and analysis of high- quality data. The data can be collected, evaluated and a science-based California-specific attenuation factor derived in a reasonable period of time. The process pause: Will be protective of human health, as there has been no toxicological imperative or basis that supports a call for accelerated or immediate action (as evidenced by the fact that the DSVIG workgroup commenced its work in 2014 and issued the review draft in 2020). Will ensure California environmental policy satisfies the gold standard for data quality and insightful analysis in which the state once took pride. Will not unnecessarily decimate the California housing development market or slow our economic recovery from the COVID 19 pandemic. 4. Will not result in adverse secondary or induced environmental health impacts, such as the elimination of much development-led environmental remediation, sprawl, and health impacts associated with displacement, poverty, and an abandoned tax base.

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188	1. Formal/ Official	26	05/29/2020	Markus	Niebanck	Amicus Strategic Environmental Consulting	26.008a	04. Introduction	04b. A – Scope and Applicability	vi, 1	Comment 2 We must be honest – the “guidance” published in the final SVIG will be treated as policy and the process associated with its authorship and promulgation must not pretend otherwise. In the DSVIG and during the on-line forum, DSVIG authors emphasized the guidance as not carrying the weight of California policy, rule, or regulation. The DSVIG states: Disclaimer: This document is guidance and is not intended as regulation or water quality control plan or policy. This Supplemental Guidance describes a consistent approach recommended for evaluating vapor intrusion in California. This Supplemental Guidance is not binding on California Environmental Protection Agencies or staff, or on members of the public. This Supplemental Guidance is not intended to exclude alternative methodologies nor is it intended to provide prescriptive or inflexible requirements. This Supplemental Guidance does not supersede or implement laws or regulations and does not have the force or effect of law. The DSVIG authors, regulators and California practitioners know this Disclaimer will have absolutely no bearing on how the guidance is put into practice. In fact, practitioners have already been directed by regulators to follow the guidance as if it were already final. If the history of regulatory reliance on past “guidance” is any indication, the SVIG when published will effectively become the law of the land. Moreover, in places the language of the DSVIG is directory, such as its express direction that the DSVIG is to be prioritized over other guidance documents, and a stated preference for remediation over mitigation, which is a decision expressly reserved by statute for the remedy-selection process.

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189	1. Formal/ Official	26	05/29/2020	Markus	Niebanck	Amicus Strategic Environmental Consulting	26.008b	04. Introduction	04b. A – Scope and Applicability	vi, 1	Comment 2 We must be honest – the “guidance” published in the final SVIG will be treated as policy and the process associated with its authorship and promulgation must not pretend otherwise. In the DSVIG and during the on-line forum, DSVIG authors emphasized the guidance as not carrying the weight of California policy, rule, or regulation. The DSVIG states: Disclaimer: This document is guidance and is not intended as regulation or water quality control plan or policy. This Supplemental Guidance describes a consistent approach recommended for evaluating vapor intrusion in California. This Supplemental Guidance is not binding on California Environmental Protection Agencies or staff, or on members of the public. This Supplemental Guidance is not intended to exclude alternative methodologies nor is it intended to provide prescriptive or inflexible requirements. This Supplemental Guidance does not supersede or implement laws or regulations and does not have the force or effect of law. The DSVIG authors, regulators and California practitioners know this Disclaimer will have absolutely no bearing on how the guidance is put into practice. In fact, practitioners have already been directed by regulators to follow the guidance as if it were already final. If the history of regulatory reliance on past “guidance” is any indication, the SVIG when published will effectively become the law of the land. Moreover, in places the language of the DSVIG is directory, such as its express direction that the DSVIG is to be prioritized over other guidance documents, and a stated preference for remediation over mitigation, which is a decision expressly reserved by statute for the remedy-selection process.

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190	1. Formal/ Official	26	05/29/2020	Markus	Niebanck	Amicus Strategic Environmental Consulting	26.009	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	Recommendation 2 All involved in the preparation, review and acceptance of this guidance must be clear-eyed and honest with respect to how it will be used. A disclaimer such as the one in the DSVIG is necessary, but cannot be relied upon as an excuse for making anything other than the best guidance possible. As in, just because the disclaimer suggests that if the guidance is wrong it won't be used history shows that this simply isn't the case. Therefore, the DSVIG should be subject to the rulemaking process.
191	1. Formal/ Official	26	05/29/2020	Markus	Niebanck	Amicus Strategic Environmental Consulting	26.010	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	Comment 3 The workgroup deliberately excluded non-regulatory private sector and other stakeholder practice area experts. The DSVIG workgroup is made up of only regulatory practice area experts. By its design, the workgroup excluded private sector experts, and as a consequence could not benefit from potential contributors with a different, in many cases deeper, understanding of VI. Had the workgroup included a broader cross-section of expertise and perspective, the error of exclusive reliance on an outdated EPA work for the establishment of a meaningful attenuation factor could have been avoided.
192	1. Formal/ Official	26	05/29/2020	Markus	Niebanck	Amicus Strategic Environmental Consulting	26.011	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	Recommendation 3 Broaden the workgroup constitution to include practice area experts from the private sector and regulated community.

193	1. Formal/ Official	27	05/29/2020	Jame s	Strandb erg	Groundwater Resources Association of California	27.001	04. Introduction	04b. A – Scope and Applicabil ity	vi-vii, 1-2	Comment 1: “Supplemental” Guidance or Effectively Regulation or Law. The Guidance states: “Practitioners should use the Draft Guidance in conjunction with existing California guidance (DTSC’s Final Vapor Intrusion Guidance (VIG) [2011], DTSC’s Vapor Intrusion Mitigation Advisory (VIMA) [2011], and San Francisco Bay Regional Water Quality Control Board’s Interim Framework [2014]). Where there is a conflict with the above- mentioned guidance documents, the Draft Guidance is recommended.” (Page vi, emphasis added). Similarly, the Draft Guidance seemingly tries to deflect its impact by providing: “Disclaimer: This document is guidance and is not intended as regulation…. This Draft Guidance does not supersede or implement laws or regulations and does not have the force or effect of law.” (Cover). GRA believes that regulators, municipalities, lenders, investors, consultants, vendors, and others will and are already treating the Draft Guidance as primary and enforceable on cases with vapor intrusion (VI) concerns – not supplemental guidance or advisory. This is partly due to the five- year-long build-up to public release of the Draft Guidance. We understand that another factor is the controversial nature of the approaches advocated therein – specifically the proposed 0.03 attenuation factor (AF). This very conservative AF may drive some of these parties to act in contravention of the final Guidance. GRA is also aware of instances where regulatory case managers are already treating the Draft Guidance as having the effect of regulation. For example, a Southern California agency’s direction to a responsible party (RP) who was trying to secure a no-further-action (NFA) determination at the end of implementing a Soil Vapor Extraction (SVE) remedy. The agency told the RP not to bother collecting indoor air samples since, given the Draft Guidance and SF Bay Regional Water Board’s earlier and foundational work, the agency planned to only look at sub-slab soil gas data and use the proposed 0.03 AF for evaluating closure. No actual indoor air data would be allowed.

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											This comment addresses the critical importance that the Draft Guidance is supportable and based on adequate data, properly vetted as if it were an enforceable regulation or law, and considers the impacts on all stakeholders before it is finalized.

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194	1. Formal/ Official	27	05/29/2020	James	Strandberg	Groundwater Resources Association of California	27.002	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5, viii	Comment 2: Timing of the Draft Guidance and the Bias of Assuming Unacceptable Risk The Draft Guidance references the recently created “California VI Database” to gather future data through GeoTracker to compile building-specific data and differentiate types of vapor samples. (Page viii). This makes sense and is applauded. Yet, the Draft Guidance further states: “Once GeoTracker has sufficient statewide data, the CalEPA VI Workgroup will evaluate the VI database to determine if California-specific AFs are justified.” (Page viii, emphasis added). This statement appears to be an express admission that issuing the Draft Guidance now is premature since the state-specific database upon which it should be based is yet to be adequately populated. Implementing the Draft Guidance in the near future could stop or delay real estate deals and valuable development projects, including critically-needed affordable housing, and cause substantive new costs for site investigation, at a minimum – while waiting to see “if California- specific AFs are justified.” Similarly, the Draft Guidance, as written, outlines various factors that may influence VI analysis. However, the document then concludes: “With the potential for such high variability, the probability of false negative increases – a concern that potential risks associated with VI into indoor air will be underestimated.” (Page vi). This statement appears to be inconsistent with the acknowledgement that the AF of 0.03 is very conservative. This statement or approach reflects a serious bias toward assuming unacceptable risks for most buildings and vacant sites.

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195	1. Formal/ Official	27	05/29/2020	Jame s	Strandb erg	Groundwater Resources Association of California	27.003	09. Application to Other Building Types	09b. Building I – Large Buildings and Multistory Buildings	31	Comment 3: Extraordinary Sampling for Multi-unit and Multi-story Buildings The Draft Guidance provides that parties "should consider these additional sampling locations: For large multiunit structures, such as apartment buildings or strip malls, consider collecting at least one sample per ground floor unit. … For multistory buildings, sampling in occupied spaces on upper floors may be warranted in addition to sampling on the ground floor." The document does not address or justify the burden or logistical problems for building owners, management companies, and tenants, associated with this extraordinary sampling approach. GRA recommends consideration of a statistical sampling approach that may be less onerous and still meet the intent of the Draft Guidance. Landlords often have challenges with some tenants, struggle to collect rent and to keep them modestly content with their leaseholds. The prescriptive testing requirement in the Draft Guidance strikes us as burdensome and arbitrary.

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196	1. Formal/ Official	27	05/29/2020	James	Strandberg	Groundwater Resources Association of California	27.004	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	Comment 4: Scope, Applicability, and Relation to Existing Guidance or Policy The Draft Guidance states it is meant to supplement, and to be used in conjunction with, existing California VI guidance documents but, in the case of conflicts, to follow the Draft Guidance until the pre-existing California VI guidance is revised. In addition, the Draft Guidance is meant to provide a framework for the revision of DTSC's VIG (2011) and VIMA (2011), and the SF Bay Regional Water Board's Environmental Screening Levels and Vapor Intrusion Framework. It appears the Draft Guidance is temporary and will be incorporated into these other documents at some point. To avoid further fragmentation by still using some parts of these existing VI guidance documents and the 2020 Draft Guidance, has the CalEPA VI Workgroup considered the benefit of preparing/revising these documents for concurrent release? GRA suggests the Draft Guidance be amended to further explain when and how it would be used in relation to the three noted existing California VI guidance documents. Specifically, what parts of the Draft Guidance conflict with the pre-existing California guidance documents? A flowchart may help readers more fully understand the relationship. For example, implementation of the four-step process described for VI assessments would lead to one of three risk management decisions for every building assessed. Are low priority buildings "out?" For the other two categories, are the "potential response actions" consistent with pre-existing California VI guidance documents or new? The flowchart noted above would assist the regulated community and regulatory case managers in further understanding the relationship of the Draft Guidance to the pre-existing California VI guidance documents.

197	1. Formal/ Official	27	05/29/2020	Jame s	Strandb erg	Groundwater Resources Association of California	27.005	04. Introduction	04e. D – Vapor Intrusion Attenuati on Factors	vii, 5	Comment 5: The Draft Guidance Effectively Establishes the 0.03 AF for the Selection of Soil Vapor Cleanup Goals and Determining the Need for Mitigation Measures The Draft Guidance establishes the 0.03 AF for initial screening evaluations. However, this AF will not be limited to screening existing buildings for VI evaluations as written. The 0.03 AF will also be used for the development of 1) criteria to determine if mitigation measures are required at future buildings and 2) soil vapor cleanup goals. No other AFs are recommended in the Draft Guidance and the use of modeling to develop cleanup goals is clearly rejected for the initial screening of buildings (Page 5). Further, as indicated in the Introduction Section, "The same logic and approach can be extended to the evaluation and management of future VI risk for sites with existing buildings or open lots planned for redevelopment" (Pages 1 and 2). Thus, the Draft Guidance appears to effectively establish the 0.03 AF for developing cleanup goals and determining if VI mitigation measures are required. We note that Step 3 provides for other lines of evidence to evaluate VI risks at existing buildings. However, at existing buildings, the potential future risks are estimated with subsurface data using "generic, conservative AFs." If multiple lines of evidence can be applied to develop building- or site-specific AFs and, ultimately, site-specific action levels for selecting mitigation measures and cleanup goals, the Draft Guidance should be revised to clearly state as much. We note that for tetrachloroethene (PCE) and trichloroethene (TCE), which are the most common chemicals driving VI risks, the cleanup goals developed using a 0.03 AF are not achievable at most sites. Unattainable cleanup goals may have the negative consequence of reducing active soil vapor remediation, as there is no connection between soil vapor remediation and the reduction of long- term mitigation requirements. The Draft Guidance expressly does not provide a framework for selecting how cleanup and/or mitigation is applied, nor does it update or supplement the decision-making framework outlined in the DTSC's VIMA (2011). We note that both the DTSC's Final VIG and

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											Final (Revision 1) VIMA were published concurrently in October 2011. By providing new guidance only to certain aspects of VI evaluations, the Draft Guidance could introduce more uncertainty to the overall process for remediating and managing sites with VI concerns if it is adopted as currently drafted. We recommend publishing the Draft Guidance with an update to the VIMA. At a minimum, the Draft Guidance should provide more clarity on practical approaches to managing sites with VI concerns with specific criteria or examples of risk management decisions at sites where remediation or mitigation is necessary. Without clear examples of risk management decisions that do not rely on the 0.03 AF, it is unlikely that individual, regulatory case managers will feel comfortable accepting the results of multiple lines of evidence evaluations with these recommendations in the future, as it is not clear that this multiple line of evidence approach is still recommended.

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198	1. Formal/ Official	28	05/29/2020	Jeffrey	Dagdigian (Dr.)	Waterstone Environmental, Inc.	28.001	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	Waterstone opposes the use of 0.03 as the attenuation factor (AF) used to estimate indoor air concentrations based on soil gas concentrations. In general, we believe the rationale to use 0.03 is arbitrary, lacks a scientific basis, and is not fully supported by data developed within the confines of California. Our specific comments are as follows. The 0.03 AF has no scientific basis for commercial buildings in California. While the AF value is derived from sub-slab and soil gas data contained in USEPA's 2012 VI Database from what were primarily residential buildings, the Draft Supplemental VI Guidance extends the AF of 0.03 to commercial buildings with the rationale that "in many geographic locations, some commercial enterprises have been established in converted residential buildings". This is not the case for most California commercial properties. In fact, none of the hundreds of commercial buildings studied by Waterstone have been converted from residences. Commercial buildings differ dramatically from residential buildings in their slab construction, ceiling height (interior air volume), and HVAC configuration and operation (air mixing). We believe that findings for residential buildings should not be applied to commercial buildings.

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199	1. Formal/ Official	28	05/29/2020	Jeffre y	Dagdigi an (Dr.)	Waterstone Environmental, Inc.	28.002	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	2. Practical considerations noted in USEPA's 2015 OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air to support lower AFs for non-residential buildings include higher ventilation rates and thicker concrete slabs with less settling and less cracking, with a note that EPA may consider appropriate building-specific data when evaluating VI for large non-residential buildings. Nonetheless, the Draft Supplemental VI Guidance applies the 0.03 AF to all buildings. This assumes that commercial buildings have a similar susceptibility to VI and similar interior mixing and dilution as the residential buildings represented in USEPA's 2012 VI Database. This is clearly not the case. Therefore, Waterstone believes it is inappropriate to apply the 0.03 AF to all California commercial sites without accounting for these significant differences. This one-size-fits-all approach inappropriately and unfairly penalizes the vast majority of commercial property owners and RPs.
200	1. Formal/ Official	28	05/29/2020	Jeffre y	Dagdigi an (Dr.)	Waterstone Environmental, Inc.	28.003	04. Introduction	04e. D – Vapor Intrusion Attenuati on Factors	vii, 5	3. EPA Study Sites Not Located in Southern California - Only a handful of the sites studied in USEPA's 2012 VI Database were located in California, and none of the sites were located in southern California. Many of the sites were located in cold-weather climates and had buildings with basements. This would be expected to yield lower AFs since the buildings are more tightly closed during cold weather and basements are enveloped on all sides by vadose zone soils. This is inconsistent with most California sites, and an important reason why the 0.03 AF should not be used in California until and unless proven appropriate.

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201	1. Formal/ Official	28	05/29/2020	Jeffrey	Dagdigian (Dr.)	Waterstone Environmental, Inc.	28.004	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	4. Implementation of the 0.03 AF in California is premature and not scientifically supported. In fact, the Draft Supplemental VI Guidance document itself makes the following points supporting this position: “Few buildings designed for commercial or industrial use are included in the USEPA VI Database”. “Very few California data are included in the USEPA VI Database”. “The USEPA VI Database…included data where site-specific outdoor air data were rarely collected”. The USEPA VI Database…included data…at a time when building screening techniques and tools were less well-developed. “For most buildings in the USEPA VI Database, only one indoor air sample and one subsurface sample were collected per building”. The statements above are taken directly from the Draft Supplemental VI Guidance and provide strong arguments against use of the 0.03 AF. Each of these points should be addressed and resolved before implementing the 0.03 AF in such an arbitrary manner. Clearly more California-specific data are needed before implementing a new standard. A robust California VI Database is essential to arrive at AF values that are appropriate for California, and it is inappropriate to use such a conservative AF value in the interim.
202	1. Formal/ Official	28	05/29/2020	Jeffrey	Dagdigian (Dr.)	Waterstone Environmental, Inc.	28.005	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	5. AFs should be developed based on California-specific studies or site-specific studies where soil gas, indoor air, and outdoor air data are available.

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203	1. Formal/ Official	28	05/29/2020	Jeffrey	Dagdigian (Dr.)	Waterstone Environmental, Inc.	28.006	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	6. The 0.03 AF does not account for differences in sample depth. Soil vapor at deeper depths will attenuate more than soil vapor at shallow depths. A depth component should be considered and incorporated when developing AFs for vapor intrusion, and the AF for deeper depths should be lower than the AF for shallow depths
204	1. Formal/ Official	28	05/29/2020	Jeffrey	Dagdigian (Dr.)	Waterstone Environmental, Inc.	28.007	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	7. The 0.03 AF does not account for differences in soil type or soil moisture content, both of which can dramatically affect the degree to which VOCs attenuate in the vadose zone. The ability to use different AFs for different soil conditions should be considered.
205	1. Formal/ Official	28	05/29/2020	Jeffrey	Dagdigian (Dr.)	Waterstone Environmental, Inc.	28.008	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	8. The AFs in DTSC's October 2011 Vapor Intrusion Guidance should remain the primary criteria by which soil vapor concentrations are evaluated for vapor intrusion until such time that a new California-specific value is established. These AFs provide for differences in residential vs. commercial land use, existing vs. future buildings, and sub- slab vapor vs. soil vapor. In contrast, the 0.03 AF provides no adjustment for these differences
206	1. Formal/ Official	28	05/29/2020	Jeffrey	Dagdigian (Dr.)	Waterstone Environmental, Inc.	28.009	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	9. There should be a process by which site-specific AFs can be developed similar to the manner in which the California-specific VI database will be used. Such AFs should be determined by developing a 95% UCL based on actual site data, excluding statistical outliers from worst-case scenarios, and without added layers of contingencies or safety factors.

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207	1. Formal/ Official	28	05/29/2020	Jeffrey	Dagdigian (Dr.)	Waterstone Environmental, Inc.	28.010	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	Waterstone queried our clients (commercial property owners, developers, and other RPs) regarding the Draft Supplemental VI Guidance, including the 0.03 AF, and received the following generalized feedback: The 0.03 AF is overly conservative and unreasonable, and it is premature to apply it to sites located in California. The use of the 0.03 AF will make it infinitely harder to gain regulatory closure for sites with VOC contamination and impossibly hard to get closure for sites with chlorinated VOC contamination. If this becomes the accepted standard for evaluating vapor intrusion, case closure (if possible at all) will take much longer and cost significantly more. This 0.03 AF value has already resulted in increased costs and extended project schedules where regulators have required further study. It has made VI studies more extensive, costly, and time- consuming. Further, it has made case closures more difficult for sites that might have previously been quite simple to attain. This standard will result in depressing property values, increase foreclosures, and ultimately take many properties out of circulation. The 0.03 AF will result in increased costs and extend the schedule on projects with even very low detections of VOCs in soil vapor, including at housing projects and in the redevelopment of blighted areas, both of which are so desperately needed in California. Our clients have questioned the intentions behind the 0.03 AF which will knowingly keep environmental investigation and cleanup projects open for longer periods, resulting in increased regulatory caseloads. Several clients have recently postponed purchases of property in light of the Draft Supplemental VI Guidance and the 0.03 AF.

208		29	05/29/2020	Peter	Krasnoff	West Environmental	29.001	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	The 0.03 attenuation factor used in the draft Supplemental Guidenace reflects a value extracted from the USEPA's vapor intrusion (VI) Database. While it has been stated during technical working sessions that the 0.03 is peer reviewed database using a large number of samples, the 0.03 attenuation factor was developed from an analysis of 431 sets of paired sub-slab and indoor air sample concentrations from the 1,582 paired sub-slab soil gas and indoor air measurements in the USEPA's 2006 VI Database (Regional Water Board, 2016). As noted in the Supplemental Guidance "most buildings in the VI database had only one subslab soil gas sample and one indoor air sample." As such the USEPA data are subject to "very large error (deviation from the true AF) due to spatial and temporal variability" (Regional Water Board, 2016). The USEPA calculated median attenuation factor for the 431 pair data sets at 0.003 and the 95th percentile at 0.03. Please consider acknowledging in the Supplemental Guidance that the USEPA VI Database included only nine samples collected in California, i.e., from the Orion Park near Moffett Field in April and May 2005. Information on the quality of the sampling or any unique attributes associated with the buildings was not reasonably ascertainable. However, given the development and improvement of sub-slab sampling quality control testing (e.g., leak testing), please consider that the nine reported sets of paired sub-slab and indoor air sample results for California are an inadequate basis to attribute the 0.03 indoor air sub-slab attenuation factor for the entire state of California, especially when considering the economic impact of the lower screening level is having on investigation and remediation costs. To this end, while the 0.03 attenuation factor could provide a preliminary screening value, please consider including in the Supplemental Guidance Site-specific factors such as building design, age, condition, etc. as a basis for increasing the default attenuation factor. Further, please consider that the use of the 0.03 attenuation factor has an acknowledged mass balance limitation (Regional Water Board, 2016). To achieve the 0.03 attenuation factor for a default-sized home, it has been estimated that the flow rate of soil gas would

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											have to be 70 liters per minute, which is considered "implausible based on the physics driving soil vapor entry" (Regional Water Board, 2016). It has also been noted that the due to California's milder climate that results in reduced temperature difference driven vapor intrusion, it is not appropriate to rely on a national database that represents buildings with lower air exchange rates and greater indoor-soil gas pressurization due to colder weather heating. Please consider allowing the use of mass balance/vapor transport calculations to support non-default attenuation factors for vapor intrusion. Given these considerations, please consider that the 0.03 not be used as a default attenuation factor, except for the most limited of sites where there is no existing data available. The regulated community is incurring millions of extra dollars in investigaiton and remediation costs due to the shift to the 0.03 as the default attenuation factor with no clear guidance on how higher numbers can be established, especially for new buildings. In lieu of using the 0.03 attenuation factor, the Guidance should provide clear criteria for discerning a basis for supporting a different attenuation factor, e.g., what adjustment for future building construction, adjustment for slab thickness, construction methodology, water vapor barriers, etc. Pleasee consider including in the Supplemental Guidance a default attenuation factor for new buildings at 0.001 - based on installation of proper penetration seals, water vapor barriers, slab thickness, etc. (see following comments on details).

209		29	05/29/2020	Peter	Krasnof f	West Environmental	29.002	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	While the Supplemental Guidance is relying on the USEPA for its default attenuation factor of 0.03, please consider also allowing the use of the USEPA's revisions to toxicity criteria for one of the most predominant vapor forming chemicals, i.e., tetrachloroethene (PCE). The current toxicity value for PCE is based on the Office of Environmental Health Hazard Assessment's 2016 inhalation cancer unit risk factor. California identified PCE as a "potential carcinogen in humans" based on its reported increase in the incidence of liver tumors in mice and rats (OEHHA, 2016). The mice and rat toxicological studies were extrapolated to humans using models that considered several metabolic pathways. In 2012, the USEPA updated its toxicity criteria for PCE (USEPA, 2012). Based on its updated analysis, the USEPA increased its one in one million (1E-6) exposed incremental lifetime cancer risk (ILCR) concentration for residential inhalation from 0.41 micrograms per cubic meter (ug/m3) to 4.2 ug/m3 in 2012 and to its current value of 11 ug/m3 in 2014. Following the USEPA's revision, OEHHA, however, incorporated additional conservative factors that resulted in the increase of its PCE inhalation 1E-6 ILCR from 0.41 ug/m3 to 0.46 ug/m3. In 2016, the OEHHA reviewed the basis for its PCE toxicity criteria and its ILCR 1E-6 residential indoor inhalation air concentration of 0.41 mg/m3 (OEHHA, 2016). In its review, OEHHA acknowledged that it was using an uptake model not used by the USEPA due to uncertainty in the underlying dose-response assessment. The subject uptake model's authors also acknowledged that there were inadequate data to provide calibration, which resulted in a large prediction range (OEHHA, 2016). Nevertheless, OEHHA chose to use the unreliable uptake model to provide "conservatism" to the dose-response analysis. Based on the OEHHA 2016 analysis, the PCE residential inhalation 1E-6 ILCR for residential exposure was calculated at 0.46 ug/m3, or approximately 24 times lower than the USEPA's 2014 value, which are both based on the same underlying toxicological studies. Therefore, inherent in the PCE inhalation risk evaluations is a 24 times safety factor.

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											Since the screening evaluations are being conducted using the USEPA's 0.03 attenuation factor, please consider allowing for use of the USEPA's toxicity factors in lieu of the admittedly overly conservative California toxicity factor for PCE. The compounding of the conservatism the 0.03 attenuation factor with the conservatism for PCE toxicity factor unjustifiably and inappropriately increases costs to investigate, remediate and mitigate conditions that do not pose an unacceptable risk to human health.

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210		29	05/29/2020	Peter	Krasnoff	West Environmental	29.003	04. Introduction	04d. C – Conceptual Model for Vapor Intrusion	4, Attachment 2	The Supplemental Guidance indicates that "a growing body of evidence is highlighting the importance of sewer lines as a potentially significant preferential pathway for VI." However, a review of the cited papers does not support this latter conclusion. Rather the referenced documents indicate some unique situations that were characterized by obvious defects in sewers and buildings with sewer odors. Many of the buildings were characterizing as having dry P-traps, which is typically limited to vacant/unused buildings. The Supplement Guidance represents that "once inside the sewer pipe, VFCs can be transporated beneath or directly into a building. However, the Uniform Plumbing Code (UPC) includes provisions to limit the potential for sewer gases, containing such acutely toxic chemicals as hydrogen sulfide, from entering building structures. While the Supplemental Guidance acknowledges that there are inherent building design elements to prevent the conditions where sewer gases can enter buildings, it should emphasize the occurrence of such conditions is not a "significant preferential pathway" but a pathway that should be explored when there are anomalous/unexplained indoor air detections of vapors near and/or associated with plumbing penetrations. Based on the preliminary guidance and other documents, Regional Board staff and local oversight agencies are requiring sampling of sewer gases even when there is no reason, e..g, as part of initial site investigations. The costs-benefit of requiring such sewer investigations in the absence of a technical basis is not justified. However, regulators point to such documents as the pending Supplement Guidance as a basis for requiring such investigations. Please provide clarifying language (similar to that shared during the question-and-answer session), that sewer investigations are not a requirement, but should be used when there are anomalous indoor air detections that need to be further characterized.

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211		29	05/29/2020	Peter	Krasnoff	West Environmental	29.004	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	The Supplemental Guidance should provide clarity on how alternative/non-default attenuation factors can be justified for future buildings. Many of the sites where VFCs are discovered are a result of property transactions. However, many sites are being viewed as requiring remedial actions, vapor mitigation, etc. for future building construction because there is no clear pathway for local agencies or project managers to evaluate and support alternative attenuation factors. Please consider including in the Supplemental Guidance specific considerations for supporting alternative attenuation factors for future buildings - as additional sampling is not a feasible approach (as suggested in the Supplemental Guidance), as in the absence of the future building being present there are no data that can be generated to support a value greater than the overly conservative 0.03 screening value. I have had many regulators since February 2019 require remediation and vapor mitigation when concentrations of chemicals exceeded,even by small percentages, the 0.03 attenuation factor, i.e., using published ESLs for soil gas as remediation/mitigation requirements, even in such cases where the new construction included 14-inch concrete floor slabs and chlorinated VOC resistant water vapor barriers. For example, please consider providing specific building provisions that will support a higher default attenuation factor for new buildings, e.g., 1) floor slab 6-inches or more; 2) use of penetration seals; 3) use of vapor trench dams; 4) use of chemical resistant water vapor barriers; and 5) Professional Engineer's certification that the design meets best practices for controlling vapor intrusion in conventional construction (not a vapor intrusion mitigation system). Ideally, a "point" or attenuation factor adjustment could be provided for each of these elements.

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212		29	05/29/2020	Peter	Krasnoff	West Environmental	29.005	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distribution of Soil Gas Contamination	13	Please consider revising the "recommended initial lateral spacing of 100 feet" to provide more range of judgment based on the nature of potential VFC use/release areas. As written, some regulators currently interpret to this lead to collection of soil gas samples over large areas where no such data would be justified by historical site use and potential vapor migration pathways.
213		29	05/29/2020	Peter	Krasnoff	West Environmental	29.006	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07b. Step 3A – Conduct in Depth Building Survey	19	Please consider clarifying in the Supplement Guidance that removal of potential indoor air sources of VFCs should only be conducted if occupants are cooperative/interested. Most indoor air sampling is not conducted in buildings where such removal of VFC potential sources is practical or allowed.

214		29	05/29/2020	Peter	Krasnoff	West Environmental	29.007	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	20	There has been much emphasis on cross-slab differential pressure measurements with many regulators. As noted in the Supplemental Guidance, a number of regulators are now requiring 24-hour data loggers for monitoring cross-slab differential pressure. Please consider clarifying language in the Supplemental Guidance that differential pressure measurements are a tool to aid in interpreting data, but should not be a requisite in such situations where vapor intrusion is documented. In other words, it can be used as one line of evidence in establishing whether indoor air detections might be due to vapor intrusion. However, at sites where vapor intrusion is documented, the benefit of cross-slab differential pressure measurements is not outweighed by the cost of generating the data. While the Supplemental Guidance indicates that the pressure measurements can be used to evaluate driving force for VI, the Guidance does not address the variable nature of the differential pressure due to such functions as opening the door, running exhaust fans in bathrooms, etc., which create a dynamic regime that do not provide such definitive pressure differential measurements to determine overall net flux - which at most sites is a moot issue when VI is documented. Further, to the extent that buildings have higher internal pressure than below slab, while not representing the "worst-case" scenario, it does more accurately represent conditions that are likely to leak to exposure. The goal of site characterization should not be to establish the highest concentration that receptors can be exposed to, but the reasonable maximum exposure (some integration of data). In the case of carcinogens where screening criteria are based on 25-year or 30-year exposure, there are going to be variable concentrations. During the recent question and answer session, the technical team indicated that sewer gas measurements were a tool to aid investigation and not a requirement at all sites. However, the Supplement Guidance states "sampling inside sewers and other vapor conduits concurrently with indoor air and subslab samplign is recommended..." Please clarify when such sampling is recommended, i.e., when there are anomalous detections and/or indications of such pathways. Including such a recommendation without some limits on its applicability will unnecessarily increase the

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											cost of investigations with little or no benefit. Vapor Entry Point sampling - The Supplemental Guidance indicates indoor air samples should be collected in the breathing zone, but also includes a description of sampling at cracks, openings not a breathing height. Please clarify that such entry point sampling is appropriate as an investigative tool when vapor intrusion has been determined as means to determine potential sources. Regulators have recently required "crack sampling," even before there is an indication of vapor intrusion. The concenration at a crack on the floor is not useful unless you have a situation where it results in vapor intrusion at such levels requiring further investigation. Radon/Tracer Testing - Similarly, please consider clarifying in the Supplemental Guidance y that use of such tools as radon/tracer testing can be used when there is inadequate information to determine whether there is a vapor intrusion issue. At those sites where vapor intrusion is acknowledged, such additional investigative techniques are likely unnessary - and, yet based on guidance, are being required as part of investigations.

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215		29	05/29/2020	Peter	Krasnoff	West Environmental	29.008	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	20-21	Please consider adding language in the Supplemental Guidance on how to address such common chemicals as benzene in ambient air and soil gas. The California Environmental Protection Agency (CalEPA) identified the ambient California concentration of benzene in air at 0.83 ug/m3 (CalEPA, 2018). Based on the default attenuation factor of 0.03, the presence of benzene up to 27.7 ug/m3 in soil gas would not represent an increase in indoor air risk above measured ambient concentrations if the 0.03 attenuation factor was applicable to Site conditions (i.e., 27.7 ug/m3 = 0.83 ug/m3/0.03). However, using the default attenuation factor and indoor air screening levels, sites where benzene is present above 3.2 ug/m3, regulators are requiring remediation. The remediation in such instances would not result in an overall reduction in risk.
216		29	05/29/2020	Peter	Krasnoff	West Environmental	29.009	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	The introduction to the document indicates that the document is guidance and not policy, which is very much appreciated. Please consider adding language that would clarify for regulators (and the public) when following the recommendations in the guidance is not required. In general, other regulatory guidance documents (e.g., clean import fill criteria, VIG) have been incorporated as requirements by regulators.

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217	1. Formal/ Official	30	05/29/2020	Cliff	Moriya ma	Cliff Moriyama Consulting	30.001	16. Other	16a. Other		Our organizations appreciate the opportunity to provide comments on the Draft Supplemental Guidance: Screening and Evaluating Vapor Intrusion (draft Guidance) jointly released by the State Water Resources Control Board and the Department of Toxic Substances Control (DTSC). Our organizations believe that draft Guidance should be extended until 60 days after DTSC completes its California-specific attenuation factor study. In the alternative, CalEPA should use the current and long-standing DTSC attenuation factors and revise the Guidance on the basis of the results of DTSC's study, as appropriate. The anticipated release date for DTSC's California-specific attenuation study is August 2020 — less than three months after the proposed close of the comment period.

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218	1. Formal/ Official	30	05/29/2020	Cliff	Moriyama	Cliff Moriyama Consulting	30.002	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	The draft Guidance would, on a state-wide basis, make environmental screening levels for a common class of chemicals over thirty times more stringent than under the long-standing DTSC guidance. This proposed change is based on a United States Environmental Protection Agency (EPA) study that is not representative of California and is very likely biased high for the state. Only about 3% of the data used in the EPA study was California-based, and the data relied upon for the EPA study does not reflect conditions in California. EPA's data was predominantly drawn from sites in states with cold weather climates, where groundwater is shallow, housing is largely pre-World War II vintage, and buildings have basements. Each of these factors can inappropriately bias attenuation factors in a conservative direction as compared to conditions in California. Combined these factors do not reflect conditions in California. Recognizing this limitation, the EPA study makes express caveats about how its findings should be used because of the geographically biased nature of its data. However, the draft Guidance does not consider the study's express limitations. The draft Guidance also does not consider privately conducted studies, based on large-scale California datasets, which affirm the overly conservative nature of EPA's national generic attenuation factors in reference to California and suggest that the current DTSC guidance for attenuation factors is, in fact, representative.
219	1. Formal/ Official	30	05/29/2020	Cliff	Moriyama	Cliff Moriyama Consulting	30.003	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	Applying unduly conservative attenuation factors would inappropriately screen-in more sites requiring more costly and time-consuming diagnostic work as well as mitigation and, potentially, remediation. This would compound California's housing crisis and slow economic recovery. It would also make infill development much more expensive and chill development-led site remediation by raising cost, time and uncertainty.

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220	1. Formal/ Official	30	05/29/2020	Cliff	Moriya ma	Cliff Moriyama Consulting	30.004	04. Introduction	04b. A – Scope and Applicabil ity	vi-vii, 1-2	If DTSC's nearly completed study validates its long-standing attenuation factor, the draft Guidance could reasonably be characterized as worsening public health by limiting housing opportunities and dampening economic recovery. According to the California Department of Housing and Community Development's State Housing Assessment (SHA), http://www.hcd.ca.gov/policy-research/plans-reports/docs/SHA_Final_Combined.pdf, (February, 2018), high housing costs deprive people of health care and make them more dependent on government subsidized services: When Californians have access to safe and affordable housing they have more money for food and health care, they are less likely to become homeless and need government subsidized services, their children are apt to do better in school, and businesses do not have as hard a time recruiting and retaining employees. SHA, P. 48. The California Legislature has codified this finding and other negative consequences of high housing costs and underproduction of housing at California Government Code section 65589.5(a)(2). California already has the nation's worst housing shortage and highest housing costs, as well as the worst housing-induced poverty and homelessness rates. According to multiple studies, about 40% of California's 30 million residents cannot pay ordinary monthly expenses – and California's now majority minority community members are the disproportionate victims. While increased housing prices would hurt the state, generally, an unduly conservative attenuation factor would hurt low-income and people of color the most. See also, California Government Code section 65589.5(a)(2)(F).

221	1. Formal/ Official	30	05/29/2020	Cliff	Moriya ma	Cliff Moriyama Consulting	30.005	16. Other	16a. Other		Since mid-March, when the COVID-19 shelter-in-place orders went into effect, more than 4.5 million residents have filed unemployment claims, representing 23.3 percent of the state's workforce of 19.3 million. High unemployment rates, which are disproportionately concentrated in low-income and people of color communities, have already exacerbated the housing affordability crisis. Therefore, economic and community development, in addition to housing, are special priorities that need to be protected, and action must be taken to address significant and consequential harm. Consideration of these equity concerns is fundamental. Indeed California's first environmental justice statute directs that, "[t]he California Environmental Protection Agency, in designing its… policies. shall do all of the following: (a) Conduct its programs, policies, and activities that substantially affect human health or the environment in a manner that ensures the fair treatment of people of all races, cultures, and income levels, including minority populations and low- income populations of the state. *** (c) Ensure greater public participation in the agency's development, adoption, and implementation of environmental regulations and policies. California Government Code §7200(a) and (c). This express mandate, at a minimum, supports keeping the comment period open for three more month's during the nation's worst pandemic in a century, while shelter in place orders are still in effect and while DTSC is completing its California-centered attenuation factor study. The statute also directs that, at least, some attention be devoted to the Draft Guidance's disproportionate impacts on low-income and people of color.

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222	1. Formal/ Official	30	05/29/2020	Cliff	Moriyama	Cliff Moriyama Consulting	30.006	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	Moreover, the state should, at this uniquely difficult time, pay heightened attention to the science underlying its policies and the potential unintended consequences of those policies before imposing new burdens. Indeed, if the draft Guidance were considered a rule, it would be subject to scientific peer review under Health & Safety Code section 57004. The state should also consider the broader indirect environmental effects of the policy under the California Environmental Quality Act (CEQA) and should also evaluate the likely disproportionate and adverse impacts the policy will have on people of color under Title 8 of the Fair Housing Act and low-income Californians.
223	1. Formal/ Official	30	05/29/2020	Cliff	Moriyama	Cliff Moriyama Consulting	30.007	16. Other	16a. Other		Closing the comment period on the draft Guidance only a few months before the DTSC California-specific attenuation study is complete places the cart before the horse. It would also deprive both the public and decisionmakers the opportunity to consider the implications of the draft Guidance. Given the critical importance of the draft Guidance and its likely effect on housing and affordability and economic recovery, the comment period should be kept open until well after COVID-19 restrictions are lifted. The Shelter-in-Place and other restrictions will have a significant impact on the availability of stakeholders to comment meaningfully. For example, municipalities, which will be among those most impacted by the Guidance, are currently not available to take part in the comment period given staff demands and other constraints.

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224	1. Formal/ Official	30	05/29/2020	Cliff	Moriya ma	Cliff Moriyama Consulting	30.008	16. Other	16a. Other	viii	To promote good government, good science, and to maintain the integrity of the decision making process, the comment period should be closed no earlier than 60 days after DTSC issues the results of its California-specific attenuation factor study so that it may be considered and incorporated as appropriate. In the alternative, it is urged that the long-standing DTSC attenuation factors be adopted as part of the draft Guidance document and that the Guidance document be modified appropriately in response to the forthcoming DTSC study.

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225	1. Formal/ Official	30	05/29/2020	Cliff	Moriyama	Cliff Moriyama Consulting	30.009	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	Background The CalEPA Draft Guidance would, on a state-wide basis, shift the long-standing DTSC attenuation factors (i.e., the amount of volatile organic compounds (VOCs) that may enter an occupied structure from impacted groundwater or soil) from 0.001 for new residential buildings and 0.0005 for new commercial buildings to 0.03 for both—an over thirty times more stringent increase. As noted above, the proposed 0.03 attenuation factor is derived from data not characteristic of California's climate, geology, or housing stock, and it is very likely unduly conservative. DTSC's current attenuation factors help determine whether new construction is required to include a vapor intrusion mitigation system (VIMS), whether existing occupied structures require testing and, potentially, a VIMS retrofit, and whether site remediation is needed. The associated cost of a VIMS and its upkeep (without reference to potential site remediation) can make the difference between housing (or other projects) being constructed or being passed over. This is not a case where public health is being traded-off against cost. Rather, CalEPA is urged to wait a few months to make sure that the decisionmakers and the public have relevant, good science in front of them before making a decision that has far reaching effects. In the alternative, the draft Guidance should adopt DTSC's longstanding attenuation factor and evaluate the findings of the forthcoming study for inclusion when they are available.

226	1. Formal/ Official	30	05/29/2020	Cliff	Moriyama	Cliff Moriyama Consulting	30.010	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	The analytical basis for CalEPA's proposed attenuation factor is deeply troubling. The draft Guidance proposes to rely on a "national generic" attenuation factor developed by the United States Environmental Protection Agency (EPA). The genesis of this attenuation factor is "EPA's Vapor Intrusion Database: Evaluation and Characterization of Attenuation Factors for Chlorinated Volatile Organic Compounds and Residential Buildings." (March 2012) (Database Report or Report). The Database Report, including peer review comments, is attached hereto, and incorporated herein as Exhibit "A". The Database Report is a scientific, carefully caveated, peer-reviewed document. The EPA Database Report transparently calls out its limitations. Among other things, it encourages EPA staff to question whether the Report's conclusions are based on sufficient data so as to make them applicable across all EPA Regions. Because climate, seasonal variation, groundwater depth, age of buildings, construction details, and other factors are highly relevant to vapor intrusion risk (and these factors vary across the county), the Database Report asks staff to consider whether the Report's data is sufficiently representative to be applicable to all areas of the country. Specifically, the Database Report cautions in the "Data Limitations" Section, The number of buildings sampled at individual sites ranges from one to hundreds of buildings. Of the 41 sites in the database, 31 have fewer than 10 sampled buildings, eight sites have between 10 and 50 sampled buildings, and two sites (Redfield [Colorado, EPA Region 8] and Endicott [New York, EPA Region 2]) have more than 200 sampled buildings. As a consequence, a relatively high percentage of the total data pairings come from a small group of sites (see Table 1), which are located primarily in eastern EPA Regions (1 and 2) and western EPA Regions (8 and 9). These differences in site conditions and types and amount of data for each site and the uneven distribution of sites among the Regions should be considered when evaluating the analyses and

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											interpretations presented in this report, because they may impart significant bias. EPA Database Report (emphasis added).
227	1. Formal/ Official	30	05/29/2020	Cliff	Moriyama	Cliff Moriyama Consulting	30.011	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	A subsequent 2015 EPA guidance document, which formally established the national generic attenuation factor includes, a similar caveat. See “OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air” (Technical Guidance) (2015). The Technical Guidance provides: In general, EPA recommends considering whether the assumptions underlying the generic conceptual model are attained at a given site. If they are not attained, then EPA recommends that the medium-specific [Vapor Intrusion Screening Levels] not be relied upon as a line of evidence for identifying sites or buildings unlikely to pose a health concern through the vapor intrusion pathway. Where the assumptions regarding the subsurface attenuation factors do not or may not apply, EPA generally recommends collecting indoor air samples. Technical Guidance, Section 6.5.2.

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228	1. Formal/ Official	30	05/29/2020	Cliff	Moriyama	Cliff Moriyama Consulting	30.012	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	Whether the conclusions of EPA's Database Report have applicability to California (located in EPA Region 9) is consequential because the data included in EPA's Database Report, facially, do not represent California. Here is a synopsis by the numbers: Only about 3% of the data for EPA's subslab attenuation factor were derived from California sources. Nearly half the data were drawn from only two sites: Endicott, New York (28%); and Stratford, Connecticut (20%); Less than 3% of the data for EPA's exterior soil gas attenuation factor were derived from California sources. The majority of data was drawn from only two sites: Endicott, New York (31%) and Grants, New Mexico (24%); Approximately 90% of the buildings analyzed had basements, whereas only 4% of homes built in California, Oregon, and Washington in 2013 were constructed with basements. (NOTE: Basements can be relevant to vapor intrusion because they can be leaky and are typically closer to groundwater contamination than slab-on-grade construction); The average construction date for the housing stock included in EPA's study, where construction dates were identified, was 1938, whereas on average the California housing stock was built in the 1950s. NOTE: Age of construction is relevant to foundation conditions and vapor intrusion pathways (e.g., leaks in foundation caused the presence of cracks) and overall quality of construction. A high percentage of buildings in California have post-tensioned slabs which are resistant to the development of through-going cracks. It appears that few, if any, of the buildings in the EPA study had post-tensioned foundation systems.

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229	1. Formal/ Official	30	05/29/2020	Cliff	Moriyama	Cliff Moriyama Consulting	30.013	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	Based on analysis of large-scale, California datasets conducted by the consulting firm Geosyntec, the source of data matters. Geosyntec's and other studies generally agree with the long-standing DTSC attenuation factors and are not consistent with the attenuation factors derived from the EPA study. The CalEPA draft Guidance takes neither the EPA's caveat nor the recent California-specific study findings to heart. Indeed, the draft Guidance only notes that "[o]nce sufficient data has been compiled, the data will be evaluated to determine if there is sufficient justification to support California-specific [attenuation factors]."

230	1. Formal/ Official	30	05/29/2020	Cliff	Moriyama	Cliff Moriyama Consulting	30.014a	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	The Database Report identifies limitations to its use beyond those associated with a biased dataset, but the draft Guidance does not fully address them. The EPA Database Report calls out other issues with its findings, conclusions, and analysis, beyond its non-nationally representative dataset. These issues also call into question CalEPA's use of the national generic attenuation factors in the CalEPA Guidance. The following, among others, are issues identified in the Database Report: The exterior soil gas attenuation factor derived under the EPA Database Report is internally inconsistent with, and invalidated by, the Report's attenuation factor for subslab soil gas. The attenuation factor for subslab soil gas to indoor air (95% UCL, the value the draft Cal/EPA guidance uses for its attenuation factor) is 10 times lower (0.03) than for exterior soil gas (0.3). This result indicates error. As the Database Report states, "[t]his is contrary to the conceptual model for vapor intrusion, which predicts that the exterior soil gas attenuation factor for a given building is expected to be smaller than the subslab soil gas attenuation factor for that building, because the former includes an additional contribution from attenuation through the vadose zone []. NOTE: In the 2015, non-peer reviewed Technical Guidance, EPA elected to apply the same generic attenuation factor (i.e., 0.03) to both subslab and exterior soil gas, even though the data and analysis from the Database Report did not support this conclusion. Indeed rather than the 95% UCL statistic, the later Technical Guidance report applied the 75% UCL to achieve the 0.03 attenuation factor. Among others, the Commonwealth of Massachusetts, which is more closely represented by the dataset analyzed in the Database Report than California, rejected this approach. The Database Report excludes commercial buildings and other non-residential buildings from analysis because the "database was screened to focus on those attenuation factors calculated… in residential settings…" Note: the subsequent 2015 Technical Guidance nonetheless, applied the same attenuation factor to

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											commercial structures as residential, but it notes, "[t]here are theoretical considerations to support expectations that larger nonresidential buildings that are constructed on thick slabs will have lower attenuation factors than residential buildings [including greater air exchange rates and thicker slabs]." The CalEPA draft Guidance does not take these considerations into account in electing to use the national generic attenuation factors. The Database Report excluded petroleum-related VOCs from analysis because "these data are very limited (comprise less than 3% of the database) and are not discussed further in this document." The peer reviewers also noted "the data analyses are not at all representative or useful for petroleum hydrocarbon (PHCs)." While the Draft CalEPA Guidance document identifies that underground storage tank cases should use the State Water Board's Low Threat Closure Policy, and establishes a step-wise approach for analyzing large-scale and complex petroleum releases (e.g., bulk terminal releases), it does not provide guidance on how typical petroleum constituents (e.g., benzene) in soil gas absent an underground storage tank release should be treated.

231	1. Formal/ Official	30	05/29/2020	Cliff	Moriyama	Cliff Moriyama Consulting	30.014b	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	The Database Report identifies limitations to its use beyond those associated with a biased dataset, but the draft Guidance does not fully address them. The EPA Database Report calls out other issues with its findings, conclusions, and analysis, beyond its non-nationally representative dataset. These issues also call into question CalEPA's use of the national generic attenuation factors in the CalEPA Guidance. The following, among others, are issues identified in the Database Report: The exterior soil gas attenuation factor derived under the EPA Database Report is internally inconsistent with, and invalidated by, the Report's attenuation factor for subslab soil gas. The attenuation factor for subslab soil gas to indoor air (95% UCL, the value the draft Cal/EPA guidance uses for its attenuation factor) is 10 times lower (0.03) than for exterior soil gas (0.3). This result indicates error. As the Database Report states, "[t]his is contrary to the conceptual model for vapor intrusion, which predicts that the exterior soil gas attenuation factor for a given building is expected to be smaller than the subslab soil gas attenuation factor for that building, because the former includes an additional contribution from attenuation through the vadose zone []. NOTE: In the 2015, non-peer reviewed Technical Guidance, EPA elected to apply the same generic attenuation factor (i.e., 0.03) to both subslab and exterior soil gas, even though the data and analysis from the Database Report did not support this conclusion. Indeed rather than the 95% UCL statistic, the later Technical Guidance report applied the 75% UCL to achieve the 0.03 attenuation factor. Among others, the Commonwealth of Massachusetts, which is more closely represented by the dataset analyzed in the Database Report than California, rejected this approach. The Database Report excludes commercial buildings and other non-residential buildings from analysis because the "database was screened to focus on those attenuation factors calculated… in residential settings…" Note: the subsequent 2015 Technical Guidance nonetheless, applied the same attenuation factor to

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											commercial structures as residential, but it notes, "[t]here are theoretical considerations to support expectations that larger nonresidential buildings that are constructed on thick slabs will have lower attenuation factors than residential buildings [including greater air exchange rates and thicker slabs]." The CalEPA draft Guidance does not take these considerations into account in electing to use the national generic attenuation factors. The Database Report excluded petroleum-related VOCs from analysis because "these data are very limited (comprise less than 3% of the database) and are not discussed further in this document." The peer reviewers also noted "the data analyses are not at all representative or useful for petroleum hydrocarbon (PHCs)." While the Draft CalEPA Guidance document identifies that underground storage tank cases should use the State Water Board's Low Threat Closure Policy, and establishes a step-wise approach for analyzing large-scale and complex petroleum releases (e.g., bulk terminal releases), it does not provide guidance on how typical petroleum constituents (e.g., benzene) in soil gas absent an underground storage tank release should be treated.

232	1. Formal/ Official	30	05/29/2020	Cliff	Moriya ma	Cliff Moriyama Consulting	30.015	04. Introduction	04e. D – Vapor Intrusion Attenuati on Factors	vii, 5	Using the wrong attenuation factor would harm housing, economic and community revitalization and the environment and disproportionately impact low-income and people of color communities. Significant and unnecessary damage to housing production, community revitalization, economic recovery and the environment would result from the draft Guidance's use of the national generic attenuation factor, if DTSC's analysis confirms its long-standing attenuation factor. Moreover, these costs will not be borne equally based on the twin realities that: (1) workforce and affordable housing projects tend to have thin or already negative (grant-funded) balance sheets. Housing production in the affordable and workforce categories tends to be more sensitive to building cost increases; and (2) vapor intrusion mitigation system (VIMS) and site remediation are more cost effective in multi-story buildings because remediation and the typical VIMS offer protection from the foundation up (i.e., from a cost standpoint the price of remediation and/or VIMS is averaged over the number of floors it protects). Because the number of floors a building has typically follows land prices, remediation and/or construction of VIMS disproportionately affects communities with lower-priced land/low-rise buildings. Here is an example: The design, permitting, installation, testing, and monitoring of a typical vapor intrusion mitigation system (VIMS) for a slab-on-grade building with a 10,000 square foot (sq. ft) foundation (ground floor) costs in the neighborhood of $1,030,000, as follows: Approximately $6,000 in design costs; Approximately $5,000 in regulatory review and permitting costs; Approximately $14,000 for preparation and regulatory review of the required O&M Plan and other documentation; Approximately $120,000 in installation costs; Approximately $15,000 in construction inspection, testing, and certification costs; Approximately $600,000 ($20,000/year for 30 years) in operation and maintenance (O&M) costs; plus

											$270,000 (or $9,000/year) for financial assurance (e.g., bond, funded trust, letter of credit guaranteeing the O&M work will be implement covering a 30 years period). (i.e., 30 years O&M x 20,000 per year, assuming a letter of credit is available at a cost of 1.5% of the total). In this highly simplified example, a first-tier market (e.g., Palo Alto) A-Grade commercial buildings costs approximately $1,800/sq. ft. Therefore, a typical 40,000 sq. ft building would cost approximately $72,000,000. The VIMS would account for about 1.4% of the costs. In a still strong, but outer ring market, the same building costs approximately $550/sq. ft. Therefore, the cost of the building would be approximately $22,000,000, and the VIMS would account for approximately 4.7% of the building cost. Under either scenario, the cost of housing and construction more generally will increase with the addition of a VIMS. However, the roughly 4.7% impact in the outer ring market attributed to the VIMS could well make the difference between building housing and a leaving a blighted lot vacant. Note: If the outer ring project were developed as a two-floor project, rather than four floor project under the above scenario, costs and cost differentials would be magnified further. Note, too: effects would also be magnified due to the higher rates of return typically required by creditors for projects in outer ring markets (e.g., as a result of risk of potentially lower occupancy rates, lower increased value on sale). Needless to say, if remediation were also required the impact would be even greater. The effects of these market dynamics will also be measured in terms of higher cost for commercial/industrial and community revitalization projects; stagnant tax base; slowed development-led site remediation, decreased rate of housing production (especially of cost- sensitive work force and affordability of housing), and greater hurdles for infill development. While safety and environment health are key, using an unduly conservative attenuation factor would have real effects on real people and the environment.

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											In short, closing the comment period and issuing the draft Guidance before DTSC completes its work would ignore EPA's warning about the applicability of its findings, and exchange basic principles of good science and good government for a "Ready-Fire-Aim" approach to policy. It would also cut short analysis of the negative second round and induced consequences of the draft Guidance, which do not appear to be considered.

233	1. Formal/ Official	30	05/29/2020	Cliff	Moriyama	Cliff Moriyama Consulting	30.016	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	While the draft Guidance is styled as policy, it does not provide meaningful flexibility and is already being treated as a regulatory standard. Even though the draft Guidance is identified as non-binding and provides a potential pathway for an alternative building specific attenuation factor (although no approach is provided), its stated intent is to “promote state-wide standard practice and consistency…” In many cases, like a rule, it achieves this goal by making broad statements that direct action which is currently made by agency staff on a case-by-case basis (e.g., “remediation should be the preferred response action to reduce VI risk” rather than leaving that decision to the statutorily imposed remedy selection process). As a practical matter agency regulators, municipal permit officials and private creditors are likely to use the draft Guidance as a bright line standard. Indeed, some regulators are already referencing the draft Guidance as the basis for regulatory decisions. For example, in a March 25, 2020, letter requiring modifications to a vapor intrusion assessment, staff from a Regional Water Quality Control Board commented: Although it is a draft document, and in the public review and comment period (ending on April 30, 2020), the guidance is relevant when determining a VI investigation approach. The guidance recommends using multiple lines of evidence when conducting VI investigations including: building surveys, soil gas samples, subslab soil gas samples, and indoor air, and outdoor ambient air samples. Please amend the VI pathway workplan to include using multiple lines of evidence and recommendations in the draft VI guidance document. The way the draft Guidance is already being used by some environmental regulators, it is likely that agency staff and others will closely adhere to it and treat it as a rule. Given the draft Guidance’s general state-wide applicability, its stated purpose, and its use of directive language, the question is raised whether the Guidance is an

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											impermissible “underground rule” that is subject to challenge under the California Administrative Procedure Act, or a rule subject to scientific peer review under Health and Safety Code 57004 to ensure that it “is based upon sound scientific knowledge, methods, and practices.” A question is also raised whether its effects should be evaluated under the California Environmental Quality Act (CEQA) and housing law, given its foreseeable effects on housing availability and affordability, disparate impacts on low- income and people of color, and sprawl and attendant impacts ranging from health to greenhouse gas emissions.

234	1. Formal/ Official	30	05/29/2020	Cliff	Moriya ma	Cliff Moriyama Consulting	30.017	16. Other	16a. Other		Conclusion Closing the comment period before DTSC issues its California-specific attenuation factor would short-change members of the public and decisionmakers alike. Just three months after the proposed close of the comment period, the expert environmental agency, DTSC, will bring new and highly pertinent information to the decision-making process. It will address EPA's key question, whether the findings and conclusions of its Database Report are relevant to conditions— in this case-- in California. By answering this question, it will create a proper scientific basis for CalEPA's draft Guidance and the context in which to evaluate environmental, housing availability and affordability, equity, and other effects. This is the wrong time to make a rush to judgement. Closing the comment period and making a decision before the facts are out will likely needlessly slow the production of new housing and increase housing costs at a time of a housing crisis, and burden community revitalization, particularly outside first tier real estate markets, when economic recovery is needed most. If, for no other reason, the comment period should be extended to allow for the engagement of interested parties who may be particularly impacted by the draft Guidance but who are not able to engage in the decision making process due to the multiple burdens placed on them by the COVID-19 pandemic and shelter in place orders. Without additional time in which to provide comments, the crucial views of municipalities with multiple interests (e.g., housing, environmental health, risk management, equity) may be missing. For the reasons stated above, it is urged that either the historical DTSC attenuation factors be adopted within the draft Guidance document and be modified appropriately in response to the forthcoming DTSC study, or hold-open the comment period for the draft Guidance until after the DTSC study is issued.

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235	1. Formal/ Official	31	05/31/2020	Patrick	Vaughan	Stantec Consulting Services Inc.	31.001	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	Issuance of the draft guidance is premature and should only be issued following determination of California-specific attenuation factors based on California climate and typical building construction already underway by DTSC and industry groups. Preemptive use of the EPA generic attenuation factor has already resulted in protracted investigation costs and/or mitigation measures that may ultimately be shown to be unwarranted.
236	1. Formal/ Official	31	05/31/2020	Patrick	Vaughan	Stantec Consulting Services Inc.	31.002	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	Adoption of the generic attenuation factor (0.03) for screening of current or future commercial/industrial use properties is not supported by the EPA residential building database-a very small number of commercial properties were included in the database and there was no discussion of empirical attenuation factors. EPA notes that their 95 percentile attenuation factors for residential buildings is supported by calculation of a theoretical AFBldg as the ratio of Qsoil/QBldg (A central value for Qsoil of 5L/min and a median value for QBldg of 0.45 air changes per hours was used). Accounting only for a difference in air exchange rates and building volumes typical of commercial buildings indicates that the generic attenuation factor should be different between commercial and residential buildings. The Cal-EPA screening levels using the generic screening attenuation factor (0.03) are being interpreted as de facto cleanup levels by more than one agency within the state, especially regarding future buildings. According to EPA, subsurface screening levels are expected to be conservative and are likely to over-estimate the contribution to indoor air from vapor intrusion due to use of the generic high-end attenuation factor (0.03).

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237	1. Formal/ Official	31	05/31/2020	Patric k	Vaugha n	Stantec Consulting Services Inc.	31.003	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3, 29	Use of the fate and transport component of the EPA Johnson & Ettinger model (Version 6.0 or later) using site-specific information should be specifically allowed as a line of evidence supporting or refuting the potential for vapor intrusion at least for future buildings as noted on multiple occasions in the 2015 EPA guidance. The model, owing to considerable uncertainty and debate about appropriate values for Qsoil/Qbuilding, provides outputs as a range based on minimum and maximum values reported in literature to assist with risk management decisions. Use of range estimates also reduces possible reliance on single estimated indoor air concentrations and risk estimates such as assumed using generic attenuation factors, as absolute values. Thus, use of the model does not create any greater uncertainty than application of a generic attenuation factor to be developed buildings.
238	1. Formal/ Official	31	05/31/2020	Patric k	Vaugha n	Stantec Consulting Services Inc.	31.004	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distributi on of Soil Gas Contamin ation	12	Page 12 1st bullet. Please remove statement that standard reporting limits for VFCs in soil are typically greater than estimated levels of concern for some VFCs. This statement is vague and the use of soil concentrations for evaluating potential vapor intrusion is no longer accepted and soil VI screening levels have not been established.
239	1. Formal/ Official	31	05/31/2020	Patric k	Vaugha n	Stantec Consulting Services Inc.	31.005	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05c. Step 1B – Prioritizin g Buildings for VI Evaluatio n	10	Page 10. Proximity to Groundwater Plumes. “Buildings overlying contaminated groundwater with high VFC concentrations…” The basis for “high VFCs is not described.

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240	1. Formal/ Official	31	05/31/2020	Patrick	Vaughan	Stantec Consulting Services Inc.	31.006	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distribution of Soil Gas Contamination	5	According to EPA, a critical assumption when using their VISL (that uses the generic attenuation factor of 0.03) is "site-specific subsurface characteristics will reduce or attenuate soil gas concentrations as vapors migrate upward from the source and into overlying structures". Since a generic attenuation factor is proposed regardless of depth, the draft guidance should include a discussion regarding the inferred absence of attenuation. It is noted that in the May 2020 Q&A webinar regarding the draft guidance, a statement was made regarding this that the Water Board considers that a sample collected at 15-feet bgs provides the best indicator of concentrations immediately below the slab. However attenuation will occur as a result of transport across the building slab. The draft guidance does not include discussion of 50x background as selected in the database for evaluating significance of soil gas concentrations.

241	1. Formal/ Official	32	05/31/2020	Kathryn	Ostapuk	DoD / Department of the Navy	32.001	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07e. Step 3D – Evaluate Temporal Variability	26, x	1) Flexibility: While there is language in the disclaimer and introduction that acknowledges, "this guidance is not intended to provide prescriptive or inflexible requirement" there are very prescriptive requirements in this guidance. A few examples are provided below: Samples must be collected with HVAC on and off. DoD recommends including consideration of alternate approaches such as: a) use of indicators and tracers to better understand air mixing, flow, and exchange (see EPA Vapor Intrusion (VI) Workshops from 2016-2020); b) building pressure control to induce near worst-case VI (Use of Building Pressure Cycling in Vapor Intrusion Assessment, DoD 2017/ https://denix.osd.mil/irp/vaporintrusion/); and c) detailed HVAC evaluation by an engineer to determine appropriate conditions for sampling (Matrix for Selecting Vapor Intrusion Investigation Technologies, DoD 2019 /https://denix.osd.mil/irp/vaporintrusion/). For a single sampling event, at a minimum, 9 samples (across indoor air, outdoor air, and soil gas) are to be collected in small (1,500 sq. ft.) structures. DoD recommends that the number of samples should be based on the site/building-specific conceptual site model (CSM) regardless of the size of the building. It is the DoD's experience that three outdoor air samples are not necessary to understand ambient conditions near a single small structure. In Step 1C of the 4-Step process (refer to Flowchart) prescribes that either exterior soil gas (Step 2) or indoor air sampling (Step 3) is to be selected as an investigation strategy; however, the criteria listed and the flowchart "yes/no" structure provide no flexibility for other options. DoD recommends the guidance provide options, for example to allow for subslab sampling as an initial step to assess vapor concentrations beneath a building for assessing VI potential (in conjunction with screening / evaluation of preferential pathways, when appropriate) or sample indoor air even if Step 1C criteria are not met. This is consistent with Step 6 of the Department of Toxic Substances Control (DTSC) 2011 Guidance which states, "Monitoring subslab soil gas is potentially less costly than monitoring indoor air quality."

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											DoD appreciates the CalEPA goal for consistency but also believes flexibility to select any number of defensible VI technologies warrants greater discussion in the guidance. Recommended change: Incorporate more flexibility in the guidance when choosing defensible VI technologies.
242	1. Formal/ Official	32	05/31/2020	Kathryn	Ostapuk	DoD / Department of the Navy	32.002	01. VI Supplemental Guidance General Comments	01b. Recommendations	9, 11	2) Screening vs. Site-Specific Evaluations: Recommend the guidance define what is meant by screening and address the role of site-specific evaluations when assessing the VI pathway. The guidance uses “screening” in many different ways: examples include: “screening buildings,” “AFs for screening,” “screening risk assessment,” “and “VI screening.” This contributes to confusion, particularly when evaluating the potential for VI into a building vs. estimating VI exposure risk. Screening evaluations rely on conservative / default assumptions, whereas more refined assessments use site-specific inputs. Recommended change: Identify Steps 1 and 2 as screening since they rely on conservative and default assumptions (e.g., DTSC default attenuation factor (AF)) and acknowledge the role of direct comparison of measured concentrations against appropriate screening levels during the initial step in the data evaluation process. Incorporate site-specific assumptions into any step in the VI assessment process.

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243	1. Formal/ Official	32	05/31/2020	Kathryn	Ostapuk	DoD / Department of the Navy	32.003	03. Flowchart (Steps)	03e. Step 4: Decide if Risk Management is Needed to Address Current and Future VI Risk	x	3) Lack of Exit Strategy: There is no real exit strategy in the guidance. At best, a building is considered low priority for current VI based on indoor air data, and an area considered low priority based on soil gas data. Recommend the guidance define what "low priority" means and provide the basis for concluding there is no VI concern as an exit strategy for VI. For example, the guidance identifies "none" as the "potential response action" in Step 4, which can and should be used to justify an exit strategy for no further action (NFA) for the "low priority" buildings or areas. The risk management matrix (Step 4) identifies response actions even when risk estimates, based on maximum concentrations and conservative default criteria, are within acceptable EPA risk thresholds (1x10-6 to 10-4 and HI < 1). EPA acknowledges action is generally not warranted when RME risk is within these acceptable thresholds. DoD acknowledges that conservative assumptions are often used for exit strategies in a screening process, but recommends the guidance also highlight the CERCLA process for using site-specific quantitative risk assessments and risk management criteria for determining response actions and exit strategies. Recommended change: Define what "low priority" means and provide the basis for concluding there is no VI concern as an exit strategy for VI.

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244	1. Formal/ Official	32	05/31/2020	Kathryn	Ostapuk	DoD / Department of the Navy	32.004	02. Executive Summary	02a. General Comments	x	4) Conservatism and Uncertainty: DoD understands the use of conservative assumptions in a screening process to support decisions for no further action. DoD also understands the need to consider the potential for short-term or acute hazards. This guidance highlights the potential for short-term effects of trichloroethylene (TCE), but should acknowledge the uncertainty and on-going debate over the scientific analysis of inhalation exposure and a developmental endpoint for this VOC. DoD also recommends the guidance acknowledge the overall conservatism incorporated into screening evaluations (toxicity value, exposure assumptions, AFs), and in all four steps of the guidance. DoD also recommends acknowledging the TCE developmental endpoint debate while still identifying this endpoint for conservatism in the guidance. DoD also recommends CalEPA encourage incorporating a summary of the latest scientific evidence regarding TCE short-term toxicity in VI assessments. Understanding and documenting the conservatism and uncertainties in a VI assessment facilitates more defensible risk management decisions and is particularly useful when communicating risk to the public. Recommended change: Acknowledge the overall conservatism incorporated into screening evaluations (toxicity value, exposure assumptions, AFs), and in all four steps of the guidance.

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245	1. Formal/ Official	32	05/31/2020	Kathryn	Ostapuk	DoD / Department of the Navy	32.005	04. Introduction	04d. C – Conceptual Model for Vapor Intrusion	3	5) Preferential Pathways: DoD recognizes the potential influence of preferential pathways / vapor conduits on VI occurrence. DoD is also aware the science of vapor migration via conduits is still evolving. Utilities are connected to nearly all buildings, yet VI from contaminant releases only occurs in a small percentage of all the buildings evaluated; consequently, without an understanding of the significance of preferential pathways, every building with a utility would require indoor air sampling and/or conduit sampling. DoD recommends the guidance clarify the criteria needed to determine “intersecting significant contamination” in Step 1C and also acknowledge the uncertainty and complexity when assessing VI via preferential pathways. The guidance acknowledges research sponsored by DoD, but fails to mention the research developed and validated a conceptual model for preferential pathway VI that includes a process for identification of higher risk and lower risk preferential pathway VI sites: https://www.serdp-estcp.org/Program-Areas/Environmental-Restoration/Contaminated-Groundwater/Emerging-Issues/ER-201505/ER-201505 Recommended change: Clarify the criteria needed to determine “intersecting significant contamination” in Step 1C and acknowledge the uncertainty and complexity when assessing VI via preferential pathways.

246	1. Formal/ Official	32	05/31/2020	Kathryn	Ostapuk	DoD / Department of the Navy	32.006	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	5	6) EPA Vapor Intrusion Attenuation Factors are Highly Conservative The EPA Vapor Intrusion Attenuation Factors are generated from empirical data representing 900 buildings and 40 sites in the US (reference 1 below). However, closer inspection of the data shows that there are limited data from California Sites(Ettinger et all, 2018). Most of the EPA data were collected in colder climates (i.e., New York, Colorado, Connecticut, Montana, etc.) and focused on residential buildings (85%) and most of these dwellings had basements. In 2018, Ettinger et al. presented their findings of an empirical analysis for vapor intrusion attenuation factors focused on California sites. The findings from the paper and presentation show that they were able to evaluate paired indoor air to sub-slab and/or soil vapor results from over 400 buildings from 31 sites. The majority of the sites evaluated were commercial buildings (26 sites) versus residential buildings (9 sites) and focused on slab-on-grade and crawl space structures. The study concludes that empirical values for attenuations factors were one to two orders of magnitude lower than the EPA screening value of 0.03. For example, the median value was 0.00012, while the 95th percentile was 0.0019. These results and others introduced below can assist responsible parties to introduce screening values that are “protective of human health and the environment while focusing resources to” address buildings that are most likely to have complete vapor intrusion pathways. In addition to this study, McAlary et al. conducted a detailed Environmental Security Technology Certification Program (ESTCP) study at four locations, including Building 11193 at Vandenberg AFB (reference 2 below). While the objective of this research was to “demonstrate and validate a more technically advanced process for design, optimization and performance of sub-slab venting systems,” the research included a robust dataset to support other technical questions. These data included conducting indoor to sub-slab tracer testing, indoor air sampling, differential pressure monitoring, mass flux monitoring, and calculating a building-specific attenuation factor. Results of this data is in Section 8.3.8 and showed that the “EPA default attenuation factor of 0.03 is about 100-fold greater (overly protective) than the building-specific (empirical and calculated from pneumatic testing) attenuation factors from Building 11193.” This is

											especially significant since this building was a former dry-cleaning facility built in the early 1960's with exposed drains to the sewer and vacuum evidence of leakages across expansion joints and other cracks in the concrete. This building also represents a worst-case scenario for Vandenberg, as the northeast portion of the building is directly over a soil and groundwater plume for perchloroethylene (PCE), TCE, and cis-1,2-dichloroethylene (cis-DCE). Sub-slab TCE concentrations were as high as 41,400 µg/m3 with the highest indoor air value of 3.9 µg/m3. If the EPA attenuation factor of 0.03 were applied to this sub-slab result, the predicted indoor air concentration would be 1,242 µg/m3; yet the site-specific result of 3.9 µg/m3 is below the "Accelerated Response Action Level" of 8 µg/m3 for a commercial/industrial building (reference 6 below). Finally, in order to ground truth the implications of using the generic attenuation factor of 0.03, DoD compiled raw data of sub-slab results with corresponding indoor air sampling results from seven buildings (reference 7 below). These are all industrial buildings in the Cantonment area with overly high concentration solvent plumes. The soils in this portion of the base are generally fine-grained; consisting of silty sands with interbedded silty clay layers and depth to water is shallow generally ranging from 10 to 20 feet below grade. The cursory results are as follows: • Maximum attenuation factor – 0.0037 • Minimum attenuation factor – 0.000014 • Mean attenuation factor – 0.00072 These results are consistent with the results that McAlary et al. 2018 came up for Vandenberg AFB Building 11193 and within similar orders of magnitude published by Ettinger et al. in 2018 (references 2 and 1 below). Published data and findings specific to California vapor intrusion show that actual attenuation is greater than the EPA empirical attenuation factor. Recommended change: Allow for the use of site-specific attenuation

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											factors to screen, and provide a decision point in the flow chart to distinguish high-priority buildings from low priority.
247	1. Formal/ Official	32	05/31/2020	Kathr yn	Ostapu k	DoD / Department of the Navy	32.007	04. Introduction	04e. D – Vapor Intrusion Attenuati on Factors	vii, 5	7) Missing the OSWERs Semi-Site-Specific Groundwater Attenuation Factor of 0.0005. One of the stated objectives in the guidance is to use default attenuation factors generated by the EPA (reference 5 below). However, the EPA guidance recognized that “smaller attenuation factors, which would indicate greater reducing in vapor concentration would be expected in vadose zones with finer-grained soils,” so they stated that a “semi-site-specific attenuation factor of 0.0005 may be used at sites where laterally extensive fine-grained sediment has been demonstrated through site-specific sampling to underlay buildings being investigate for vapor intrusion.” Recommended change: Add the semi-site-specific attenuation factor of 0.0005 to the appropriate tables and text of the guidance.

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248	1. Formal/ Official	32	05/31/2020	Kathryn	Ostapuk	DoD / Department of the Navy	32.008	13. Attachment 4 – Guidance on Uploading Vapor Intrusion Information into GeoTracker	13a. General Comments	Attachment 4	8) Develop a method for responsible parties to add historical data into the California VI Database. Vandenberg AFB has indoor air, sub-slab and shallow soil gas data collected from 2007 to 2012 that are not in the California VI database. The reports associated with the Vandenberg AFB historical data are in GeoTracker; the older shallow soil gas, sub-slab, and indoor air results are not found within the California VI Database. This data was collected by contractors that no longer work for the Base and there isn't a means for the Base to track down the labs to directly upload the data. Is there consideration on how to get this validated data into the system? Especially, as discussed above, there is viable data to assist the State with developing a site-specific attenuation factor using empirical data. Recommended change: Obtain historical empirical data from all laboratories that may have obtained legacy vapor intrusion studies.

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249	1. Formal/ Official	32	05/31/2020	Kathryn	Ostapuk	DoD / Department of the Navy	32.009	03. Flowchart (Steps)	03a. General Comments	ix-x	9) Flowchart and guidance should include exit steps that allow for multiple lines of evidence to be used to apply a site-specific attenuation factor and/or to present an exit-strategy to show that lower priority buildings do not need robust sampling. Throughout the variations of guidance for vapor intrusion sampling, ranging from the EPA, DTSC, San Francisco Regional Water Quality Control Board (SFRWQCB), etc. (references 5, 3, and 4 below respectively), a means of using multiple lines of evidence to support a technically based variation of a case has been used. Yet this guidance document is written in a prescriptive manner and uses evaluation of multiple lines of evidence to “reduce the considerable uncertainty associated with individual lines of evidence due to the spatial and temporal variability of VFCs in groundwater, soil and indoor air” but not as a means to support a proponent using site-specific empirical data to support a site-specific attenuation factor. Recommended change: Allow for the use of multiple lines of evidence to select a site-specific empirical attenuation factor, to show that sampling lower priority buildings may not be warranted.

250	1. Formal/ Official	32	05/31/2020	Kathryn	Ostapuk	DoD / Department of the Navy	32.010	03. Flowchart (Steps)	03b. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	x	1B Prioritize Buildings: DoD understands the importance in Step 1B to prioritize buildings based on proximity to contamination, transport via conduits, and occupancy/receptor. Recommend the guidance define or clarify what is meant by "most contaminated area" and "release locations." There is no reference to a vapor intrusion screening level (VISL) for soil gas or groundwater; therefore, it is unclear how to define the most contaminated area. For example, apply a factor (e.g. 100-times, 1,000-times) to the VISL to define the "most contaminated area" or "release location?" Note that Department of Navy (DON) has demonstrated that default VISLs based on an AF of 0.03 (e.g., EPA and SFRWQCB values) are not appropriate and are overly conservative for industrial buildings (Venable et al., 2015 https://clu-in.org/download/issues/vi/TR-NAVFAC-EXWC-EV-1603.pdf). DON has also demonstrated that the lateral inclusion distance of 100 ft (Step 1B of the flowchart) from the source of the release is overly conservative for most non-residential buildings and developed a quantitative decision framework for prioritizing buildings and assessing VI potential which considers additional relevant factors (e.g. building characteristics). In Step 1B, answering "no" to the first question is likely to be interpreted as a requirement that soil gas data be collected. DoD recommends this be clarified since "vadose zone or groundwater" data are used to identify buildings. Furthermore, there is no exit strategy associated with Step 1B when there are no "buildings within 100 ft. of the most contaminated area." DoD's concern is that the prescriptive nature of the flowchart/4-Step process would preclude use of the DoD quantitative decision framework and recommends incorporating more flexibility in the guidance. The prescriptive nature of Step 1B implies groundwater data cannot be used to exclude buildings/areas from further VI consideration. Recommended change: Incorporate more flexibility in the guidance and allow use of the DoD quantitative decision framework.

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251	1. Formal/ Official	32	05/31/2020	Kathryn	Ostapuk	DoD / Department of the Navy	32.011	03. Flowchart (Steps)	03c. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	ix	Step 2 Evaluate VI using Soil Gas Data: The introduction on page v notes that the document" …does not provide guidance on the sampling required for all media (soil, vapor, and groundwater) to determine the nature and extent of contamination." However, Step 2 provides prescriptive guidance on sampling to "evaluate the spatial distribution of soil gas" which is the definition of nature and extent. For sites with impacted groundwater, it is unclear when soil gas data (Step 2) would not lead directly to indoor air sampling (Step 3), particularly when: 1) risk estimates are based on the maximum concentration "just above the subsurface source;" and 2) when using conservative screening criteria based on a default AF. Even when a groundwater source is remediated to MCLs, soil gas at the capillary fringe typically remains at levels greater than conservative soil gas to indoor air screening criteria. The science of VI does not support concluding a complete VI pathway when groundwater is at or below MCLs. Step 2C requires risk to be calculated using soil gas data and makes no reference to screening criteria. DoD recommends CalEPA continue to allow the use of screening criteria in Steps 1 through 3 of this guidance. This is consistent with DTSC 2011 guidance that references Senate Bill 32 and the corresponding California Human Health Screening Levels (CHHSLs), along with use of the SFRWQCB environmental screening levels (ESLs). DTSC 2011 guidance (Step 5) allows use of screening criteria when "performing a preliminary screening evaluation for vapor intrusion". Recommended change: Continue to allow the use of screening criteria in Steps 1 through 3.

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252	1. Formal/ Official	32	05/31/2020	Kathryn	Ostapuk	DoD / Department of the Navy	32.012	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07a. General Comments	x	Step 3 Evaluate VI Using Concurrent Indoor Air, Subslab, and Outdoor Air: Step 3A: DoD requests the guidance incorporate “when feasible” in the recommendation to locate and remove indoor sources of vapor-forming chemicals (VFCs), and to acknowledge that even when indoor sources of VFCs are found and removed, this does not mean indoor air detections are not related to unidentified background sources. Step 3B: DoD recommends a footnote to acknowledge flexibility per a site-specific CSM in this prescriptive step. DoD recommends including weather parameters (e.g., temperature, barometric pressure, precipitation) as complementary lines of evidence. Step 3C: DoD recommends a footnote to acknowledge conservatism in this step which assesses risk using conservative defaults, and to allow site-specific inputs/exposure assumptions. DoD has demonstrated when assessing risk that a default AF of 0.03 is not representative of the attenuation of subsurface vapors into commercial/industrial buildings (Venable et al., 2015 https://clu-in.org/download/issues/vi/TR-NAVFAC-EXWC-EV-1603.pdf). Step 4: As noted in general comments, the risk management decision of “low priority” should be replaced with “NFA.” Recommended change: 1) Incorporate “when feasible” in the recommendation to locate and remove indoor sources of VFCs. 2) Acknowledge flexibility per a site-specific CSM in Step 3B. 3) Allow site-specific inputs/exposure assumptions in Step 3C. 4) Replace “low priority” with “NFA.”

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253	1. Formal/ Official	32	05/31/2020	Kathryn	Ostapuk	DoD / Department of the Navy	32.013	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	Footnote 2 acknowledges this guidance provides the framework for revision of DTSC 2011 VI Guidance. DON notes that recent DTSC comments on a Navy site in California interpret DTSC 2011 guidance to conclude that an indoor air result is VI-related unless the sub-slab concentration is equal to or less than the measured indoor air concentration, and that if chemicals are detected in both soil gas and indoor air it is the result of VI of those chemicals. DON considers this a misinterpretation and not supported by VI science or empirically-based experience that shows indoor air concentrations within, for example, 3-times ambient concentrations are not due to VI, even when the indoor air concentration is equal to or greater than the sub-slab concentration. This misinterpretation also does not account for background indoor sources, which can be detected in the subslab since air flow is in and out of the building. Recommended change: More clearly define how background (indoor and outdoor) is accounted for when determining the source(s) of indoor detections.

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254	1. Formal/ Official	32	05/31/2020	Kathr yn	Ostapu k	DoD / Department of the Navy	32.014	04. Introduction	04e. D – Vapor Intrusion Attenuati on Factors	vii, 5	Empirical AFs vs. Screening AFs: Within the regulated community there is some confusion regarding the difference between empirical attenuation factors (Empirical AFs) and Screening AFs. It would be helpful to provide definitions: Empirical AF: The ratio between the measured indoor air concentration (CIA) and the measured soil gas concentration (CSS) for paired measurement locations. Screening AF: A conservative (i.e., reasonable upper-bound) attenuation factor selected to be protective of public health under most building occupancy scenarios. Screening AFs are identified by DTSC, USEPA, and other regulatory agencies based on datasets of empirical AFs and other considerations. Recommended change: 1) Revise Section D to distinguish between empirical AFs and screening AFs. 2) Change the title of Table 1 to "Medium-Specific Screening Attenuation Factors."
255	1. Formal/ Official	32	05/31/2020	Kathr yn	Ostapu k	DoD / Department of the Navy	32.015	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05c. Step 1B – Prioritizin g Buildings for VI Evaluatio n	5	The screening AF values in Table 1 are based on empirical studies mostly looking at attenuation into single family-type residential buildings. DON has documented, based on empirical data, representative AFs for commercial/industrial buildings (Venable et al., 2015 https://clu-in.org/download/issues/vi/TR-NAVFAC-EXWC-EV-1603.pdf). DoD recommends including in the guidance the ability to assess VI potential using representative AFs. Recommended change: Allow flexibility for applying representative AFs for evaluation and acknowledge the use of models (refer to EPA 2015 guidance) and allow flexibility for applying representative AFs.

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256	1. Formal/ Official	32	05/31/2020	Kathryn	Ostapuk	DoD / Department of the Navy	32.016	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05c. Step 1B – Prioritizing Buildings for VI Evaluation	10	The guidance notes "The presence of clean groundwater overlying a VFC plume can significantly reduce the potential for VI". A clean water lens not only reduces the potential but has been shown to completely prevent VI. DoD recommends the guidance allow the flexibility to use evidence of a clean water lens to demonstrate an incomplete VI pathway to support an NFA exit strategy. Recommended change: Allow the flexibility to use evidence of a clean water lens to demonstrate an incomplete VI pathway to support an NFA exit strategy.
257	1. Formal/ Official	32	05/31/2020	Kathryn	Ostapuk	DoD / Department of the Navy	32.017	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06c. Step 2B – Estimate Human Health Risk from Vapor Intrusion	15-17	Recommended change: Refer to the recommendation in general comment #2. DoD recommends the text describing Step 2B (pages 15-17) incorporate direct comparison to VISLs as well as incorporating site-specific assumption into VISLs or risk estimates.

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258	1. Formal/ Official	32	05/31/2020	Kathryn	Ostapuk	DoD / Department of the Navy	32.018	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07b. Step 3A – Conduct in Depth Building Survey	18-19	Field Screening for VFCs: Step 3A lists four elements of an in-depth building survey to be conducted prior to indoor air sampling: i) identify building type, ii) locate and remove indoor sources, iii) field screen for VFCs, and iv) observe potential outdoor sources. The guidance implies that field screening is a required element comparable to the other three elements. Field screening (using a sufficiently sensitive field instrument) for indoor VFCs and vapor entry points can be a valuable tool for vapor intrusion investigation. However, this investigation tool is not appropriate for all vapor intrusion investigations due to the cost and expertise required. Recommended change: Clarify that field screening for VFCs is an optional tool most appropriate for buildings where i) indoor sources may be present but would be difficult to identify and/or remove or ii) identification of specific vapor entry points is important for refinement of the VI conceptual model.

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259	1. Formal/ Official	32	05/31/2020	Kathryn	Ostapuk	DoD / Department of the Navy	32.019	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	22	Duration and Timing of Outdoor Air Samples: The guidance that outdoor air sampling should start at least 1 hr before indoor air sampling and continue to at least 30 min before indoor sampling ends is overly complex. VOC concentrations in outdoor air typically do not vary greatly over time. The effort to time shift the outdoor air sample will do little to improve the comparability of indoor and outdoor test results. Many of the cases where outdoor air test results appear to be inconsistent with indoor air test results (for example TCE is detected in outdoor air but not indoor air) are likely an artifact of canister contamination or other sample/analysis issues (see McHugh et al., 2018). These issues are not mitigated by complex outdoor air sampling procedures. Recommended change: Recommend that outdoor air samples be collected over approximately the same time period as indoor air samples.

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260	1. Formal/ Official	32	05/31/2020	Kathryn	Ostapuk	DoD / Department of the Navy	32.020	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	22	Number of Outdoor Air Samples: One outdoor sample per building per day (or fewer when sampling multiple near-by buildings and/or over multiple days) is typically sufficient to characterize outdoor air quality. Collection of additional outdoor air samples provides little value. The target building is rarely a significant source of volatile organic compounds (VOCs) to outdoor air, so collection of multiple outdoor air samples to characterize upwind vs. downwind is not warranted. In the rare case where VOCs from the building could impact downwind outdoor concentrations, the VOC concentration inside the building will far exceed even the downwind outdoor concentration. Recommended change: Recommend collection of one outdoor sample per building per day (or fewer when sampling multiple near-by buildings and/or over multiple days). When specific outdoor sources are identified, additional targeted outdoor air samples may be warranted.

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261	1. Formal/ Official	32	05/31/2020	Kathryn	Ostapuk	DoD / Department of the Navy	32.021	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	22, 25	Building Pressure Differential Measurements: DoD agrees that measurement of building differential pressure is a complementary line of evidence to better understand the susceptibility of a building to soil gas entry during indoor air sampling. However, the guidance only discusses the measurement of cross-foundation building pressure. This can be problematic because cross-slab pressure differentials are sensitive to the condition of the slab at the chosen measurement location which can be highly variable in a given building. In contrast, cross-building envelope (i.e., indoor-outdoor) pressure differential measurements are often simpler to collect, and often better reflect averaging in the building zone being measured (which is consistent with the indoor air sampling process itself). Results of indoor-outdoor pressure differential measurements are consistent with those from cross-slab measurements (McHugh et al., 2012). Recommended change: Revise the bullet heading to “Building Pressure Differential Measurements” and add cross-building envelope measurements as an option.

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262	1. Formal/ Official	32	05/31/2020	Kathryn	Ostapuk	DoD / Department of the Navy	32.022	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	23	Vapor Conduit Air Sampling: Sampling inside sewers and other vapor conduits concurrently with indoor air and subslab sampling is recommended as a complementary line of evidence. Recommended change: To be more consistent with other sections of the guidance, add the underlined text: "Sampling inside sewers…is recommended under certain conditions to determine if such preferential pathways are enhancing VI (see Step 1B.2…".

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263	1. Formal/ Official	32	05/31/2020	Kathryn	Ostapuk	DoD / Department of the Navy	32.023	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07d. Step 3C – Assess Risk from Contaminated Indoor Air and Subslab Soil Gas	24	Recommended change: Refer to the recommendation in general comment #2. DoD recommends the text describing Step 3C.2 (page 24) incorporate direct comparison to VISLs, as well as incorporating site-specific assumption into VISLs, risk estimates, and risk-based decision making.

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264	1. Formal/ Official	32	05/31/2020	Kathryn	Ostapuk	DoD / Department of the Navy	32.024	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07e. Step 3D – Evaluate Temporal Variability	26	Sampling with HVAC on and HVAC off: DoD agrees that understanding the potential impact of HVAC operation on vapor intrusion is important for many buildings. However, two full sampling periods (HVAC on and HVAC off) over a single sample event is likely not necessary for many buildings: In many buildings (e.g., modern office buildings), the HVAC is almost always operating at times when the building is occupied. For buildings where the HVAC is usually operating, sampling under typical HVAC operation should be sufficient. Some buildings cannot be occupied when the HVAC is off. Turning off the HVAC for three full days (36 hours prior to sampling plus sampling) might not be feasible. In areas with significant winter heating seasons (e.g., inland and northern parts of the state), the winter heating season is likely the higher risk season due to the stack effect. In these areas, two sample events (winter and summer) with typical HVAC operation for each season is likely sufficient to characterize full range of vapor intrusion. For the remaining cases, the effect of HVAC operation on building differential pressure can be easily and quickly evaluated by cycling the HVAC on and off while measuring building differential pressure. When HVAC operation has a clear impact on building differential pressure, these results can be used to identify the higher risk operating condition (e.g., the operating condition that results in negative building pressure). Recommended change: Separate the discussion of HVAC system from the discussion of sampling across seasons (i.e., create a new section specifically focused on evaluating the effect of HVAC on vapor intrusion). Provide a range of options for evaluating the effect of the HVAC system. Require separate HVAC on and HVAC off sampling periods only when simpler evaluations are not definitive.

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265	1. Formal/ Official	33	06/01/2020	Kirby	Tyndall	Golder Associates	33.001	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	Vapor Intrusion Attenuation Factors – The EPA attenuation factors, which serve as the basis for the proposed AFs, are derived from nation-wide data that is over five years old. A comprehensive and current evaluation should be conducted to derive a more up-to-date value and/or one that is specific to geographic areas of CA given the importance this value plays in estimating VI impacts. McHugh et al., have more recent research on this topic and should be considered. Additionally, it should be defined as to what “sufficient” data means or when “sufficient” is achieved in context with determining a CA-specific AF.
266	1. Formal/ Official	33	06/01/2020	Kirby	Tyndall	Golder Associates	33.002	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06c. Step 2B – Estimate Human Health Risk from Vapor Intrusion	15, 24	Why is the maximum soil gas concentration used to determine risk/action if you have enough data and site knowledge to estimate an average or other statistic? The maximum concentration is typically a gross overestimate of the plume and what results directly below a slab and in indoor air due to fate and transport properties. Additionally, the maximum soil gas concentration with a conservative AF is inconsistent with empirical data we have observed at sites.
267	1. Formal/ Official	33	06/01/2020	Kirby	Tyndall	Golder Associates	33.003	04. Introduction	04b. A – Scope and Applicability		We have a very real concern that the level of effort involved to collect enough data as described in the guidance document coupled with the conservatism of the data evaluation and risk management will result in tremendous expense and time for very little benefit to protect the “future” receptor (ie., remediate the source area) when mitigations strategies including the use of engineering and/or institutional controls can provide adequate protection of the vapor intrusion pathway.

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268	1. Formal/ Official	33	06/01/2020	Kirby	Tyndall	Golder Associates	33.004	08. Step 4: Concurrent and Future Risk Evaluation and Management Decisions	08d. Step 4C – Managing Future Vapor Intrusion Risk	29-30	In the discussion related to the proximity of a soil gas plume to a building, if there are no buildings, which suggests the VI risk is low, can soil gas characterization be deferred until a building is planned and/or has been constructed? New construction design and materials can make a significant difference on VI potential so it seems unreasonable to try to manage risks with a series of conservative assumptions.
269	1. Formal/ Official	33	06/01/2020	Kirby	Tyndall	Golder Associates	33.005	03. Flowchart (Steps)	03a. General Comments	ix-x	There are a couple of instances that the flowchart makes no sense or is unclear. For example, it seems like the answer is "No" from Step 1B and 1C yet the flow chart instructs the user to proceed to Step 2. Please clarify.
270	1. Formal/ Official	33	06/01/2020	Kirby	Tyndall	Golder Associates	33.006	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distribution of Soil Gas Contamination	13	Section 2A.3. "If there is no building present, deeper soil gas samples may best represent anticipated conditions immediately below a future building, and are typically more appropriate for risk assessment than shallow samples." Please provide data or a reference to support this statement as it seems that the shallower soil gas sample (from a depth of 5 ft bgs), which would currently be impacted by the deeper soil gas, is more representative of the vapors that would be available for further migration into a future building. Collecting deeper samples would be less representative than shallow samples as the data collected from deeper samples will not reflect the attenuation that occurs as vapors move through the vadose zone towards the receptor.
271	1. Formal/ Official	33	06/01/2020	Kirby	Tyndall	Golder Associates	33.007	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06d. Step 2C – Evaluate Temporal Variability	17	Section 2C indicates that even if your cumulative soil gas evaluation is below the risk goals, you are still required to re-sample during a different season. If you can show that you sampled during conditions that would be representative of a "theoretical maximum or worst-case", are you still required to re-sample?

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272	1. Formal/ Official	33	06/01/2020	Kirby	Tyndall	Golder Associates	33.008	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distribution of Soil Gas Contamination	12	Section 2A.2. Please provide additional information related to the significance of characterizing a soil gas plume. Characterizing source material, soil and groundwater make sense from a remediation standpoint, but fully delineating a soil gas plume, especially deeper soil zones, provides no relevant data to manage and reduce risks.
273	1. Formal/ Official	33	06/01/2020	Kirby	Tyndall	Golder Associates	33.009	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07d. Step 3C – Assess Risk from Contaminated Indoor Air and Subslab Soil Gas	24	3C.3. Why would future indoor air concentrations be any different than what is currently measured, especially “Even when indoor air concentrations are low”? Is there any evidence to suggest that concentrations increase? Why collect site-specific (empirical) indoor air data if you always have to default to an estimated concentration using the maximum soil gas concentrations and the default AF?

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274	1. Formal/ Official	33	06/01/2020	Kirby	Tyndall	Golder Associates	33.010	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	The implications for this guidance document and the level of effort required to assess the VI pathway seem quite large. Has CalEPA, DTSC, and Cal Water Boards done any beta testing of the program on a variety of sites? We are concerned that most sites with even very low levels of volatile hydrocarbons in soil or groundwater will be subjected to a very onerous evaluation, mitigation, and long-term management under this guidance given the few “exit ramps” that other guidance such as EPA (2015) provide.
275	1. Formal/ Official	34	06/01/2020	Gina	Plantz	Haley & Aldrich, Inc.	34.001	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	The public comment period should be extended. CalEPA extended the comment period to 1 June 2020 due to the COVID-19 crisis. However, in light of the fact that COVID-19 has impeded the typical public meeting forum from being able to occur for the Draft Guidance, and that many stakeholders have been devoting most resources to address the public health concerns and business operations, CalEPA should extend the comment period further. Additionally, we understand that the Department of Toxic Substances Control (DTSC) is currently compiling a VI attenuation factor (AF) database which includes data collected from sites in California. This AF database should be incorporated into the final Guidance document.

276	1. Formal/ Official	34	06/01/2020	Gina	Plantz	Haley & Aldrich, Inc.	34.002	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	The Draft Guidance recommends the use of the USEPA 2015 VI Guidance AFs. The CalEPA VI Workgroup has received concerns from numerous stakeholders regarding this approach, and have offered other alternatives for screening AFs. The USEPA 2015 AFs are taken from the USEPA 2012 VI database. There have been numerous publications and presentations regarding limitations and considerations that should be evaluated prior to using the USEPA 2012 database (USEPA, 2012; Brewer, 2014; Plantz et al. 2018, 2019, 2020). The limitations and considerations include: Majority of data from a small number of sites, and limited data from California sites; 85% of measurements from residential buildings - majority with basements; Petroleum hydrocarbons only comprise 3% of data and the USEPA 2012 database and AFs were as published specifically for chlorinated hydrocarbons; Indoor air sources and preferential pathways not documented; Outdoor ambient air data not evaluated; No distance criteria to define “proximal” for exterior soil vapor; and An indoor air background or source strength screen was applied. The Supplemental Guidance does not discuss the importance of any of these critical factors and applies the 95th percentile AF for screening of all existing buildings. The USEPA notes that a high percentage of the paired data come from a small number of sites and states: “These differences in site conditions and types and amount of data for each site and the uneven distribution of sites among the Regions should be considered when evaluating the analyses and interpretations presented in this report, because they may impart significant bias.” In 2018, Haley & Aldrich teamed with Geosyntec, Ramboll and ERM to share California-specific AFs from 31 sites. This empirical data has been presented several times and shared with CalEPA. The 95th percentile sub-slab to indoor air AF from this database is 0.0026 (Ettinger et. al. 2018). It is our understanding that DTSC is currently compiling a VI AF database which includes data collected exclusively from sites in California. The CalEPA VI Workgroup should wait until

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											this study is complete and review the findings before finalizing the Supplemental VI Guidance.
277	1. Formal/ Official	34	06/01/2020	Gina	Plantz	Haley & Aldrich, Inc.	34.003	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	The use of the USEPA 2015 95th percentile AF will screen out very few sites and consequently the Draft Guidance will result in investigations for sites with little or no risk. We agree with CalEPA VI Workgroup members' statements that the guidance should be based on the best available science. However, the Draft Guidance is not using the best available science to recommend AFs. The USEPA 2015 95th percentile AFs were developed from predominantly out-of-state data collected between 1990- 2005. The science and understanding of VI has improved greatly since 2005, and data collection and evaluation methods reflect that. There is better quality data available now that should be relied upon. Also, it does not appear that the Draft Guidance is meeting its objective to promote consistency at State-lead sites. We have experienced inconsistencies in the interpretation of the Draft Guidance among different CalEPA offices. DTSC announced at the December 2019 National Brownfields Conference that it will recommend AFs of 0.01 for new residential buildings and 0.0005 for new commercial buildings. DTSC's values recognize that new buildings have much lower VI potential, but they clearly conflict with a 0.03 AF.

278	1. Formal/ Official	34	06/01/2020	Gina	Plantz	Haley & Aldrich, Inc.	34.004	03. Flowchart (Steps)	03a. General Comments	ix-x	1B – define “most contaminated area”. 1B- this Draft Guidance is applicable for screening current buildings. The “potential future building on open lot” should be deleted. 1C: having a building near a contaminated groundwater plume is not a reason to go straight to indoor air (IA) sampling. Clearly define what is significant contamination in shallow groundwater that would trigger the need for IA sampling. 2B. When data is collected from multiple depths and the data supports attenuation from the source area, you should not automatically have to collect IA if a deep sample exceeds the screening level. There is a blanket agreement within this document regarding capping effects, which was based upon modeling studies – and are not applicable to all sites. This needs to be acknowledged and corrected. 2C If soil vapor using 0.03 AF is <1E-6, then it should be “No Further Action”. Not low priority. There needs to be an off-ramp from this Draft Guidance. 3A – Removing all possible indoor air sources is not practical or necessary. 3B – 3+ ambient air samples per building is not generally warranted. One to two upwind is generally sufficient. 3C – Applying 0.03 to estimate future AF should not be automatically warranted if you are collecting the empirical data to calculate building specific AF. 3D – HVAC on/off scenario may not be warranted. Understanding the pressure differential during the time of sampling is valuable information and could guide the decision on HVAC conditions during sampling

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279	1. Formal/ Official	34	06/01/2020	Gina	Plantz	Haley & Aldrich, Inc.	34.005	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05a. General Comments	2	Step 1B.1. states "buildings within 100 feet of the release area should be prioritized for the VI evaluation". The release area is defined as "the area of estimated vadose zone soil contamination extending out from a source." A clearer definition of how to determine the release area should be provided.
280	1. Formal/ Official	34	06/01/2020	Gina	Plantz	Haley & Aldrich, Inc.	34.006	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05c. Step 1B – Prioritizing Buildings for VI Evaluation	10	Step 1.B2. The discussion regarding potential preferential pathways through sewers should acknowledge that the plumbing inside the building needs to be compromised for this to be a potential complete pathway.
281	1. Formal/ Official	34	06/01/2020	Gina	Plantz	Haley & Aldrich, Inc.	34.007	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05d. Step 1C – Selecting Sampling Approach: Soil Gas Screening or Indoor Air	10	Step 1C – Select Sampling Approach: Soil Gas Screening or Indoor Air. This section states "Buildings near a significantly contaminated groundwater plume – Collecting soil gas concentration data before sampling indoor air (Step 3) would unduly delay direct evaluation of risk to occupants." Significantly contaminated should be defined. Also, site and building characteristics should support whether a logical step-wise approach should be followed. Just because you have a building near a groundwater plume does not equate to a potentially significant VI risk and going directly to indoor air being warranted.

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282	1. Formal/ Official	34	06/01/2020	Gina	Plantz	Haley & Aldrich, Inc.	34.008	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distributi on of Soil Gas Contamin ation	12	2A.2 – Sampling to Characterize the Overall Soil Gas Plume. This section states "The sample depths generally should be no shallower than five feet below ground surface (bgs) to reduce the likelihood of ambient air breakthrough (CalEPA, 2015)." If appropriate quality assurance measures are implemented, soil vapor samples can successfully be collected shallower than 5 feet below ground surface.

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283	1. Formal/ Official	35	05/31/2020	Ivy	Inouye	RMD Environmental Solutions, Inc.	35.001	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	21	3B.4 - Indoor Air and Subslab Soil Gas: Location and Number of Samples The DTSC Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (Vapor Intrusion Guidance), dated October 2011, states that DTSC recommends collection of at least one duplicate indoor air sample per laboratory per field day. The Draft Supplemental Guidance: Screening and Evaluating Vapor Intrusion (Supplemental Guidance), dated February 2020, does not mention duplicate indoor air samples. Neither the Vapor Intrusion Guidance nor the Supplemental Guidance recommends a threshold for relative percent difference (RPD) between the indoor air sample and field duplicate indoor air sample results. The Advisory Active Soil Gas Investigations (Soil Gas Advisory), dated July 2015, recommends collection of at least one duplicate soil gas sample per 20 samples or per batch, whichever is more often. The Soil Gas Advisory recommends an allowance for the differences of 50 percent (RPD) because of the inherent variability associated with soil gas samples. Similarly, past experience has shown inherent variability with indoor air samples and duplicate samples. It is recommended that the Draft Supplemental Guidance be updated to either remove the duplicate indoor air sample or provide a threshold for RPD of at least 50%.

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284	1. Formal/ Official	35	05/31/2020	Ivy	Inouye	RMD Environmental Solutions, Inc.	35.002	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	22	3B.5 - Outdoor Air: Location and Number of Samples The DTSC Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (Vapor Intrusion Guidance), dated October 2011, and the Draft Supplemental Guidance: Screening and Evaluating Vapor Intrusion (Supplemental Guidance), dated February 2020, both recommend at least three outdoor air sample locations. For small project sites; such as, a single residence or small commercial building, three outdoor air sample locations can be excessive. When conducting an indoor air investigation, the weather and wind direction are recorded. Based on this information for a small project site, one outdoor air sample upwind of the project site building should be acceptable. If the prevailing wind direction for a project site is known and is different from current wind direction, then a second outdoor air sample could be collected in the upwind direction of prevailing wind. It is recommended that the Draft Supplemental Guidance be updated to indicate that less than three outdoor samples (i.e., one or two outdoor air samples) may be reasonable and acceptable or provide alternative guidance for small project sites with a single residence or small commercial building.

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285	1. Formal/ Official	36	06/01/2020	Lowell	Kessel	CERES Corporation	36.001	04. Introduction	04f. E – Evaluation of Lines of Evidence	7	E-Evaluation of Lines of Evidence Page 7. LOEs for Evaluating Future Risk and Limitations of LOEs It is stated that “Subsurface concentration data are the preferred LOE to evaluate long-term future VI risk…”. There are temporal variability “limitations” reflective in the results of active soil gas investigations (McHugh, 2007). Therefore it is apparent that long-duration passive soil gas sampling would offer more defensible time-weighted average concentration data and add value to risk calculations by reducing, at least, the measured temporal variability when sampling periods are days to weeks. References McHugh, T.E., Nickels, T.N., Brock, B., 2007. Evaluation of spatial and temporal variability in VOC concentrations at vapor intrusion investigation sites. In: Proceeding of Air &Waste Management Association's Vapor Intrusion: Learning from the Challenges, September 26-28, 2007, Providence, RI, pp. 129e142.

286	1. Formal/ Official	36	06/01/2020	Lowell	Kessel	CERES Corporation	36.002	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05d. Step 1C – Selecting Sampling Approach : Soil Gas Screenin g or Indoor Air	11	STEP 1C- Select Sampling Approach: Soil Gas Screening or Indoor Air Page 11. Third bullet point. Condition discussed: Soil gas sampling when groundwater is shallower than 5 feet beneath a building. It is recognized that the results of active soil gas sampling may be compromised at sites with shallow groundwater due to short time periods and high water-moisture which affect the Summa canister and laboratory analysis. Passive Sampling for Soil Gas has been accomplished for decades in such environments and has advanced significantly during this time. As noted in NAVFAC, some benefits of passive soil gas sampling include: ease of use, analytical sensitivity, precision, representativeness and sampler duration, target compound breadth (uptake rate dependent), and lower overall cost (NAVFAC, 2015). Furthermore, it has been well known that passive soil gas has been a preferred method for soil gas sampling investigations where low-permeability lithology and high-moisture is present or very low concentrations are expected (ITRC, 2007). These known conditions have been documented in many State agencies guidance documents for more than a decade. The adsorbents in the Beacon Passive Soil Gas sampler are hydrophobic, so water moisture does NOT directly affect the sample quality or analytical procedure. Because passive soil gas sampling is conducted over longer durations from 24hrs to weeks, the short-term temporal variability is reduced and sufficient time is provided for VOCs to be captured by the adsorbent samplers. North Carolina DEQ recommends the use of Beacon Passive Soil Gas samplers specifically when groundwater is shallow (less than 5ft bgs) as the preferred method over active soil gas sampling.

287	1. Formal/ Official	36	06/01/2020	Lowell	Kessel	CERES Corporation	36.003	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distribution of Soil Gas Contamination	12	Step 2A- Evaluate Spatial Distribution of Soil Gas Contamination 2A.1- Soil Gas: Sampling Method Page 12 The guidance specifies Active Soil Gas Investigations Advisory. It does not include quantitative passive soil gas as an option. Recommendation to Include the following text: Long-duration passive soil gas sampling is acceptable as an overall site characterization strategy satisfying the objectives for spatial distribution of soil gas concentrations. Support Long-duration time-weighted average passive sampling has been well established in the industry for over a decade during indoor air or outdoor air applications. The very same technology has been demonstrated to be effective for soil gas applications, conforming to ESTCP (2014) guidance of verified VFC uptake rates between 0.1 and 1 ml/min, applicable to soil gas and sub-slab investigations. There are significant concerns related to data quality and the validity of results from temporal variability attributable to meteorological conditions (wind, barometric pressure, temperature) and ventilation (exhaust fans-HVAC systems, combustion appliances, open windows and doors) (EPA, 2010 and Folks, et al, 2009). While there is a need to document each and all influences of temporal variability, some conditions are not controllable (only measurable) and such variability must be factored into the results used for assessment of long-term risk without bias. Long-duration passive sampling providing validated time-weighted average concentration data for VFCs on the scale of hours to weeks provides quantitative data that limits such bias. Furthermore, passive sampling is less susceptible to many data quality concerns familiar to other sampling media; Summa canisters in particular (McHugh, 2018). As noted in NAVFAC, some benefits of passive soil gas sampling include: ease of use, analytical sensitivity, precision, representativeness and sampler duration, target compound range (uptake rate dependent), and lower overall cost (NAVFAC, 2015).

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288	1. Formal/ Official	36	06/01/2020	Lowell	Kessel	CERES Corporation	36.004	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distribution of Soil Gas Contamination	12-13	Step 2A- Evaluate Spatial Distribution of Soil Gas Contamination 2A.2 – Sampling to Characterize the Overall Soil Gas Plume Page 12-13, Second bullet point. Sentence three. The following statement reflects the risk and assumptions expected during ACTIVE soil gas sampling with small (1L) to large (6L) volume purging to collect samples. “The sample depths generally should be no shallower than five feet bgs to reduce the likelihood of ambient air breakthrough (CalEPA, 2015). Shallow groundwater can limit the ability to collect soil gas samples.” Argument Passive soil gas sampling is a steady-state sampling method that does not require soil gas purging and does not pose a risk of mixing ambient air with soil gas because no vacuum is applied to collect the sample. Recommended Revision for your consideration. During active soil gas sampling, the sample depths generally should be no shallower than five feet bgs to reduce the likelihood of ambient air breakthrough (CalEPA, 2015). During passive soil gas sampling, sample depth can be based on site specific data quality objectives. When shallow groundwater is present, passive soil gas sampling is preferred to minimize the concerns of soil moisture effects on sampling and analysis.

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289	1. Formal/ Official	36	06/01/2020	Lowell	Kessel	CERES Corporation	36.005	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06d. Step 2C – Evaluate Temporal Variability	17	Step 2C – Evaluate Temporal Variability Page 17. First paragraph. No change to existing text is recommended. However, additional text is recommended to be added at the end of the paragraph. Recommended additional text. Long-duration passive soil gas sampling may offer additional benefits to mitigating temporal variability if sampled at depths and at locations that meet objectives for characterizing spatial distribution of soil gas contamination.
290	1. Formal/ Official	36	06/01/2020	Lowell	Kessel	CERES Corporation	36.006	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	20	Step 3B.1 – Indoor Air: Sampling Method Page 20. Second bullet. Third sentence. Incorrect (outdated) statement. Requires correction. “Passive samplers may not be suitable for all situations or chemicals (e.g., high moisture or poor chemical sorption).” Facts The adsorbents used in passive samplers (i.e. Beacon passive samplers) are hydrophobic and not affected by high moisture as is the case for Summa canisters. High moisture does not affect passive samplers as it does for Active Sampling devices (e.g. Summa canisters). Uptake rates are not available for all known volatile compounds, so passive sampling may not be viable for all chemicals. Suggest the following revised text: Passive samplers may not be suitable for all chemicals of concern (e.g. Methane). Consultant must confirm available uptake rates and reporting limits for target VFCs are viable with the passive sampler supplier.

291	1. Formal/ Official	36	06/01/2020	Lowell	Kessel	CERES Corporation	36.007	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	20	Step 3B.1 – Indoor Air: Sampling Method RECOMMEND THE REMOVAL OF FOOTNOTE 8 on Page 20: “At this time, quantitative passive sampling for soil gas is undergoing research and not recommended as a sole line of evidence for soil gas screening evaluations.” Statement of Defense This statement or footnote is based on outdated information. It is also punitive as written and no longer justified based on demonstrated results for more than 5 years. Long-duration time-weighted average passive sampling has been well established in the industry for many years during indoor air or outdoor air applications. The very same technology has been demonstrated to be effective for soil gas applications, conforming to ESTCP (2014) guidance of verified VFC uptake rates between 0.1 and 1 ml/min, applicable to soil gas and sub-slab investigations. These results and data have been presented in person to DTSC, RWQCB, SWRCB, and OEHHA-EPA during multiple office presentations from March 2019 to March 2020. Furthermore, passive sampling is less susceptible to many data quality concerns familiar to other sampling media, in particular Summa canisters (McHugh, 2018). As noted in NAVFAC, some benefits of passive soil gas sampling include: ease of use, analytical sensitivity, precision, representativeness and sampler duration, target compound breadth (uptake rate dependent), and lower overall cost (NAVFAC, 2015). The entire guidance document highlights the importance of Multiple Lines of Evidence (LOE). What is particularly interesting, is that experience has demonstrated that passive soil gas sampling tends to reduce the likelihood of false negatives compared to active soil gas sampling, especially in low permeability soils. Finally, it has been well known that passive soil gas sampling has been a preferred method for soil gas sampling investigations where low-permeability

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											lithology and high-moisture is present or very low concentrations are expected (ITRC, 2007).

292	1. Formal/ Official	36	06/01/2020	Lowell	Kessel	CERES Corporation	36.008	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	21	3B.2 – Subslab Soil Gas: Sampling Method. Page 21. First paragraph. First sentence. “Subslab soil gas samples should be collected in accordance with the Active Soil Gas Investigations Advisory (CalEPA, 2015).” Recommend revision /update to include quantitative passive soil gas sampling. Long-duration passive soil gas sampling offers quantitative and validated time-weighted average concentrations and is perfectly well suited for use in sub-slab applications. Arguments for Passive Soil Gas being an Accepted (preferred) Method of Sampling Passive samplers limit the likelihood of ambient air breakthrough resulting during active soil gas events: long-duration steady-state passive subslab soil gas sampling does not introduce this concern. Passive samplers limit the influence of temporal variability: long-duration steady-state passive subslab soil gas sampling incorporates the temporal variability of concentrations known to be present in subslab soil gas and provides a time-weighted average concentration. Long-duration passive subslab soil gas sampling is better suited and easier to implement when conducting SIMULTANEOUS sampling with indoor and ambient air sampling Steady-state passive subslab soil gas sampling avoids potential cross-contamination of indoor air samples from VFCs because NO PURGING is involved or conducted. Long-duration passive soil gas sampling is better suited for exterior soil gas sampling when access limitations preclude indoor subslab sampling; there is significantly more temporal variability in soil gas outside the footprint of buildings (McHugh, 2007). Contemporaneous deployment of long-duration passive sampling for indoor air, ambient air, subslab, and exterior soil gas will be better corelated, more practical to implement, and least likely to be susceptible to the temporal variability inherent in each environment and operator or equipment error.

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293	1. Formal/ Official	36	06/01/2020	Lowell	Kessel	CERES Corporation	36.009	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	21	3B.3 – Outdoor Air: Sampling Method Page 21. First paragraph. RECOMMENDED TEXT ADDITION Ambient air sampling by passive methods may provide a better time-weighted average concentration and assessment of ambient air contribution to indoor air soil gas concentrations when concurrent indoor and ambient air sampling is performed. Additional Rationale. There are data quality concerns of Summa canisters resulting from carry over of VFCs which are more significant when VFC concentration are very low or at the detection limits.

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294	1. Formal/ Official	36	06/01/2020	Lowell	Kessel	CERES Corporation	36.010	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	22	3B.4 – Indoor Air and Subslab Soil Gas: Location and Number of Samples Page 22. Second paragraph. Recommend adding the following sentence to second paragraph on Page 22. Paired indoor air and subslab long-duration passive gas sampling may be conducted to minimize potential release of VFCs into indoor air during the subslab sampling process and may be more practical considering the longer time interval and non-intrusive features of the passive samplers for building occupants.
295	3. Informal: Water Boards	37	05/29/2020	Thizar	Williams	INTERNAL RWQCB-Region 4	37.001a	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06e. Step 2D – Decide on Next Step	17	Step 2 of the Four-Step VI Evaluation Process involves exterior soil gas data evaluation only, so we suggest revising the heading of Step 2 process as follows: Step 2 – Evaluate Vapor Intrusion Risk Using Exterior Soil Gas Data

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296	3. Informal: Water Boards	37	05/29/2020	Thizar	Williams	INTERNAL RWQCB-Region 4	37.001b	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06e. Step 2D – Decide on Next Step	17	2. Step D2 – Alternatives for Screening notes that alternative approaches to the 0.03 attenuation factor may be used if supported by adequate technical and site information. To be consistent, the attached Flowchart 2B of the Guidance should be revised by adding an Alternatives for Screening option or editing 2B to add "or agency-approved site-specific attenuation factor."
297	3. Informal: Water Boards	37	05/29/2020	Thizar	Williams	INTERNAL RWQCB-Region 4	37.002b	16. Other	16a. Other		We have a few additional suggestions that are not recommended edits to the document, but rather suggestions to improve the roll-out of the Guidance and improve transparency and communication with Board staff and the public. It would be useful to have a compilation of FAQ from the Q&A sessions (technical and general sessions) published on the website or otherwise make them accessible to the general public. If State Board has an estimated timeframe on when a California-specific attenuation factor will be developed, that would be useful to include on an FAQ on the website. We recognize that a specific date may not be predictable, but a general estimate of a timeframe would be information that many dischargers (and staff) would be interested in knowing. State-approved VI work plan and sampling and analysis plan (SAP) templates should be made available for general public use (just like the work plan and SAP templates developed for California chrome platers). It would be helpful to have information about USEPA's 2D VI model application and limitations including description and minimum parameters used for the deep soil VI transport model on an FAQ or otherwise make them accessible to the general public.

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298	6. Letter to Management	38	05/29/2020	Josue	Maldonado	N/A	38.001	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	I am writing to express my concerns over some of the provisions in the new Vapor Intrusion Guidance proposed by CalEPA. If these issues are not addressed, I fear these policies could halt real estate investment and development, which will hurt my neighborhood. CalEPA VI Guidance should consider impacts on local real estate development projects and the effects on blighted communities during its development.
299	6. Letter to Management	38	05/29/2020	Josue	Maldonado	N/A	38.002	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	I am concerned that CalEPA's Vapor Intrusion Guidance document will result in very low soil and ground water cleanup levels compared to current practices (which are already the most strict in the nation), thereby making commercial and residential development cost prohibitive in my city. This proposed VI Guidance will reduce certain soil and groundwater clean-up limits by over 95%, to the point where no remediation technology can achieve the new standards.
300	6. Letter to Management	38	05/29/2020	Josue	Maldonado	N/A	38.003a	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	There are also questions surrounding the developmental practice of this proposed VI Guidance as there is no current public health crisis prompting this proposed VI Guidance, because the 2011 CalEPA DTSC specifications for VI management have been significantly protective of human health and the environment. Also, the new VI Guidance is based on empirical US EPA data from only six (6) locations throughout the State. Nonetheless, CalEPA has begun enforcing new standards while VI research continues.
301	6. Letter to Management	38	05/29/2020	Josue	Maldonado	N/A	38.003b	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	There are also questions surrounding the developmental practice of this proposed VI Guidance as there is no current public health crisis prompting this proposed VI Guidance, because the 2011 CalEPA DTSC specifications for VI management have been significantly protective of human health and the environment. Also, the new VI Guidance is based on empirical US EPA data from only six (6) locations throughout the State. Nonetheless, CalEPA has begun enforcing new standards while VI research continues.

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302	6. Letter to Management	38	05/29/2020	Josue	Maldonado	N/A	38.004	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	The proposed VI Guidance will also potentially undercut housing goals statewide as contaminated sites can no longer be cleaned up to make way for housing or commercial development. Until now, CalEPA issued No Further Action letters for similar sites for commercial and residential development using defensible, site-specific analyses. The absence of NFAs will thwart debt financing for thousands of projects statewide.
303	6. Letter to Management	38	05/29/2020	Josue	Maldonado	N/A	38.005	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	Even though the VI Guidance is still being developed and no public participation has occurred, local environmental agencies have been told to stop using existing clean-up criteria/practices, and many development projects have been brought to a halt. There are approximately 200,000 contaminated sites in California. Many of these sites could be converted to commercial/residential facilities with appropriate remediation, but CalEPA's new VI Guidance will scare away brownfield investors, because the "how clean is clean" question is being obfuscated.
304	6. Letter to Management	38	05/29/2020	Josue	Maldonado	N/A	38.006	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	CalEPA's VI Guidance is exacerbating blight and the housing crisis in our communities as developers are unable to buy, finance, and insure sites in the absence of No Further Action letters. Please address these concerns as the VI Guidance policy continues to develop. CalEPA can not exacerbate an already emergency situation by further hampering housing and commercial development.
305	5. Extension Request	39	05/29/2020	Sheila	Joy	National Association of Sewer Service Companies (NASSCO)	39.001	16. Other	16a. Other		

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306	1. Formal/ Official	40	06/01/2020	Norm an	Eke	Converse Consultants	40.001	04. Introduction	04e. D – Vapor Intrusion Attenuati on Factors	vii, 5	It is our experience as environmental consultants that many of the proposed aspects in this new document are overly conservative. Further, the additional burdens placed on property owners during due diligence periods is making it difficult for our clients (owners/developers) to complete real estate transactions. As a result, many have begun looking a properties in alternative states, which in effect is hurting our business and presumably the State economy.
307	1. Formal/ Official	40	06/01/2020	Norm an	Eke	Converse Consultants	40.002	04. Introduction	04e. D – Vapor Intrusion Attenuati on Factors	vii, 5	The recommended approach in evaluating soil vapor data is to initially apply a worst-case-scenario assumption of AF = 0.03, and then conduct significant further testing to prove that the assumption is overly conservative. However, many deals are killed following the initial screening since their due diligence periods don't allow for all of the necessary supplemental testing, an/or their lenders don't want to deal with properties that show any sign of an environmental problem (not passing initial screening).
308	1. Formal/ Official	40	06/01/2020	Norm an	Eke	Converse Consultants	40.003	04. Introduction	04b. A – Scope and Applicabil ity	vi-vii, 1-2	For projects that do move forward past the initial screening stage following the appropriate further action, it can then be a challenge to convince lenders and/or local agencies to look past the initial failure and accept that no further action is warranted. This may then result in killing the deal, or in unnecessary mitigation/remediation measures, and/or ongoing monitoring expenses.
309	1. Formal/ Official	40	06/01/2020	Norm an	Eke	Converse Consultants	40.004	04. Introduction	04e. D – Vapor Intrusion Attenuati on Factors	vii, 5, 7	It is recommended that DTSC figure out a way to make the initial data evaluation process less conservative, so that fewer sites are subject to the further testing / data evaluation requirements to arrive at the conclusion that no further action is warranted. One option may be again use a range of AFs like in the prior VIG for varying building use and construction types. As noted in the Draft Guidance (Page 7), the new default AF of 0.03 is based on very few data from buildings in California, and/or for commercial/industrial use, so it would seem reasonable to initially allow for a less conservative value for at least some properties.

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310	1. Formal/ Official	40	06/01/2020	Norman	Eke	Converse Consultants	40.005	01. VI Supplemental Guidance General Comments	01b. Recommendations		It is our experience as environmental consultants that for many properties that fail the initial screening evaluation and need further testing / evaluation, local agencies are not consistent in their evaluation of supplemental data. Often times they want to continue to err on the side of caution, resulting in even more testing or unnecessary mitigation/remediation measures. It is recommended that DTSC provide further guidance relative to supplemental data evaluation, so that local agencies can be more uniform in their oversight.
311	1. Formal/ Official	40	06/01/2020	Norman	Eke	Converse Consultants	40.006	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	We object to the use of the recommended EPA Attenuation Factors due to the following: New AF data set is not representative of commercial/industrial building construction types in California. Initial evaluation requirements are overly conservative in our experience, resulting in excessive supplemental assessment and/or remedial costs. These AF result in unattainable cleanup goals, which may cause clients to choose mitigation measures rather conducting remediation, which would result in fewer properties being remediated. It is our recommendation to continue using the DTSC developed AFs until the new data set supports switching to something more conservative.

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312	1. Formal/ Official	40	06/01/2020	Norman	Eke	Converse Consultants	40.007	08. Step 4: Concurrent and Future Risk Evaluation and Management Decisions	08b. Step 4A – Need for Risk Management	15, 27	Given that the current risk of developing cancer from general life is upwards of 3x10-1, along with the overly conservative assumptions throughout the health-risk estimation process, we would recommend modifying the risk management framework for VI such that no response action is required beginning at 1x10-4. Additionally, it is recommended that the Risk Management Decision Framework for VI table be modified to only have two scenarios, No Response Action Needed (formerly Low Priority) and Response Action Needed. With the exception of "None", all of the Potential Response Actions in the middle row can be moved into the row for Response Action Needed. We have yet work with a regulatory agency that is willing to concur with our determination that no response action may be appropriate when the estimated Risk is between 1x10-4 and 1x10-6. Therefore, we recommend taking the onus off of the regulator to choose being less protective when they can just as easily choose to be more protective. There is no incentive for them, financial or otherwise, to consider being less protective. On the other hand, there are incentives to recommend further action when given a choice, such as job security and not having to defend a decision that some may argue potentially put lives at risk.
313	1. Formal/ Official	40	06/01/2020	Norman	Eke	Converse Consultants	40.008	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06d. Step 2C – Evaluate Temporal Variability	17	It is noted that some portions of California exhibit very minimal temporal variability. It is recommended that the recommendation to sample soil gas probes in at least 2 seasons be limited to areas that experience significant temporal variability.

314	1. Formal/ Official	41	06/01/2020	Richa rd	Kapusci nski	U.S. Environmental Protection Agency, US EPA	41.001	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	References to the USEPA OSWER VI Guide [OSWER Technical Guide For Assessing And Mitigating The Vapor Intrusion Pathway From Subsurface Vapor Sources To Indoor Air (OSWER Publication 9200.2-154)]: Contrary to implications on a few pages of California's draft supplement (e.g., page 3 and page vi), the OSWER VI Guide pertains to all of the federal land cleanup programs (e.g., RCRA corrective action also), not only to the Superfund remedial program or even CERCLA. Specifically, "This Technical Guide is intended for use at any site (and any building or structure on a site) being evaluated by EPA pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or the corrective action provisions of the Resource Conservation and Recovery Act (RCRA), EPA's brownfield grantees, or state agencies acting pursuant to CERCLA or an authorized RCRA corrective action program where vapor intrusion may be of potential concern" (quoting the OSWER VI Guide). There are no electronically detectable instances/uses of the phrase "preferential pathway" in the OSWER VI Guide). So, it is unclear why the draft California supplemental guide would attribute to the OSWER VI Guide the statement that "preferential pathway is a general term used to define all high-capacity transport pathways for vapors from the subsurface source to the building foundation or into the building". The OSWER VI Guide generally uses the adjective "preferential" when referring to zones of higher gas permeability "due to geology or infrastructure" (e.g., "utility corridor or more porous zones of soil or rock"), as in "preferential migration route". In hindsight, perhaps we should have introduced in the OSWER VI Guide the term "conduit gas intrusion" as a distinct mechanism of vapor intrusion (in contrast to "soil gas intrusion"). Instead, we defined vapor intrusion to embrace both mechanisms (i.e., "Vapor intrusion is the general term given to migration of hazardous vapors from any subsurface contaminant source, such as contaminated soil

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											or groundwater or contaminated conduit(s), into an overlying building or unoccupied structure via any opening or conduit."); and noted "chemicals that are released into the subsurface as liquids or solids may form hazardous vapors that … eventually enter buildings as a component of a gas by migrating (being transported) through cracks, seams, interstices, and gaps in basement floors, walls, or foundations ("adventitious openings"), through intentional openings (e.g., perforations due to utility conduits, sump pits), and/or within conduits (e.g., drain and sewer lines)." I'd welcome having these matters corrected in the final version of California's supplemental guide.
315	1. Formal/ Official	41	06/01/2020	Richa rd	Kapusci nski	U.S. Environmental Protection Agency, US EPA	41.002	01. VI Supplement al Guidance General Comments	01b. Recomm endations	ix, 2, 3	There are a few instances (e.g., pages ix and 2) where the wording might leave a non-expert with the impression that vapor-forming chemicals arise in conduits (e.g., sewers) only when they "intersect" or pass through areas of contaminated soil or groundwater. In each such instance, I'd recommend that the wording be explicitly clear regarding California's intent (e.g., which I understand to be that, where vapor-forming chemicals were directly discharged into conduits, "vapor conduits" merit consideration regardless of whether co-located in an area of significant soil or groundwater contamination). Contaminated groundwater and soil are mentioned as vapor sources, on page 3 and elsewhere. In light of the "vapor conduits" being recommended for sampling, perhaps, for completeness, conduits and other subsurface infrastructure should also be designated as a reservoir or "source" of vapors, at least in circumstances where vapor-forming chemicals have been discharged directly into conduits and other subsurface infrastructure.

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316	1. Formal/ Official	41	06/01/2020	Richard	Kapuscinski	U.S. Environmental Protection Agency, US EPA	41.003	10. Attachment 1 – Petroleum Specific Considerations	10a. General Comments	Attachment 1	Attachment 1 states that “Petroleum vapor intrusion (PVI) most often occurs where petroleum impacted soil or groundwater is located near a building foundation.” I am unaware of any systematic identification, review, and evaluation of petroleum contamination situations (e.g., where PVI has and has not occurred), whereas such a study would seem to be needed to support the statement as written. A noteworthy example of PVI of which I’m aware (which doesn’t fit the foregoing quoted claim) involved releases of gasoline from underground storage tanks into sewers in Hazleton, Pennsylvania (the so-called Transguch site; http://www.health.state.pa.us/pdf/tranguch/tranguchspill.pdf). A petroleum hydrocarbon (i.e., benzene) posed a vapor intrusion threat via “conduit gas intrusion”, as distinct from “soil gas intrusion”. Whereas benzene is recognized as biodegradable in aerobic soil, benzene vapors did not have to pass through aerobic soil before entering the buildings in this situation.

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317	1. Formal/ Official	41	06/01/2020	Richard	Kapuscinski	U.S. Environmental Protection Agency, US EPA	41.004a	12. Attachment 3 – Groundwater as Line of Evidence to Evaluate VI Risk	12a. General Comments	5, 7, Attachment 3	There are a few instances (e.g., page 5 and Attachment 3) where the draft supplemental guide states that groundwater data "should rarely be a primary line of evidence for VI decision-making." In this context, California may want to consider making an explicit distinction between situations where the groundwater data support taking a response action versus those where the groundwater data, by themselves, do not support taking a response action (i.e., the phrase "VI decision-making" is generic and all encompassing). In the case where concentration(s) of a vapor-forming chemical(s) significantly exceeds risk-based screening levels for that substance and the substance is not known to be biodegradable in the vadose zone, it isn't obvious why such a result is not a reliable basis for deciding to undertake an investigation. In the case where concentration(s) of a vapor-forming chemical(s) significantly exceeds risk-based cleanup levels for that substance and the substance is not known to be biodegradable in the vadose zone, it isn't obvious why such a result is not a reliable basis for deciding to undertake response action. On the other hand, if it is California's view that only indoor air sampling (and multiple rounds of same) provides data suitable to support any type of risk management decision for vapor intrusion, in cases where contaminated groundwater serves as the only subsurface source of vapor-forming chemicals (e.g., because vapor transport in the subsurface is so unpredictable), then perhaps this view/policy warrants more explicit explanation. Elsewhere (e.g., page 7), the draft guide states "Subsurface concentration data are the preferred LOE to evaluate long-term future VI risk to building occupants…" Since groundwater data represent a type of "subsurface concentration data", does this sentence mean that groundwater data also are a "preferred LOE to evaluate long-term future VI risk to building occupants"?

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318	1. Formal/ Official	41	06/01/2020	Richard	Kapuscinski	U.S. Environmental Protection Agency, US EPA	41.004b	12. Attachment 3 – Groundwater as Line of Evidence to Evaluate VI Risk	12a. General Comments	5, 7, Attachment 3	There are a few instances (e.g., page 5 and Attachment 3) where the draft supplemental guide states that groundwater data "should rarely be a primary line of evidence for VI decision-making." In this context, California may want to consider making an explicit distinction between situations where the groundwater data support taking a response action versus those where the groundwater data, by themselves, do not support taking a response action (i.e., the phrase "VI decision-making" is generic and all encompassing). In the case where concentration(s) of a vapor-forming chemical(s) significantly exceeds risk-based screening levels for that substance and the substance is not known to be biodegradable in the vadose zone, it isn't obvious why such a result is not a reliable basis for deciding to undertake an investigation. In the case where concentration(s) of a vapor-forming chemical(s) significantly exceeds risk-based cleanup levels for that substance and the substance is not known to be biodegradable in the vadose zone, it isn't obvious why such a result is not a reliable basis for deciding to undertake response action. On the other hand, if it is California's view that only indoor air sampling (and multiple rounds of same) provides data suitable to support any type of risk management decision for vapor intrusion, in cases where contaminated groundwater serves as the only subsurface source of vapor-forming chemicals (e.g., because vapor transport in the subsurface is so unpredictable), then perhaps this view/policy warrants more explicit explanation. Elsewhere (e.g., page 7), the draft guide states "Subsurface concentration data are the preferred LOE to evaluate long-term future VI risk to building occupants…" Since groundwater data represent a type of "subsurface concentration data", does this sentence mean that groundwater data also are a "preferred LOE to evaluate long-term future VI risk to building occupants"?

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319	1. Formal/ Official	41	06/01/2020	Richa rd	Kapusci nski	U.S. Environmental Protection Agency, US EPA	41.004c	12. Attachment 3 – Groundwate r as Line of Evidence to Evaluate VI Risk	12a. General Comment s	5, 7, Attachment 3	There are a few instances (e.g., page 5 and Attachment 3) where the draft supplemental guide states that groundwater data "should rarely be a primary line of evidence for VI decision-making." In this context, California may want to consider making an explicit distinction between situations where the groundwater data support taking a response action versus those where the groundwater data, by themselves, do not support taking a response action (i.e., the phrase "VI decision-making" is generic and all encompassing). In the case where concentration(s) of a vapor-forming chemical(s) significantly exceeds risk-based screening levels for that substance and the substance is not known to be biodegradable in the vadose zone, it isn't obvious why such a result is not a reliable basis for deciding to undertake an investigation. In the case where concentration(s) of a vapor-forming chemical(s) significantly exceeds risk-based cleanup levels for that substance and the substance is not known to be biodegradable in the vadose zone, it isn't obvious why such a result is not a reliable basis for deciding to undertake response action. On the other hand, if it is California's view that only indoor air sampling (and multiple rounds of same) provides data suitable to support any type of risk management decision for vapor intrusion, in cases where contaminated groundwater serves as the only subsurface source of vapor-forming chemicals (e.g., because vapor transport in the subsurface is so unpredictable), then perhaps this view/policy warrants more explicit explanation. Elsewhere (e.g., page 7), the draft guide states "Subsurface concentration data are the preferred LOE to evaluate long-term future VI risk to building occupants…" Since groundwater data represent a type of "subsurface concentration data", does this sentence mean that groundwater data also are a "preferred LOE to evaluate long-term future VI risk to building occupants"?

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320	1. Formal/ Official	41	06/01/2020	Richard	Kapuscinski	U.S. Environmental Protection Agency, US EPA	41.005	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distribution of Soil Gas Contamination	11	By contrast, the draft supplemental guide appears to provide relatively unequivocal support for using exterior soil gas samples as a primary line of evidence for VI decision-making. If it is California's view that vapor transport in the subsurface is inherently unpredictable (e.g., "soil matrices are typically heterogeneous" and, therefore, groundwater data "should rarely be a primary line of evidence for VI decision-making"), then it would seem to follow logically that soil gas sampling data of any kind also "should rarely be a primary line of evidence for VI decision-making", in part because soil matrices are "typically heterogeneous". The expected spatial pattern in vapor concentrations in soil gas arising from laterally extensive plumes of contaminated groundwater provides evidence that exterior soil gas data can be unreliable for purposes of supporting risk management decisions that response action is not needed in the case of soil gas intrusion. As noted in the OSWER VI Guide, for example: "Modeling results for idealized scenarios show that, in homogeneous soil, soil gas concentrations tend to be greater beneath the building than at the same depth in adjacent open areas when the vapor source is underneath the building, even if the source is laterally extensive relative to the building footprint (e.g., broad plume of contaminated groundwater)" (page 33 therein). Given these predictions and supporting field evidence, "individual exterior soil gas samples cannot generally be expected to accurately estimate sub-slab or indoor air concentrations" (page 33 therein). "On this basis, shallow exterior soil gas sampling data generally are not recommended for purposes of estimating indoor air concentrations" (page A-5 therein).

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321	1. Formal/ Official	42	06/01/2020	Tiona	Todoru k (Dr.)	Worley Group Inc. operating as Advisian	42.001	04. Introduction	04e. D – Vapor Intrusion Attenuati on Factors	vii, 5	We concur that the application of prescribed, conservative attenuation factors as an initial step in site assessment is an appropriate approach. This aligns with the methodology recommended by United States Environmental Protection Agency (USEPA) and other state agencies. We concur that use of empirically derived attenuation factors is more appropriate than modelled attenuation factors when representative data are available, considering factors such as soil texture, thickness of the vadose zone, contaminant characteristics and distribution and building construction.
322	1. Formal/ Official	42	06/01/2020	Tiona	Todoru k (Dr.)	Worley Group Inc. operating as Advisian	42.003	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3, 18	We recommend retaining an option to utilize the Johnson and Ettinger vapor intrusion model to evaluate vapor intrusion on a site-specific basis where appropriate technical rationale and justification can be provided. This aligns with current USEPA methodology. While indoor air sampling provides more representative data, it is not always a practical approach to site investigation. This includes scenarios when building owners and/or tenants will not grant access for indoor air sampling, and when buildings have not yet been constructed.
323	1. Formal/ Official	42	06/01/2020	Tiona	Todoru k (Dr.)	Worley Group Inc. operating as Advisian	42.004	10. Attachment 1 – Petroleum Specific Considerati ons	10a. General Comment s	Attachment 1	We note that the guidance includes reference to the Low Threat Underground Storage Tank (UST) closure policy. Our experience suggests that the Los Angeles (LA) Regional Water Quality Control Board (RWQCB) does not consistently approve hydrocarbon sites for case closure under the Low Treat UST closure policy. State-wide consistency in application of this guidance is required.

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324	1. Formal/ Official	43	06/01/2020	Peter	Scaramella	GSI Environmental Inc.	43.001	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	The objective of the Supplemental Guidance is to provide a consistent approach for evaluating VI at existing buildings. However, as indicated in the Introduction Section, "The same logic and approach can be extended to the evaluation and management of future VI risk for sites with existing buildings or open lots planned for redevelopment" (Pp. 1 and 2). As currently drafted, the Supplemental Guidance applies the same technical assumptions appropriate for initial building screening to existing buildings where sampling has indicated vapor intrusion is not occurring as well as future buildings that may be constructed with mitigation systems. The entire process of evaluating the VI pathway, from the initial screening of buildings through the selection of long-term risk management measures, should be part of an integrated risk assessment and management framework. The Supplemental Guidance provides significant changes to the evaluation of VI exposures (and beyond initial building screening) without providing an updated road map for managing potential exposures with remediation and/or mitigation.

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325	1. Formal/ Official	43	06/01/2020	Peter	Scaramella	GSI Environmental Inc.	43.002	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07d. Step 3C – Assess Risk from Contaminated Indoor Air and Subslab Soil Gas	24	With respect to existing buildings, specific recommendations should be included in the Supplemental Guidance for closing sites where sampling has demonstrated that VI is not occurring. Existing buildings can be effectively evaluated for VI, including screening for preferential pathways, with indoor air sampling and other lines of evidence. However, the Supplemental Guidance appears to eliminate closing sites with existing buildings if soil vapor concentrations exceed screening criteria, regardless of the results of indoor air sampling or other lines of evidence. In Step 3C.3, potential future risks at existing buildings are estimated using the maximum detected concentrations in external or sub-slab soil vapor samples and generic, conservative attenuation factors (i.e., 0.03 for soil vapor). Section 3B.6 describes “complementary lines of evidence” that can support a VI evaluation, but the Supplemental Guidance does not describe how these complementary lines of evidence can be used in conjunction with risk estimates based on generic, conservative attenuation factors. Thus, the Supplemental Guidance establishes an approach that will designate buildings with low concentrations of VOCs in soil vapor as long-term VI risks that must be managed in perpetuity. If this is the intended approach, the Supplemental Guidance also should provide specific recommendations for how such sites should be managed. If the Supplemental Guidance is intended to allow for the closure of sites with low concentrations of VOCs in soil vapor with the use of complementary lines of evidence, the Supplemental Guidance would benefit from examples or case studies to demonstrate how such closure may be achieved.

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326	1. Formal/ Official	43	06/01/2020	Peter	Scaramella	GSI Environmental Inc.	43.003	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07d. Step 3C – Assess Risk from Contaminated Indoor Air and Subslab Soil Gas	1-2	With respect to future buildings, the Supplemental Guidance as drafted introduces more uncertainty to the long-term management of redevelopment sites with VI concerns. The VI evaluation process outlined in the Supplemental Guidance is applicable to redevelopment sites to determine the need for remediation or mitigation at future buildings (Pp. 1 and 2). However, the risk management framework does not present specific criteria for selecting the appropriate mitigation, confirmation sampling, or monitoring approach. For example, the Supplemental Guidance does not specify criteria for selecting passive versus active mitigation systems. (Nor are such criteria included in the 2011 Vapor Intrusion Mitigation Advisory.) In addition, it is not clear how monitoring requirements at a building constructed with a mitigation system would be different than an unmitigated building. The lack of clarity will introduce more variability between agencies and regions within California, and more uncertainty in the overall process for redeveloping sites with VI concerns. The Supplemental Guidance should be revised to clearly limit its scope to the initial screening of existing buildings or be published with a complementary update to guidance for the selection of VI remediation and mitigation measures.

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327	1. Formal/ Official	44	06.01.2020	Jeremy	Squire	Murex Environmental, Inc.	44.001	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	Casts too Wide a Net & Will Tie Up Thousands of Sites The Draft Guidance is designed in such a way that it will entangle thousands more sites, unnecessarily, in a year-plus-long process of expensive testing and reporting in order to prove a negative. The 0.03 AF, combined with the lengthy and expensive step-wise process of soil gas testing, indoor air testing, repeated indoor air testing, and consultant analysis & reporting will delay property transactions, scuttle redevelopment projects, and burden small businesses and families. These impacts, caused by the Draft Guidance, will not be offset by improvements in health outcomes for California citizens, because the only entities that can afford to go through this process will move their real estate development investments out of State. This is not hyperbole. Actual real estate and Brownfields developers are already cancelling projects. Further, at a time when affordable housing is in such great need in the State, this guidance will have the impact of halting many such projects.

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328	1. Formal/ Official	44	06.01.2020	Jeremy	Squire	Murex Environmental, Inc.	44.002	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	Policy Masquerading as Guidance The proponents of the Draft Guidance have repeatedly stated that it is guidance, and is not to be construed as Cal-EPA policy. However, that distinction is meaningless in practice and only serves to lessen the level of scrutiny that the Draft Guidance faces. Once published, case managers with DTSC and RWQCB regions will require that project stakeholders conduct VI investigations pursuant to the guidance, in similar fashion as prior VI guidance documents (i.e., “Evaluation of Potential Vapor Intrusion Risk,” 2011, “Advisory – Active Soil Gas Investigations,” 2015, etc.). Cal-EPA should recognize that this guidance becomes de facto policy, simply by it’s unilateral adoption by Site Cleanup and Brownfields groups within the agencies. As such, the guidance should be subject to a full CEQA analysis, including an in-depth examination of the policy’s financial impact on the real estate sector of California.

329	1. Formal/ Official	44	06.01.2020	Jerem y	Squire	Murex Environmental, Inc.	44.003	04. Introduction	04e. D – Vapor Intrusion Attenuati on Factors	vii, 5	The 0.03 AF is Overly Conservative and Not Representative of California An attenuation factor expresses the relationship between concentrations of VOCs below a building slab to the resulting indoor air concentration. The 0.03 AF was selected from the 2012 USEPA empirical attenuation factor study, which was both flawed and non-representative for use in California. The majority of data was collected from only a few sites, almost none of which were in California. The data set was not normally distributed; the median value and the 95th percentile value were off by an order of magnitude from one another. The majority of data was collected from residential homes, exhibiting basements, built prior to WWII, in cold weather climates (all characteristics that exacerbate vapor intrusion, and all characteristics that make it inappropriate for application in California). A private working group of practitioners in California (Ettinger, et. al, 2018) produced a more representative and rigorously vetted data set of AFs in November 2018. The data set focused only on California sites, with various land uses, and included over 400 buildings. As expected, the model produced significantly lower AFs that were in-line with existing California guidance. Despite the more defensible work presented by the working group, the existing empirical data from California, which was available to the working group of Draft Guidance authors, was ignored in the production of the Draft Guidance. The Draft Guidance AF should be revisited, and modified, based on California empirical data, so that it can more accurately represent real world conditions; this will allow practitioners and site owners to put their effort and money towards sites that actually present a human health risk.

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330	1. Formal/ Official	44	06.01.2020	Jerem y	Squire	Murex Environmental, Inc.	44.004a	04. Introduction	04b. A – Scope and Applicabil ity	vi-vii, 1-2	Unfair Standard VOC sites closed by Cal-EPA using vapor intrusion models (J&E, DTSC models, etc.) are not being re-opened to apply this guidance, presumably because of case load limitations. Petroleum UST cases are not subject to this guidance, presumably because the UST fund could not afford to apply it on California UST sites, despite the toxicity of benzene (proposed screening level 0.014 ug/L for soil vapor at a commercial site). And yet, new and existing VOC sites will be subject to this Draft Guidance that reduces the vapor screening thresholds by two orders of magnitude. If human health is actually at risk at these low-level sites, Cal-EPA should apply their new policy uniformly.
331	1. Formal/ Official	44	06.01.2020	Jerem y	Squire	Murex Environmental, Inc.	44.004b	04. Introduction	04b. A – Scope and Applicabil ity	vi-vii, 1-2	Unfair Standard VOC sites closed by Cal-EPA using vapor intrusion models (J&E, DTSC models, etc.) are not being re-opened to apply this guidance, presumably because of case load limitations. Petroleum UST cases are not subject to this guidance, presumably because the UST fund could not afford to apply it on California UST sites, despite the toxicity of benzene (proposed screening level 0.014 ug/L for soil vapor at a commercial site). And yet, new and existing VOC sites will be subject to this Draft Guidance that reduces the vapor screening thresholds by two orders of magnitude. If human health is actually at risk at these low-level sites, Cal-EPA should apply their new policy uniformly.

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332	1. Formal/ Official	45	06/01/2020	James	Bryson	Terraphase Engineering Inc.	45.001	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	This guidance should not be rushed into use with a single default EPA attenuation factor derived from mostly residential buildings located outside of California. The guidance should be postponed until the CA VI Database is developed with appropriate attenuation factors.
333	1. Formal/ Official	45	06/01/2020	James	Bryson	Terraphase Engineering Inc.	45.002	13. Attachment 4 – Guidance on Uploading Vapor Intrusion Information into GeoTracker	13a. General Comments	Attachment 4	Reliance on GeoTracker modifications to develop CA specific AFs is not necessary and creates delays in developing more appropriate AFs for both residential and commercial sites. Existing CA data already available in Geotracker and Envirostor should be used in development of separate residential and commercial AFs. There are plenty of sites with paired sub-slab/soil vapor and indoor air data. Polling of agency project managers would provide the sites and the data in short order. This would also help screen the data for quality with the PM's input.
334	1. Formal/ Official	45	06/01/2020	James	Bryson	Terraphase Engineering Inc.	45.003	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	The guidance should be amended to include a groundwater AF of 0.0005 in the screening phase for sites with deeper groundwater and laterally extensive fine grained soils. This is consistent with the 2015 EPA VI Guidance where the other default attenuation factors were selected. Knowledge of site lithology in the initial phases of site screening for VI can be known, and therefore this AF should be included as a screening option.

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335	1. Formal/ Official	45	06/01/2020	James	Bryson	Terraphase Engineering Inc.	45.004	08. Step 4: Concurrent and Future Risk Evaluation and Management Decisions	08c. Step 4B – Managing Current Vapor Intrusion Risk	28	The guidance should provide for the modeling of vapor intrusion from soil and groundwater using semi-site-specific and site-specific mathematical models that can be supported with a comprehensive conceptual site model and multiple lines of evidence. Not allowing for such modeling limits site-specific risk assessments from evaluating potential future exposures (e.g., in cases where buildings have been yet to be constructed or where new buildings may be constructed in the future). Also limiting the assessment to be based solely upon the evaluation of soil gas and indoor air data does not provide practitioners with the information needed to design remedies for sites where unacceptable vapor intrusion exposure has been identified. For example, if unacceptable soil gas or indoor air concentrations are identified, without modeling it becomes difficult to determine (and justify) the extent to which soil and/or groundwater contamination would need to be remediated in order to eliminate the unacceptable risk. As noted in the guidance "[r]remediation should be the preferred response action to reduce VI risk" and that "mitigation is considered to be an interim response action". In order to provide practitioners with the ability to conservatively determine (design) the need for (and extent of) soil and groundwater remediation, the process should provide for modeling from soil and groundwater.
336	1. Formal/ Official	45	06/01/2020	James	Bryson	Terraphase Engineering Inc.	45.005	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	The guidance should be transparent in explaining what the generic default subslab soil-gas-to-indoor air and soil-gas-to-indoor air attenuation factor of 0.03 is based upon, what conditions it is presumed to be representative of (e.g., the 95th percentile), and that may be overly conservative than necessary to be protective of most sites (e.g., for nonresidential buildings). For example, the guidance should explain that the value was derived from USEPA's empirical attenuation database of which a vast majority of the attenuation factors are for residential buildings, most are from sites with coarse-grained soil or very coarse-grained soil, and that most were derived for chlorinated VOCs (and in particular TCE and PCE).

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337	1. Formal/ Official	45	06/01/2020	James	Bryson	Terraphase Engineering Inc.	45.006	08. Step 4: Concurrent and Future Risk Evaluation and Management Decisions	08b. Step 4A – Need for Risk Management	1	In order to ensure consistency with other CalEPA risk management guidance, the chart presented under Step 4A should be revised to note in the row designated as "Low Priority", that acceptable risks would be as follows: Risk ≤ 1x10-6 and HI ≤ 1. Likewise, the row designated as "Determine Appropriate Action" should be revised as follows: 1x10-6 > Risk ≥ 1x10-4 and HI ≤ 1.
338	1. Formal/ Official	45	06/01/2020	James	Bryson	Terraphase Engineering Inc.	45.007	08. Step 4: Concurrent and Future Risk Evaluation and Management Decisions	08b. Step 4A – Need for Risk Management	28	The guidance should clarify conditions that would allow for a site with, for example, an estimated cumulative cancer risk of 2x10-6 and noncancer HI of 0.5 to have a potential response action of "None" as indicated on the chart presented under Step 4a. The chart should also be expanded to note that should an initial evaluation identify cumulative cancer risk > 1x10-4 and/or a noncancer HI >1, that potential response actions may include the development of a refined risk assessment.
339	1. Formal/ Official	45	06/01/2020	James	Bryson	Terraphase Engineering Inc.	45.008	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	The guidance notes that while it "supports the use of USEPA's AFs for initial screening of buildings, alternative approaches may be used if supported by adequate technical and site information." We support this principle and believe it helps to provide flexibility in determining more optimal and more reasonable ways to conservatively evaluating the vapor intrusion exposure scenario and determining the need for (and extent of) risk management action. It would be helpful if the guidance expanded upon this concept and provided some examples or illustrations of such alternative approaches and what would be considered adequate technical and site-specific support

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340	1. Formal/ Official	45	06/01/2020	James	Bryson	Terraphase Engineering Inc.	45.009	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	Using EPA default attenuation factors without considering the condition of the foundation will lead to unecessary expenditure on unneeded sampling. For example, a new concrete foundation, especially post-tensioned slabs, cracks capable of transmitting VOCs will be non-existent. If the slab is determined to be in good condition, the indoor air sampling program should be greatly reduced as compared to facilities with foundations in poor conditions.
341	1. Formal/ Official	45	06/01/2020	James	Bryson	Terraphase Engineering Inc.	45.010	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11a. General Comments	10, Attachment 2	Sewer gas sampling methodology needs to be developed and presented more completely to ensure consistency and data quality. The guidance includes it as a (sometimes necessary LOE) yet does not provide much other than suggested methods based on a few cited studies. In addition, given the demonstrated high variability of data gathered from sewer gas sampling, how will the agencies be consistent in their requirements and approvals for sampling programs targeting this LOE?
342	1. Formal/ Official	45	06/01/2020	James	Bryson	Terraphase Engineering Inc.	45.011	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11a. General Comments	10, Attachment 2	Data interpretation and the inclusion of sewer gas sampling data in risk assessments is not detailed. The guidance should include further information on appropriate screening levels and/or AFs for evaluation of this data if collected. Clarificaiton of the role of sewer gas sampling needs to be provided, e.g. whether this type of data could be considered by an agency as a risk drivesr or whether it is only considered within the context of CSM development.

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343	1. Formal/ Official	45	06/01/2020	James	Bryson	Terraphase Engineering Inc.	45.012	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05c. Step 1B – Prioritizing Buildings for VI Evaluation	9-10	Required timing of sewer gas sampling is unclear/conflicting. Section 1B.2 states: "If indoor air results indicate the presence of VFCs, but these VFCs do not appear to be migrating through subsurface soil, then sampling the air inside the vapor conduit should be considered." This suggests sampling sewer gas only after completion of initial IA sampling, and finding a gap in the CSM. However, Section 3B.6 states: "Sampling inside sewers and other vapor conduits concurrently with indoor air and subslab sampling is recommended to determine if such preferential pathways are enhancing VI". This suggests implementation of Step 3 including sewer gas sampling immediately. Agency requirements for how and when to evaluate sewer gas as an LOE need to be further clarified.
344	1. Formal/ Official	45	06/01/2020	James	Bryson	Terraphase Engineering Inc.	45.013	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	21	Suggest revising "concurrent" sampling to "sequential" sampling for subslab and indoor air sampling. As stated in Section 3B.2, sub-slab samples should be collected after IA to avoid cross-contamination.

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345	1. Formal/ Official	45	06/01/2020	James	Bryson	Terraphase Engineering Inc.	45.014	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07e. Step 3D – Evaluate Temporal Variability	26	Creating artificial building conditions (HVAC-off) to collect "worst-case" scenario sampling results is unwarranted if sampling conducted under normal conditions do not indicate a VI risk. In addition, for an occupied space, requiring 36-hours of HVAC off conditions prior to sampling could be prohibitive.

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346	1. Formal/ Official	46	06/01/2020	Harry	O'Neill	Beacon Environmental	46.001	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05d. Step 1C – Selecting Sampling Approach : Soil Gas Screenin g or Indoor Air	11	Page 11 The guidance suggests that it may not be possible to collect soil gas samples when groundwater is shallower than five feet. Passive soil gas samples are routinely used to collect soil gas samples at depths shallower than five feet because no vacuum is applied when collecting the sample, as is the case with evacuated canisters, and there is no risk of pulling tramp ambient air down the sampling hole, which would cause a low bias. States, such as North Carolina, recommend using passive soil gas samplers that have validated uptake rates and utilize hydrophobic adsorbents as the preferred method to measure soil gas concentrations when groundwater is shallower than five feet bgs. Recommend the following modification Groundwater shallower than five feet if collecting active soil gas samples because soil gas samples may be impacted by the capillary fringe or soil gas samples can be biased low from breakthrough of ambient air; (Note: samples can be collected where groundwater is less than five feet with passive soil gas samplers that utilize hydrophobic adsorbents.); or

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347	1. Formal/ Official	46	06/01/2020	Harry	O'Neill	Beacon Environmental	46.002	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distribution of Soil Gas Contamination	13	Page 13 Last two sentences of last paragraph of this subsection. As noted in prior comment, passive samplers are routinely used to sample soil gas at depths shallower than five feet bgs Recommend to modify the last two sentences to state, The sample depths generally should be no shallower than five feet below ground surface (bgs) when collecting active soil gas samples (e.g., using canisters) to reduce the likelihood of ambient air breakthrough (CalEPA, 2015). However, passive samples can be collected in holes shallower than five feet bgs. Shallow groundwater can limit the ability to collect soil gas samples with active sampling methods (e.g., canisters) and it is recommended to collect samples in these conditions with passive soil gas samplers.

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348	1. Formal/ Official	46	06/01/2020	Harry	O'Neill	Beacon Environmental	46.003	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	20	Page 20 The footnote is not related to indoor air and incorrectly represents the current capability of proven passive soil gas samplers with validated uptake rates less than 1.0 ml/min and which use hydrophobic adsorbents. Recommend to remove Footnote 8 so as not to limit project managers from the use of quality passive samplers that meet project and data quality objectives and can be used - at a minimum - where canister sampling is not viable. The use of passive samplers to sample soil gas should be noted in Section 3B.2

349	1. Formal/ Official	46	06/01/2020	Harry	O'Neill	Beacon Environmental	46.004	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	21	age 21 CalEPA 2015 describes how to collect passive soil gas samples in Appendix A and lists some of the advantages. Recommend to re-write this paragraph to include passive soil gas sampling. Please consider that the use of passive samplers to measure soil gas concentrations is being used on projects in California, as well as across the country, and not including its use at least as part of a multiple line of evidence will limit this methodology from being further improved by current and future laboratories and manufacturers. It is well known in the industry of the challenges with the collection and analysis of samples using evacuated canisters and California should remain open to advancing the science of measuring soil gas concentrations with time-integrated passive samplers that i) do not require the use of helium shrouds, ii) are lighter and easier to transport, iii) require less time for sample collection, iv) are efficient to analyze and condition so are not prone to carry over problems as the canisters are, v) produce high quality data by accredited laboratories using GC/MS instruments, and v) are offered at lower costs than canister methods. Please see below for suggested changes: Subslab soil gas samples should be collected in accordance with the Active Soil Gas Investigations Advisory (CalEPA, 2015), which recommends both active and no-purge passive soil gas sampling. Passive soil gas samplers with validated uptake rates and hydrophobic adsorbents may be used as a line of evidence to provide time integrated soil gas concentration data while simultaneously measuring indoor air concentrations with passive samplers. Active subslab samples typically are grab samples while passive samples allow for the steady-state collection of time-integrated samples over hours, days or weeks. Active soil gas samples ideally should be collected within 48 hours of indoor air sampling (USEPA 2012b) while passive soil gas and indoor air samples can be collected at the same time. To avoid potential cross-contamination of indoor air samples from VFCs released during subslab purging and

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											sampling, subslab active samples should be collected after indoor air samples. However, when no-purge passive soil gas samples are collected over 8-hour or longer time periods, indoor air samples may be collected simultaneously while the samplers are in the ground to provide a direct comparison. If subslab active soil gas samples must be collected before indoor air sampling, allow sufficient time for subsurface VFCs released into indoor air during subslab sampling to dissipate. This requirement is not necessary for passive sampling. Exterior soil gas sampling may be used in place of subslab sampling on a site-specific basis (e.g., permission to drill through floors is declined). Subslab sampling is recommended when there is a known or suspected release within or just below the building footprint and exterior soil gas concentration data may not be representative
350	1. Formal/ Official	46	06/01/2020	Harry	O'Neill	Beacon Environmental	46.005	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07d. Step 3C – Assess Risk from Contaminated Indoor Air and Subslab Soil Gas	24	Page 24 Recommend adding a paragraph noting the advantage of collecting a time integrated sample over days or weeks. Suggestion: The collection of indoor samples over longer time periods (e.g., 2 weeks) with passive samplers minimizes the impacts of short duration introductions of target VFCs inside the building. Elevated short duration concentrations from activities, such as bringing in dry cleaned garments, are normalized when collecting long duration samples.

351	1. Formal/ Official	47	06/01/2020	Matth ew	Jones	Trihydro Corporation	47.001	07. Step 3: Indoor Air Investigatio n – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07a. General Comment s	19, 26	The draft supplemental guidance is very prescriptive and helps to reduce uncertainty when conducting a vapor intrusion (VI) investigation. In some areas, however, it is quite exhaustive, expanding the typical investigation scope to include additional activities that, while adding to the duration/complexity of sampling activities, likely provide little additional benefit to the investigation results. Examples of this include the requirement to remove chemicals from within the building 24 to 72 hours prior to sampling (page 19) and, for at least one sampling event, perform sampling in both a HVAC on and HVAC off state with a minimum period of 36 hours between events (page 26). For an occupied building, such activities can be difficult to coordinate. Residential property owners, although inconvenienced, may be able to comply without financial impact; however, an operating business which relies on a certain daily production output, may be unable to comply as chemical removal and deactivation of any air conditioning would result in closing shop for the duration of the sampling event. The rationale for revising these guidance recommendations is discussed below. 1. Removing chemicals may temporarily reduce (but not eliminate) vapor forming chemical concentrations in indoor air; however, if such chemicals had been stored in leaky containers or frequently used within an area of a building, it's possible the case that emitted vapor forming chemicals have adsorbed to porous building surfaces (e.g., walls, ceiling, carpet, furniture, etc.) over time. Upon removal of formerly stored/used chemicals, impacted surfaces will likely continue to emit volatile chemicals in concentrations detectable in indoor air. When interpreting VI data from the building, there can be a false interpretation that, because potential chemical sources were removed from the building interior, measured indoor air constituents are likely from below the floor (sub-slab or crawlspace). On multiple occasions, when evaluating paired indoor air/sub-slab data, we have observed a downward concentration gradient. For example, the concentration of benzene within the occupied space was found to be 10x that below the slab. This is evidence supportive of vapor extrusion, not intrusion for this particular constituent. Removal of

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											potential secondary sources within the building might temporarily reduce (but not eliminate) concentrations within indoor air, thus obfuscating the concentration gradient that has existed for potentially years prior to the sampling event. While constituents in indoor air are never in complete steady state equilibrium with subsurface soil gas and outdoor air, the act of chemical removal only a couple days before sampling perturbs the system being investigated potentially leading to ambiguous or, worse, incorrect conclusions about vapor sources and transport. Potential interior indoor air sources should be thoroughly documented as part of an initial building survey, which may/should include “sniffing” individual storage areas/rooms with a low level sensitive PID. This information in conjunction with constituent-specific attenuation factors (some of which may be greater than 1) can be used to more accurately inform the fate and transport of vapor forming chemicals within the subsurface soil and building system in its normal unperturbed state.

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352	1. Formal/ Official	47	06/01/2020	Matthew	Jones	Trihydro Corporation	47.002	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07b. Step 3A – Conduct in Depth Building Survey	26	2. Conducting a sampling event during both an HVAC-on and HVAC-off status adds to the scope in a manner difficult to comply with for both residential and commercial buildings and may result in a superfluous set of VI data (i.e., one event will not capture the “worst case”). It is recognized that HVAC systems, particularly the large industrial variety, have some measurable effect on indoor air constituent concentrations due to increased ventilation and effects on interior building air flow (e.g., creating a stack effect during heating), which can increase advection through the sub-floor cracks and penetrations. Ideally, however, VI sampling events would be conducted during the “worst case” season and HVAC on/off status. DTSC has indicated that a database of building VI sample results will be maintained for, among other things, the purposes of empirically determining a conservative building attenuation factor potentially distinct from the USEPA default value of 0.03 (pages 7-8). It is recommended that this same data set be mined to evaluate the attenuation factor versus HVAC system status relationship with consideration for the building being in heating or cooling season. A simple comparison of mean/95UCL of attenuation factors for this 2x2 matrix of conditions (HVAC On/Off vs Heating/Cooling Season) may inform the typical worst case conditions (i.e., lowest alpha). The guidance could then recommend sampling during this condition, and only when not possible, additional events would be prescribed as currently outlined. In this manner, the scope of work and inconvenience to the occupants may be able to be reduced while still providing a conservative result that is likely more protective of human receptors.

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353	1. Formal/ Official	48	06/01/2020	Dennis	Nakamoto	Wallace-Kuhl & Associates	48.001	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	The Executive Summary specifies that the Final Guidance will not be binding on either the regulatory agencies or the regulated public. The Executive Summary goes on to state that a regulatory agency should not make the public defend against enforcement f the Guidance (page v). The Guidance is stated as not being either prescriptive or inflexible (page 2). Well before the Draft Guidance was made available to the public, we had orally communicated with a representative of the group preparing the document. A portion of that conversation addressed, what the representative referred to as “underground regulation”. Even before the Draft Guidance had been released, we were told by some agency representatives that their department would be strictly following the guidance. Because of this potential conflict between a flexible guidance and a strictly applied guidance, we ask that the guidance clearly state the process for the regulated community to option out of some or all of the guidance elements.
354	1. Formal/ Official	48	06/01/2020	Dennis	Nakamoto	Wallace-Kuhl & Associates	48.002	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06d. Step 2C – Evaluate Temporal Variability	17	Step 2C – Evaluate Temporal Variability: This section describes having to collect soil gas samples during two different seasons before a decision may be made regarding the risk posed to human health (page 17). This requirement will extend the assessment period to over six months, which would exceed the current decision period employed by land developers. Thus, development of brownfields and conversion of land uses could be curtailed.

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355	1. Formal/ Official	48	06/01/2020	Dennis	Nakamoto	Wallace-Kuhl & Associates	48.003	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	19	The Draft Guidance describing having to remove sources of VOCs within occupied buildings and then operating the HVAC system in preparation of collecting indoor air sample (page 19). This action would close the building for operation for a period more that a weekend period. In the post COVID 19 environment, more economic loss would be incurred. The guidance notes that some VOC sources, such as carpets could not be removed; however, there are no clearly stated alternatives to the indoor sampling requirement. Assessments of unoccupied buildings become problematic as the HVAC systems may not be operational or the configuration of the building may change before future human occupancy. The guidance fails to differentiate between residential, commercial and industrial sized buildings. There are no discussion of vertical stratification arising from tall ceiling heights. The guidance should have included data derived by structural or material engineers regarding attenuation factors provided by foundation designs. The attenuation factors are key to the initial assessment of soil vapor intrusion.
356	1. Formal/ Official	49	06/01/2020	Steve	Luis	Ramboll	49.001	01. VI Supplemental Guidance General Comments	01a. General Comments		Ramboll has identified the following concerns regarding the Guidance: Significant portions of the Guidance exceed and contradict the stated scope of the Guidance Step 4 is inconsistent with the stated scope of the guidance Use of the 0.03 attenuation factor with external soil vapor sample results is technically indefensible The Guidance should acknowledge CalEPA's stated acceptance of modeling as a tool for evaluating vapor intrusion sites The Guidance should clarify criteria for evaluating sewers We summarize these concerns and provide comments and recommendations below.

357	1. Formal/ Official	49	06/01/2020	Steve	Luis	Ramboll	49.002	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	Significant Portions of the Guidance Exceed and Contradict the Stated Scope of the Guidance As stated in the Executive Summary, the Draft Supplemental Guidance was developed to serve as a “supplement to existing information, not as a standalone document” and “does not constitute complete guidance for the overall evaluation and management of VI.” The Guidance supplements existing guidance and does not constitute a comprehensive roadmap for evaluating, much less mitigating or remediating, vapor intrusion sites. As expressed in at least one of the YouTube videos posted by CalEPA, the Guidance “does not cover everything needed to clean up a site.” The Executive Summary indicates what is not included in the Guidance, stating that the Guidance “does not provide guidance on the sampling required for all media (soil, vapor, and groundwater) to determine the nature and extent of contamination in development of a conceptual site model. Cleanup goals, remedial strategies, and closure criteria should be established on a site-specific basis, which is outside the scope of this document” (emphasis added). Although the Executive Summary emphasizes what is not included within the scope of the Guidance, it also clearly states what is included: “The Supplemental Guidance recommends a consistent approach to be used by practitioners and regulators when screening buildings for subsurface vapor risk to building occupants” (emphasis added). Although “screening” is not explicitly defined in the Draft Supplemental Guidance, it is generally understood to refer to a preliminary step in the process of site evaluation. The United States Environmental Protection Agency (USEPA) provides a relevant definition in Section 6.5 of its 2015 Vapor Intrusion Guidance: “The primary objective of risk-based screening is to identify sites or buildings unlikely to pose a health concern through the vapor intrusion pathway. Generally, at properties where subsurface concentrations of vapor-forming chemicals (e.g., groundwater or “near source” soil gas concentrations) fall below screening levels (i.e., VISLs), no further action or study is warranted…”

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											Although these limitations are stated clearly, the Executive Summary goes on to state that “This Supplemental Guidance describes a framework for deciding when cleanup and/or mitigation is needed.” Ramboll recognizes that in some instances an expedited response is warranted based on a screening evaluation. However, after sites are screened “in,” most decisions regarding cleanup and/or mitigation are appropriate only after thorough investigation of the site, development of a comprehensive understanding of site conditions and potential exposure pathways, and summary of that understanding in a robust conceptual site model (CSM). As reflected in the remainder of the document following the Executive Summary, the Guidance exceeds and contradicts its stated scope. For example, the Conclusion indicates that “Through a four-step process outlined in this Supplemental Guidance, regulators and practitioners can evaluate whether occupants of buildings located near known or suspected subsurface VFC sources are at potential health risk from VI. Moreover, this Supplemental Guidance provides a reasonable framework to decide when the potential VI risk should be managed.” Although preliminary determinations of risk and decisions regarding management of potential VI risk may fall within the scope of a screening-level assessment for the purpose of screening sites out of the evaluation process (i.e., identifying sites for which potential risks are clearly not of concern), experience demonstrates that final decisions typically are made only after thorough investigation of the site and development of a comprehensive CSM.

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358	1. Formal/ Official	49	06/01/2020	Steve	Luis	Ramboll	49.003	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	The out-of-scope components of the Guidance also appear to short-circuit provisions in the National Contingency Plan (NCP; see sections §300.420-§300.430)1 and the Hazardous Substance Account Act (HSAA). Both the NCP and HSAA place final decision-making at the end of processes that include thorough site investigations. The purpose of a more thorough investigation is reflected in the very terminology widely used in the environmental community: at §25322.2, the HSAA defines remedial investigation to be “those actions deemed necessary by the department to determine the full extent of a hazardous substance release at a site, identify the public health and environmental threat posed by the release, collect data on possible remedies, and otherwise evaluate the site for purposes of developing a remedial action plan.” 1 The NCP also includes an expedited process of site evaluation and removal action in §300.410 and §300.415.
359	1. Formal/ Official	49	06/01/2020	Steve	Luis	Ramboll	49.004a	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	The Department of Toxic Substances Control (DTSC) provides a useful framework specific to investigating vapor intrusion sites in its 2011 Vapor Intrusion Guidance (2011 VIG), summarized as a flexible 11-step process, which DTSC staff have successfully applied at sites throughout California. The stated scope of the Guidance appears to pertain to 2011 VIG steps 1-5 and, if indoor air sampling is warranted, steps 8-10. However, the Guidance discusses additional components of investigation, risk assessment, and remedial decisions that appear in steps 6-7 and 11. The Executive Summary recognizes the potential for “conflict” with existing VI guidance and recommends the Draft Supplemental Guidance be given precedence. However, given the inherent contradiction within the Guidance as noted above, this recommendation will (indeed, already has – see below) lead to confusion and inconsistent decision-making as CalEPA staff are left to make their own determinations regarding applicability.

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360	1. Formal/ Official	49	06/01/2020	Steve	Luis	Ramboll	49.004b	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	The Department of Toxic Substances Control (DTSC) provides a useful framework specific to investigating vapor intrusion sites in its 2011 Vapor Intrusion Guidance (2011 VIG), summarized as a flexible 11-step process, which DTSC staff have successfully applied at sites throughout California. The stated scope of the Guidance appears to pertain to 2011 VIG steps 1-5 and, if indoor air sampling is warranted, steps 8-10. However, the Guidance discusses additional components of investigation, risk assessment, and remedial decisions that appear in steps 6-7 and 11. The Executive Summary recognizes the potential for “conflict” with existing VI guidance and recommends the Draft Supplemental Guidance be given precedence. However, given the inherent contradiction within the Guidance as noted above, this recommendation will (indeed, already has – see below) lead to confusion and inconsistent decision-making as CalEPA staff are left to make their own determinations regarding applicability.

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361	1. Formal/ Official	49	06/01/2020	Steve	Luis	Ramboll	49.005	16. Other	16a. Other		During the recent Question & Answer sessions, CalEPA indicated the Draft Supplemental Guidance has been released in draft form for public comment only and will be implemented following review of public comments and finalization of the Guidance. However, on multiple occasions since its release in February 2020, CalEPA staff have sought to apply the Guidance to sites in California. Moreover, some staff appear to be misinformed as to the purpose of the Guidance as they seek not only to apply the Guidance prematurely, but also to apply the Guidance outside its stated scope. Instances in which CalEPA staff have sought to apply the Guidance outside its stated scope include the following: evaluation of sites that have been investigated extensively and for which robust CSMs have been already been developed, evaluation of sites that have already been remediated, development of cleanup levels, and decision-making regarding the need for and nature of remedial action.

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362	1. Formal/ Official	49	06/01/2020	Steve	Luis	Ramboll	49.006	01. VI Supplemental Guidance General Comments	01b. Recommendations		Finally, some staff have also expressed the view that the Draft Supplemental Guidance disallows the use of models such as the Johnson & Ettinger (J&E) model to evaluate vapor intrusion sites. To address the issues raised above, Ramboll recommends the following: Clarify the applicability and scope of the Guidance in general and with respect to existing CalEPA vapor intrusion guidance. Rather than focusing on what is outside the scope of the Draft Supplemental Guidance, clearly specify what is within the scope of the Guidance. Provide a definition of “screening” analogous to the definition provided in Section 6.5 of USEPA’s 2015 VI Guidance. Identify those steps of the 2011 VIG 11-step process and/or other existing CalEPA guidance as appropriate to which the Draft Supplemental Guidance is applicable (i.e., steps 1-5 and, if warranted, 8-10). Clarify distinctions among screening sites, investigating sites, developing cleanup levels, and making decisions regarding remediation. Upon finalization of the Guidance, provide training and support to CalEPA staff to promote consistent implementation of the Guidance.

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363	1. Formal/ Official	49	06/01/2020	Steve	Luis	Ramboll	49.007	08. Step 4: Concurrent and Future Risk Evaluation and Manageme nt Decisions	08a. General Comment s	27	Step 4 is Inconsistent with the Stated Scope of the Guidance As discussed above, the Executive Summary states the purpose of the Draft Supplemental Guidance is to provide guidance when screening sites for potential VI concerns. The Executive Summary indicates that decisions regarding remediation are outside the scope of the Guidance. This makes sense: the purpose of a screening evaluation is to distinguish those sites at which no further investigation is warranted (i.e., sites that are screened “out”) from sites at which there may be imminent threats to building occupants (i.e., those sites at which urgent responses are warranted to protect building occupants) or at which further investigation is warranted (i.e., sites that are screened “in”). The emphasis on remediation in the context of Step 4 is inconsistent with the stated purpose of the Guidance. Aside from addressing imminent threats, decisions regarding remediation and mitigation (including operations & maintenance of mitigation systems) are appropriate following thorough investigation and development of a robust CSM, which is outside the stated scope of the Guidance. To address the issues raised above, Ramboll recommends the following: Revise Step 4 to be consistent with the screening purpose of the Draft Supplemental Guidance. Revise the Risk Management Decision Framework for Vapor Intrusion to be less prescriptive and to focus on additional investigation (i.e., the natural result of a site being screened “in” – further investigation is warranted) rather than remediation, etc.

364	1. Formal/ Official	49	06/01/2020	Steve	Luis	Ramboll	49.008	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	Use of the 0.03 Attenuation Factor with External Soil Vapor Sample Results is Technically Indefensible The Draft Supplemental Guidance recommends a soil vapor-indoor air attenuation factor (AF) of 0.03 for use with sub-slab soil vapor and "external" soil vapor to screen sites in California.2 The Guidance cites USEPA (2015) as the source of the 0.03 AF. USEPA (2015), in turn, is based on USEPA (2012), which reports the AF of 0.03 to be based on analysis of data in the underlying USEPA AF Database (an Excel spreadsheet containing the data used to calculate USEPA's AFs). In response to questions posed during CalEPA's recent online Question & Answer sessions, reliance on the USEPA AF Database upon which the 0.03 AF is based was defended on the following grounds: It is the only and/or best AF dataset available. The 0.03 AF from the USEPA AF Database has been used by 47 states. The USEPA AF Database has been subjected to peer review. USEPA's analysis and results were not defended on their technical merits as being reasonable or valid. As USEPA acknowledges, although definition and calculation of AFs are straightforward, development of representative AFs is challenging due to spatial and temporal variability of both indoor air and subsurface concentrations (both sub-slab soil vapor and external soil vapor) as well as contributions of background sources of vapor-forming chemicals (VFCs) "which may impart a high bias" to AFs (USEPA, 2012). USEPA (2012) devotes several pages to the challenging problem of identifying sample pairs appropriate for use in calculating AFs due to the potential for upward bias resulting from background/ambient VFCs. Ramboll agrees that screening out sample pairs influenced by background/ambient VFCs is a critical and challenging step when developing AFs (see, for example, Luis, et al., 2019).

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											2 Sub-slab soil vapor samples are collected from within the building footprint at approximately 6 inches below the foundation/building slab. External soil vapor samples are those samples collected outside the building footprint at depths greater than those collected in sub-slab soil vapor samples, typically 5 or 15 feet below ground surface.

365	1. Formal/ Official	49	06/01/2020	Steve	Luis	Ramboll	49.009	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	Ramboll has reviewed USEPA (2015) as well as the USEPA AF Database and accompanying report (USEPA, 2012), with a focus on the AFs calculated using external soil vapor data. USEPA's analysis was based on 106 external soil vapor and indoor air sample pairs collected between approximately 1993 and 2007.3 Most sample pairs are for residences; commercial buildings are not well represented (as acknowledged by the Guidance on p. 7). Characteristics of the dataset are provided by USEPA and summarized in the table below (for more information, see the USEPA AF Database and USEPA (2012)). Based on the table above, Ramboll observes the following: Some AFs are greater than 1 (i.e., Grants, NM) and others were close to 1 (SCM Cortlandville, NY). As noted by USEPA, AFs greater than 1 likely indicate upward bias due to the presence of a background/ambient source of VFCs. In fact, USEPA reported reviewing AFs to identify and screen out values greater than 1 to reduce upward bias resulting from background/ambient VFCs. Only one site is located California. Many of the sites are located in cold-weather climates (e.g., Endicott, NY) that are not representative of conditions in California. As has been reported in the literature, climate can strongly influence vapor intrusion (Brewer, et al. 2014). Most building foundations were classified as basements. As California residents are aware, the foundations of the overwhelming majority buildings in California are slab-on-grade. Moreover, basements can promote vapor intrusion (ITRC, 2007), so AFs for buildings with basement foundations are likely to be higher than AFs for buildings with slab-on-grade foundations. Fewer than three sample pairs were available for the following sites: Alliant, CO; Jackson, WY; MADEP1, MA. Given the spatial and temporal variability of concentrations that makes determination of AFs challenging, as USEPA acknowledges, reliance on such small sample sizes unnecessarily introduces uncertainty into USEPA's analysis.

											Although USEPA rated data quality for most sites as “High,” data quality for two sites was rated “Low.” The USEPA rated the data quality of the sole California site as “Low.” In addition, although USEPA reports that the temporal gap between collection of indoor air and soil vapor sample pairs was limited to “a few weeks,” review of the USEPA AF Database indicates temporal gaps of greater than one year are present in the dataset. Spatial gaps between soil vapor sample locations and buildings in which indoor air samples were collected range from approximately 25 feet to more than 200 feet, with most distances greater than 50 feet. Doubtless, many of the data pairs used by USEPA would not be acceptable for use today. USEPA calculated the median and 95th percentile soil vapor-indoor air AFs to be approximately 0.004 and 0.3, respectively. USEPA commented as follows: The median exterior soil gas attenuation factor is slightly larger, and the 95th percentile value is substantially larger than the respective statistics for the subslab soil gas attenuation factors (see Table 10 and Figure 25). This is contrary to the conceptual model for vapor intrusion, which predicts that the exterior soil gas attenuation factor for a given building is expected to be smaller than the subslab soil gas attenuation factor for that building because the former includes an additional contribution from attenuation through the vadose zone. (USEPA, 2012 [emphasis added]) Acknowledging this counterintuitive and inconsistent result, USEPA (2015) substitutes the 0.03 AF developed for sub-slab soil vapor data for the flawed AF developed using soil vapor data. As USEPA and intuition indicate, the 0.03 AF developed from sub-slab soil vapor-indoor air data pairs is necessarily higher than the corresponding AF for deeper soil vapor data. 3 The Draft Supplemental Guidance acknowledges that the USEPA AF Database relies on results of samples collected “at a time when building

366	1. Formal/ Official	49	06/01/2020	Steve	Luis	Ramboll	49.010	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05a. General Comments	vii, 5	A study of AFs using substantially larger numbers of data pairs for sites in California than USEPA is available. Ettinger, et al. (2018), is based on 385 soil vapor-indoor air data pairs and 301 sub-slab soil vapor-indoor air data pairs. Residences and commercial buildings with slab-on-grade foundations are well represented. The study concluded that the 95th percentile AFs for residential and commercial sites in California is approximately 0.002, roughly an order of magnitude lower than USEPA's AF of 0.03.4 The AF of 0.02 is generally consistent with existing AFs listed in DTSC's 2011 VIG. As noted above, during recent public Question & Answer sessions, CalEPA referred to the fact that the 0.03 AF is based on a peer-reviewed study by USEPA. However, USEPA indicates the document (i.e., an earlier draft of USEPA (2012)) was subjected to external peer review. USEPA does not indicate the underlying dataset was subject to peer review. The seven "Charge Questions" for the peer reviewers are listed in Section A.3 of USEPA (2012). Review of these Charge Questions shows that, with one exception, the focus is on documentation, methodology, and discussion. The only Charge Question pertaining to review and critique of the underlying dataset focuses on an important but narrow statistical question regarding treatment of non-detect sample results. Other than this narrow statistical question, there is no indication the underlying dataset was subjected to external peer review. Moreover, with respect to the issues raised above about data quality and the potential for background/ambient sources introducing upward bias in AFs, the reviewers' comments are not uniformly favorable, as indicated by the quotes below: The document admits that data quality at some sites is low, sites may not be well-characterized, and source strengths beneath buildings may not be known. (p. A-10) Was the potential for indoor sources of background VOCs

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											appropriately considered when interpreting the results? No. (p. A-10) Based on the foregoing considerations, it is apparent that USEPA's external peer review was limited and did not include evaluation of the underling USEPA AF Database. Moreover, some of the reviewers' comments were unfavorable. 4 It is worth noting a second study, Nawikas (2020), which developed AFs using 220 paired sub-slab soil vapor-indoor air radon sample results for commercial buildings located throughout California, resulting in a somewhat higher AF of 0.004. This study is less relevant to the discussion above which focuses not on sub-slab soil vapor data but on external soil vapor data.

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367	1. Formal/ Official	49	06/01/2020	Steve	Luis	Ramboll	49.011	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	Given the shortcomings of the USEPA AF Database both in general, as USEPA acknowledges, and with respect to applicability to California, Ramboll recommends the following: Continue to use current AFs listed in the 2011 VIG and other lines of evidence (including modeling) as appropriate rather than the USEPA AF Database until California AFs become available. Develop California AFs based on data obtained through up-to-date sampling techniques from sites in California. Data selection and screening criteria should be implemented more rigorously than in USEPA (2012). In addition to previously published studies, Ramboll understands that DTSC is currently developing California AFs. As summarized in the Guidance, GeoTracker is available for uploading data suitable for development of AFs as well. Given the challenges in developing AFs, consider performing cost-benefit analyses to establish AFs within a framework of decision-making under uncertainty or hypothesis testing (see, for example, Benjamin & Cornell, Probability, Statistics, and Decision for Civil Engineers, 2014).

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368	1. Formal/ Official	49	06/01/2020	Steve	Luis	Ramboll	49.012	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	The Guidance Should Acknowledge CalEPA's Stated Acceptance of Modeling as a Tool for Use in Evaluating Vapor Intrusion Sites During the recent Question & Answer sessions CalEPA acknowledged that models can be used to evaluate vapor intrusion sites. However, the Draft Supplemental Guidance appears to contradict this position, stating that models are "not recommended for the screening described in this Supplemental Guidance." The Draft Supplemental Guidance also indicates "Current VI models with scientifically defensible input parameters cannot predict the range of results observed in empirical VI studies," appearing to cite Derycke, et al. (2018) and USEPA (2012b) in support of its recommendation against using models. Ramboll has reviewed both cited documents and could not find statements that directly support this quote. To address the issues raised above, Ramboll recommends the following: Acknowledge that the use of models as a line of evidence is acceptable. Clarify and/or revise the statement above to be consistent with the cited literature.

369	1. Formal/ Official	49	06/01/2020	Steve	Luis	Ramboll	49.013	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11a. General Comments	10, Attachment 2	The Guidance Should Clarify Criteria for Evaluating Sewers The Draft Supplemental Guidance emphasizes the potential for “vapor conduits,” especially sewers, to convey VFCs beneath or directly into buildings in the Executive Summary, Introduction, Step 1B.2, and Attachment 2. In the Executive Summary, the Guidance indicates that “Recent scientific literature highlights the importance of sewer lines as a potential preferential pathway for vapor intrusion” and Attachment 2 indicates that “A growing body of evidence is highlighting the importance of sewer lines as potentially significant preferential pathways for VI,” providing a list of citations.5 The Guidance acknowledges that plumbing systems include components intended to prevent intrusion of sewer gases into buildings, but the Guidance also makes the broad assertion that those components can become “compromised” due to dry p-traps and degraded toilet gaskets, concluding that “Overall, this evidence shows that conventional methods used to assess VI (i.e., groundwater and soil gas sampling outside the building) may not adequately represent the potential risk posed by VFCs.” The Guidance also indicates indoor air sampling may be warranted for “Buildings connected to vapor conduits that intersect significant levels of contamination,” but does not specify the levels that constitute “significant” or the likelihood that the vapor conduits will increase the potential for vapor intrusion. This emphasis without clarification is of concern because virtually all buildings evaluated for a potential intrusion condition are constructed with sewers and other types of vapor conduits, but experience and the professional literature indicate that instances of sewers playing a significant role in vapor intrusion are relatively rare. Without further explanation, a reasonable interpretation is that vapor conduits should be evaluated in all cases. To avoid unnecessary investigation, increased risk of false alarms, and inefficient allocation of resources, the Supplemental Guidance should provide appropriate context and point out that the literature concerning “vapor conduits” acknowledges that such cases are rare. In addition, the Supplemental Guidance should also provide

											guidance to assist the user in distinguishing higher risk scenarios from lower risk scenarios such as that provided in the cited documents by SERDP/ESTCP, which explains that vapor conduits should be of concern only under certain circumstances. Local building codes govern sewers with the objective not only of conveying wastewater from the sources but also protecting building inhabitants from sewer gas, which includes toxic and hazardous gases such as hydrogen sulfide and methane. For example, in 2011 the City of Los Angeles published its Sewer Odor Control Master Plan that includes discussion of the many measures taken to control sewer gas (https://www.lacitysan.org/cs/groups/public/documents/document/y250/mdez/~edisp/cnt013943.pdf). This point is acknowledged by the literature cited by CalEPA (see, for example, Pennell, 2013). As also acknowledged in the literature (again, see, for example, Pennell, 2013), the odor threshold for hydrogen sulfide is relatively low, ranging from approximately 4 to 30 micrograms per cubic meter (µg/m3). These concentrations are in the same range of indoor air screening levels for VFCs of interest from a vapor intrusion perspective. If plumbing components were compromised to facilitate VI, they would likely also produce sewer gas odors noticeable to building occupants, as indeed was the case in the residence studied by Pennell (2013).6 To address the issues raised above, Ramboll recommends the following: • Clarify the criteria indicating investigation of sewers is warranted. • Consult with organizations knowledgeable about design, construction, and operation of sewers and other components of wastewater collection and conveyance systems. • Add the following criterion to those criteria to be considered as part of the decision to sample indoor air (Step 1B.2): Indication of compromise of plumbing fixtures such as p-traps and toilet gaskets designed to prevent migration of sewer gas into the building. • Consistent with the Draft Supplemental Guidance emphasis on sewers and conduits, Ramboll recommends including guidelines in

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											Attachment 5 to assist building surveyors in the identification of sewers and other vapor conduits that are likely to play a role in vapor intrusion. For example, the forms should include examination of p-traps and toilet gaskets, consistent with the discussion of sewers in Attachment 2. 5 Note that at least one of the articles cited, Guo, et al. (2015), focuses on land drains rather than sewers. 6 Moreover, Pennell (2013) reported that the owner of the building noted “that the toilet did not appear to be properly attached to the sewer pipe.”

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370	1. Formal/ Official	50	06/01/2020	Eileen	Chen	Alameda County Water District	50.001	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05c. Step 1B – Prioritizing Buildings for VI Evaluation	10, 12	1. Step 1B.2 – Contaminated Vapor Conduits and Step 2A.2 – Sampling to Characterize the Overall Soil Gas Plume Vapor conduits (e.g., sewers, drains, and other large subsurface pipe) and the backfill material surrounding the pipe can act as preferential pathways for soil vapor contaminants. Vapor can travel inside of the piping or outside along the backfill material (which is often sand). The Supplemental Guidance indicates that due to greater void space, vapor transport can be greater in the pipe than the backfill, therefore, has focused largely on sampling conduit air. However, in situations where conduits are intersecting or are located directly above contaminated soil, or groundwater, the backfill material may still act as a significant preferential pathway for vapor migration. Therefore, it should be clarified, that during the assessment of preferential pathways, both vapor conduits and associated backfill material should be evaluated. In addition, all permitting and local ordinances pertaining to conducting subsurface work should be followed. In some cases, shallow drilling or drilling through the slab floor is not regulated. The Supplemental Guidance should provide language regarding the proper re-sealing of structures compromised during sampling activities (e.g., flooring or foundations) and the proper grouting of all boreholes to avoid creating unintentional preferential pathways for vapor migration.

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371	1. Formal/ Official	50	06/01/2020	Eileen	Chen	Alameda County Water District	50.002	10. Attachment 1 – Petroleum Specific Considerati ons	10a. General Comment s	Attachment 1	2. Attachment 1: Petroleum-Specific Considerations In the State Board's Low-Threat Underground Storage Tank Case Closure Policy (LTCP), the soil gas criteria (media-specific criteria for petroleum vapor intrusion Scenario 4-1 (no bioattenuation zone)) are based on the California Human Health Screening Levels (CHHSLs), while the Supplemental Guidance is based mainly on the Department of Toxic Substances Control's (DTSC) Human Health Risk Assessment (HHRA). Since both are human health based, the resulting differences in soil gas screening levels/risk for benzene, ethylbenzene, and naphthalene, should be discussed.

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372	1. Formal/ Official	51	06/01/2020	Brett	Thomas	Riaz Capital	51.001a	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	1. The DSVIG Should Be Withdrawn Until the Agencies Speak With One Voice Agency representatives have stated that the Draft Supplemental Vapor Intrusion Guidelines (DSVIG) would provide a unified approach to investigating, regulating, and mitigating vapor intrusion. To the contrary, even after the DSVIG was published for public comment, management-level staff at the Department of Toxic Substances Control (DTSC) have stated that they will use different Attenuation Factors (AF) for new residential (.001) and commercial (.0005) buildings that DTSC staff announced during the December 19, 2019 National Brownfields Conference in Los Angeles. Similarly, various Regional Water Quality Control Board managers have stated that they will continue to use AFs ranging from .002 to .03 for new residential buildings. There is great confusion among the regulator community as well as those who are regulated, leading to disinvestment in affordable housing and widespread distrust of the ability of the various agencies to approach vapor intrusion issues on a unified, scientific basis. This confusion undermines the credibility of the DVSIG and the agencies responsible for its development. The only appropriate remedy is for Cal-EPA, DTSC and the State and Regional Water Boards to withdraw the DSVIG and resolve obvious implementation conflicts before progressing further with public review and comment.

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373	1. Formal/ Official	51	06/01/2020	Brett	Thomas	Riaz Capital	51.001b	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	1. The DSVIG Should Be Withdrawn Until the Agencies Speak With One Voice Agency representatives have stated that the Draft Supplemental Vapor Intrusion Guidelines (DSVIG) would provide a unified approach to investigating, regulating, and mitigating vapor intrusion. To the contrary, even after the DSVIG was published for public comment, management-level staff at the Department of Toxic Substances Control (DTSC) have stated that they will use different Attenuation Factors (AF) for new residential (.001) and commercial (.0005) buildings that DTSC staff announced during the December 19, 2019 National Brownfields Conference in Los Angeles. Similarly, various Regional Water Quality Control Board managers have stated that they will continue to use AFs ranging from .002 to .03 for new residential buildings. There is great confusion among the regulator community as well as those who are regulated, leading to disinvestment in affordable housing and widespread distrust of the ability of the various agencies to approach vapor intrusion issues on a unified, scientific basis. This confusion undermines the credibility of the DVSIG and the agencies responsible for its development. The only appropriate remedy is for Cal-EPA, DTSC and the State and Regional Water Boards to withdraw the DSVIG and resolve obvious implementation conflicts before progressing further with public review and comment.

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374	1. Formal/ Official	51	06/01/2020	Brett	Thomas	Riaz Capital	51.002	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	2. The DSVIG Creates Major New Barriers to Affordable Housing Projects It is notable that one of the “Essential Businesses and Activities” exempted from even the most stringent COVID-19 “shelter-in-place” orders is the “construction of affordable housing.” However, the success of in-fill housing developments in many California communities will depend on avoiding the imposition of unnecessary costs. This reality argues for more refined vapor intrusion guidance that actually screens out lower risk sites. Conceptual site models and other screening tools must use inputs that are representative of actual site conditions. A multiple-lines-of-evidence approach using site-specific information should be encouraged in lieu of default assumptions. This approach is consistent with EPA guidance and long standing DTSC and Water Board practice. Deficiencies in these aspects of the DSVIG will make redevelopment of urban brownfields much more difficult and expensive and will serve as a major barrier to resolving California’s affordable housing crisis.

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375	1. Formal/ Official	51	06/01/2020	Brett	Thomas	Riaz Capital	51.003	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	3. Default Attenuation Factor Must Be Replaced With California-Specific Values The DSVIG proposes to use USEPA's default soil vapor attenuation factor (AF; 0.03) for various purposes ranging from indoor air screening of existing buildings to risk management decisions for future buildings. The DSVIG appropriately acknowledges some of the shortcomings in the USEPA AF data base (very few California data; a limited number of buildings designed for commercial or industrial use; lack of site-specific outdoor air data; a limited number of paired indoor air and subsurface samples; see pages 7-8) and it commits to developing a California-specific data base. These statements implicitly recognize that a single default value based predominantly on data from sites in Colorado and New York cannot reasonably represent the VI conditions that exist at sites in California. In the best case, use of a 0.03 AF as interim policy would substantially increase the number of sites the state characterizes as "high risk" for purposes of vapor intrusion investigation, diverting limited regulatory and private resources from truly high-risk sites to lower risk sites. Adoption and field use of a final supplemental VI guidance document should be conditioned on completion of a California data base and development of California-specific AFs. If Cal-EPA must establish an interim statewide policy while it works toward this goal, it should utilize a range of values derived from the soon-to-be-completed DTSC data base (see next comment) and other relevant, published and peer reviewed sources.

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376	1. Formal/ Official	51	06/01/2020	Brett	Thomas	Riaz Capital	51.004	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	4. DTSC's Data Base Should Be The Foundation For Any Interim Attenuation Factors The DSVIG invites many unanswered questions about how the California data base will be developed, in what timeframe, and whether this work will actually lead to California-specific values that supplant the default USEPA value. More importantly, it fails to acknowledge that this work is already underway at the Department of Toxic Substances Control (DTSC), which is nearing completion of a California AF data base using available data from EnviroStor that meets more rigorous data quality requirements and is far more representative of actual California sites than the USEPA data base. DTSC staff openly discussed their "Attenuation Factor Study" during USEPA's recent national brownfields conference in Los Angeles (December 2019). It should be foundational to any interim guidance and to a future statewide VI policy.

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377	1. Formal/ Official	51	06/01/2020	Brett	Thomas	Riaz Capital	51.005a	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	5. DSVIG Creates Confusion About Its Intended Applicability In anticipation of this guidance, many case managers at many different agencies have been citing 0.03 as the default AF for all potential VI sites, regardless of the presence or absence of occupied buildings on those sites. A core purpose of the DSVIG should be to clarify that it only applies to initial screening of occupied buildings. Instead, it contains broad-brush statements that are counter-productive to this purpose. For example, the document states “The same logic and approach can be extended to the evaluation and management of future VI risk for sites with existing buildings or open lots planned for redevelopment.” On the one hand, the DSVIG encourages use of other VI guidance and, on the other hand, indicates that where conflicts arise, the DSVIG should take precedence. DTSC announced at the December 2019 brownfields conference that it will recommend AFs of .001 for new residential buildings and .0005 for new commercial buildings. DTSC’s values clearly conflict with a 0.03 AF. The DSVIG appears to require across the board use of an AF developed in 2015 from predominantly out-of-state data, rather than DTSC AFs developed on 2019-2020 exclusively from California data. Absent explicit statements restricting its application to a clearly defined set of circumstances, the DSVIG will exacerbate the confusion that already exists in the field about how to evaluate potential VI risk under other circumstances. That confusion will lead to remedies that are more costly than necessary to protect public health. 1 DVSIG, pages 1-2.

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378	1. Formal/ Official	51	06/01/2020	Brett	Thomas	Riaz Capital	51.005b	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	5. DSVIG Creates Confusion About Its Intended Applicability In anticipation of this guidance, many case managers at many different agencies have been citing 0.03 as the default AF for all potential VI sites, regardless of the presence or absence of occupied buildings on those sites. A core purpose of the DSVIG should be to clarify that it only applies to initial screening of occupied buildings. Instead, it contains broad-brush statements that are counter-productive to this purpose. For example, the document states “The same logic and approach can be extended to the evaluation and management of future VI risk for sites with existing buildings or open lots planned for redevelopment.” On the one hand, the DSVIG encourages use of other VI guidance and, on the other hand, indicates that where conflicts arise, the DSVIG should take precedence. DTSC announced at the December 2019 brownfields conference that it will recommend AFs of .001 for new residential buildings and .0005 for new commercial buildings. DTSC’s values clearly conflict with a 0.03 AF. The DSVIG appears to require across the board use of an AF developed in 2015 from predominantly out-of-state data, rather than DTSC AFs developed on 2019-2020 exclusively from California data. Absent explicit statements restricting its application to a clearly defined set of circumstances, the DSVIG will exacerbate the confusion that already exists in the field about how to evaluate potential VI risk under other circumstances. That confusion will lead to remedies that are more costly than necessary to protect public health. 1 DVSIG, pages 1-2.

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379	1. Formal/ Official	51	06/01/2020	Brett	Thomas	Riaz Capital	51.006	03. Flowchart (Steps)	03d. Step 3: Evaluate VI Using Concurrent Indoor Air, Subslab, and Outdoor Air	ix	6. Cleanup Goals Should Be Site-Specific The DSVIG states that cleanup goals should be site-specific and implies that the default attenuation factor of 0.03 is not required to support these decisions. However, no guidance is provided on how site-specific values can be developed. DTSC has stated that it is working on separate guidance to address this information gap, but this work is not acknowledged in the DSVIG. Furthermore, the DSVIG states that risk management decisions for future VI risk should be based on cumulative risk calculations using sub-slab vapor data and an attenuation factor of 0.03. The approach shown in Step 3 of the flow chart does not allow for site-specific assessments of cleanup goals. The ability to use site-specific data to make risk-based decisions for cleanup goals must be clearly delineated in the guidance.
380	1. Formal/ Official	51	06/01/2020	Brett	Thomas	Riaz Capital	51.007	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06a. General Comments	11	7. Proposed Investigation Requirements Are Too Prescriptive The DSVIG includes very prescriptive investigation requirements for the collection of soil gas, sub-slab, indoor air, and outdoor air data. The guidance specifies the minimum number of samples to be collected regardless of whether the high sample density described in the guidance provides a more accurate assessment of the vapor intrusion pathway. For example, the guidance requires collection of three outdoor air samples for every sampling event. However, there is typically little difference in outdoor air concentrations around a structure. Such detailed assessments will only serve to increase site investigation costs without a corresponding regulatory or public health benefit.

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381	1. Formal/ Official	51	06/01/2020	Brett	Thomas	Riaz Capital	51.008	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05c. Step 1B – Prioritizing Buildings for VI Evaluation	9	8. Emphasis On Vapor Conduits Without Adequate Guidance Will Disrupt Site Cleanups The DSVIG emphasizes the potential for "vapor conduits" (e.g., sewers) to convey vapor forming compounds (VFCs) beneath or directly into buildings. The DSVIG indicates indoor air sampling may be warranted for "Buildings connected to vapor conduits that intersect significant levels of contamination" (Step 1B.2), but does not provide guidance regarding the likelihood of such conveyance or what levels of contamination would be considered "significant." This emphasis on vapor conduits without adequate guidance will disrupt most site cleanups because virtually all buildings and many brownfield properties evaluated for a potential vapor intrusion condition contain vapor conduits. However, both the professional literature and decades of field experience indicate that instances of vapor conduits playing a significant role in vapor intrusion are rare. Without further guidance or clarification, the DSVIG's emphasis on vapor conduits will likely lead to unnecessary investigation, including indoor air sampling.

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382	1. Formal/ Official	51	06/01/2020	Brett	Thoma s	Riaz Capital	51.009	08. Step 4: Concurrent and Future Risk Evaluation and Manageme nt Decisions	08b. Step 4A – Need for Risk Manage ment	28	9. Requirements For Future Risk Evaluation Will Lead to Open-Ended Assessments The DSVIG states that indoor air data should be used for current risk evaluations and soil gas/sub-slab data should be used for future risk evaluations. Under these conditions, even if indoor air concentrations are non-detect, responsible parties could still be required to mitigate if soil gas/sub-slab concentrations exceed screening levels. Specifically, as outlined in the Risk Management Decision Framework for Vapor Intrusion, action may be required if the future risk at a building exceeds a cancer risk of 1 x 10-6 or a non-cancer hazard index of 1. For some of the most common chemicals such as TCE and PCE, this would require action at sites where sub-slab soil gas concentrations are above ~100 ug/m3 (for commercial) or ~20 ug/m3 (for residential), even if indoor air concentrations are non-detect. This policy would impose unnecessary and potentially large costs for developers, responsible parties and even building and home owners. In many cases, it will lead to on-going assessments that have no realistic endpoint or installation of mitigation systems that are not necessary to protect public health. Although the DSVIG indicates that a refined risk assessment or alternative attenuation factors can be used, it does not provide guidance on how these options could be exercised or how much data would be necessary to support alternative inputs.

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383	1. Formal/ Official	51	06/01/2020	Brett	Thomas	Riaz Capital	51.010	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	10. The DSVIG Is An Underground Regulation In California, an agency rule or standard is subject to the rulemaking provisions of the Administrative Procedure Act if: (1) it applies generally rather than to a specific case; and (2) it implements, interprets, or makes specific the law administered by the agency imposing it. (Gov't Code § 11342.600.) By its own terms, the DSVIG applies generally. The stated purpose of the document is to create a "state-wide standard practice" that is "to be used by practitioners and regulators when screening buildings for subsurface vapor risk to building occupants." The DSVIG states that when pre-existing guidance conflicts with it, the provisions of the DSVIG "should be followed." The DSVIG interprets and makes specific the law regarding hazardous substance site cleanups. It sets forth five equations that are to be used in analyzing vapor intrusion risks and specifies the key parameter (an "attenuation factor") that "should be used" in the equations. Among other things, the DSVIG specifies: (1) the number of indoor, outdoor and sub-slab samples that should be collected; (2) the depth of the sub-slab samples; (3) the manner of indoor air sample collection ("time integrated"); (4) whether and when samples in sewers and other "conduits" should be collected; (5) the number of sampling events required; and (6) when remediation and/or mitigation is required.

384	1. Formal/ Official	52	06/01/2020	Marga ret	Stone	Sacramento Area Sewer District (SASD)	52.001	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11a. General Comment s	10, Attachment 2	Comment No 1: Sewer systems should not be considered preferential pathways for building vapor intrusion As described below, sewers are designed and operate in a manner to create negative pressure, which causes air (including any soil vapor contained in the air) to flow away from buildings. Therefore, by their nature, sewers are not preferential pathways for soil vapor to enter into buildings. Wastewater (water used within a building that is not consumed) is removed from a building via the waste piping system. Wastewater first flows through a P-trap, a U-shaped pipe that holds standing water and prevents sewer gases from entering the building. By state and local plumbing codes, every water fixture with a drain must have a P-trap. The drain system within a building works by gravity, allowing wastewater to flow down gradient through a series of pipes that typically increase in diameter as more fixtures are connected. These drain pipes are connected to a vent pipe system that brings fresh air to the drain pipes, preventing suction that would either stop or slow the free flow of wastewater. Vent pipes exit the building through one or more roof vents. The roof vents allow air into the waste piping system. In multistory buildings, fixtures connect to a waste piping main stack, which eventually exits the building below grade through the foundation. Single story building waste piping collects wastewater from the building fixtures with drains eventually combining the connections to a single pipe exiting the building below grade. In municipal systems, the sewer line connecting the building to the municipal sewer main is known as a sewer lateral. Many laterals are provided with a ground level wye-cleanout, or two-way cleanout, which allows blockages to be more easily removed. After the lateral connects to the sewer main, the wastewater flows down gradient through sewer manholes to larger and larger mains known as trunk sewers or interceptors. Eventually the trunk

											sewer/interceptor reaches a pump station or wastewater treatment plant. As wastewater flows down the collection system pipeline network, the liquid pulls air with it, creating a consistent flow of air in the headspace above the liquid in the pipeline. The dynamics of sewer headspace atmosphere, including the transport of air (gas) in sewers, is discussed in scientific publications authored by Richard L. Corsi, PhD, P.E. These publications reported the concept of a Reduction Factor (RF), which is the measured ratio of the headspace airflow rate to wastewater flow rate ranging from near zero up to 0.8 at the air/water interface. The conclusions and points of note in Dr. Corsi's publications include: Liquid drag causes gas flow in the same direction as wastewater flow, and is the only ventilation mechanism that acts continuously. Under conditions of low resistance to ambient air inflow and sewer gas exhaust, liquid drag can induce maximum gas mean velocities of up to 0.66 feet per second (fps) or 0.2 meters per second (m/s). Actual velocities in sanitary sewers are expected to be on the order of: 0.13 to 0.66 fps (0.04 to 0.2 m/s) for small pipes up to 0.25 m diameter (10-inch diameter); 0.010 to 0.66 fps (0.003 to 0.20 m/s) for mid-sized pipes up to 1.0 m diameter (39- inches); and 0.016 to 0.59 fps (0.005 to 0.18 m/s) for large pipes up to 2.5 m diameter (98-inches). The Southern California Alliance of Publically Owned Treatment Works (SCAP), who represents over 80 public water/wastewater agencies in Southern California, conducted a research project in which they measured headspace air velocity in Southern California sewers. The study utilized 30 data points converted to headspace air velocity for the depth of flow. A range of magnehelic pressure and vacuum gauges with varying sensitivities were used to conduct the pressure measurements. An air flow balometer with manhole cover adapter plate was used to measure the volume of air flow being drawn into the sewer pipe system. The study showed headspace air

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											velocity ranged between 0.11 fps to 2.3 fps with an average field result of 0.55 fps. These field measurements for a Southern California collection system are in alignment with Dr. Corsi's findings. Another Southern California study measured sewer headspace vacuum at manholes and confirmed significant head space air flow away from buildings. This Southern California empirical testing and research clearly demonstrate that sewer collection systems operate under negative air pressure conditions with headspace air flowing away from buildings not towards or into buildings. As such, sewer systems should not be considered a preferential pathway for building vapor intrusion.

385	1. Formal/ Official	52	06/01/2020	Marga ret	Stone	Sacramento Area Sewer District (SASD)	52.002	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11a. General Comment s	10, Attachment 2	Comment No 2: Cured In Place Pipe (CIPP) Sewer Rehabilitation Basics Cured in place pipe (CIPP) rehabilitation is a valuable tool for the wastewater industry to rehabilitate aging sewer and lateral pipelines to increase their reliability and usable life. It is highly economical, quick, and eliminates the need for costly, time consuming and disruptive excavation. Any public exposure to CIPP curing vapors is temporary, one day or less, and transient. CIPP is widely accepted as a 50-year repair; if a sewer main and building lateral were to be rehabilitated using CIPP on separate dates the potential building exposure to CIPP curing vapors would be two times in 50-years. During the CIPP installation process, a resin-impregnated felt tube typically made of polyester is inverted or pulled through a damaged mainline sewer pipe. The liner can be inverted using water or air pressure. Hot water or steam can be used to accelerate the curing rate of the resin. If a fiberglass tube is used, the curing of the resin can also be triggered though the use of UV light introduced into the tube. As the resin cures, it forms a tight-fitting, fully structural replacement pipe that will help prevent vapor and liquid infiltration and exfiltration along the new jointless pipe. Styrene-based resin systems properly used in a CIPP installation process produce a safe and environmentally sound solution to the challenges of restoring the nation’s failing infrastructure and have been used for nearly 50 years in CIPP rehabilitation. The trenchless nature of CIPP installation makes for a potentially more cost-effective and less disruptive method than traditional "dig and replace" pipe repair methods. As such, any vapor intrusion during this process would be temporary; should a short duration intrusion occur, the effects are transient and dissipate quickly. Because styrene odor can be detected at concentrations as low as 0.16 ppm, depending on one’s ability to detect odors, styrene’s odor can be a nuisance to those not familiar with the odor. Wastewater agencies performing work may inform residents/homeowners of the CIPP installation schedule and what to expect. They should also be

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											advised to ensure that their sewer traps are filled with water and are in a proper state of repair. By design, properly maintained sewer laterals and interior plumbing systems prevent sewer gases and other vapor intrusions. There has been recent research regarding vapor intrusion concern conducted jointly with Universities in the USA and Canada by NASSCO Inc., a trade association dedicated to protecting the health and safety of worker and communities through the proper assessment, maintenance and rehabilitation of underground infrastructure. While we appreciate the importance of protecting public health and the need for this Guidance Document update, providing additional time to thoroughly review the reference documents that pertain to CIPP and provide feedback to DTSC and SWRCB staff on their relevance to this issue is critical.

386	1. Formal/ Official	52	06/01/2020	Margaret	Stone	Sacramento Area Sewer District (SASD)	52.003	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11a. General Comments	10, Attachment 2	Comment No 3: Long term sewer mitigation measures identified in the Draft Supplemental Guidance (Step 4b, Pages 28-29) have the potential to disrupt the collection system air flow balance, cause clogging or sewer overflows, and create other disruptions to the sewer system SASD agrees with the short term vapor intrusion risk mitigation recommendations of adding water to dry P-traps and replacing damaged toilet bowl gaskets. This is simply good maintenance that should be performed regardless of vapor intrusion concerns. SASD has significant concerns with some of the long term recommendations identified in the Draft Supplemental Guidance, such as venting, installing check valves and rerouting the sewer pipeline: Venting systems beyond plumbing code and municipal engineering standards is a delicate procedure and must be analyzed carefully by engineers with specific sewer air flow experience to avoid disruption of the overall collection system air flow balance. Installing check valves to gravity sewer pipelines is highly discouraged and can lead to clogging or even sewer overflows. Additionally, a check valve on a building lateral would block the beneficial airflow that exists in sewer collection systems pulling air away from the building. In rare cases where a building pad elevation is low in comparison to the sewer main elevation, the wastewater agency will recommend a backwater device to prevent sewage from back flowing up into the building during hydro jetting pipeline cleaning or extreme high flow events. It should be noted that this scenario is rare and there is not full agreement in the industry on this practice. It is widely accepted in the wastewater industry that these backwater devices can be problematic with respect to blockages and should be used with caution. There may be instances where it is beneficial to reroute a sewer main for a variety of reasons. It should be noted that generally sewer mains are routed to provide convenient building lateral connections.

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											Rerouting a typical sewer main creates a myriad of building connection challenges that need to be carefully evaluated. Additionally, it is very costly to the sewer service ratepayers and disruptive to the public. SASD urges DTSC and SWRCB to discuss potential mitigation measures and their impacts to buildings and the sewer system with wastewater industry professionals before including these measures in the final guidance.

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387	1. Formal/ Official	52	06/01/2020	Marga ret	Stone	Sacramento Area Sewer District (SASD)	52.004	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11a. General Comment s	10, Attachment 2	Comment No 4: The Draft Supplemental Guidance is overbroad in its description of buildings that should be evaluated simply due to their connection to sewers that receive vapor forming chemicals (VFCs), or pass through or overlie VFC-contaminated soil or groundwater (Page 10) The Draft Supplemental Guidance (Page 10) states: “Situations where conduit air is likely to be impacted by site contamination include: Known discharge directly into a sewer or drain; Conduits intersecting soil contamination within a VFC release area; Conduits intersecting groundwater contamination; or Conduits located directly above contaminated groundwater.” The Draft Supplemental Guidance further provides, “If it is determined that conduit air is likely to be impacted and the conduit(s) is connected to a building or has the potential to release vapors below a building, proceeding to an indoor air investigation (Step 3) is recommended for that building.” The above statement suggests that anytime a sewer receives or has received discharges containing VFCs or passes through or over VFC contamination, buildings connected to or overlying the sewer network should be evaluated for indoor air impacts. This recommendation could result in the unnecessary evaluation of numerous buildings as parties chase sewer lines throughout communities impacted by VFC releases. Such investigations would result in wasted resources and unfounded concerns. Soil vapor simply does not move throughout sewer systems to enter buildings. As set forth above in Comment No. 1, sewers are designed such that sewer vapor travels away from buildings. The recommendation should be removed or significantly narrowed to specific, well-defined, circumstances.

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388	1. Formal/ Official	52	06/01/2020	Marga ret	Stone	Sacramento Area Sewer District (SASD)	52.005	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11a. General Comment s	10, Attachment 2	Comment No. 5: More time and coordination is needed to evaluate claims relating to sewers SASD appreciates the importance of protecting public health and the need for updated guidance regarding vapor intrusion. However, the Draft Supplemental Guidance is the first DTSC/SWRCBguidance document that we are aware of that specifically identifies sewers as preferential pathways. As a result, SASD requires additional time to thoroughly review the reference documents and provide additional feedback to DTSC and SWRCB staff on their relevance to California wastewater collection systems. This extra time is particularly necessary as the COVID-19 restrictions have caused disruption, limiting resources available for fully evaluating the Draft Supplemental Guidance's claims relating to sewers. SASD requests that DTSC and SWRCB not rush into issuance of the final guidance and instead take the time to meet with SASD and other professionals within the wastewater community. SASD appreciates DTSC's and SWRCB's consideration of these comments and strongly urges DTSC and SWRCB to proceed in close coordination with the wastewater sector on any sewer collection system recommendations DTSC and SWRCB are contemplating. SASD has tremendous expertise on collection system operations and is willing to assist in this area.

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389	1. Formal/ Official	53	06/01/2020	David	Moleme n	Elevate Environmental Consultants, Inc.	53.001	08. Step 4: Concurrent and Future Risk Evaluation and Manageme nt Decisions	08d. Step 4C – Managin g Future Vapor Intrusion Risk	29	Step 4C - Manage Future Vapor Intrusion Risk Selected Text: "Collecting near-source soil gas samples (as described in Section 2A.3) is recommended to evaluate VI risks for future buildings (open lots)." Comment: This section does not address use of sub-slab samples at existing buildings to evaluate future buildings (e.g., redevelopment of a site with existing buildings). Soil gas samples above the source can overestimate sub-slab soil gas concentrations, particularly if the building footprint is not located above the source. Accordingly, in some scenarios, sub-slab soil gas concentrations in existing buildings may be more representative of concentrations which could accumulate below a future building than soil gas samples immediately above the source, particularly if the current and future building footprints are similar. We suggest the guidance clarify that subslab data collected beneath an existing building may be appropriate to evaluate vapor intrusion into a future building under the scenario described here.

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390	1. Formal/ Official	53	06/01/2020	David	Moleme n	Elevate Environmental Consultants, Inc.	53.002	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05b. Step 1A – When to Expedite VI Evaluatio ns: Acute and Short-Term Hazard	9	Step 1A - Expedite VI Evaluation if Acute or Short-Term Hazards are Present Selected Text: “When acute or short-term exposures may result in adverse health effects, promptly evaluate the need for immediate action and expedited turnaround times for laboratory analyses. Threats can also include fire and explosion hazards as well as acute toxicity.” Comment: For a compound such as trichloroethene (TCE) with an acute toxicity hazard, this statement implies that any facility with TCE as a constituent of potential concern (COPC) should have samples collected and analyzed immediately, prior to any pre-existing indoor air sampling data. There are many instances where TCE is present beneath a facility and indoor air sampling determines TCE concentrations are below the short-term action limits. Furthermore, in occupied buildings where conditions have remained unchanged for a year or more, the risk averted by expediting turnaround times (i.e., from two weeks to 1-2 days) may be insignificant relative to the overall occupancy period. We suggest caveats be added to this statement noting that facility history and prior analytical data should be considered in selecting the most appropriate timing of actions and turnaround times.

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391	1. Formal/ Official	53	06/01/2020	David	Molemen	Elevate Environmental Consultants, Inc.	53.003	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05b. Step 1A – When to Expedite VI Evaluations: Acute and Short-Term Hazard	9	Step I.A - Sample Locations in Step 3 Selected Text: “For large multiunit structures, such as apartment buildings or strip malls, consider collecting at least one sample per ground floor unit.” Comment: Depending on the size of the structures being evaluated, and the interior configuration of the structure, this recommendation has the potential to require a very large number of indoor air samples be collected. We suggest that either the term “unit” be further defined, in particular for commercial buildings, or the statement be caveated with considerations which could assist in refining the number of indoor air samples required (e.g., distribution of subsurface data, building ventilation zones, locations of preferential pathways or vapor entry points, building usage and occupancy, etc.).

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392	1. Formal/ Official	53	06/01/2020	David	Molemen	Elevate Environmental Consultants, Inc.	53.004	14. Attachment 5 – Building Survey and Indoor Air Source Screen Forms	14a. General Comments	Attachment 5	Attachment 5 - Building Survey and Indoor Air Source Screen Form Comment: While the form does provide for "Instrument Reading," there is no field for indicating the compounds for which the instrument is calibrated (e.g., TCE, total volatile organic compounds [TVOCs], etc.). While Cal/EPA's approach to quantify potential indoor air sources appears to be an improvement over USEPA's approach, without the option to specify which compounds are detected, it will be difficult to easily integrate this information with the planned California-specific VI database. For example, if the reading is collected using a GC/PID and is TCE specific, the instrument reading may just read "3 ppbv." If another reading is collected using a PID and is non-specific (i.e., total VOCs), the reading may read "500 ppbv." Without further manual input, it would appear the reading with 500 ppbv is more significant; however, in the context of the indoor air samples, the 3 ppbv TCE-specific reading would be far more significant. It is recommended adding an additional drop-down option for "analyte" or the opportunity to add an analyte either by name or CAS number. This would reduce error during data analysis of the database and minimize manual review.
393	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.001	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	Since the DSVIG seeks to interpret state law regarding hazardous substance site cleanups, it should be based on the most recent applicable science and research. We have significant concerns, as the comments below describe, that several aspects of the DSVIG are not based on the most recent science, including the prescribed use of an attenuation factor (AF) with known data quality issues. The many challenges facing California communities, which are more pronounced due to the COVID-19 pandemic, require a more refined, science-based and site-specific approach than the current DSVIG would allow.

394	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.002	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	Default Attenuation Factor Must be Replaced with California-Specific Values The DSVIG proposes to use the U.S. Environmental Protection Agency's (USEPA) default soil vapor and sub-slab soil vapor attenuation factor (AF) of 0.03 for various purposes ranging from indoor air screening of existing buildings to risk management decisions for future buildings, irrespective of how the building is or will be used (e.g., residential, commercial or industrial). The DSVIG appropriately acknowledges several shortcomings in the USEPA AF data base (2012). First, it contains very little California data. Second, few commercial or industrial buildings are included in the data base. Third, it does not contain site-specific outdoor air data to place the indoor air data into proper context. Fourth, there are few instances where paired indoor air and subsurface samples were collected at the same time to allow for accurate correlations.1 These shortcomings illustrate that a single default value, based predominantly on data from residential sites in Colorado and New York, cannot reasonably represent conditions that exist at sites in California. Using a 0.03 AF as interim policy will substantially increase the number of sites the state characterizes as "high risk" for purposes of vapor intrusion investigation. Instead of focusing resources on an administratively manageable number of high-risk sites, resources will be expended on a much larger population of sites, including sites in the low- and medium-risk categories. Adoption of a final supplemental VI guidance document should be conditioned on completion of a California data base and development of California-specific AFs. If Cal-EPA believes it must establish an interim statewide policy while it works toward this goal, it should utilize a range of values derived from the soon-to-be-completed Department of Toxic Substances Control (DTSC) California AF data base (see next comment) and other published and peer reviewed sources that more accurately represent actual conditions in California. 1 DSVIG, pages 7-8.

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395	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.003	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	DTSC's Data Base Should be the Foundation for Any Interim Attenuation Factors The DSVIG does not specify how California AFs will be developed, in what timeframe, or how the DSVIG will be amended to incorporate California AFs. In fact, the DSVIG is non-committal about whether California-specific AFs will ultimately supplant the default USEPA value. More importantly, the DSVIG fails to acknowledge that work to establish a California AF is already underway and apparently nearing completion at DTSC using available data from DTSC's EnviroStor data base that meets more rigorous data quality requirements and is far more representative of actual California sites than the USEPA data base. DTSC staff discussed their "Attenuation Factor Study" during USEPA's recent national brownfields conference in Los Angeles in December 2019. Staff responses to questions about a future California AF study described in the DSVIG2 suggest an exhaustive, multi-year process designed to generate a statewide data base that is far superior to USEPA's data base both in terms of data quality and in the number of locations sampled. It is not necessary to develop a perfect data base to improve the efficacy of the DSVIG as a building screening tool. Moreover, this approach guarantees indefinite dependence on a default value that is recognized as having significant data quality issues and not being representative of California conditions. At a minimum, the DSVIG should state that it will be revised immediately upon completion of DTSC's AF study to incorporate more representative and scientifically robust California AFs. 2 DSVIG Technical Question and Answer session, May 19, 2020.

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396	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.004	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07e. Step 3D – Evaluate Temporal Variability	25	Proposed Investigation Requirements Are Overly Prescriptive The DSVIG includes very prescriptive investigation requirements for the collection of soil gas, sub-slab, indoor air, and outdoor air data. The guidance specifies the minimum number of samples to be collected regardless of site conditions. For example, the guidance requires collection of three outdoor air samples for every sampling event. However, there is typically little difference in outdoor air concentrations around a structure. Such prescriptive requirements will increase site investigation costs without a corresponding regulatory or public health benefit. To take another example, the DSVIG specifically includes “HVAC-off” sampling. Existing guidance indicates that the need for HVAC-off sampling should be determined by the project manager. In almost all cases, sampling with HVAC off is not representative of typical site conditions because businesses with operating HVAC systems generally do not have employees present when the HVAC system is off. The DSVIG should allow sampling to be tailored to site specific conditions established in a conceptual site model (CSM). Please see Attachment 1 for a more in-depth discussion of these issues.

397	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.005a	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	Cleanup Goals Should Be Site-Specific The DSVIG states that cleanup goals can be based on a site-specific analysis and implies that the USEPA default AF of 0.03 is not required to select cleanup goals. However, no guidance is provided on how much site-specific data are necessary for such an analysis. DTSC has indicated that it is working on separate guidance to address this information gap, but this work is not acknowledged in the DSVIG. Furthermore, the DSVIG states that risk management decisions for future VI risk should be based on cumulative risk calculations using sub-slab vapor data and the 0.03 AF. The approach shown in Step 3 of the flow chart does not allow for site-specific assessments of cleanup goals. For example, where the default AF of 0.03 indicates potential future risk from sub-slab soil gas data, current indoor air data may show there is no risk from vapor intrusion. Under these conditions, it should be possible to demonstrate using multiple lines of evidence that there are no long-term risks based on reasonably foreseeable site uses, but the DSVIG does not appear to accommodate this kind of approach. This conflict reinforces the concern that the DSVIG will foster more confusion among regulators and responsible parties, leading to misinterpretation, misapplication and undesirable outcomes. The DSVIG should be revised to clearly indicate that site-specific data should be used to develop risk-based cleanup goals. In addition, any guidance on cleanup goals should state that cleanup goals are to be based on approved current and future land uses, considering all applicable covenants and use restrictions, or reasonably foreseeable near term uses in the absence of such restrictions. Requiring cleanup goals to be based on hypothetical unrestricted use conditions in all cases would reverse decades of policy innovations designed to stimulate revitalization and reuse of in-fill and brownfield properties.

398	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.005b	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	Cleanup Goals Should Be Site-Specific The DSVIG states that cleanup goals can be based on a site-specific analysis and implies that the USEPA default AF of 0.03 is not required to select cleanup goals. However, no guidance is provided on how much site-specific data are necessary for such an analysis. DTSC has indicated that it is working on separate guidance to address this information gap, but this work is not acknowledged in the DSVIG. Furthermore, the DSVIG states that risk management decisions for future VI risk should be based on cumulative risk calculations using sub-slab vapor data and the 0.03 AF. The approach shown in Step 3 of the flow chart does not allow for site-specific assessments of cleanup goals. For example, where the default AF of 0.03 indicates potential future risk from sub-slab soil gas data, current indoor air data may show there is no risk from vapor intrusion. Under these conditions, it should be possible to demonstrate using multiple lines of evidence that there are no long-term risks based on reasonably foreseeable site uses, but the DSVIG does not appear to accommodate this kind of approach. This conflict reinforces the concern that the DSVIG will foster more confusion among regulators and responsible parties, leading to misinterpretation, misapplication and undesirable outcomes. The DSVIG should be revised to clearly indicate that site-specific data should be used to develop risk-based cleanup goals. In addition, any guidance on cleanup goals should state that cleanup goals are to be based on approved current and future land uses, considering all applicable covenants and use restrictions, or reasonably foreseeable near term uses in the absence of such restrictions. Requiring cleanup goals to be based on hypothetical unrestricted use conditions in all cases would reverse decades of policy innovations designed to stimulate revitalization and reuse of in-fill and brownfield properties.

399	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.006a	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	DSVIG Creates Confusion About Intended Applicability The DSVIG should clarify that it only applies to initial screening of existing, occupied buildings, with explicit statements restricting its application to a clearly defined set of circumstances. Instead, it contains broad-brush statements and features that confuse its intended application. For example, the document includes a risk management decision framework in Step 4, which lists potential response actions based on screening risk estimates calculated in Step 3. The implication is that the response actions described in Step 4 should be considered before (or in lieu of) other lines of evidence or site-specific risk characterization. If, as agency staff have stated, the DSVIG is not intended to support risk management decisions, then Step 4 does not serve a purpose and should be removed. If it is retained in final guidance, it will be a source of confusion for users and will likely result in interpretations that diminish reliance on site-specific information to inform risk management decision making. In some places, the DSVIG encourages use of other VI guidance and, in other places, it indicates that where conflicts arise, the DSVIG should take precedence. Adding further confusion, DTSC announced at the December 2019 National Brownfields Conference that it will recommend AFs of .001 for new residential buildings and .0005 for new commercial buildings. DTSC's values recognize that new buildings have much lower VI potential, but they clearly conflict with a 0.03 AF. The DSVIG appears to require across the board use of an AF developed in 2015 from predominantly out-of-state data, rather than DTSC AFs developed in 2019-2020 based exclusively on California data, and will be a significant impediment to in-fill and brownfields development in California. Absent explicit statements restricting its application to a clearly defined set of circumstances, the DSVIG will exacerbate the confusion that already exists in the field about how to evaluate potential VI risk. That confusion will lead to delayed investigations as project proponents, regulators and other stakeholders debate the

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											correct approach, and to remedies that are more costly than necessary to protect public health.

400	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.006b	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	DSVIG Creates Confusion About Intended Applicability The DSVIG should clarify that it only applies to initial screening of existing, occupied buildings, with explicit statements restricting its application to a clearly defined set of circumstances. Instead, it contains broad-brush statements and features that confuse its intended application. For example, the document includes a risk management decision framework in Step 4, which lists potential response actions based on screening risk estimates calculated in Step 3. The implication is that the response actions described in Step 4 should be considered before (or in lieu of) other lines of evidence or site-specific risk characterization. If, as agency staff have stated, the DSVIG is not intended to support risk management decisions, then Step 4 does not serve a purpose and should be removed. If it is retained in final guidance, it will be a source of confusion for users and will likely result in interpretations that diminish reliance on site-specific information to inform risk management decision making. In some places, the DSVIG encourages use of other VI guidance and, in other places, it indicates that where conflicts arise, the DSVIG should take precedence. Adding further confusion, DTSC announced at the December 2019 National Brownfields Conference that it will recommend AFs of .001 for new residential buildings and .0005 for new commercial buildings. DTSC's values recognize that new buildings have much lower VI potential, but they clearly conflict with a 0.03 AF. The DSVIG appears to require across the board use of an AF developed in 2015 from predominantly out-of-state data, rather than DTSC AFs developed in 2019-2020 based exclusively on California data, and will be a significant impediment to in-fill and brownfields development in California. Absent explicit statements restricting its application to a clearly defined set of circumstances, the DSVIG will exacerbate the confusion that already exists in the field about how to evaluate potential VI risk. That confusion will lead to delayed investigations as project proponents, regulators and other stakeholders debate the

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											correct approach, and to remedies that are more costly than necessary to protect public health.

401	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.006c	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	DSVIG Creates Confusion About Intended Applicability The DSVIG should clarify that it only applies to initial screening of existing, occupied buildings, with explicit statements restricting its application to a clearly defined set of circumstances. Instead, it contains broad-brush statements and features that confuse its intended application. For example, the document includes a risk management decision framework in Step 4, which lists potential response actions based on screening risk estimates calculated in Step 3. The implication is that the response actions described in Step 4 should be considered before (or in lieu of) other lines of evidence or site-specific risk characterization. If, as agency staff have stated, the DSVIG is not intended to support risk management decisions, then Step 4 does not serve a purpose and should be removed. If it is retained in final guidance, it will be a source of confusion for users and will likely result in interpretations that diminish reliance on site-specific information to inform risk management decision making. In some places, the DSVIG encourages use of other VI guidance and, in other places, it indicates that where conflicts arise, the DSVIG should take precedence. Adding further confusion, DTSC announced at the December 2019 National Brownfields Conference that it will recommend AFs of .001 for new residential buildings and .0005 for new commercial buildings. DTSC's values recognize that new buildings have much lower VI potential, but they clearly conflict with a 0.03 AF. The DSVIG appears to require across the board use of an AF developed in 2015 from predominantly out-of-state data, rather than DTSC AFs developed in 2019-2020 based exclusively on California data, and will be a significant impediment to in-fill and brownfields development in California. Absent explicit statements restricting its application to a clearly defined set of circumstances, the DSVIG will exacerbate the confusion that already exists in the field about how to evaluate potential VI risk. That confusion will lead to delayed investigations as project proponents, regulators and other stakeholders debate the

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											correct approach, and to remedies that are more costly than necessary to protect public health.

402	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.007	08. Step 4: Concurrent and Future Risk Evaluation and Management Decisions	08b. Step 4A – Need for Risk Management	27	Requirements for Future Risk Evaluation Will Lead to Open-Ended Assessments The DSVIG states that indoor air data should be used for current risk evaluations and soil gas/sub-slab data should be used for future risk evaluations. Under these conditions, responsible parties could be required to mitigate if soil gas/sub-slab concentrations exceed screening levels, even if indoor air concentrations are non-detect. Specifically, as outlined in the Risk Management Decision Framework for Vapor Intrusion, action may be required if sub- slab sampling indicates that future risk exceeds a cancer risk of 1 x 10-6 or a non-cancer hazard index of 1, using an AF of 0.03. For some of the more common chemicals such as TCE and PCE, this would require mitigation at sites where sub-slab soil gas concentrations are above ~100 ug/m3 (for commercial) or ~20 ug/m3 (for residential), even if indoor air concentrations are non-detect. This requirement will impose unnecessary and potentially large costs on developers, responsible parties and even building and home owners. In many cases, it will lead to on-going assessments that have no defined endpoint or installation of mitigation systems that are not necessary to protect public health. Although the DSVIG indicates that a refined risk assessment or alternative attenuation factors can be used, it does not provide guidance on how these options could be exercised or how much additional data would be necessary to support alternative inputs and future risk evaluations. For example, additional seasonal sampling results could indicate that indoor air concentrations remain non-detect or below risk-based screening levels, in which case no further assessment is warranted. Alternatively, monitoring data could indicate that source concentrations are decreasing such that no further assessment is necessary. Cal-EPA should consider these likely scenarios and develop a clear strategy that relies on a CSM and provides appropriate off-ramps from further investigation and assessment.

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403	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.008	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05c. Step 1B – Prioritizing Buildings for VI Evaluation	10	Emphasis on Vapor Conduits Without Adequate Guidance Will Disrupt Site Cleanups The DSVIG emphasizes the potential for “vapor conduits” (e.g., sewers) to convey vapor forming compounds (VFCs) beneath or directly into buildings. The DSVIG indicates indoor air sampling may be warranted for “Buildings connected to vapor conduits that intersect significant levels of contamination” (Step 1B.2), but does not provide guidance regarding the likelihood of such conveyance or what levels of contamination would be considered “significant.” This emphasis on vapor conduits without adequate guidance will disrupt many site cleanups because virtually all buildings and many brownfield properties evaluated for a potential vapor intrusion condition contain vapor conduits. Despite these concerns, both the professional literature and decades of field experience indicate that instances of vapor conduits playing a significant role in vapor intrusion are limited. Without further guidance or clarification, the DSVIG’s emphasis on vapor conduits will likely lead to unnecessary, confusing and open-ended investigations.

404	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.009	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	The DSVIG Creates Major New Barriers to Affordable Housing Projects It is notable that one of the essential businesses and activities exempted from even the most stringent COVID-19 “shelter-in-place” orders is the “construction of affordable housing.” However, the success of in-fill housing and complementary commercial development in many California communities will depend on avoiding the imposition of unnecessary costs. This reality argues for vapor intrusion guidance that actually screens out lower risk sites through use of data inputs and AFs that are based on realistic data sources rather than maximum worst case conditions. CSMs and other inputs that are representative of actual site conditions will yield much more focused results and identify properties that present meaningful risks to public health. A multiple lines of evidence approach using site-specific information where possible should be encouraged in lieu of default assumptions. This approach is consistent with USEPA guidance and long standing DTSC and Water Board practice. Deficiencies in these aspects of the DSVIG will make redevelopment of urban brownfields much more difficult and expensive and will serve as a significant barrier to resolving California’s affordable housing crisis. The DSVIG also does not differentiate between residential and commercial buildings, even though residential and commercial structures present different potential vapor intrusion risks. Application of a single overly conservative AF to both building classes, failure to consider use patterns and related factors such as air exchange rates, especially in buildings used for industrial purposes, will result in significantly higher costs for site characterization and remediation that are not necessary to protect the health of building occupants. Commercial buildings represent a class of buildings that, when available for reuse, complement local housing development by providing new jobs and increasing local economic activity. Treating commercial buildings in the same manner as residential buildings will create unnecessary new impediments to local economic development.

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405	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.010a	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	The DSVIG Should Be Subject to Outside Technical and Peer Review The process that led to the development of the DSVIG was almost entirely internal to Cal-EPA. Over a five-year period, the participating agencies were approached by various stakeholders offering technical input and review by subject matter experts. Except for periodic stakeholder meetings to discuss guidance elements in concept, these offers were not accepted. To the best of our knowledge, the DVSIG has not been subject to external scientific peer review during its development, despite being predicated on research that is compromised by scientific deficiencies (e.g., USEPA, 2012). Furthermore, Cal-EPA has provided no indication of what steps it will take to address public comments in a final guidance document. These procedural deficiencies will undermine stakeholder confidence in the DSVIG. The Cal-EPA interagency team had previously contemplated formation of a technical advisory group to assist in resolving information gaps and scientific deficiencies in the DSVIG. Those deficiencies remain largely unresolved. Cal-EPA should convene a technical advisory group to review the DSVIG and subject it to external peer review before proceeding to implement any new guidance, even on an interim basis.

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406	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.010b	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	The DSVIG Should Be Subject to Outside Technical and Peer Review The process that led to the development of the DSVIG was almost entirely internal to Cal-EPA. Over a five-year period, the participating agencies were approached by various stakeholders offering technical input and review by subject matter experts. Except for periodic stakeholder meetings to discuss guidance elements in concept, these offers were not accepted. To the best of our knowledge, the DVSIG has not been subject to external scientific peer review during its development, despite being predicated on research that is compromised by scientific deficiencies (e.g., USEPA, 2012). Furthermore, Cal-EPA has provided no indication of what steps it will take to address public comments in a final guidance document. These procedural deficiencies will undermine stakeholder confidence in the DSVIG. The Cal-EPA interagency team had previously contemplated formation of a technical advisory group to assist in resolving information gaps and scientific deficiencies in the DSVIG. Those deficiencies remain largely unresolved. Cal-EPA should convene a technical advisory group to review the DSVIG and subject it to external peer review before proceeding to implement any new guidance, even on an interim basis.

407	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.011	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	The DSVIG Is an Underground Regulation According to the California Office of Administrative Law, "the requirements set forth in the Administrative Procedure Act (APA) are designed to provide the public with a meaningful opportunity to participate in the adoption of state regulations and to ensure that regulations are clear, necessary and legally valid." An agency rule or standard is subject to the rulemaking provisions of the APA if: (1) it applies generally rather than to a specific case; and (2) it implements, interprets, or makes specific the law administered by the agency imposing it.3 By its own terms, the DSVIG applies generally. The stated purpose of the document is to create a "state-wide standard practice" that is "to be used by practitioners and regulators when screening buildings for subsurface vapor risk to building occupants."4 The DSVIG states that when pre-existing guidance conflicts with it, the provisions of the DSVIG "should be followed." The DSVIG interprets and makes specific the law regarding hazardous substance site cleanups. It sets forth five equations that are to be used in analyzing vapor intrusion risks and specifies the key parameter (an "attenuation factor") that "should be used" in the equations. Among other things, the DSVIG specifies: (1) the number of indoor, outdoor and sub-slab samples that should be collected; (2) the depth of the sub-slab samples; (3) the manner of indoor air sample collection ("time integrated"); (4) whether and when samples in sewers and other "conduits" should be collected; (5) the number of sampling events required; and (6) when remediation and/or mitigation is required. While the process for finalizing the DSVIG is still undefined, to the extent it does not satisfy APA requirements for rule makings or operates as "interim" statewide policy for an indefinite period of time, it is likely to constitute an underground regulation. In its current format the DSVIG is too prescriptive to be considered a guidance document. If truly intended as a guidance document, the DSVIG should be restructured to provide a range of acceptable processes and procedures. To avoid further confusion, we suggest that Cal-EPA withdraw the DSVIG and defer to the individual

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											regulatory agencies to update their existing vapor intrusion policies as appropriate. 3 Government Code § 11342.600 4 DSVIG, page v.
408	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.012	16. Other	16a. Other		The Workshop Schedule and Comment Deadline Should Be Extended Given the Covid-19 outbreak and government responses, including a statewide shelter-in-place order, local government agencies, developers, responsible parties and other vapor intrusion stakeholders are focused on the immediate tasks of protecting workers, delivering essential goods and services and restructuring operations. The 30-day extension of the public comment deadline (from May 1 to June 1) is appreciated but inadequate to facilitate meaningful stakeholder engagement in this process. Confining the public process to the front end of a pandemic greatly diminishes the ability of interested parties to devote the time and attention necessary to develop substantive comments on the DSVIG. Meaningful public participation is critical to inform actions taken by administrative agencies. In addition, acceptance of the guidance by stakeholders will be undermined by a lack of public input. Cal-EPA should reschedule public workshops and extend the public comment deadline by at least 30 days after COVID-19 public health orders are lifted to ensure that all interested parties have a reasonable opportunity to participate in the public review process.

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409	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.013	01. VI Supplemental Guidance General Comments	01a. General Comments		Conclusion The release of “preliminary” guidance is called for in emergency circumstances. In all other circumstances, a sufficient scope of work is required to produce a final guidance that is based on the best available science. In this circumstance, there does not appear to be a basis for interim guidance.
410	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.014	14. Attachment 5 – Building Survey and Indoor Air Source Screen Forms	14a. General Comments	Attachment 5	The DSVIG provides specific recommendations for the number of samples in a small building/residential home. Specifically, Cal-EPA has increased the number of samples for a small single-story building without providing clear evidence or a rationale that additional samples are needed in every case. The few examples cited by CalEPA were influenced by preferential pathways that are not likely to be present in every home. Moreover, in small buildings it may not be possible to find three locations suitable for sampling; especially if the building is slab-on-grade. Instead, CalEPA should identify specific conditions that may require additional sampling and allow practitioners to determine the number of samples necessary based on a conceptual site model (CSM). Similarly, Cal-EPA provides no rationale to support the need for three outdoor samples. In most cases a single outdoor sample is sufficient to compare to indoor air data.

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411	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.015	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07e. Step 3D – Evaluate Temporal Variability	26	The DSVIG specifically includes “HVAC-off” sampling. Existing guidance indicates that the need for HVAC-off sampling should be determined by the project manager. In almost all cases, sampling with HVAC off is not representative of typical site conditions because businesses with operating HVAC systems generally do not have employees present when the system is off. Data collected under these conditions can overestimate indoor air concentrations of VFCs and associated VI risk. HVAC-off sampling should only be specified if representative data demonstrates that indoor air concentrations of VFCs under HVAC-off conditions can also occur when the building is occupied and the HVAC is operational. Otherwise, sampling should be conducted under normal building use conditions.

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412	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.016	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	19	The DSVIG indicates that more samples (both spatially and temporally) are needed to address variability in data results. In some cases this may be true, but in most cases variability will be much more limited than the DSVIG suggests. First, of the two studies listed by Cal-EPA to support the variability claim, one site was later determined to have a preferential pathway that influenced the results. Second, consistent with the approach outlined in the DSVIG, the CSM should be the primary mechanism used to determine the appropriate number of samples. At many sites where the data indicate that source concentrations and building conditions are stable, fewer samples are necessary to accurately characterize the vapor intrusion pathway.
413	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.017	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05c. Step 1B – Prioritizing Buildings for VI Evaluation	9	There are no data to support the request to sample within 100 feet of a vadose zone soil source where there is no corresponding groundwater source, especially if the soil source is shallow. This seemingly random criterion ignores concentration attenuation due to natural diffusion in soil. For non-underground storage tank petroleum hydrocarbon (PHC) sites, which are purportedly within the scope of the DSVIG, biodegradation will significantly attenuate VFC concentrations within a few feet.

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414	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.018	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06a. General Comments	11	Step 2 of the DSVIG addresses the collection of soil gas samples outside of a building. These data are used to provide "an appropriate early screening step to evaluate the potential for VI." In some cases, collecting soil gas samples is an important step to understand vapor flow paths and identify buildings for additional investigation. Indeed, the focus of any soil gas sampling program should be on identifying complete exposure pathways. Evaluating and documenting a soil gas plume where no building exists does not allow for efficient use of resources or a prioritization of human health risks. Similarly, in cases where the data indicate that vapor intrusion may be occurring, it may be advisable to go directly to sub-slab and indoor air sampling.
415	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.019	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distribution of Soil Gas Contamination	12	When collecting indoor air samples, the DSVIG appropriately recommends limiting analyte lists when the subsurface contamination is well characterized. This approach is strongly supported and should also be extended to both sub-slab soil gas and exterior soil gas samples. Interference of background chemicals when sampling is well documented and focused sampling lists can help produce more useful data.
416	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.020	04. Introduction	04f. E – Evaluation of Lines of Evidence	6	The DSVIG emphasizes that a multiple lines of evidence (MLOE) approach should be used at vapor intrusion sites to reduce variability and uncertainty in data results. In some cases, MLOE will include multiple sample types (i.e., groundwater, soil gas, indoor air) and multiple sampling rounds. In other cases, the MLOE could include variables and data related to the CSM (e.g., soil type, distance to source, building construction). In cases where the CSM provides information to support the MLOE it may not be necessary to perform multiple rounds of sampling. If one round of sampling consistently indicates sub-slab and indoor air concentrations are low, and these findings are supported by the CSM, it should not be necessary to resample.

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417	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.021	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	19	Many homes in California are constructed with a crawl space under the building. The DSVIG indicates that when a crawl space is sampled, it should be compared directly to indoor air screening levels (USEPA, 2015). There is some USEPA data that supports this approach. However, building construction (e.g., crawl space ventilation, building materials, etc.) will dictate the extent to which crawl space concentrations can be compared to indoor air concentrations. Moreover, the relevant data point is the indoor air concentration. From an exposure perspective, the crawl space is never occupied for any meaningful period of time. As a result, indoor air in the occupied living space should be used to evaluate indoor exposures instead of crawl space data.

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418	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.022	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07b. Step 3A – Conduct in Depth Building Survey	18	Step 3 of the DSVIG outlines the approach for sampling ground floor and below-grade parking garages. The proposed approach is flawed for several reasons. First, the DSVIG fails to mention the many chemicals that may be associated with automobile emissions. At a minimum, the DSVIG should prioritize a limited analytical list. Second, the guidance fails to acknowledge building code requirements that specify minimum air flow in a parking garage; the air flow necessary to protect people from automobile emissions will also limit the potential for vapor intrusion. Third, parking garages are not designed to be occupied for extended periods of time; while a parking attendant booth may be present, it is almost always located very close to the door opening where ambient air flow tends to reduce chemical concentrations. Overall, it is expected that any data collected from a parking garage will be confounded by background data and will be of limited use in evaluating vapor intrusion potential.
419	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.023	04. Introduction	04d. C – Conceptual Model for Vapor Intrusion	3	The DSVIG correctly states that if a clean water lens is present at a site (and below a building) where groundwater is the primary source of VFCs, then VI is likely to be reduced. The DSVIG should be revised to more clearly state that if groundwater is the primary source and a clean water lens is present, no further investigation of VI pathways is necessary.
420	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.024	02. Executive Summary	02a. General Comments	v	Executive Summary (ES), page v: "If uncontrolled, chemical vapors can migrate into buildings and pose a risk to human health." This statement improperly assumes outcomes that may or may not occur depending on complex chemical and physical processes and site-specific conditions. It should be rephrased as follows: "If uncontrolled, chemical vapors have the potential to migrate into buildings and could pose a risk to human health."

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421	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.025	02. Executive Summary	02a. General Comments	vi	ES, page vi: The concern about temporal variability is valid for chlorinated hydrocarbons (CHCs), but not for PHCs, as indicated in field studies by Luo et al. Temporal variability for PHCs is minimized with presence or absence of sufficient oxygen and limited to only a few feet below ground. The DSVIG should clarify this important distinction.
422	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.026	02. Executive Summary	02a. General Comments	vi	ES, page vi; The DSVIG recognizes that PHCs at UST sites will be evaluated pursuant to the State Water Resources Control Board's Low Threat Closure Policy (LTCP). However, it is important to recognize that larger PHC sources at non-UST sites will also biodegrade rapidly in the vadose zone. Screening and cleanup guidance for non-UST PHC sites should be consistent with existing guidance for UST sites and should not be subject to the same requirements as sites with chlorinated compounds.

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423	1. Formal/ Official	54	06/01/2020	Mayte	Sanche z	California Manufacturers and Technology Association (CMTA)	54.028	02. Executive Summary	02a. General Comment s	vii	ES, page vii: Vapor Intrusion Attenuation Factors: a. This section states that a site-specific AF cannot be estimated using Johnson & Ettinger (J&E) modeling for initial site screening mainly because the fixed inputs cannot reasonably represent variability (see also section D1, pages 5-6). We strongly suggest including the option to use EPA's PVIScreen modeling to assess VI potential at PHC-impacted sites, at least for empty lots. Unlike one-dimensional models, PVIScreen incorporates biodegradation of PHCs (based on BioVapor) and a Monte Carlo uncertainty analysis that can evaluate VI potential across a range of input parameters. PVIScreen is a more accurate predictor ofpotential VI risk in actual VI scenarios, especially when modeling biodegradable compounds. b. Also in Chart 2B (blue box), using 0.03 for both sub-slab and deep soil gas is inappropriate because it ignores the fact that soil gas concentration decreases with natural diffusion processes as it migrates from deep soil to shallow soil, even in the absence of biodegradation (also shown in Figure 1A). We recommend using a lower AF for exterior soil gas more than 5 feet below ground surface.
424	1. Formal/ Official	54	06/01/2020	Mayte	Sanche z	California Manufacturers and Technology Association (CMTA)	54.029	02. Executive Summary	02a. General Comment s	viii	ES, page viii: The DSVIG states that "Once GeoTracker has sufficient statewide data, the CalEPA workgroup will evaluate the VI database to determine if California-specific AFs are justified." However, it provides no indication of what amount of data will be "sufficient" to make this determination. This lack of definition invites an open-ended process that will leave the default 0.03 AF in place indefinitely, even after much more robust and relevant data are available. The DSVIG should propose reasonable targets for an actionable California data base, recognizing that an exhaustive statewide data gathering effort is not necessary to replace USEPA's extremely limited California data set.

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425	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.030	03. Flowchart (Steps)	03a. General Comments	ix-x	ES Flowchart (pages ix-x): a. Step 1B: We recommend revising the text in the first green box (no buildings within 100 feet of most contaminated area) as follows: “add buildings as the extent of soil gas concentrations are better understood.” The term “delineated” should be deleted. It implies the existence of a soil gas “plume,” which does not accurately describe contaminant detections in soil gas. In terms of locating the contaminant mass, soil and groundwater impacts need to be delineated. Soil gas detections are a reflection of these impacts and do not need to be delineated. b. Step 1B (first white box): This step assumes everything within 100 feet originates from the contaminated area. This assumption will not be valid in all cases. For example, a conduit can carry VFCs much further than 100 feet. This step should rely on the CSM to determine the potential for vapor sources other than the immediate contaminated area, and allow for alternative outcomes if other sources are identified. c. Step 2A: We recommend deleting sub-step 2 under “lateral sampling locations.” It is not necessary to perform step-out sampling of soil gas away from the release area to “delineate” soil gas for purposes of assessing risk from VI (see also comment on section 2A.2, page 12). Instead, the DSVIG should identify building(s) with potential for VI and indicate placement of soil gas probes near these locations, as indicated in sub-step 3. The DSVIG mentions elsewhere the appropriate use of professional judgement. This step is a good example of where professional judgment should be exercised in lieu of the recommended step-out sampling approach.

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426	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.031	03. Flowchart (Steps)	03a. General Comments	ix	Flow Chart and page 4: One of the stated purposes of the DSVIG is to emphasize the importance of evaluating preferential pathways, but neither the flow chart nor the relevant appendix provide useful guidance on when and where to investigate potential preferential pathways. In addition, the DSVIG lacks guidance on interpreting data from preferential pathway investigations.
427	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.032	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05c. Step 1B – Prioritizing Buildings for VI Evaluation	10	Step 1B-2, page 10 (Contaminated Vapor Conduits): Virtually every building has some attached “vapor conduits.” The DSVIG should indicate what vapor conduit scenarios near or under buildings should be considered. Absent this information, and unless the case manager is willing to exercise professional judgment, the DSVIG will be an ineffective tool for screening buildings.
428	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.033	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05d. Step 1C – Selecting Sampling Approach: Soil Gas Screening or Indoor Air	11	Step 1C, page 11: The DSVIG should define what is meant by “Buildings near a significantly contaminated groundwater plume.” For PHCs, potential VI risk via preferential pathway exposure is considered much lower and the only known cases occur when bulk light non-aqueous phase liquids (LNAPL) are present in conduits close to a building causing high concentration-VOCs to enter indoor air, or when contaminated water off-gases directly into indoor air.
429	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.034	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06a. General Comments	13	Step 2, page 13: For future buildings, the DSVIG should allow use of passive vapor samplers for large empty lots.

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430	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.035	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distribution of Soil Gas Contamination	15	Figure 1A, page 15: This figure refers to the idea of a “slab capping effect” under a foundation and has the potential to undermine the use of external shallow soil gas sampling around the building footprint to make decisions at sites where depth to contamination is greater than 20 feet below ground surface. This conclusion is based on modeling that assumes the slab is totally impermeable with air exchange only through peripheral cracks. This condition is not observed at actual sites and therefore is not a valid basis for limiting sampling options.
431	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.036	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07b. Step 3A – Conduct in Depth Building Survey	18	Step 3, page 18: Sub-slab soil gas sampling should be conducted before proceeding to indoor air and ambient outdoor air sampling rather than conducting all three concurrently. Subsequent steps are only relevant if sub-slab soil gas suggests a high potential for VI.

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432	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.037	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	23	Step 3B.6, page 23 ("Radon and Other Tracer Data"): The DVSIG should provide guidance on how these data may be interpreted and how they can inform a VI risk assessment. For example, can a site-specific AF be derived from these data and accepted by the regulatory agency?

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433	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.038	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	23-24	Step 3B.6, pages 23-24: The DSVIG does not justify the need for continuous cross-slab pressure differential measurements before the sampling event. It is unclear what additional insights this step would provide for data interpretation in comparison to discrete cross-slab pressure differential measurements during the sampling event. Absent an explanation, requiring continuous cross-slab pressure differential measurements, especially days before a sampling event, appears to be an unnecessary expenditure of resources.

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434	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.039	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07e. Step 3D – Evaluate Temporal Variability	25	Step 3D, page 25: What is the purpose of conducting one sampling event with HVAC-on and one with HVAC-off, given the requirement for sampling in different seasons? Also, since heating and cooling have different effects on VI, is the intent to require sequential on-off sampling, or some other unspecified approach?
435	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.040	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06d. Step 2C – Evaluate Temporal Variability	26	Steps 2C and 3D.1, page 26: The DSVIG should define what constitutes a “different” season. What defines a hot season relative to a cold season or a wet season relative to a dry season? How should practitioners choose among them?

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436	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.041	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07e. Step 3D – Evaluate Temporal Variability	26	Step 3D.1, page 26: The DSVIG should define what “similar” means when comparing indoor air VFC concentrations for the HVAC on-off sampling events.
437	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.042	08. Step 4: Concurrent and Future Risk Evaluation and Management Decisions	08c. Step 4B – Managing Current Vapor Intrusion Risk	29	Step 4B, page 29: The DSVIG should provide example metrics and monitoring frequencies for evaluating the effectiveness of passive mitigation systems. Similar guidance should be provided for buildings with crawl spaces and vented garages under conventional soil VI scenarios.

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438	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.043	08. Step 4: Concurrent and Future Risk Evaluation and Management Decisions	08d. Step 4C – Managing Future Vapor Intrusion Risk	30	Step 4C, page 30: The list of relevant building conditions should include building foundation type (e.g., slab-on-grade, basement, vented garages, raised foundation) which can significantly impact VI potential for future development projects.
439	1. Formal/ Official	54	06/01/2020	Mayte	Sanchez	California Manufacturers and Technology Association (CMTA)	54.044	09. Application to Other Building Types	09d. Building III – Above-Grade or Below-Grade Parking Structures	33	Application to Other Building Types, page 33: a. Although it is true that “Parking garage air samples are intended to determine if VI is occurring and are not representative of indoor air in the occupied upper floors due to the high ventilation rate typical in parking garages,” in the conventional VI scenario, garage air is a worst-case scenario for indoor air in occupied spaces above the garage. In this scenario, a high garage ventilation rate is a very effective mitigation tool for potential VI risk. Any subsurface VFCs must pass through garage air before it can reach the indoor air above it. Thus, sampling garage air should be sufficient to evaluate potential VI to indoor air. It is important to be aware that for newer buildings, sumps are usually covered and vented if they contain contaminated groundwater. Elevator shaft wells are usually tightly sealed with a thick concrete layer. Consequently, preferential pathways through sumps and elevator shaft wells are highly unlikely. b. The DSVIG should specify covering and venting of sumps containing contaminated groundwater to eliminate potential off-gassing into garage air.

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440	1. Formal/ Official	55	06/01/2020	Scott	Johns	ENGEO Inc	55.001	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06a. General Comments	17	The guidance document suggests multiple rounds of soil gas sampling to assess seasonal variation. With property due diligence and sale transactions typically having a 30 to 45 day window, what is the RWQCB's/DTSC's recommendation to prospective purchasers on decision making with these short timeframes? (Page 17).
441	1. Formal/ Official	55	06/01/2020	Scott	Johns	ENGEO Inc	55.002	04. Introduction	04f. E – Evaluation of Lines of Evidence	6	We understand J&E Modeling may no longer be considered as conservative as desired, however; J&E Modeling can still be used as a multiple line of evidence, correct? (Page 6).
442	1. Formal/ Official	55	06/01/2020	Scott	Johns	ENGEO Inc	55.003	04. Introduction	04g. F – California Vapor Intrusion Database	7	What is the timeline estimate of when a California-specific attenuation factor will be established? (Page 7).
443	1. Formal/ Official	55	06/01/2020	Scott	Johns	ENGEO Inc	55.004	04. Introduction	04g. F – California Vapor Intrusion Database	7	Understanding that an attenuation factor of 0.03 for new construction around the San Francisco Bay Area is not representative, please provide guidance for establishing site-specific attenuation factors as well as for properties that do not have any existing buildings. (Page 7).
444	1. Formal/ Official	55	06/01/2020	Scott	Johns	ENGEO Inc	55.005	04. Introduction	04g. F – California Vapor Intrusion Database	7	While some may be of the opinion that radon does not perform exactly like VOCs, radon sampling can still help establish site-specific attenuation factors. Please include guidance about incorporating radon sampling to assist with site-specific attenuation factors. (Page 7).

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445	1. Formal/ Official	55	06/01/2020	Scott	Johns	ENGEO Inc	55.006	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	19	Please provide guidance for when an active or passive vapor intrusion mitigation system is warranted as well as when a system should be converted from passive to active.
446	1. Formal/ Official	56	06/01/2020	Estelle	Shiroma	Ahtna, Inc.	56.001	08. Step 4: Concurrent and Future Risk Evaluation and Management Decisions	08d. Step 4C – Managing Future Vapor Intrusion Risk	29	The draft guidance document focuses on sites on with currently existing buildings and sites with planned future buildings. Further clarification on the applicability of the guidance to sites with no current buildings and no potential future buildings is needed.

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447	1. Formal/ Official	56	06/01/2020	Estelle	Shiroma	Ahtna, Inc.	56.002	03. Flowchart (Steps)	03a. General Comments	ix	In this section, the VI assessment process is summarized, and recommends that for unoccupied buildings or potential future buildings on open lots that future VI risk should be assessed after a full site characterization. However, without any indoor air to sample, it would be impossible to calculate a site-specific attenuation factor, and any site characterization would likely be required to default to the conservative recommended AFs. However, as discussed in Comment 3 below, the recommended AFs are subject to significant uncertainties, and any VI risk assessment would be incomplete without understanding a given building's vapor entry points and possible soil gas entry rates. These would be impossible to measure on a site without a currently existing building, and the path suggested by the current draft of the guidance document would result in using a very conservative assessment of future risk that would still fail to address these uncertainties.

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448	1. Formal/ Official	56	06/01/2020	Estelle	Shiroma	Ahtna, Inc.	56.003	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	In this section, recommended attenuation factors (AFs) for screening buildings during a VI assessment in California are listed. The suggested AF for sublab soil gas is 0.03, based on comparing empirical paired indoor air and subslab soil gas data from a USEPA database (USEPA, 2015). However, as discussed in Brewer et al. (2014), AFs extracted from databases are subject to error arising from interference from indoor and outdoor sources, reliance on data from basements, seasonal variability, heterogeneity of subsurface vapor plumes, and uncertainty regarding vapor entry points. Luo et al. (2009) collected samples from random points beneath a 210 m2 slab and found that data varied by three orders of magnitude. Luo et al. (2009) concluded that sampling a few locations might not reveal the true subslab soil gas distribution and would not clarify pathway significance without knowing the vapor entry points to a building and the soil gas entry rates at those points. As a result, the uncertainties inherent in the data used for the calculation of the suggested AFs are difficult to quantify and site-specific approaches should be preferred. Further, when site-specific data are unavailable (e.g., potential future buildings), an approach based on regional average Indoor Air Exchange Rates (IAERs) and vapor entry rates should be considered.

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449	1. Formal/ Official	56	06/01/2020	Estelle	Shiroma	Ahtna, Inc.	56.004	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	In this section, recommended attenuation factors (AFs) for screening buildings during a VI assessment in California are listed. However, California's climate varies considerably across the state, from the deserts of Imperial County to the mountains of Sierra County to the Mediterranean climate of coastal Monterey County. As a result, the number of days with heating or air conditioning varies greatly across the state, and so it follows that the average IAERs for buildings in California likely vary just as greatly across these climates. When considering vapor entry rates, Song et al. (2014) found that vapor entry rates peaked at 3-5 L/min during the winter and ranged from 0-2 L/min during the summer when utilizing a building leakage model. When Brewer et al. (2014) considered the impacts of climate on IAERs and vapor entry rates, they arrived at estimated subslab AFs for broadly defined climate zones for the United States, with suggested subslab AFs ranging from 0.0008 to 0.0020 for California climates. These studies suggest that the recommended subslab AF of 0.03 in the Draft VI Guidance is likely overly conservative for the local climate conditions found in California.
450	1. Formal/ Official	56	06/01/2020	Estelle	Shiroma	Ahtna, Inc.	56.005	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	The paragraph states that alternative approaches to the USEPA's AFs for initial screening of buildings can be used "if supported by adequate technical and site information". The paragraph needs more specific information about justifications for alternative approaches that CalEPA, DTSC, and the Water Board will accept.

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451	1. Formal/ Official	56	06/01/2020	Estelle	Shiroma	Ahtna, Inc.	56.006	04. Introduction	04g. F – California Vapor Intrusion Database	7, Attachment 4	These paragraphs state that once GeoTracker has sufficient statewide data, the CalEPA workgroup will evaluate the VI database to determine if California-specific AFs are justified. The guidance document would benefit from a more complete explanation of what “sufficient” data will entail and the decision-making process that will be used to determine when GeoTracker has “sufficient” data. While these California site-specific data are being collected, how will the regulatory agencies evaluate sites that do not meet screening criteria, particularly when there are no buildings onsite? Further, as mentioned on page 7 of the document, very few California data are included in the USEPA VI Database. As mentioned in Comment #4 above, studies that considered California's climate variability would suggest the USEPA AFs are overly conservative for California. Although the current document states that the suggested AFs are based on data that is non-representative of California, it still insists on screening investigations using the admittedly non-representative AFs.

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452	1. Formal/ Official	56	06/01/2020	Estelle	Shiroma	Ahtna, Inc.	56.007	04. Introduction	04g. F – California Vapor Intrusion Database	7, Attachment 4	Paragraph 3 mentions several limitations of the USEPA VI Database used in the generation of the suggested AFs. Paragraph 4 states that the data collected and entered into the GeoTracker VI database will provide the basis for developing California-specific attenuation factors. Despite the serious issues raised in Paragraph 3, the document insists on the use of conservative suggested AFs. Paragraph 3 also indicates that CalEPA, DTSC, and the Water Board would prefer a dataset that was more representative of different building types, California's climate, different sources of VFCs, spatial variability, and temporal variability. Before California-specific attenuation factors are available, there is the possibility that VI investigations will continue with the likely overly conservative AFs, and these investigations will provide the data CalEPA, DTSC, and the Water Board will then use to develop the promised California-specific AFs. However, the current draft of the guidance document does not provide any description of a process for re-evaluation of sites that will be investigated with the use of the USEPA AFs if the future California-specific AFs are less conservative than the currently suggested AFs.
453	1. Formal/ Official	56	06/01/2020	Estelle	Shiroma	Ahtna, Inc.	56.008	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06a. General Comments	13	The text in these sections describes the processes for prioritizing and selecting sampling approaches for VI screening evaluations. However, the discussion is mostly focused on screening for currently existing buildings, and the guidance for empty lots or sites without buildings is described in one paragraph in Section 2A.3. Further clarification of screening approaches that CalEPA, DTSC, and the Water Board would accept for sites without buildings is needed.

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454	1. Formal/ Official	56	06/01/2020	Estelle	Shiroma	Ahtna, Inc.	56.009	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06d. Step 2C – Evaluate Temporal Variability	17	The text in these sections describes the need for multiple rounds of sampling to address the temporal variability in VI for a given building. However, the text within these sections is mostly focused on addressing seasonal variation in VI for existing buildings. Further clarification of methods to address the temporal variability requirement for sites without existing buildings is needed.

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455	1. Formal/ Official	56	06/01/2020	Estelle	Shiroma	Ahtna, Inc.	56.010	08. Step 4: Concurrent and Future Risk Evaluation and Management Decisions	08a. General Comments	27	The text in these sections describe the risk mitigation and risk management strategies for VI risk. However, as stated in Comments #8 and #9 above, the text in these sections is mostly focused on managing VI risk for existing buildings. For sites without buildings where indoor air sample collection is not possible, further clarification is needed to address risk evaluation and risk management approaches that CalEPA, DTSC, and the Water Board would accept for sites without buildings. References: Brewer, R., Nagashima, J., Rigby, M., Schmidt, M., and O'Neill, H. (2014). Estimation of Generic Subslab Attenuation Factors for Vapor Intrusion Investigations, Groundwater Monitoring & Remediation 34, no.4, pp. 79-92. Luo, H., Dahlen, P., Johnson, P.C., Peargin, T., and Creamer, T. (2009). Spatial variability of soil-gas concentrations near and beneath a building overlying shallow petroleum hydrocarbon impacted soils. Groundwater Monitoring & Remediation 29, no.1, pp. 81-91. Song, S., Schnorr, B.A., and Ramacciotti, F.C. (2014). Quantifying the influence of stack and wind effects on vapor intrusion. Human and Ecological Risk Assessment 20, pp.1345-1358. USEPA. (2015). OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air. Office of Solid Waste and Emergency Response. Publication 9200.2-154. June. https://www.epa.gov/sites/production/files/2015-09/documents/oswer-vapor-intrusion-technical-guide-final.pdf

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456	1. Formal/ Official	56	06/01/2020	Estelle	Shiroma	Ahtna, Inc.	56.011	10. Attachment 1 – Petroleum Specific Considerations	10a. General Comments	Attachment 1	The text in Attachment 1 describes how the guidance interacts with exclusively petroleum VI sites. However, petroleum VFCs can be collocated with non-petroleum VFCs in soil, soil gas, outdoor air, and indoor air. Attachment 1 should clarify whether the draft guidance, the petroleum VI guidance, or both guidance documents apply in these cases. If there is overlap, the draft guidance should clarify the specific points of overlap.
457	1. Formal/ Official	57	06/01/2020	Michael	Harrison	EnviroAssets, Inc.	57.001	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	My comments are focused on implementation of the document. Within its Section A Scope and Applicability, the document states important guiding principles that: 1) "[t]his document is guidance and is not intended as regulation or water quality control plan or policy" and; 2) "[t]his Supplemental Guidance is not intended to exclude alternative methodologies nor is it intended to provide prescriptive or inflexible requirements". These statements are consistent with the User's Guide: Derivation and Application of Environmental Screening Levels (ESLs) (Interim Final 2019 Revision 1, 2019) which states "[t]he presence of a chemical at concentrations exceeding an ESL does not necessarily indicate adverse effects on human health or the environment, rather that additional evaluation is warranted". Given the extremely conservative nature of the 0.03 attenuation factor that the draft standards are based on, and the nature of vapor intrusion concerns where a completed pathway and exposure is required for actual risk, it is critical that the standards trigger site-specific evaluation rather than prescriptive action.

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458	1. Formal/ Official	57	06/01/2020	Michael	Harrison	EnviroAssets, Inc.	57.002	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	Unfortunately, we have already experienced prescriptive regulatory action stating that any property exceeding soil vapor screening concentrations must mitigate. The justification for this position has been that building conditions can change, potentially allowing enhanced future vapor intrusion. Such an interpretation seeks to make the de minimis guidance provided with the draft Supplemental Guidance and the ESLs enforceable cleanup standards and circumvents the rule-making process for such an enforceable standards.
459	1. Formal/ Official	57	06/01/2020	Michael	Harrison	EnviroAssets, Inc.	57.003	01. VI Supplemental Guidance General Comments	01a. General Comments		The draft Supplemental Guidance and the ESLs also do not explicitly address the regulatory approach to dischargers versus properties that are passively impacted. Given the conservative nature of the new guidance concentrations, they are applicable to a multitude of innocent landowners that exist over local vicinity or regional plumes in soil vapor or groundwater that exist in virtually every town and city I have worked in. The potential for regulatory impacts on normal business is even more crucial consideration given the economic challenges faced by business and municipalities during the time of the Covid crisis and its fallout. Consequently, my public comment is to challenge the agencies to include specific guidance regarding non-discharger and discharger entity regulatory approach, and to clarify or confirm the requirements for a temporal data set that will be sufficient to address the regulatory concern that changes in buildings over time require mitigation when de minimis vapor guidance concentrations are exceeded.

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460	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.001	16. Other	16a. Other		We have several broad comments on the DSVIG and provide detailed comments on the different sections of the document. Extend the Public Comment Period. CalEPA previously extended the comment period to June 1, 2020 due to the COVID-19 public health emergency. However, we understand that many stakeholders remain focused on addressing the COVID-19 crisis and have been unable to devote the resources necessary to evaluate the DSVIG and the impact it will have on their business and communities. Additionally (as discussed below), we understand that the Department of Toxic Substances Control (DTSC) is conducting a study to assess VI attenuation factors (AFs) based on data collected in California. Consideration of the results of the DTSC study will be important for the finalization of the Supplemental VI Guidance.

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461	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.002	04. Introduction	04e. D – Vapor Intrusion Attenuati on Factors	5, 7	Use Current and California-Specific Empirical Data for the Selecting Screening AFs Presented in the Supplemental VI Guidance. We recognize that the CalEPA VI Workgroup has received numerous comments regarding the use of the USEPA default AFs for screening sites in California. The USEPA screening AFs are based on a database that is predominantly comprised of data collected from single-family residences with basement construction and has limited data from large commercial/industrial buildings. A small fraction of the AFs in the USEPA study are based on data collected in California. The majority of the data in the USEPA database are from states with relatively cold climates where the stack effect due to building heating is expected to enhance the potential for VI and are not representative of the vast majority of volatile chemical release sites in California. Additionally, the DSVIG does not include references to other studies that either identify limitations/uncertainties with the USEPA default AFs or propose AFs that may be more representative of California. We also understand that the DTSC is currently conducting a study to evaluate California-specific AFs. This work is expected to be completed soon and the findings should be considered for the Supplemental VI Guidance in order to facilitate consistency among different CalEPA agencies. The Supplemental VI Guidance should be based on the best available science, and there has been considerable research and an improved understanding of AFs since the USEPA empirical AF study was published in 2012. Studies with data from California sites should be relied upon for the Supplemental VI Guidance. If the CalEPA VI workgroup believes that a peer review of a California-specific AF is warranted, then that review should be completed, and the results incorporated into the guidance before it is finalized

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462	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.003	03. Flowchart (Steps)	03e. Step 4: Decide if Risk Management is Needed to Address Current and Future VI Risk	x, 27	Do Not Include Step 4: Current and Future Risk Evaluation and Management Decisions. The Supplemental VI Guidance is intended to "promote state-wide standard practice and consistency for screening buildings for vapor intrusion and to establish appropriate sampling to protect building occupants from vapors off- gassing from contaminated sources" and CalEPA staff have stated that the Supplemental VI Guidance is not intended to be used to make risk management decisions. The VI risk management decision framework included in Step 4 lists potential response actions based on screening risk results calculated using the default screening AF of 0.03 which will likely be different from a multiple-lines-of-evidence evaluation of VI risks. To avoid confusion, this section should be modified to simply state that the data collected in Steps 1 through 3 should be evaluated using the VI conceptual site model, multiple lines of evidence, additional data collection, and/or formal risk characterization to develop a risk management strategy and reference existing guidance documents to assist the users in completing this task.

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463	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.004	03. Flowchart (Steps)	03d. Step 3: Evaluate VI Using Concurre nt Indoor Air, Subslab, and Outdoor Air	ix, 23	Provide Additional Details and/or Examples for Alternatives to the Generic Screening Approach. The DSVIG indicates that there is flexibility in the screening analysis. For example: Section D2 states that alternative approaches may be used for the initial screening of buildings. Section E lists additional lines of evidence that may be considered for the VI screening assessment Section 3B.6 describes various complementary lines of evidence for the vapor intrusion investigation. However, the DSVIG text and flow chart do not show how consideration of these alternatives may be used in the screening process. For example, Step 3C states that future VI risk and hazard should be calculated using an attenuation factor of 0.03. The flow chart and the step-by-step process described in the DSVIG does not indicate that alternate approaches or consideration of additional lines of evidence may be used to assess future VI risks. Without examples and/or specific details on the use of these additional lines of evidence in the guidance document, the ability to receive regulatory approval for alternate approaches will be limited.

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464	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.005	04. Introduction	04g. F – California Vapor Intrusion Database	7, Attachment 4	Formalize the Process and Schedule for Evaluation of the GeoTracker VI Data. Section F of the DSVIG states that VI data to be uploaded to the GeoTracker website will be compiled and evaluated to assess whether California-specific AFs can be justified. This is an important task for the CalEPA VI Workgroup and additional detail regarding the process and schedule for this effort should be provided. The Supplemental VI Guidance should: Clarify the amount of data that will be necessary to have a "sufficient" dataset; Seek input from technical specialists outside of CalEPA to assist in the data analysis; Describe the peer-review process; and Provide a schedule to complete this task.

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465	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.006	10. Attachment 1 – Petroleum Specific Considerations	10a. General Comments	Attachment 1	Include Separation Distance Screening and Bioattenuation Factor for Evaluation of Petroleum Vapor Intrusion. We agree with the statements included in the DSVIG that the VI pathway for petroleum releases from underground storage tanks (USTs) should be evaluated using the State Water Board's Low-Threat Underground Storage Tank Case Closure Policy (LTCP). For non-UST petroleum release sites, Attachment 1 – Petroleum-Specific Considerations describes additional lines of evidence to evaluate whether there is sufficient bioattenuation of vapors; however, the DSVIG does not describe how these data should be used for risk-based decision making. This attachment should be modified to clearly describe petroleum vapor intrusion screening for non-UST sites. The following screening criteria, included in the references cited in Attachment 1, should be added to the Supplemental VI Guidance: The 2014 ITRC PVI guidance recommends a separation distance of 5 feet for a dissolved phase source or 18 feet for a non-UST petroleum site. The SWRCB LTCP uses a 1000-fold bioattenuation factor for sites where the requirements for a bioattenuation zone are satisfied.

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466	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.007	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05d. Step 1C – Selecting Sampling Approach: Soil Gas Screening or Indoor Air	3, 10, Attachment 2	Provide Greater Clarity for Evaluation of Sewers as Preferential Pathways. The DSVIG recommends sampling sewers to assess these preferential pathways for the VI screening evaluation. The guidance does not clearly state when sewers should be sampled or how the data should be interpreted after the sewer air samples are collected. It appears that the DSVIG intends that sewer sampling would serve as an optional technique as a complementary line of evidence to help interpret indoor air results and is not a required investigation step for site screening. This should be explicitly stated in the Supplemental VI Guidance. Step 1C states that indoor air sampling should be conducted with buildings are "connected to conduits intersecting significant contamination," but the document does not describe what is considered significant.
467	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.008a	04. Introduction	04b. A – Scope and Applicability	vi, 1	The introduction states "This document provides a reasonable framework for evaluating VI with a high level of confidence and promoting consistency at State-lead sites in California." It appears that the proposed framework will screen out very few sites and consequently the guidance will result in substantial investigation for sites with little or no risk. As discussed below, our analysis of vapor intrusion data collected in California indicates that the proposed screening levels may result in false positive results for a majority of the soil vapor or subslab samples collected. We do not believe the framework described in the DSVIG is reasonable because it will require detailed investigations at numerous sites where VI risks are not of concern. Additionally, it does not appear that the DSVIG is meeting its objective to promote consistency at State-lead sites. We have experienced inconsistencies in the interpretation of the DSVIG among different CalEPA offices. For example, DTSC has stated that they recommend different AFs for redevelopment sites than what is presented in the DSVIG [DTSC, 2019].

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468	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.008b	04. Introduction	04b. A – Scope and Applicability	vi, 1	The introduction states “This document provides a reasonable framework for evaluating VI with a high level of confidence and promoting consistency at State-lead sites in California.” It appears that the proposed framework will screen out very few sites and consequently the guidance will result in substantial investigation for sites with little or no risk. As discussed below, our analysis of vapor intrusion data collected in California indicates that the proposed screening levels may result in false positive results for a majority of the soil vapor or subslab samples collected. We do not believe the framework described in the DSVIG is reasonable because it will require detailed investigations at numerous sites where VI risks are not of concern. Additionally, it does not appear that the DSVIG is meeting its objective to promote consistency at State-lead sites. We have experienced inconsistencies in the interpretation of the DSVIG among different CalEPA offices. For example, DTSC has stated that they recommend different AFs for redevelopment sites than what is presented in the DSVIG [DTSC, 2019].
469	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.009	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	6	We appreciate the DSVIG’s recognition that professional judgment and alternative approaches may be used for evaluating the VI pathway. Prior to CalEPA’s release of the DSVIG, we recently implemented an alternate approach consisting of high-volume sampling (HVS) and calculation of building-specific attenuation factors based on subslab flow and vacuum measurements. Working with DTSC, Regional Board, and USEPA staff, we were able to collect data for risk-based decision making without the need for multiple seasons of subslab and indoor air samples. However, we believe that most regulatory case workers will point to the flowchart presented in the DSVIG and be unwilling to accept methods that are not described in sufficient detail in guidance. The intended flexibility of the guidance will have much greater acceptance and use if the Supplemental Guidance provides additional specifics on alternative approaches and use of alternative lines of evidence for VI assessments.

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470	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.010	08. Step 4: Concurrent and Future Risk Evaluation and Manageme nt Decisions	08a. General Comment s	27	The DSVIG states that cleanup goals, remedial strategies, and closure criteria should be established on a site-specific basis and is outside the scope of this document. However, the Step 4 requires development of a remedial strategy based on screening levels calculated using the default AF of 0.03. This inconsistency must be corrected in the final guidance.
471	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.011	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	The DSVIG recommends the use of USEPA empirically derived AFs for screening sites in California. There are limitations and uncertainties associated with the USEPA database that should be considered when applying the results of this study for the CalEPA Supplemental VI Guidance: The USEPA database is predominantly comprised of data collected from single- family residences with basement construction with the bulk of these data collected from within the basement instead of typically occupied spaces above ground level. Additionally, over 16% of the buildings with basement construction had unfinished basements. The USEPA database has limited data from large commercial/industrial buildings. The USEPA database largely contains data came from states with relatively cold climates where the stack effect due to building heating is expected to enhance the potential for VI. USEPA’s efforts to address the influence of VOC background sources on the empirical AF does not completely resolve the bias associated with background sources.

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472	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.012	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	USEPA's assessment (after using a source-strength filtering process to exclude data that may be biased by indoor background sources) included only two small subslab datasets and two small soil vapor datasets from sites in California where the stack effect is expected to be less significant. These factors limit the applicability of the USEPA AFs for risk-based decision making at VI sites in California and sites with different building construction (e.g., single-family homes without basements or large commercial/ industrial buildings).
473	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.013	04. Introduction	04c. B – Relation to Existing Guidance or Policy	52-3	Building construction can be a significant factor. The USEPA study found the 95th percentile AF for slab on grade residential construction was lower than that for basement construction. The USEPA database does not have sufficient data to estimate attenuation factors for large commercial/industrial buildings, which are expected to have lower AFs due to building size and ventilation rate. The DSVIG does not include guidance to adjust the screening AF based on building construction factors that are known to influence vapor intrusion. Instead, the guidance treats all structures the same and recommends a screening AF of 0.03, whether the building is a single-family residence with basement construction, single-family home with crawl space or slab on grade construction, manufacturing facility, maintenance facility, or warehouse.
474	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.014	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	The USEPA study notes that a high percentage of the paired data come from a small number of sites and states: "These differences in site conditions and types and amount of data for each site and the uneven distribution of sites among the Regions should be considered when evaluating the analyses and interpretations presented in this report, because they may impart significant bias." Published studies have shown that differences in climate and/or average outdoor temperature will have a significant impact on vapor intrusion [Brewer et al., 2014, Chan et al., 2009]. CalEPA should follow USEPA's recommendation to consider these factors when selecting a screening AF for the Supplemental VI Guidance.

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475	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.015	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	Additionally, other studies have been conducted to evaluate empirical AFs using different datasets [Ettinger et al., 2018; Eklund et al., 2019; Nawikas, 2020]. These studies found empirical AFs approximately an order of magnitude lower than the default USEPA value. CalEPA has questioned the data quality of the Ettinger et al, 2018 study; however, these data were submitted and accepted by either CalEPA (DTSC or Regional Boards) or USEPA, and therefore have suitable data quality for this assessment. CalEPA has noted that these studies have not yet been published in peer- reviewed journal; however, the DSVIG references multiple articles/presentations from non-peer reviewed sources to support technical decisions. It is not anticipated that the conclusions from the proposed CalEPA empirical AF analysis using data uploaded to GeoTracker will be significantly different from these studies. Consequently, these recent empirical AF studies should be considered in the development of the Supplemental VI Guidance.

476	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.016	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	To further assess the impact of the proposed AF in the DSVIG, a reliability analysis of the TCE data included in a database of VI empirical data for California sites has been conducted. This evaluation follows the approach used by USEPA to support its selection of the default screening AF recommended in Appendix A of the 2015 Vapor Intrusion Guidance. In this guidance, the USEPA used a false negative threshold of 2% as a rationale to justify the use of the 0.03 AF [USEPA, 2015]. The reliability analysis presented here is based on the dataset used in the Ettinger, et al., 2018 study that has been supplemented with additional data. To limit the influence of indoor and outdoor background sources of vapor forming chemicals (VFCs), the reliability analysis focuses on data pairs of TCE concentrations in indoor air (IA) and subslab/soil gas (SSSV). IA and SSSV concentrations were compared to their respective screening levels (e.g., residential IA screening level of 0.48 µg/m3 and commercial/industrial screening level of 3 µg/m3). Three different sets of attenuation factors were considered: The reliability analysis considers the following outcomes: False Positive: SSSV concentrations above SLs, IA concentrations below SLs False Negative: SSSV concentrations below SLs, IA concentrations above SLs True Positive: SSSV concentrations above SLs, IA concentrations above SLs True Negative: SSSV concentrations below SLs, IA concentrations below SLs The reliability analysis results are plotted on the following figures. Figure 1. TCE Reliability Analysis Using USEPA Default AF Figure 2. TCE Reliability Analysis Using Ettinger et al., 2018 AF Figure 3. TCE Reliability Analysis Using SFBRWQCB, 2016 Afs

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											The frequency for each category in the reliability assessment are summarized in the table below: Use of the USEPA default AF results in a very small fraction (0.3%) of false negative results, but 57% of the data resulted in false positive results. The false negative rate is well below the threshold of 2% considered by USEPA in their analysis [USEPA, 2015]. The reliability assessment for the California data indicates that using the 0.03 AF correctly assesses less than half of the sample pairs evaluated, and the use of this screening AF would lead to additional investigation requirements in more than half the cases where concomitant exceedances of IA screening levels were not found. The false negative rate using the AFs presented in the SFBRWQCB 2016 Environmental Screening Levels (ESLs, [SFBRWQCB, 2016]) is less than 2% which is consistent with the threshold used by USEPA for selecting its default AFs. Consequently, this data analysis indicates that the AFs previously proposed by the SFBRWQCB are appropriate for risk-based decision making and should be used in the Supplemental VI Guidance until other CalEPA studies are completed.
477	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.017	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	Finally, we understand that the DTSC is conducting a study to evaluate a California- specific empirical AF. DTSC has been reviewing data from CalEPA files and expects to complete their study shortly. The CalEPA VI Workgroup should wait until this study is complete and review the findings before finalizing the Supplemental VI Guidance.

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478	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.018	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	We agree with CalEPA VI Workgroup members' statements that the guidance should be based on the best available science. However, there has been more research and an improved understanding of AFs since the USEPA empirical AF study was published. Studies with data from California sites with comparable or better quality than those used in the USEPA study should be relied upon for the Supplemental VI Guidance. If the CalEPA VI workgroup believes that a peer review of a California-specific AF is warranted, then that review should be completed and the results incorporated into the guidance before it is finalized.
479	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.019	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	Use of Models for VI Screening The DSVIG does not recommend site-specific AFs based on mathematical models for screening. One of the rationales for this caution provided in the DSVIG is that VI models cannot predict the range of results observed in empirical VI studies. Prior to filtering the USEPA empirical database, 103 of the 1208 subslab empirical AFs were greater than 1 (and these results would not be predicted by models). These results with AF>1 were likely due to indoor sources and/or insufficient data quality. USEPA filtered these results out of the dataset used for their evaluation, but this does not mean that the limitations that led to the exclusion of these points did not exist in the other data points that remained in the empirical dataset. The upper-bound results presented in the USEPA study may be due to confounding factors and these data should not be used to exclude the use of models for VI assessments.

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480	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.020	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	Contrary to the statement in the DSVIG, models with upper-bound input values can predict values up to the 95-percentile attenuation factor presented in the USEPA empirical AF study. A simple model to predict the subslab to indoor air AF is $AF =$ Qsoil QBldg An AF = 0.03 can be calculated assuming a building with dimensions of 10 m x 10 m x 2.44 m, air exchange rate of 0.18 per hour (10th percentile value from the USEPA exposure factors handbook) and a Qsoil value of 20 liters per minute (L/min). The value for Qsoil is slightly above the typical range (1 – 10 L/min) considered by USEPA [USEPA, 2017] and below values estimated from field investigation data collected at a residential property with a basement in a cold environment [Nazaroff et al., 1985].
481	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.021	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	Additionally, there is a recently published model that provides a method for pneumatic testing and mathematical analysis to calculate a building-specific attenuation factor [McAlary et al, 2018]. The model results presented in this paper compares very well to the empirical attenuation factors in the USEPA database.
482	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.022	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	The DSVIG also fails to recognize numerous studies that illustrate how models with well-justified input parameters can effectively provide conservative assessments of the vapor intrusion pathway [Ettinger et al, 2018; Johnson et al, 2009]. Models can be a useful tool to assess how changing building conditions may affect the potential for vapor intrusion in the future. Instead of focusing only on examples where VI modeling has not been appropriately used to evaluate the VI pathway, CalEPA should look to understand how modeling can be an effective tool for risk-based decision making.

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483	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.023	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	There is no basis for CalEPA's statement that current VI models cannot predict the range of results observed in empirical VI studies and this statement should be deleted.
484	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.024	04. Introduction	04e. D – Vapor Intrusion Attenuati on Factors	6	D2 – ALTERNATIVES FOR SCREENING The DSVIG states that alternative approaches may be used for the initial screening of buildings. However, no details on recommended approaches or considerations for alternative screening levels are presented. Without sufficient information regarding the methods and application of these alternative approaches in the guidance, regulatory acceptance will be difficult to obtain. The Supplemental VI Guidance should include specific examples of alternatives that are acceptable to CalEPA.

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485	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.025a	04. Introduction	04f. E – Evaluation of Lines of Evidence	6	E – EVALUATION OF LINES OF EVIDENCE This section lists potential lines of evidence to consider for the VI screening assessment: Site History, Contaminant Sources, Release Mechanisms, Contaminant Migration, Location of Possible Preferential Pathways, Locations of Receptors, and Information about the Construction of Buildings. It is understood that these data will be used to develop the conceptual site model (CSM), but with the prescriptive nature of the assessment described in the DSVIG, it does not seem that these factors will affect the screening assessment. For example, the DSVIG requires the use of a single line of evidence for current use (indoor air only) and a different single line of evidence for future use (subslab vapor data plus the default AF only).
486	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.025b	04. Introduction	04f. E – Evaluation of Lines of Evidence	6	The document does not explain how these additional lines of evidence may be used for risk-based decision making. The guidance should be expanded to more clearly describe these other lines of evidence may be applied for risk-based decision making or make it clear that collection of this information would be used for inform risk-based decision and calculation of site-specific cleanup goals, which are outside the scope of this guidance.

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487	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.026	04. Introduction	04g. F – California Vapor Intrusion Database	7, Attachment 4	F – CALIFORNIA VAPOR INTRUSION DATABASE The DSVIG describes an ambitious program to evaluate California-specific empirical AFs. However, no information regarding the process or schedule to complete this task is included. The Supplemental VI Guidance should specify: The amount of data that will be necessary to have a “sufficient” dataset for this evaluation; A process to obtain input from technical specialists outside of CalEPA to assist in the data analysis; The peer-review process; and A schedule to complete this analysis. During the May 19, 2020 Question and Answer Session, CalEPA staff indicated that the amount of data for evaluation of a California-specific AF would be similar to that included in the USEPA database. It should be clear that even though the USEPA database contains 1,582 paired subslab and indoor air measurements, but after USEPA’s filtering process, 431 paired measurements were used to assess the empirical subslab to indoor air AF.
488	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.027	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05c. Step 1B – Prioritizing Buildings for VI Evaluation	9	STEP 1B.1 – PROXIMITY TO CONTAMINATION The DSVIG recommends buildings within 100 feet of area of the release area should be prioritized for the VI evaluation. The release area is defined as “the area of estimated vadose zone soil contamination extending out from a source.” It is unclear whether this area is to be delineated by the detection of VFC is soil vapor (i.e., above method detection limit), concentrations above generic screening levels, or concentrations above approved site-specific screening levels. A clearer definition of the release area should be provided.

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489	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.028	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05d. Step 1C – Selecting Sampling Approach: Soil Gas Screening or Indoor Air	10	STEP 1C – SELECT SAMPLING APPROACH: SOIL GAS SCREENING OR INDOOR AIR The DSVIG states that the investigation should proceed directly to Step 3 if buildings are near a “significantly contaminated groundwater plume”. This should be more clearly defined.
490	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.029	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distribution of Soil Gas Contamination	11	STEP 2: EVALUATE VAPOR INTRUSION RISK USING SOIL GAS DATA The DSVIG does not recommend the use of soil data for VI Screening. However, in some instances soil data may be the only practical line of evidence for the VI screening evaluation. For example, it is not practical to collect soil gas or indoor air data at a redevelopment site with potential shallow (less than 2 ft bgs) contamination. The use of soil data for this site may be appropriate provided that the uncertainties in the assessment are considered. If this is not acceptable, The Supplemental VI Guidance should explain how sites like these should be screened.

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491	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.030a	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06c. Step 2B – Estimate Human Health Risk from Vapor Intrusion	15	STEP 2B1 – ESTIMATE POTENTIAL INDOOR AIR CONCENTRATION In various locations, the DSVIG states describes a “potential indoor air concentration” or “predicted indoor air concentration” based on soil vapor or groundwater data. Given that the screening-level attenuation factors are based on the 95 percentile of the USEPA empirical attenuation factors, the indoor air concentration are expected to be less than (and in many cases orders of magnitude less than) the value calculated using the generic attenuation factor. The guidance should be modified to use the phrase “upper-bound estimated indoor air concentration” (or something similar) to acknowledge the conservative nature of these screening calculations.
492	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.030b	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06c. Step 2B – Estimate Human Health Risk from Vapor Intrusion	15	The DSVIG states that the default AF of 0.03 should be used to screen all buildings. This ignores the potential for alternate screening described in Section D2. This should be modified to include “other approved screening levels.”

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493	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.031a	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06c. Step 2B – Estimate Human Health Risk from Vapor Intrusion	16	STEP 2B.2 – ESTIMATE CANCER RISK AND NONCANCER HAZARD QUOTIENT It would be better to evaluate risk and hazard based on soil gas concentrations (Equations 2 and 3) or comparison of soil vapor concentrations to soil vapor screening levels (Equations 4 and 5). This way, the user will avoid calculation of hypothetical indoor air concentrations (CIA = CSG × AF) which will be biased high (due to the use of an upper-bound screening AF) and may be misinterpreted to represent actual indoor air concentrations. The SDVIG states that Equation 2 should be modified, when appropriate, to take into account increased sensitivity during childhood [USEPA, 2020, OEHHA, 2009]. USEPA and OEHHA guidance differs on which chemicals require this age adjustment (USEPA includes this age adjustment for chemicals with a mutagenic mode of action has been identified whereas OEHHA includes the age adjustment to all carcinogens unless chemical-specific data exist to the contrary). CalEPA screening level guidance (i.e., DTSC HHRA Note 3 and SFBRWQCB ESLs) follow USEPA guidance to identify chemicals requiring this adjustment. The text should confirm that USEPA guidance can be used to identify when it is appropriate to make this age adjustment for mutagenic carcinogens.

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494	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.031b	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06c. Step 2B – Estimate Human Health Risk from Vapor Intrusion	16	STEP 2B.2 – ESTIMATE CANCER RISK AND NONCANCER HAZARD QUOTIENT It would be better to evaluate risk and hazard based on soil gas concentrations (Equations 2 and 3) or comparison of soil vapor concentrations to soil vapor screening levels (Equations 4 and 5). This way, the user will avoid calculation of hypothetical indoor air concentrations (CIA = CSG × AF) which will be biased high (due to the use of an upper-bound screening AF) and may be misinterpreted to represent actual indoor air concentrations. The SDVIG states that Equation 2 should be modified, when appropriate, to take into account increased sensitivity during childhood [USEPA, 2020, OEHHA, 2009]. USEPA and OEHHA guidance differs on which chemicals require this age adjustment (USEPA includes this age adjustment for chemicals with a mutagenic mode of action has been identified whereas OEHHA includes the age adjustment to all carcinogens unless chemical-specific data exist to the contrary). CalEPA screening level guidance (i.e., DTSC HHRA Note 3 and SFBRWQCB ESLs) follow USEPA guidance to identify chemicals requiring this adjustment. The text should confirm that USEPA guidance can be used to identify when it is appropriate to make this age adjustment for mutagenic carcinogens.

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495	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.032	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06c. Step 2B – Estimate Human Health Risk from Vapor Intrusion	17	STEP 2B.4 – EVALUATE RISK AND STEP 2C.2 – RE-EVALUATE RISK The DSVIG recommends proceeding to Step 3 (indoor air investigation) if there is any exceedance of the point of departure level for risk or hazard. Given the conservative nature of the screening risk calculations, a risk management decision should be made here to identify the appropriate next step. For example, if one of many samples collected at site is slightly above the conservative screening level, it would be appropriate to confirm the soil gas concentration before proceeding to indoor air sampling.
496	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.033	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07b. Step 3A – Conduct in Depth Building Survey	18	STEP 3A.1 – IDENTIFY BUILDING TYPE, CHARACTERISTICS, AND CONDITION The building survey states that understanding how occupants use windows and doors to ventilate the building is important. This is particularly important for commercial/ industrial facilities that keep rollup doors open during operating hours. The DSVIG should state how this information would be used to identify conditions for indoor air sampling and to make risk management decisions when evaluating indoor air sampling results.

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497	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.034	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07b. Step 3A – Conduct in Depth Building Survey	19	STEP 3A.2 – LOCATE AND REMOVE POTENTIAL INDOOR SOURCES OF VFCs The DSVIG states that sources should be removed 24 to 72 hours before a sampling event, but that all sources may not be identified or removable. The Supplemental VI Guidance should clarify that there may be situations where indoor air sampling should not be conducted, such as when all sources cannot be removed (e.g. mechanical shops with substantial chemical product use).

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498	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.035	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	19	STEP 3B – EVALUATE SPATIAL DISTRIBUTION The DSVIG provides a description of an indoor air sampling program for slab on grade construction and the Application to Other Building Types Section provides information for Large and Multistory Buildings, Crawl Space Buildings, and Building with Above- Grade or Below-Grade Parking Structures. However, if the Agencies believe that there is a substantial population of single-family homes with basement construction in California, then a description of an indoor air sampling program for this construction type should be included in the Guidance. For small structures, it may be acceptable to collect a sample that integrates concentrations throughout the building and use this information for risk-based decision making. This can be achieved in an efficient manner during a BPC test, which can address spatial and temporal variability with a single test.

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499	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.036	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	20	STEP 3B.1 – INDOOR AIR: SAMPLING METHOD Technology is available to collect air samples with canisters for periods longer than 24- hours. The Supplemental Guidance should acknowledge that longer sampling periods may be used to collect samples for risk characterization. The DSVIG states that real time monitoring results can be used to calculate time- integrated average concentrations. One of the references cited in the DSVIG collected a grab sample every 25 minutes, but in some cases, the sampling period can be as high as one to two hours. The guidance should clarify the limits of using real-time monitoring results to calculate time-integrated average concentrations. Additionally, the guidance should caution that analytical methods that do not include the use of mass spectrometry may not distinguish between compounds at the same time in the gas chromatograph, which may bias results to appear more elevated than actually present. Additional confirmation analysis may be warranted when a mass spectrometry is not used in the analytical method.

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500	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.037	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06c. Step 2B – Estimate Human Health Risk from Vapor Intrusion	21	STEP 3B.2 – SUBSLAB SOIL GAS: SAMPLING METHOD In large buildings, high volume sampling (HVS) can be an efficient approach to characterize the distribution of VFCs in subslab soil gas. The HVS sampling method described in the CalEPA Advisory for Active Soil Gas Sampling [CalEPA, 2015] and should be referenced in the Supplemental Guidance. The DSVIG states "At this time, quantitative passive sampling for soil gas is undergoing research and not recommended as a sole line of evidence for soil gas screening evaluations." A series of peer-reviewed articles demonstrating the effectiveness of passive samplers for soil gas sampling have been published [McAlary, et al., 2014a, b, c], and passive sampling for subslab soil gas analysis should be permitted.

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501	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.038	07. Step 3: Indoor Air Investigatio n – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distributi on	22	STEP 3B.5 – OUTDOOR AIR: LOCATION AND NUMBER OF SAMPLE LOCATIONS The DSVIG recommends collecting at least three outdoor air sample locations for each sampling event. Our experience is that the spatial variability in outdoor air concentrations at most sites is less than the analytical variability and one or two outdoor air samples is sufficient. CalEPA should modify the document to provide greater flexibility regarding the number of outdoor air samples locations for indoor air investigation. The objective of these samples to identify whether indoor air impacts are due to vapor intrusion versus migration from outdoor air (regardless of the source of the outdoor air contamination). There is no reason that the outdoor air samples must be collected away from the influence of subsurface VFC contamination, storage area, and remediation areas. If outdoor air contamination is due to one of these sources, that pathway should be evaluated separately (and is outside the scope of this supplemental guidance). The DSVIG should be modified to state that outdoor air samples should be collected near the building to assess outdoor air contributions to indoor air without restriction.

502	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.039	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	22	STEP 3B.6 – COMPLEMENTARY LINES OF EVIDENCE We support the inclusion of the various complementary lines of evidence for the vapor intrusion investigation. We suggest the following additional lines of evidence be included in the guidance: (i) high volume sampling (HVS) for characterization of the distribution of VFCs in subslab soil gas [McAlary et al., 2010] and (ii) subslab pneumatic testing to collect data for building-specific AF analysis [McAlary et al., 2018]. We have the following comments for the complementary lines of evidence listed in the DSVIG: There is no clear reason that the same probe cannot be used to monitor pressure differential and collect subslab samples. This reference to the USEPA recommendation should be deleted or the technical justification for this statement provided. The time frame for the soil gas and indoor air sampling should be different than that for subslab to indoor air. Samples collected within three months of each other are likely to be sufficient to provide information about vapor transport through the subsurface and into the building. Sampling inside sewers or other vapor conduits can provide information to assess if these pathways have a potential to enhance VI, but these data are not conclusive. For example, if the vapor trap in the sewer line is competent, then the presence of a VFC in a sewer will not enhance VI. The text regarding this sampling technique should be modified to clearly state that this line of evidence only indicates a potential for VI. The guidance does not describe how these lines of evidence would be used for risk- based decision making (particularly for future risk characterization, which the DSVIG states must be evaluated using subslab soil gas data with the screening level attenuation factor). For example, building pressure control (BPC) testing may be used to exclude the need for seasonal testing (i.e., BPC can create

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											conditions favorable to vapor intrusion during a single site visit). Additional explanation and/or references for the use and interpretation of complementary lines of evidence should be added to the Supplemental Guidance.
503	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.040	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07d. Step 3C – Assess Risk from Contaminated Indoor Air and Subslab Soil Gas	24	STEP 3C.2 – ESTIMATE RISK FROM INDOOR AIR DATA. The DSVIG states that the maximum measured indoor air concentrations should be used to assess current risk. This does not take into account background sources (either from outdoor air or indoor sources) of the chemical that may be detected indoor air. The background sources may be identified in the chemical survey (Step 3A.2), field screening (Step 3A.3), outdoor air sampling (Step 3B.3), or complementary lines of evidence (Step 3B.6). It appears that the guidance suggests collection of data that will aid in the vapor intrusion assessment, but then does not permit their use in the decision- making process. Also, the guidance should specifically state that samples collected from vapor conduits (e.g., elevator shafts, stairwells) or other samples from infrequently occupied areas that are specifically used to assess preferential pathways (e.g., bathrooms) should not be used to evaluate indoor air risks. Occupancy of these locations are not consistent with exposure assumptions used for risk calculations (i.e., 24-hours per day for residential exposures or 8-hrs per day for commercial/industrial exposures).

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504	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.041	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07d. Step 3C – Assess Risk from Contaminated Indoor Air and Subslab Soil Gas	24	STEP 3C.3 – ESTIMATE POTENTIAL FUTURE RISK FROM SUBSURFACE DATA. The DSVIG requires potential future risks/hazards be calculated using the maximum soil gas or subslab concentration and the generic conservative screening AF. This does not consider potential alternate attenuation factors, results of complementary lines of evidence, or the conceptual site model (CSM). The DSVIG should be modified to allow for estimation of potential future risk considering these additional factors.

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505	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.042	08. Step 4: Concurrent and Future Risk Evaluation and Management Decisions	08a. General Comments	27	STEP 4: CURRENT AND FUTURE RISK EVALATION AND MANAGEMENT DECISION During the May 19, 2020 Question and Answers Session, CalEPA indicated that the Supplemental VI Guidance is not intended to lead to risk management decisions. It is reasonable to use the CSM, alternate lines of evidence, additional data collection, and/or formal risk characterization to make risk management decisions, develop cleanup goals, and develop a remedial action strategy. However, the DSVIG infers that risk management decisions (e.g., remediation or mitigation) would be based on screening- level risk analysis, including the use of the default screening AFs. The VI risk management decision framework included in Step 4 lists potential response actions based on screening risk results (as calculated in Step 3). Many users of this guidance will assume that these response actions must be considered prior to consideration of additional lines of evidence or site-specific risk characterization. To avoid confusion, this section should be modified to simply state that the data collected in Steps 1 through 3 should be evaluated to develop a risk management strategy and reference existing guidance documents to assist the users in completing this task. The details in Steps 4A and 4B of the DSVIG add confusion and are not necessary for a VI screening guidance. Alternately, the Risk Management Decision Framework should be modified to permit the use of additional lines of evidence, consideration of the site conceptual model, additional sampling/investigation, monitoring, implementation of institutional controls, and/or preparation of a refined risk assessment for cases where current or future risk and hazard exceed the point of departure levels.

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506	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.043	09. Application to Other Building Types	09a. General Comments	30	APPLICATION TO OTHER BUILDING TYPES Large Buildings and Multistory Buildings. This section focuses on indoor air sampling for large buildings but does not describe sampling density or interpretation of subslab soil gas results to evaluate future risks. This additional detail should be added to the document. Buildings with Above-Grade or Below Grade Parking Structures. This section does not provide information on evaluating future risks for this class of buildings. Methods to evaluate future risks for occupied spaces above parking structures have been developed [Plantz et al., 2020]. This information should be included or at least referenced in the document.
507	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.044	10. Attachment 1 – Petroleum Specific Considerations	10c. Using the Supplemental Guidance in Conjunction with PVI Guidance for Petroleum-Only Release Sites	Attachment 1	ATTACHMENT 1 – PETROLEUM-SPECIFIC CONSIDERATIONS. Attachment 1 should be modified to clearly describe petroleum vapor intrusion screening for non-UST sites. The following screening criteria should be listed in Attachment 1: The ITRC PVI guidance [ITRC, 2014] recommends a separation distance of 5 feet for a dissolved phase source or 18 feet for a non-UST petroleum site. The SWRCB LTCP [SWRCB, 2012] uses a 1000-fold bioattenuation factor for sites where the requirements for a bioattenuation zone are satisfied.

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508	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.045	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11c. Overview of Sewers	Attachment 2	ATTACHMENT 2 – SEWERS AND OTHER VAPOR CONDUITS AS PREFERENTIAL PATHWAYS FOR VAPOR INTRUSION The DSVIG does not clearly state when sewers should be sampled or how the data should be interpreted after the sewer air samples are collected. It appears that the DSVIG intends that sewer sampling would serve as an optional technique as a complementary line of evidence to help interpret indoor air results and is not a required investigation step for site screening. Step 1C states that indoor air sampling should be conducted with buildings are "connected to conduits intersecting significant contamination." The document should clearly describe what is considered significant.
509	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.046	14. Attachment 5 – Building Survey and Indoor Air Source Screen Forms	14a. General Comments	Attachment 5	The DSVIG states that the forms are in Microsoft ExcelTM, but only PDF Forms were available on the SWRCB website.
510	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.047	14. Attachment 5 – Building Survey and Indoor Air Source Screen Forms	14a. General Comments	Attachment 5	The use of drop-down menus to fill in the form is helpful, but there may be cases that do not fit with the options listed. Consider adding "other" for most drop down menus and include a spot in the form for additional notes details.

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511	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.048	14. Attachment 5 – Building Survey and Indoor Air Source Screen Forms	14a. General Comment s	Attachment 5	Building Occupants (bottom of page 1). The form lists “onsite” or “offsite” as options in the drop-down menu. This should be corrected.
512	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.049	14. Attachment 5 – Building Survey and Indoor Air Source Screen Forms	14a. General Comment s	Attachment 5	HVAC System (middle of page 2). Add “Enhanced Ventilation” as on option. HVAC systems may vary for different parts of a building. For example, for warehousing/manufacturing facilities there may be HVAC for offices and enhanced ventilation for the warehouse/manufacturing area.
513	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.050	14. Attachment 5 – Building Survey and Indoor Air Source Screen Forms	14a. General Comment s	Attachment 5	Large slab penetrations (bottom of page 2). There is a typo in the drop-down menu (“Slump”). Modify the form to note multiple penetrations be accounted for in the form (floor drain and elevator shaft). Consider adding a comment/detail line below for this section.
514	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.051	14. Attachment 5 – Building Survey and Indoor Air Source Screen Forms	14a. General Comment s	Attachment 5	Soil Type 0 to 3 Feet Below Building (bottom of page 2). Provide definitions for fine and coarse

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515	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.052	14. Attachment 5 – Building Survey and Indoor Air Source Screen Forms	14a. General Comments	Attachment 5	Repeat Building Windows questions regarding status for sampling for doors (include roll-up doors?)
516	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.053	14. Attachment 5 – Building Survey and Indoor Air Source Screen Forms	14a. General Comments	Attachment 5	Factors Potentially Influencing Indoor Air Quality (Top of page 4) Include “Chemical storage area” as an option in the drop-down menu. Identify locations of potential releases Historical Building Use: Include residential, commercial, office, warehouse Do current building occupants use solvents at another locations - Drop down menu is unclear –this should be a yes/no answer (with option to include details if yes).
517	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.054	14. Attachment 5 – Building Survey and Indoor Air Source Screen Forms	14a. General Comments	Attachment 5	Meteorological Conditions (bottom of page 4) Input max/min barometric pressure Need to allow for changing wind conditions

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518	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.055	14. Attachment 5 – Building Survey and Indoor Air Source Screen Forms	14a. General Comment s	Attachment 5	• Indoor Air Source Screen Form should include a text box to describe the sample location (for example, consider sample locations for a commercial building with multiple bathrooms). Also, include sample time (for each sample) on this form.
519	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.056	04. Introduction	04e. D – Vapor Intrusion Attenuati on Factors	vii, 5	Revise the document to use current and California-specific empirical data (including DTSC study that is in progress) for the selection of screening AFs;
520	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.057	08. Step 4: Concurrent and Future Risk Evaluation and Manageme nt Decisions	08a. General Comment s	27	Remove the section discussing Current and Future Risk Evaluation and Management Decisions and instead reference other CalEPA guidance documents;
521	1. Formal/ Official	58	06/01/2020	Rober t	Ettinger	Geosyntec Consultants (Geosyntec)	58.058	01. VI Supplement al Guidance General Comments	01b. Recomm endations		Provide additional details and/or examples for alternatives to the generic screening approach;

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522	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.059	13. Attachment 4 – Guidance on Uploading Vapor Intrusion Information into GeoTracker	13a. General Comments	Attachment 4	Formalize the process and schedule for evaluation of the GeoTracker VI data;
523	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.060	10. Attachment 1 – Petroleum Specific Considerations	10a. General Comments	Attachment 1	Include separation distance screening and bioattenuation factor for evaluation of petroleum VI; and
524	1. Formal/ Official	58	06/01/2020	Robert	Ettinger	Geosyntec Consultants (Geosyntec)	58.061	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11a. General Comments	4, 10, Attachment 2	Provide greater clarity for evaluation of sewers as preferential pathways.

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525	1. Formal/ Official	59	06/01/2020	Alissa	Barrow	SCS Engineers	59.001	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	5	The attenuation factor (AF) is at the heart of and drives both the screening of sites and much of the follow on diagnostic work contemplated by the DSVIG. In addition, although the AF is not portrayed as a "remediation goal" in the DSVIG, as a practical matter the AF will drive which sites require remediation, and possibly drive how long remediation will be necessary. For example, in new buildings that have state of the art vapor intrusion mitigation systems (VIMS), will the decision to turn off a remediation system be based on the default AF even though there are no detectable concentrations of constituents of concern in the indoor air? If the answer is yes, then the AF does, in fact, serve as a remediation standard despite what the DSVIG says. Unfortunately, due the DSVIG reliance on a U.S. Environmental Protection Agency's (U.S. EPA)-derived AF, which is based on outdated, flawed, and unrepresentative data, the DSVIG is fundamentally flawed.

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526	1. Formal/ Official	59	06/01/2020	Alissa	Barrow	SCS Engineers	59.002	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	The DSVIG proposes to use the U.S. EPA default soil vapor and sub-slab soil vapor attenuation factor (AF) of 0.03, which was derived in the 2012 U.S. EPA's Vapor Intrusion Database: Evaluation and Characterization of Attenuation Factors for Chlorinated Volatile Organic Compounds and Residential Buildings (EPA Database Report), which complies data from 913 buildings from 41 Sites across 15 states. While at first glance this dataset may seem robust, it is predominantly comprised of data collected from single-family residences with basement construction and has limited data from large commercial/industrial buildings. A small fraction of the attenuation factors in the EPA Database are based on data collected in California; the majority of the data are from states with relatively cold climates where the stack effect due to building heating is expected to enhance the potential for VI and are not representative of the vast majority of VOC release sites in California.
527	1. Formal/ Official	59	06/01/2020	Alissa	Barrow	SCS Engineers	59.003	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	Of the six EPA Database sites located in California, only two are commercial; the remainder of the Sites consist of single-family homes. Of the two commercial Sites, one has petroleum hydrocarbons as the chemical of concern, which, from a VI standpoint, are not comparable to chlorinated hydrocarbons, which the DSVIG is focused on. Further, only three of the California EPA Database Sites contain paired sub-slab and indoor air samples, and the data from these three Sites is questionable. One of these Sites has petroleum hydrocarbon as the constituent of concern; one is a residential site in which it's stated in Appendix C to the EPA Database Report that the "indoor air levels were consistent with background;" and one is a residential site with no indoor survey conducted, which is crucial when evaluating indoor air to avoid false positives. Basically, the data from California that the EPA Database relies on are either flawed or irreverent.

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528	1. Formal/ Official	59	06/01/2020	Alissa	Barrow	SCS Engineers	59.004	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	Sample date. Much of the data in the EPA Database was collected in the 1990's, and the vast majority collected before 2005. Sample collection methodology has evolved substantially over the years, and sampling conducted in the 1990s can reasonably be seen as of potentially lesser quality, as techniques such as sample train design and leak testing had not yet become a standard component of the sample collection process.
529	1. Formal/ Official	59	06/01/2020	Alissa	Barrow	SCS Engineers	59.005	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	Screening for indoor sources of contamination (chemicals, building materials). As underscored in the DSVIG, an examination of VI risk at sites of potential concern must include an examination of structural interiors for the presence of products/materials that may contain similar chemistry to the subsurface contaminants. Absent such screening, an investigator cannot reliably attribute the indoor air measurement of chemicals of concern exclusively to a subterranean source. As indicated in Appendix C of the EPA Database Report, many sites used in the database did not include an indoor screening for VOCs at all, and for many of those that did include indoor surveys, it was found that indoor air concentrations were generally consistent with ambient background (outdoor air) concentrations.
530	1. Formal/ Official	59	06/01/2020	Alissa	Barrow	SCS Engineers	59.006	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	Type of case/chemical of concern. For many of the sites included in the EPA Database, petroleum hydrocarbons is the chemical of concern. Clearly, due to differences in the chemical makeup as well as bio-attenuation, petroleum hydrocarbon cases provide no CVOC-relevant data.
531	1. Formal/ Official	59	06/01/2020	Alissa	Barrow	SCS Engineers	59.007	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	Data quality. In Appendix C to the EPA Database Report, EPA offers information on the provenance and "quality" of case data. A significant fraction of cases are identified as being of either "low" or "medium" quality, and much of the data is derived from conference materials or published papers (not first-hand EPA case data).

532	1. Formal/ Official	59	06/01/2020	Alissa	Barrow	SCS Engineers	59.008	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	EPA DATABASE REPORT PEER REVIEW The EPA Database Report includes a peer review by four external subject matter experts: Robin V. Davis, P.G., Utah Department of Environmental Quality; Philip Dixon, Iowa State University; James Harrington, New York State Department of Environmental Conservation; and Mart Oostrom, Pacific Northwest Laboratory (Attachment 1). The Peer review brings to light the various flaws with the EPA Database report, as summarized in Attachment 2. In the peer review, Mr. Phillip Dixon observed: “I commend the authors for compiling a detailed database and making it available for the risk assessment community. My review focuses on the statistical aspects of the document, primarily the estimation of attenuation factors. The analysis of attenuation factors is characterized as a ‘preliminary analysis’ in both the document title and introduction. Hence, my comments are primarily suggestions for a more thorough analysis.” Mr. Dixon’s observation of the wording was appropriate – the data set does indeed present itself as preliminary – it is neither nationally comprehensive nor internally robust. Interestingly, in apparent response to Mr. Dixon’s observation, the final 2012 EPA Database Report simply drops the words ‘preliminary analysis’ from the title and introduction. Mr. Dixon goes on to state: “The correlation between soil gas and indoor air values seems very close to 0. If there is little (or no) association between the source and indoor air values, is it appropriate to calculate an AF? I don't think so.” Mr. Robin Davis commented: “While the discussion is understandable, the application is objectionable because: 1) the document admits that data quality at

											some sites is low, sites may not be well-characterized, and source strengths beneath buildings may not be known. Poor site characterization is often the case for CVOCs but not for PHCs. I think the document should exclude data from sites that are not well-characterized and all data from PHC sites." Mr. Davis further states: "Adequate site characterization is a basic and fundamental necessity for investigating any exposure pathway. This document implies that EPA is willing to use poorly characterized sites in their data analysis, and that is unacceptable." Mr. Mart Oostrom states: "The attenuation factors tend to have a huge range so it appears that almost any value found at a site may be considered within the range of possibilities. In light of that, how should data from a new site be evaluated?" Mr. James Harrison states: "The summary and conclusions section should underscore the fact that this data includes contamination from indoor sources [false positives] which must be factored into decisions regarding whether mitigation is needed. The summary and conclusions section should discuss the fact that calculated attenuation factors greater than one are indicative of indoor sources and that it is impossible for levels higher than subslab or crawlspace to be attributed solely to vapor intrusion." Copies of the EPA Peer Review document, as well as a summary of the peer comments compiled by SCS, may be found as an Appendix to this letter and we request that these documents be reviewed as part of this process.

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533	1. Formal/ Official	59	06/01/2020	Alissa	Barrow	SCS Engineers	59.009	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	During the first DSVIG on-line forum on May 14, a submitted question asked if the workgroup had evaluated the peer review incorporated as Appendix A to the 2012 EPA Database Report, particularly as it pertained to the treatment of low and medium quality data. In response, the group representative indicated that they had not exhaustively reviewed the 2012 report or its peer review, instead offering their observation that 47 states were relying upon the 2012 EPA Database and that this was essentially good enough for them.
534	1. Formal/ Official	59	06/01/2020	Alissa	Barrow	SCS Engineers	59.010	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	With California's history of being at the forefront of environmental science and regulation, screening levels in California are generally substantially lower than in other states. We are by no means suggesting that public health is an acceptable trade off, and that regulations that result in necessary public health benefits be adjusted or watered down as a tradeoff for economic development or impacts to a regulated party. However, because the science that underpins the DSVIG is flawed, it must be addressed as well as the unintended consequences on brownfields sites and infill development. Applying an AF that is one to two orders of magnitude stricter than current practice, combined with ultra conservative screening levels, results in targeted sub-slab concentrations that are unrealistic and at times unachievable, guaranteeing substantial expense for development projects underway and the abandonment of many on the drawing board. This approach creates a financial obligation that will impose significant additional costs on infill redevelopment projects. Some projects that would otherwise contribute to local economic recovery will be abandoned because they are no longer financially viable.

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535	1. Formal/ Official	59	06/01/2020	Alissa	Barrow	SCS Engineers	59.011	04. Introduction	04c. B – Relation to Existing Guidance or Policy	2-3	With no disrespect intended to the U.S. EPA or the members of the CalEPA workgroup, the AF relied upon in the DSVIG must be replaced by one calculated accurately, using a defensible and legitimately peer-reviewed data set. Preferably, because every building is different, the DSVIG will also more fully develop alternatives that will allow for “off ramps” from the default AF and for building specific AFs to be developed. It has been our experience that building specific AFs can be developed and are scientifically defensible.
536	1. Formal/ Official	59	06/01/2020	Alissa	Barrow	SCS Engineers	59.012	04. Introduction	04g. F – California Vapor Intrusion Database	viii, 7	We understand that the DTSC is currently conducting a study to evaluate California-specific AFs using available data from EnviroStor and other sources that meets more rigorous data quality requirements and is far more representative of actual California sites than the EPA Database. This work is expected to be completed in the next 60 days and consideration of the results of this study will be important for the finalization of the Supplemental VI Guidance. Given the deficiencies in the EPA data set described above and given the easy access to an abundance of high-quality, recent, California-specific data, the DSVIG effort must be paused until a reliable attenuation factor can be calculated.

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537	1. Formal/ Official	59	06/01/2020	Alissa	Barrow	SCS Engineers	59.013	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	5	Additionally, other studies have been conducted to evaluate empirical AFs using different datasets [Ettinger et al., 2018; Eklund et al, 2019; Nawikas, 2020]. These studies found empirical AFs approximately an order of magnitude lower than the default USEPA value. CalEPA has questioned the data quality of the Ettinger et al, 2018 study; however, these data were submitted and accepted by either CalEPA (DTSC or Regional Boards) or USEPA, and therefore have suitable data quality for this assessment. CalEPA has noted that these studies have not yet been published in peer-reviewed journal; however, the DSVIG references multiple articles/presentations from non-peer reviewed sources to support technical decisions. Consequently, these recent empirical AF studies should be considered in the development of the Supplemental VI Guidance.

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538	1. Formal/ Official	59	06/01/2020	Alissa	Barrow	SCS Engineers	59.014	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	THE DSVIG IS AN UNDERGROUND REGULATION In the DSVIG and during the on-line forum, DSVIG authors emphasized the guidance as not carrying the weight of California policy, rule, or regulation. The DSVIG states: “Disclaimer: This document is guidance and is not intended as regulation or water quality control plan or policy. This Supplemental Guidance describes a consistent approach recommended for evaluating vapor intrusion in California. This Supplemental Guidance is not binding on California Environmental Protection Agencies or staff, or on members of the public. This Supplemental Guidance is not intended to exclude alternative methodologies nor is it intended to provide prescriptive or inflexible requirements. This Supplemental Guidance does not supersede or implement laws or regulations and does not have the force or effect of law.” Both the authors, regulators and California practitioners know this Disclaimer will have absolutely no bearing on how the guidance is put into practice. In fact, practitioners have already been directed by regulators to follow the guidance as if it were already final. If the history of regulatory reliance on past “guidance” is any indication, the SVIG when published will effectively become the law of the land.

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539	1. Formal/ Official	59	06/01/2020	Alissa	Barrow	SCS Engineers	59.015	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	6	OTHER CONCERNS Another potential area of confusion the DSVIG creates is the lack of details or examples provided regarding alternatives to the generic screening approach. The DSVIG states that alternative approaches may be used for the initial screening of buildings. For example: Section D2 states that alternative approaches may be used for the initial screening of buildings; Section E lists additional lines of evidence that may be considered for the VI screening assessment; and Section 3B.6 describes various complementary lines of evidence for the vapor intrusion investigation. However, no details on recommended approaches or considerations for alternative screening levels are presented. The flow chart and the step-by-step process described in the DSVIG do not indicate that alternate approaches or consideration of additional lines of evidence may be used to assess future VI risks. Without additional detail in the guidance, regulatory acceptance of alternative approaches will be difficult to obtain. The Supplemental VI Guidance should include specific examples of alternatives that are acceptable to CalEPA.

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540	1. Formal/ Official	59	06/01/2020	Alissa	Barrow	SCS Engineers	59.016	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06c. Step 2B – Estimate Human Health Risk from Vapor Intrusion	15	Additionally, the DSVIG appears to abandon mitigation as an acceptable intermediate-term tool to manage health risk from vapor intrusion, but allows mitigation only when paired with a robust remedial action plan designed to lower primary or secondary source concentrations to levels that satisfy predicted vapor intrusion potential. This approach creates a financial obligation that will impose significant additional costs on infill redevelopment projects. It appears that, even in situations where risk can be managed through engineered solutions, land use covenants, deed restrictions or some combination thereof, remediation will be required to protect some unknown and improbable future use. This approach would reverse decades of progress in applying risk management tools designed to protect public health while also facilitating redevelopment of in-fill properties. Some projects that would otherwise contribute to local economic recovery will be abandoned because they are no longer financially viable.
541	1. Formal/ Official	59	06/01/2020	Alissa	Barrow	SCS Engineers	59.017	09. Application to Other Building Types	09a. General Comments	30	The DSVIG also does not differentiate between residential and commercial buildings, even though residential and commercial structures present different potential vapor intrusion risks. Application of a single, overly-conservative attenuation factor to both building classes, failure to consider use patterns and related factors such as air exchange rates, especially in buildings used for industrial purposes, will result in significantly higher costs for site characterization and remediation that are not necessary to protect the health of building occupants. Commercial buildings represent a class of buildings that, when available for reuse, complement local housing development by providing new jobs and increasing local economic activity. Treating commercial buildings in the same manner as residential buildings will create unnecessary new impediments to local economic development.

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542	1. Formal/ Official	59	06/01/2020	Alissa	Barrow	SCS Engineers	59.018	16. Other	16a. Other		Lastly, given the Covid-19 outbreak and government responses including a statewide shelter-in-place order, local government agencies, developers, responsible parties and other vapor intrusion stakeholders are focused on the immediate tasks of protecting workers, delivering essential goods and services and restructuring operations.
543	1. Formal/ Official	59	06/01/2020	Alissa	Barrow	SCS Engineers	59.019	16. Other	16a. Other		The 30-day extension of the public comment deadline (from May 1 to June 1) is appreciated but inadequate to facilitate meaningful stakeholder engagement in this process. Many stakeholders remain focused on addressing the COVID-19 crisis and have been unable to devote the resources necessary to evaluate the DSVIG and the impact it will have on their business and communities. Meaningful public participation is critical to inform actions taken by administrative agencies. In addition, acceptance of the guidance by stakeholders will be undermined by a lack of public input. Cal-EPA should reschedule public workshops and extend the public comment deadline by at least 90 days after shelter-in-place orders are lifted to ensure that all interested parties have a reasonable opportunity to participate in the public review process.

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544	1. Formal/ Official	59	06/01/2020	Alissa	Barrow	SCS Engineers	59.020	16. Other	16a. Other		It is notable that one of the essential businesses and activities exempted from even the most stringent COVID-19 “shelter-in-place” orders is the construction of affordable housing. However, the success of in-fill housing and complementary development in many California communities will depend on avoiding the imposition of unnecessary costs. This reality argues for vapor intrusion guidance that actually screens out lower risk sites through use of data inputs and AFs that are based on realistic data sources rather than maximum worst case conditions. Conceptual site models and other inputs that are representative of actual site conditions will yield much more focused results and identify properties that are more likely to present meaningful risks to public health. A multiple-lines-of-evidence approach using site-specific information where possible should be encouraged in lieu of default assumptions. This approach is consistent with U.S. EPA guidance and long standing DTSC and Water Board practice. Deficiencies in these aspects of the DSVIG will make redevelopment of urban brownfields much more difficult and expensive and will serve as a significant barrier to resolving California’s affordable housing crisis.

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545	1. Formal/ Official	60	06/01/2020	Dawn	Koepke	California Council for Environmental & Economic Balance (CCEEB)	60.001	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	Unclear & Inconsistent Application, Possible Underground Regulation CCEEB's overarching concern is the unclear and inconsistent process and interpretation associated with the Draft Guidance. While it specifically notes its intent to promote greater consistency across the state, the disclaimer at the outset of the draft specifically provides the following: Disclaimer: This document is guidance and is not intended as regulation or water quality control plan or policy. This Supplemental Guidance describes a consistent approach recommended for evaluating vapor intrusion in California. This Supplemental Guidance is not binding on California Environmental Protection Agencies or staff, or on members of the public. This Supplemental Guidance is not intended to exclude alternative methodologies nor is it intended to provide prescriptive or inflexible requirements. This Supplemental Guidance does not supersede or implement laws or regulations and does not have the force or effect of law. While the Draft Guidance purports not to institute prescriptive or inflexible requirements or have the force or effect of law, it begs the question about how it can promote consistency when it has no authority or force to ensure agencies abide by the approach – much less the regulated community even if it were a workable approach, which it is not for reasons described further in this letter.

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546	1. Formal/ Official	60	06/01/2020	Dawn	Koepke	California Council for Environmental & Economic Balance (CCEEB)	60.002a	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	Further exacerbating the lack of clarity and inconsistency, this Draft Guidance is intended to be used in conjunction with existing guidance from DTSC (https://dtsc.ca.gov/wpcontent/uploads/sites/31/2018/01/Final_VIG_Oct_2011.pdf) and the San Francisco Regional Water Quality Control Board (www.waterboards.ca.gov/rwqcb2/water_issues/programs/sitecleanup/TCE_Interim_VI_ Frame work.pdf). There has long been concern among the regulated community about conflicts between the two existing sets of guidance. To that end, the draft suggests where conflict between the two existing guidance documents exists and where this supplemental guidance is recommended. Curiously, another section of the guidance (p.2) indicates that where conflicts exist between the existing guidance frameworks and the Draft Guidance, the Draft Guidance should be followed until the existing frameworks are revised. The footnote to that mention indicates this joint supplemental guidance will serve as the framework for the revisions. To be clear, the lack of authority and force associated with this Draft Guidance does nothing to ensure the conflict between the existing frameworks is addressed or that the Draft Guidance overrides these frameworks. Experience has shown that agencies will seek to use whatever suits their specific interest at any given site, rather than what may be best suited based on site- specific considerations. This is explicitly inconsistent, despite the Draft Guidance explicitly aiming to provide consistency.

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547	1. Formal/ Official	60	06/01/2020	Dawn	Koepke	California Council for Environmental & Economic Balance (CCEEB)	60.002b	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	Further exacerbating the lack of clarity and inconsistency, this Draft Guidance is intended to be used in conjunction with existing guidance from DTSC (https://dtsc.ca.gov/wpcontent/uploads/sites/31/2018/01/Final_VIG_Oct_2011.pdf) and the San Francisco Regional Water Quality Control Board (www.waterboards.ca.gov/rwqcb2/water_issues/programs/sitecleanup/TCE_Interim_VI_ Frame work.pdf). There has long been concern among the regulated community about conflicts between the two existing sets of guidance. To that end, the draft suggests where conflict between the two existing guidance documents exists and where this supplemental guidance is recommended. Curiously, another section of the guidance (p.2) indicates that where conflicts exist between the existing guidance frameworks and the Draft Guidance, the Draft Guidance should be followed until the existing frameworks are revised. The footnote to that mention indicates this joint supplemental guidance will serve as the framework for the revisions. To be clear, the lack of authority and force associated with this Draft Guidance does nothing to ensure the conflict between the existing frameworks is addressed or that the Draft Guidance overrides these frameworks. Experience has shown that agencies will seek to use whatever suits their specific interest at any given site, rather than what may be best suited based on site- specific considerations. This is explicitly inconsistent, despite the Draft Guidance explicitly aiming to provide consistency.

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548	1. Formal/ Official	60	06/01/2020	Dawn	Koepke	California Council for Environmental & Economic Balance (CCEEB)	60.003	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	Beyond the lack of clarity and consistency, the Draft Guidance bears the hallmarks of an underground regulation in that it applies generally rather than to a specific case and is intended to implement and specify the authorities of CalEPA, SWRCB and DTSC who are charged with the implementation and enforcement of the overriding law. The Administrative Procedures Act (APA) in California specifically provides for formal rulemaking processes under these conditions. This document is proposed merely as guidance despite conflicting components in the Draft Guidance that indicate it should override in situations of conflict with current frameworks. The Draft Guidance specifically interprets and specifies current law related to site cleanups by requiring a specified attenuation factor be used and setting forth specific criteria to analyze vapor intrusion risks overall. Such requirements and criteria take the Draft Guidance beyond merely guidance and, therefore, it constitutes an underground regulation outside of the required procedure in the APA.
549	1. Formal/ Official	60	06/01/2020	Dawn	Koepke	California Council for Environmental & Economic Balance (CCEEB)	60.004	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	The Draft Guidance fails to institute the unified and consistent approach it was purportedly put forth as seeking to provide. The Draft Guidance should therefore be withdrawn and the agencies should revisit the approach to ensure consistency and clarity across each of their jurisdictions so as to speak with continuity on these issues.

550	1. Formal/ Official	60	06/01/2020	Dawn	Koepke	California Council for Environmental & Economic Balance (CCEEB)	60.005	04. Introduction	04g. F – California Vapor Intrusion Database	7	Lacks Relevance for Site Specific & California Considerations CCEEB appreciates that the Draft Guidance seems to acknowledge some of the shortcomings associated with the U.S. Environmental Protection Agency's (U.S. EPA) Attenuation Factor database. Notably, it references the database having limited data specific to California, few paired indoor air and subsurface samples, lacks site-specific outdoor air data, and more. To this end, the Draft Guidance highlights California's intent to develop its own state-specific database. This is an important admission and makes clear that relying upon data from sites that are not specific to California is flawed and should not be used to assess the vapor intrusion conditions at sites here. It is our understanding that DTSC has been working on a California-specific database for some time and may be nearing completion with data pulled from EnviroStor that meets more thorough data quality standards and is representative of California-specific sites. That said, the Draft Guidance does not appear to reference or acknowledge this work already underway at DTSC, much less specify how any different database would be developed and the timeline for doing so that is different from defaulting back to the US EPA values. The values ultimately used are critically important in establishing cleanup goals that should be site-specific. The Draft Guidance supports site-specific cleanup goals. And while it seems to imply that the default attenuation factor of 0.03 is not required to support such decisions, the Draft Guidance does not provide clarity on how to develop site- specific values. Purportedly DTSC is working on separate guidance to address this issue, but this Draft Guidance fails to account for that work despite it being such a critical component. It should also be noted that the flow chart does not appear to provide for site-specific assessments of cleanup goals. The Draft Guidance should be reworked to explicitly ensure site-specific data can be used to make risk-based decisions for cleanup goals and alleviate this discrepancy.

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551	1. Formal/ Official	60	06/01/2020	Dawn	Koepke	California Council for Environmental & Economic Balance (CCEEB)	60.006a	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	Prescriptive Nature will Lead to Unending Investigations & Site Cleanups Finally, CCEEB is highly concerned that the Draft Guidance is far too prescriptive when it comes to the investigation requirements as it specifies the minimum number of samples to be collected irrespective of whether the high sample density described in the Draft Guidance provides a more accurate assessment of the vapor intrusion pathway. This will only serve to increase costs without a corresponding environmental or public health benefit. Additionally, the Draft Guidance provides indoor air data be used for current risk evaluations and soil gas/sub-slab data be used for future risk evaluations. Under this approach even where indoor air concentrations are non-detect, responsible parties can still be required to mitigate if soil gas/sub-slab concentrations exceed screening levels. This is unnecessary and will impose significant costs on responsible parties, developers and more leading to on-going assessments with increased costs, lower land values and overall reduced redevelopment without any increased public health benefit – all at a time when California is looking to ramp up its affordable housing capacity. This is unnecessary and in direct conflict with the overarching housing goals of the state.

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552	1. Formal/ Official	60	06/01/2020	Dawn	Koepke	California Council for Environmental & Economic Balance (CCEEB)	60.006b	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	Prescriptive Nature will Lead to Unending Investigations & Site Cleanups Finally, CCEEB is highly concerned that the Draft Guidance is far too prescriptive when it comes to the investigation requirements as it specifies the minimum number of samples to be collected irrespective of whether the high sample density described in the Draft Guidance provides a more accurate assessment of the vapor intrusion pathway. This will only serve to increase costs without a corresponding environmental or public health benefit. Additionally, the Draft Guidance provides indoor air data be used for current risk evaluations and soil gas/sub-slab data be used for future risk evaluations. Under this approach even where indoor air concentrations are non-detect, responsible parties can still be required to mitigate if soil gas/sub-slab concentrations exceed screening levels. This is unnecessary and will impose significant costs on responsible parties, developers and more leading to on-going assessments with increased costs, lower land values and overall reduced redevelopment without any increased public health benefit – all at a time when California is looking to ramp up its affordable housing capacity. This is unnecessary and in direct conflict with the overarching housing goals of the state.

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553	1. Formal/ Official	60	06/01/2020	Dawn	Koepke	California Council for Environmental & Economic Balance (CCEEB)	60.007	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	Potential Regulatory Duplication, Conflict with CalOSHA Standards Finally, CCEEB is concerned about the duplication and potential conflict this approach for vapor intrusion may have on CalOSHA's authority and process that sets standards for workers. While CalEPA may have authority for public exposure and environmental health, CalOSHA retains the authority for worker related protections and standards. For workers, which standards apply? CalOSHA requires employees be informed of hazardous conditions under hazard communication and using CalOSHA standards; however, visitors to a site do not have hazard communication training and are not considered employees. This could result in two sets of standards that are at best duplicative and, at worst, may conflict. To address this concern, the Draft Guidance should be revised to clearly state that it does not impact or override CalOSHA standards even if a site has occasional visitors.

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554	1. Formal/ Official	61	06/01/2020	Steve	Jepsen	Southern California Alliance of Publicly Owned Treament Works (SCAP)	61.001	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11a. General Comment s	10, Attachment 2	Having reviewed the Draft Supplemental Guidance and participated in the Technical and General webinar sessions, we offer five comments for consideration and further discussion: Sewer systems should not be considered preferential pathways for building vapor intrusion. Cured in place pipe sewer rehabilitation is effective in preventing sewer gas entry to buildings. Long term sewer mitigation measures identified in the Draft Supplemental Guidance have the potential to disrupt the collection system air flow balance, cause clogging or sewer overflows, and create other disruptions to the sewer system. The Draft Supplemental Guidance is overbroad in its description of buildings that should be evaluated simply due to their connection to sewers that receive vapor forming chemicals (VFCs), or pass through or overlie VFC-contaminated soil or groundwater. More time and coordination are needed to evaluate claims relating to sewers. Each of these comments is further detailed below to provide technical and scientific context.

Row	Letter Type	Letter ID	Date of Submission	First Name	Last Name	Company or Agency	Comment ID	Topic[1]	Section[1]	Page Number(s)[1]	Comment
555	1. Formal/ Official	61	06/01/2020	Steve	Jepsen	Southern California Alliance of Publicly Owned Treament Works (SCAP)	61.002	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11a. General Comment s	10, Attachment 2	In sum, we are concerned with the Draft Supplemental Guidance's inclusion of sanitary sewer pipes as preferential pathways for building vapor intrusion due to the erroneous assumption that soil vapors preferentially travel through sewer pipes towards or into buildings. Moreover, the mitigation identified in the document could create problems within the sewer network and compromise public health. We requests that, before developing and issuing the final guidance, DTSC and State Water Board staff arrange with wastewater industry trade association professionals the necessary meetings to discuss sewer collection system design and operation, the likelihood of sewer pipes serving as pathways to convey soil vapor into buildings, and the appropriate way to approach modifications to sewer systems. We believe such collaboration will result in a markedly improved guidance document.

556	1. Formal/ Official	61	06/01/2020	Steve	Jepsen	Southern California Alliance of Publicly Owned Treament Works (SCAP)	61.003	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11a. General Comments	10, Attachment 2	COMMENT NO 1: Sewer systems should not be considered preferential pathways for building vapor intrusion As described below, sewers are designed and operate in a manner to create negative pressure, which causes air (including any soil vapor contained in the air) to flow away from buildings. Therefore, by their nature, sewers are not preferential pathways for soil vapor to enter into buildings. Wastewater (water used within a building that is not consumed) is removed from a building via the waste piping system. Wastewater first flows through a P-trap, which is a U-shaped pipe that holds standing water and prevents sewer gases from entering the building. By state and local plumbing codes, every water fixture with a drain must have a P-trap. The drain system within a building works by gravity, allowing wastewater to flow down gradient through a series of pipes which typically increase in diameter as more fixtures are connected. These drain pipes are connected to a vent pipe system that is designed to bring fresh air into the drain pipes to prevent suction that would either stop or slow the free flow of wastewater. Vent pipes exit the building through one or more roof vents. The roof vents allow air into the waste piping system. In multistory buildings, fixtures typically connect to a waste piping main stack which eventually exits the building below grade through the foundation. Single story building waste piping collects wastewater from the building fixtures with drains eventually combining into a single pipe exiting the building below grade. In municipal systems, the sewer line connecting the building wasting piping to the municipal sewer main is known as a sewer lateral or Property Service Connection (PSC). Many laterals are provided with a ground level wye-cleanout, or two-way cleanout, which allows blockages to be more easily removed. After the lateral connects to the sewer main, the wastewater flows

											down gradient to progressively larger mains known as trunk sewers. Eventually the trunk sewer reaches a pump station or wastewater treatment plant. As wastewater flows down the collection system pipeline network, the liquid pulls air with it, creating a consistent flow of air in the headspace above the liquid in the pipeline. The dynamics of the sewer headspace atmosphere, including the transport of air (gas) in sewers, is discussed in scientific publications authored by Richard L. Corsi, PhD, P.E. These publications reported the concept of a Reduction Factor (RF), which is the measured ratio of the headspace airflow rate to wastewater flow rate ranging from near zero up to 0.8 at the air/water interface. The conclusions and points of note in Dr. Corsi's publications include: Liquid drag causes gas flow in the same direction as wastewater flow, and is the only ventilation mechanism that acts continuously. Under conditions of low resistance to ambient air inflow and sewer gas exhaust, liquid drag can induce maximum gas mean velocities of up to 0.66 feet per second (fps) or 0.2 meters per second (m/s). Actual velocities in sanitary sewers are expected to be on the order of: ◦0.13 to 0.66 fps (0.04 to 0.2 m/s) for small pipes up to 0.25 m diameter (10-inch diameter); ◦0.010 to 0.66 fps (0.003 to 0.20 m/s) for mid-sized pipes up to 1.0 m diameter (39-inches); and ◦0.016 to 0.59 fps (0.005 to 0.18 m/s) for large pipes up to 2.5 m diameter (98-inches). SCAP members conducted a research project in which they measured headspace air velocity in Southern California sewers. The study utilized 30 data points converted to headspace air velocity for the depth of flow. A range of magnehelic pressure and vacuum gauges with varying sensitivities were used to conduct the pressure measurements. An air flow balometer with manhole cover adapter plate was used to measure the volume of air flow being drawn into

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											the sewer pipe system. The study showed that headspace air velocity ranged between 0.11 fps to 2.3 fps with an average field result of 0.55 fps. These field measurements for a Southern California collection system are in alignment with Dr. Corsi's findings. For a Southern California sewer siphon air jumper research project conducted by SCAP members, sewer headspace vacuum or pressure was measured at manholes, with any existing air jumpers both plugged and unplugged. The measured instantaneous vacuum was from 0.05 inches water column (in. WC) to 0.20 in. WC at a temporarily plugged siphon air jumper location. Airflow rates into manholes on large trunk sewers were measured at up to 600 cubic feet per minute (cfm) further confirming the significant head space air flow away from buildings. This Southern California empirical testing and research, conducted in 2005, clearly demonstrate that sewer collection systems operate under negative air pressure conditions with headspace air flowing away from buildings not towards or into buildings. As such, sewer systems should not be considered a preferential pathway for building vapor intrusion.

557	1. Formal/ Official	61	06/01/2020	Steve	Jepsen	Southern California Alliance of Publicly Owned Treament Works (SCAP)	61.004	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11a. General Comment s	10, Attachment 2	COMMENT NO 2: Cured In Place Pipe (CIPP) Sewer Rehabilitation Basics CIPP rehabilitation is a valuable tool for the wastewater industry to rehabilitate aging sewer and lateral pipelines to increase their reliability and usable life. It is highly economical, quick and eliminates the need for costly, time consuming and disruptive excavation. Any public exposure to CIPP curing vapors is temporary, one day or less, and transient. CIPP is widely accepted as a 50-year repair, if a sewer main and building lateral were to be rehabilitated using CIPP on separate dates the potential building exposure to CIPP curing vapors would be two times in 50-years. During the CIPP installation process, a resin impregnated felt tube typically made of polyester is inverted or pulled through a damaged mainline sewer pipe. The liner can be inverted using water or air pressure. Hot water or steam can be used to accelerate the curing rate of the resin. If a fiberglass tube is used, the curing of the resin can also be triggered though the use of UV light introduced into the tube. As the resin cures, it forms a tight-fitting, fully structural jointless replacement pipe. Styrene-based resin systems properly used in CIPP produce a safe and environmentally sound solution to the need for restoring the nation’s failing infrastructure and have been used for nearly 50 years in CIPP. The trenchless nature of CIPP installation makes for a potentially more cost- effective and less disruptive method than traditional "dig and replace" pipe repair methods. As such, any vapor intrusion during the CIPP process due to an internal building plumbing malfunction would be temporary and transient, should a short duration intrusion occur the effects dissipate quickly. Because styrene odor can be detected at concentrations as low as 0.16 ppm, depending on one’s ability to detect odors, styrene’s odor can be a nuisance to those not familiar with the odor. To minimize short term odor during the installation of CIPP, residents/homeowners are informed of the CIPP installation schedule and what to expect. They should also be advised to ensure

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											that their sewer drain P-traps are functional and filled with water. By design, properly maintained sewer laterals and interior plumbing systems prevent sewer gases and other vapor intrusions. There has been recent research conducted jointly with universities in the USA and Canada by the National Association of Sewer Service Companies (NASSCO), a trade association dedicated to protecting the health and safety of worker and communities through the proper assessment, maintenance and rehabilitation of underground infrastructure, and NASSCO member companies regarding vapor intrusion concerns. While we appreciate the importance of protecting public health and the need for this Guidance Document update, it is critical to have additional time to thoroughly review the reference documents that pertain to CIPP sewer rehabilitation and provide feedback to DTSC staff on their relevance to this issue.

558	1. Formal/ Official	61	06/01/2020	Steve	Jepsen	Southern California Alliance of Publicly Owned Treament Works (SCAP)	61.005	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11a. General Comment s	10, Attachment 2	COMMENT NO 3: Long term sewer mitigation measures identified in the Draft Supplemental Guidance (Step 4b, Pages 28-29) have the potential to disrupt the collection system air flow balance, cause clogging or sewer overflows, and create other disruptions to the sewer system We agree with the short term vapor intrusion risk mitigation recommendations of adding water to dry P-traps and replacing damaged toilet bowl gaskets. This is simply good maintenance that should be performed regardless of vapor intrusion concerns. We have significant concerns with some of the long term recommendations identified in the Draft Supplemental Guidance, such as venting, installing check valves and rerouting the sewer pipeline: Venting of sewer systems beyond plumbing code and municipal engineering standards is a delicate procedure and must be analyzed carefully by engineers with specific sewer air flow experience to avoid disruption of the overall collection system air flow balance. Installing check valves in gravity sewer pipelines is highly discouraged and can lead to clogging or even sewer overflows. Additionally, a check valve on a building lateral would block the beneficial airflow that exists in sewer collection systems pulling air away from the building. In rare cases where a building pad elevation is low in comparison to the sewer main elevation, the wastewater agency will recommend a backwater device to prevent sewage from back flowing up into the building during hydro jetting pipeline cleaning or extreme high flow events. It should be noted that this scenario is rare and there is not full agreement in the industry on this practice. It is widely accepted in the wastewater industry that these backwater devices can be problematic with respect to blockages and should be used with caution. There may be instances where it is beneficial to reroute a sewer main for a variety of reasons. It should be noted that generally sewer mains are routed to provide convenient building lateral connections. Rerouting a typical sewer main creates a myriad of building connection challenges that need to be carefully evaluated.

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											Additionally, it is very costly to the sewer service ratepayers and disruptive to the public. In light of these points, we urge DTSC and State Water Board staff to discuss with wastewater industry professionals these proposed mitigation measures and their impacts to buildings and the sewer system before including these measures in the final guidance.

559	1. Formal/ Official	61	06/01/2020	Steve	Jepsen	Southern California Alliance of Publicly Owned Treament Works (SCAP)	61.006	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11a. General Comment s	10, Attachment 2	COMMENT NO 4: The Draft Supplemental Guidance is overbroad in its description of buildings that should be evaluated simply due to their connection to sewers that receive vapor forming chemicals (VFCs), or pass through or overlie VFC-contaminated soil or groundwater The Draft Supplemental Guidance (Page 10) states: Situations where conduit air is likely to be impacted by site contamination include: Known discharge directly into a sewer or drain; Conduits intersecting soil contamination within a VFC release area; Conduits intersecting groundwater contamination; or Conduits located directly above contaminated groundwater. The Draft Supplemental Guidance further provides, “If it is determined that conduit air is likely to be impacted and the conduit(s) is connected to a building or has the potential to release vapors below a building, proceeding to an indoor air investigation (Step 3) is recommended for that building.” The above statement suggests that anytime a sewer receives or has received discharges containing VFCs or passes through or over VFC contamination, buildings connected to or overlying the sewer network should be evaluated for indoor air impacts. This recommendation could result in the unnecessary evaluation of numerous buildings as parties chase sewer lines throughout communities impacted by VFC releases. Such investigations would result in wasted resources and unfounded concerns. Soil vapor simply does not move throughout sewer systems to enter buildings. As set forth above in Comment No. 1, sewers are designed such that sewer pipeline headspace travels away from buildings. The recommendation should be removed or significantly narrowed to specific, well-defined, circumstances.

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560	1. Formal/ Official	61	06/01/2020	Steve	Jepsen	Southern California Alliance of Publicly Owned Treament Works (SCAP)	61.007	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11a. General Comment s	10, Attachment 2	COMMENT NO. 5: More time and coordination is needed to evaluate claims relating to sewers We appreciate the importance of protecting public health and the need for updated guidance regarding vapor intrusion. However, the Draft Supplemental Guidance is the first California EPA guidance document that we are aware of that specifically identifies sewers as preferential pathways for building vapor intrusion. As a result, we require additional time to thoroughly review the reference documents and provide additional feedback to DTSC staff on their relevance to California wastewater collection systems. This extra time is particularly necessary as the COVID-19 restrictions have caused disruption to our members' organizations, limiting resources available for fully evaluating the Draft Supplemental Guidance's claims relating to sewers. We request that DTSC not rush into issuance of the final guidance and instead take the time to meet with our professionals within the wastewater community. We appreciate DTSC's consideration of these comments and strongly urges DTSC to proceed in close coordination with the wastewater sector on any sewer collection system recommendations DTSC is contemplating. The California wastewater trade association partners signing on this letter and our collective membership have tremendous expertise on collection system operation and are willing to assist in this area.
561	1. Formal/ Official	62	06/01/2020	Andre w	Lojo	Terraphase Engineering Inc.	62.001	01. VI Supplement al Guidance General Comments	01a. General Comment s		It is time to fix our industry's misuse of technical terminology. We call them soil gas investigations and we call it vapor intrusion. Please fix that with this document. We are not measuring vapors, or vapor intrusion. It is soil gas. I know that the term "soil gas intrusion" may not be as catchy but we are all scientists. At least clarify up front in the document that the word Vapor is incorrect. It is really soil gas, not vapors.

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562	1. Formal/ Official	62	06/01/2020	Andrew	Lojo	Terraphase Engineering Inc.	62.002	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	With respect to everyone who has worked so hard in our industry to further this field of investigation, the reason that screening levels were lowered so far, and the basis for making our clients endure such expensive rigors and exhaustive investigation, with uncertain outcomes for their projects, is based on an "argumentum ad ignorantiam". I have heard numerous times over the last two years during informal debates with some of the leaders/authors of this document, that until "industry" generates enough data to show that the new screening levels are too low, they are going to insist that the data be collected. This is a classic Argument from Ignorance. Until we can prove that something is not a problem, California Regulators assume one exists, treat any and all buildings as if they are single family, slab on grade, poor quality slabs, and will regulate them all together, without regard for the costs and impacts. That is just wrong, and it gives environmental professionals a bad light.

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563	1. Formal/ Official	62	06/01/2020	Andrew	Lojo	Terraphase Engineering Inc.	62.003	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	26	Given the importance of the subject, it is a shame that more research on modern building technology, or collaboration with HVAC/Mechanical engineers on standard building code, and required air exchange rates was not considered in its development. It makes no sense to apply one attenuation factor to all buildings. The current attenuation factors have nothing at all similar to modern building technology, yet our clients are forced to assess risk to their properties as if they were building slab on grade, foundations using building code HVAC standards that have not been applicable or allowed in construction for over 30 years. Doing that research would not take nearly as much effort as making all of our clients go out and collect data to satisfy the argumentum ad ignorantiam, some day, when we realize that modern buildings have significantly less VI impact than older ones do. It's like designing a modern efficient car without the use of fuel injection technology. We really can and should do much better, to avoid wasted of technical staff time, client money, and valuable regulatory staff time. The cost of regulating sites unnecessarily is ultimately paid by society by way of higher housing costs, which is one of the last things California needs.

564	1. Formal/ Official	62	06/01/2020	Andre w	Lojo	Terraphase Engineering Inc.	62.004	04. Introduction	04b. A – Scope and Applicabil ity	vi-vii, 1-2	Despite the huge letters proclaiming that this and the new ESLs are not binding regulation, the authors have admitted in public numerous times that they know how they will be applied as such. And they are being applied as such. Unfortunately too many regulators especially at the County and City levels, are not staffed well enough to A) assess each site individually, or B) establish their own guidelines on when it is ok to let one building go up without a VMS, and another with X amount of different data to do the same. They seek easy, uniform standards on which to base those decisions. The current stated views about the J&E model and other risk-based models cited in this and other recent regulatory guidance virtually eliminates the use of risk-based modeling to evaluate sites with slight ESL exceedances. Unless you clearly state that modeling is valid, is allowed, and is encouraged as the next logical step in assessing a site for VI, local regulators will continue to mandate expensive VMS, and long term monitoring on any site with any singe ESL exceedance. Modeling and additional guidance on how to assess sites with few, or minor, exceedances here or there, needs to go with this guidance. For example, I have a site now with 7 soil gas wells, 3 of them have had at least one but not all PCE exceedances, while the other 4 have had none. There are no VOCs in shallow groundwater or soil. Most likely we have a leaky sewer pipe under this 100-year-old building, that will be replace when the new podium building goes in. There is no way to test after the building goes in to be 100% sure however, so unless our local regulator agrees with our modeling, which includes current air exchange rates, our client will be forced to install an expensive VMS. This is a low-income housing complex. It would be a shame to pass on the costs of an unnecessary VMS system onto the new owners, when the environmental professional says it is unnecessary just because this new VI era has eliminated one of our industry's' primary tools (modeling) as an assessment tool.

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565	1. Formal/ Official	62	06/01/2020	Andrew	Lojo	Terraphase Engineering Inc.	62.005	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	20	One of the two most critical elements that is missing from this document, is clear guidance on how to assess the significance of indoor air data. Until we have clear guidance on what levels are too high, compared to outdoor air, gathering all this indoor air data is useless and will add confusion. Try explaining for example, why formaldehyde detected inside a classroom at 26 ug/m3 is not a problem, when the HERO Note 3 screening level is 0.22 ug/m3, and the maximum amount detected outdoors was only 19 ug/m3. Carbon tetrachloride is another one of many other examples. So is benzene. Now multiply that discussion by all the sites that will be collecting that data, just because the soil gas numbers 5 feet below ground were 10 times higher than these super low ESLs. That is a lot of unnecessary expense and will result in huge amounts of unnecessary stress on the community, at a time when we are unsure if we can even open up our economy due to other health concerns.

566	1. Formal/ Official	62	06/01/2020	Andre w	Lojo	Terraphase Engineering Inc.	62.006	03. Flowchart (Steps)	03a. General Comment s	ix	This document is great for assessing sites with significant problems under them. Sites where there is clear evidence of a release on site or nearby. Sites with detectable VOCs in soil or groundwater, not just a few hits of VOCs in soil gas only. I really like the flow chart and the reasoning overall. It is just really bad that as currently envisioned and in regard to the super low attenuation factors, it will be applied universally at any site with any minor exceedance of an ESL/Hero value. I think that sites slated for complete re-development should be treated differently from sites that are not. I am finding more and more that many sites we look at for new development, have relatively minor VOCs detections that do not correlate to any VOC detections in soil or groundwater. I see a lot of PCE, and chloroform hits that I think must be coming from cracked sewer lines at these old buildings. That is a potential problem for the existing site, but it would not be for a completely new building with new sewer lines. I therefore suggest another line of decision making be added to the flow chart. 1) are there VOCs in soil gas above ESLs = Y ; 2) are there detections of those VOCs in soil or groundwater? (I think we could just use detections rather than re-open the can of worms about how high they are, but I would not rule out the use of modeling to assess their ability to have caused the soil gas hits. Modeling is an important tool I commented on elsewhere, but if there are no detections of those VOCS = N; then 3) is the site slated for complete redevelopment = Y; ANSER to that should be no VMS or further investigation is system necessary as long as proper sewer lines and connections are made to the new building. I would recommend that the new sewer line be leak tested all the way to the street. Maybe one or two soil gas confirmatory sampling events would be needed to completely rule out a VMS system but again in a case like this, with no soil or GW detections it is unnecessary to make clients/developers continue with full on application of this guidance, which is time consuming and expensive. The regulator would have

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											to use professional judgement as to the completeness of the soil and groundwater testing of course.

567	1. Formal/ Official	63	06/01/2020	F. Edward	Reynolds	The Reynolds Group	63.001	16. Other	16a. Other		A) COST EVALUATION AND IMPACT ON REAL ESTATE Please provide the projected total costs with underlying assumptions and calculations for implementing the Guidance statewide over the next decade. 2) Please provide the projected financial benefits (costs associated with monetized health improvement) of implementing the Guidance statewide over the next decade -- In 2020 parlance, please demonstrate the remedy is worth the cost of implementing it. 3) Please provide justification of how the projected costs to implement the Guidance match the benefits of implementation. 4) We recommend that implementation costs of the Guidance take into consideration all normal environmental cost benefit analyses parameters but also consider the following: Impact to Private Parties: The cost burden will be borne almost entirely by the regulated community (private parties) except for cases overseen by the regulators. Impact on Real Estate Capital Markets: The Guidance will alter Real Estate Capital Market Transactions where Volatile Organic Chemicals (VOCs) exist or existed due to complications arising from completing full assessments in adequate time frames where residential impacts may exist. This will lead to transaction delays and unquantifiable risks being borne by financial stakeholders. Furthermore, the feasibility of implementing viable solutions to VOC impacts other than engineering controls and continuous monitoring does not exist. Properties by Residences Will Likely Have to be Evaluated. In cases where VOCs are or were once likely used, the roll over from one financial stakeholder to the next as property transactions occur as well as change in land use designations will trigger investigations required by the Guidance. Most of the challenges will occur in commercial and industrial properties that are contiguous to

											residential properties. A Recognized Environmental Concern (REC) raised in a Phase I Environmental Site Assessment will trigger a soil vapor survey of the property being evaluated, even if that property has already been evaluated and formally "closed by a regulator". For example, there are approximately 10,000 dry cleaners in California that used VOC solutions in their operations. If the REC being evaluated results in finding VOCs in the subsurface that exceed the Guidance criteria and are contiguous to residential properties, the evaluation will have to extend off-site in order to satisfy regulations and financial stakeholders. Off-site access on residential properties is a tedious, cumbersome and possibly litigious process. Without a waiver or indemnity from the State for RP's to advance work on residential properties, the advancement of cases will slow dramatically. If the Guidance is implemented, consultants would have to advise their clients to complete assessments according to the Guidance. Without specifically clear assessment criteria to cover their liability against regulators disagreeing, consultants may have to seek oversight from the Local Oversight Agency (LOA). The Real Estate Capital Markets will quickly conform to the new, more stringent Guidance with consultants' help. However, the uncertainty of assessment or remediation without an endpoint will make the markets skittish. A possible outcome will either be "no deals" or substantial discounts of real property values where VOC impact exists. These costs need to be factored into any cost benefit analysis. To further elaborate, it will also be difficult for private consultants to provide assurances that assessments that they recommend privately can be performed to the standards of an LOA. With current guidelines, the initial assessment performed by consultants can easily be congruent with the LOAs and be guaranteed to be so. The new guidelines will require consultants more often to "shrug their shoulders" about the next steps of assessment and consult the already overburdened LOAs.

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											Before the guidelines are issued, clear and unambiguous assessment strategies should be in place that will allow both consultants and LOA's to work from a common platform, especially in cases that are in the initial discovery phases.

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568	1. Formal/ Official	63	06/01/2020	F. Edward	Reynolds	The Reynolds Group	63.002	16. Other	16a. Other		B) REOPENING"CLOSED SITES" Markets Will Reopen Cases: While regulatory closures of old cases (called "No Further Action Letters) are seemingly intended to remain closed (barring change in guidelines such as these), as indicated in the public Web discussions with CAL EPA, financial stakeholders, who will evaluate VOC financial liabilities on "closed sites", will force the issue of opening old sites even if the regulators insist on not reopening them. Plaintiffs for Residents Will Reopen Cases: Furthermore, plaintiffs' attorneys will have a field day when they figure out how many closed cases potentially abut private citizens' residences or other sensitive receptors. Because of the robust and litigious legal system in California, and the potential lack of fairness about which cases are reopened and which are not, the legal system will serve as a driving force to re-evaluate old closed cases. We understand an emphasis will be on opening old cases where Trichloroethylene (TCE) was the dominant health risk. Please explain. Please explain the equality/fairness of opening new cases going forward but not going backwards in time to open old cases. Triaging Re-openings is Important. Given the above discussion, it would seem fair and reasonable to focus on prioritizing the evaluation and oversight of old, closed cases where there was a potential impact to sensitive receptors including residences, schools, etc. that were not completed to the standards of the Guidance and those cases where the land use has changed.

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569	1. Formal/ Official	63	06/01/2020	F. Edward	Reynolds	The Reynolds Group	63.003	15. General Comments on Vapor Intrusion	15a. General Comments		C) LACK OF EXISTING IN-SITU TECHNOLOGIES There are no cost effective in-situ technologies currently available that will remediate elevated concentrations of VOCs to the levels implied by the Guidance standards Thus real properties will be in a state of limbo, not receiving closure or a “no further action” designation and requiring permanent engineering controls or indefinite continuous monitoring of indoor air. In-Situ Thermal remediation technologies, such as electrical resistance heating (ERH), touted by regulators is actually overly expensive and logistically difficult to implement, especially in residential settings. Thermal remediation cannot become a default remedy. Thermal remediation can only “guarantee” removal of 99% of mass, which in many cases, will not be sufficient to mitigate the soils to levels implied by the Guidance standards. Default “remedies” will become on-going engineering controls such as sub-slab depressurization and indefinite on-going monitoring to ensure proper function of engineering controls. These factors should be considered in the cost benefit analysis.

570	1. Formal/ Official	63	06/01/2020	F. Edward	Reynolds	The Reynolds Group	63.004	01. VI Supplemental Guidance General Comments	01a. General Comments		CONFLICTING STANDARDS (EXAMPLE LTCP v THE GUIDANCE) The Guidance is part of what we in the industry call a swing in the "environmental pendulum" towards the extreme. At The Reynolds Group, we have seen the pendulum swing several times. In his book The Environmental Pendulum: A Quest for Truth about Toxic Chemicals, Human Health, and Environmental Protection by R. Allan Freeze, who edited the famous textbook Groundwater in 1979, communicates the following: [extracted from Amazon summary] "The pendulum of environmental policy swings from one extreme to the other, depending on which camp is in power and who has the ear of the media. Underkill is followed by overkill. Concern breeds action; disillusion breeds reaction. The Environmental Pendulum provides a thoughtful and even handed assessment of this conflict. Tens of thousands of sites across the country are contaminated with toxic chemicals. Environmentalists warn us that this legacy of carelessness is seriously affecting both human health and the ecological balance of nature. They point out that even improved industrial practices will not eliminate future chemical releases to the environment. Their demand for regulatory control has received wide public support and led to the passage of the Superfund legislation in 1980. Now, after twenty years, the value of the Superfund program is being challenged by corporate America, which argues that excessive cleanup costs have the potential to bankrupt the nation. R. Allan Freeze outlines the difficulties associated with the management of hazardous waste and offers a balanced account of the controversy over the role of environmental contamination in human health. Freeze clarifies what matters and what doesn't with respect to chemical contaminants in the environment, arguing that environmental policies should be based on an accurate appraisal of the risks associated with these toxins. He concludes the book with a brilliant summation of the good news and the bad news of environmental pollution, describing what can and can't be done to bring the situation under control."

571	1. Formal/ Official	63	06/01/2020	F. Edward	Reynolds	The Reynolds Group	63.005	10. Attachment 1 – Petroleum Specific Considerations	10a. General Comments	Attachment 1	"LTCP" vs. the Guidance. The "environmental pendulum" swung to less stringent in the case of leaking underground storage tank cases. The LTCP has allowed "case closure/no further action" to be achieved in many cases that, previous to the LTCP, would not have been closed. At one time, leaving benzene in groundwater above the California Maximum Contaminant Level/Water Quality Objective of 1 microgram per liter (1 µg/L) was frowned upon. Now, in certain cases that meet what is called the Low-Threat Underground Storage Tank Case Closure Policy (LTCP), benzene can remain in groundwater under certain instances up to 3,000 µg/L and can be higher if the site is a really small plume. The LTCP has allowed "case closure/no further action" to be achieved in many cases that, previous to the LTCP, would not have been closed. LTCP is a rationale guidance taken after much deliberation recognizing many elements of site specific conditions to form "pathways to closure". But the LTCP was also created with a consideration for the overall cost of implementation. And while the backers may have been "Big Oil" and some entrepreneurial members of CAL EPA staff, the result was a reverse swing in the pendulum. The Guideline under consideration creates a huge disparity in the case of benzene, for example. Under the Guidance -- although technically a recommendation, we understand LOA's will adopt this as law and make "legally enforceable" -- soils must be cleaned to 3.2 ug/m3 (residential) and 14 ug/m3 (commercial) of benzene in the soil vapor. However, under the LTCP guideline, if the soil has a demonstrated "oxygen zone" then the allowable level to leave in the soil vapor is 85,000 ug/m3 (residential) and 280,000 ug/m3 (commercial). We ask that before adopting the Guidance, at a minimum, the conflicts between the LTCP law and the Guidance be reconciled and clarity be provided for addressing cases that do not have petroleum hydrocarbon USTs as a REC. Furthermore, we request to hear the voices of objection within the CAL EPA who give voice to practical realities and costs of implementing the Guidance.

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572	3. Informal: Water Boards	64	06/01/2020	Walter	Floyd	INTERNAL RWQCB-Region 5	64.001	15. General Comments on Vapor Intrusion	15a. General Comments		BACKGROUND Controlled Pressure Method (CPM) Testing, as described by McHugh et al., 2012, is showing promise as a superior method of sampling indoor air. By controlling the pressure inside the building, the source of variability caused by outdoor temperatures, operation of HVAC, barometric fluctuations, wind speeds, etc. are essentially removed. The CPM has the advantages: Identifies where the vapors are coming from (e.g., preferential pathway, indoor sources, outdoor air, or sub-slab). No false negatives Can be completed in a day or two. Eliminates the need to sample 2-3 times during the year No need to sample indoor air with HVAC off for 36 hours. The disadvantages are that it is more labor intensive and costs more.
573	3. Informal: Water Boards	64	06/01/2020	Walter	Floyd	INTERNAL RWQCB-Region 5	64.002	04. Introduction	04d. C – Conceptual Model for Vapor Intrusion	4	1. Page 4, Section C, first paragraph below the bullets. The text cites Guo et al., 2015 as a paper that demonstrates a sewer acted as a preferential pathway. The Guo paper actually demonstrated that a foundation drain served as a pathway, not a sewer. The text should be modified to be made more accurate, or the reference replaced with a more applicable one (e.g., Pennell et al., 2013).

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574	3. Informal: Water Boards	64	06/01/2020	Walter	Floyd	INTERNAL RWQCB-Region 5	64.003	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	2. Page 5, Section D1. It should be pointed out that the EPA (2015) database is being used for all cases (i.e., when it is unknown whether there is a preferential pathway or not) despite the warning from the EPA (Section 6.5.3 of 2015 EPA document) that the use of attenuation factors (AFs) is likely inappropriate when preferential pathways are present. The EPA AF database is being used despite the warning because it has been determined to, in fact, contain cases where apparent preferential pathways and indoor sources were present (Yao et al., 2018). And therefore, the EPA database is appropriate to use when it is unknown whether there is a preferential pathway. Without this clarification, the argument for not allowing J&E-type modeling would also apply to the use of the EPA's AFs. And the argument for not allowing J&E modeling would be diminished.
575	3. Informal: Water Boards	64	06/01/2020	Walter	Floyd	INTERNAL RWQCB-Region 5	64.004	04. Introduction	04g. F – California Vapor Intrusion Database	7	3. Page 7. Section F, first bullet. The country of France compiled a database of attenuation factors and building characteristics (Derycke, 2018). A principal component analysis on the French data set found building age to be the explanatory variable accounting for the most variability. It is suggested that the text be changed from Building-Type to Building-Characteristics so that age and other factors can be evaluated.
576	3. Informal: Water Boards	64	06/01/2020	Walter	Floyd	INTERNAL RWQCB-Region 5	64.005	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distribution of Soil Gas Contamination	14	4. Page 14, Section 2A.3, last paragraph. It is suggested that this section be re-worded for clarity. There are statements that the deepest soil gas samples (for assessing risk) should be 15 feet below the foundation; while other parts of the section indicate multiple times that the deepest samples should be near the soil contamination or adjacent to the capillary fringe, which could be considerably deeper than 15 feet below the foundation.

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577	3. Informal: Water Boards	64	06/01/2020	Walter	Floyd	INTERNAL RWQCB-Region 5	64.006	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	20	5. Page 20, Section 3B, first bullet. The requirement for 24 hours of testing is based upon the desire to assess diurnal effects. Diurnal effects are effectively made moot using the CPM. Only 8 hours of sampling should be allowed if the CPM is used.

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578	3. Informal: Water Boards	64	06/01/2020	Walter	Floyd	INTERNAL RWQCB-Region 5	64.007	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	20	6. Page 20, Section 3B, third bullet. Please clarify whether the real-time monitoring can replace the collection of samples for laboratory analyses (e.g., summa canisters) recommended in the DTSC (2011) VI Guidance.

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579	3. Informal: Water Boards	64	06/01/2020	Walter	Floyd	INTERNAL RWQCB-Region 5	64.008	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	22	7. Page 22, Section 3B.6. The first bullet – cross-slab pressure differential measurements determines whether a gradient exists to allow advective flow of vapors into a building. This seems too important to be designated “should be considered”.

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580	3. Informal: Water Boards	64	06/01/2020	Walter	Floyd	INTERNAL RWQCB-Region 5	64.009	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	23	8. Page 23, Section 3B.6. It is suggested that the second bullet – Exterior Soil Gas Sampling be elaborated upon. As presented, there does not seem to be a clear benefit to doing exterior soil gas sampling in conjunction with the sub-slab soil gas sampling.

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581	3. Informal: Water Boards	64	06/01/2020	Walter	Floyd	INTERNAL RWQCB-Region 5	64.010	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	23	9. Page 23, Section 3B.6. The last bullet appears to provide a very brief summary of CPM. As described above under “Background”, the CPM stands to be a superior method of soil gas sampling, albeit more labor intensive and expensive. It is suggested that the CPM method be more fully described in the Supplemental Guidance and presented as an alternative to conventional soil gas sampling (e.g., summa canisters). CPM should also be presented as an approved method when time is of the essence.

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582	3. Informal: Water Boards	64	06/01/2020	Walter	Floyd	INTERNAL RWQCB-Region 5	64.011	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07e. Step 3D – Evaluate Temporal Variability	25	10. Page 25, Step 3D. This section should include a blurb on not needing to assess temporal variability if the CPM is used.
583	3. Informal: Water Boards	64	06/01/2020	Walter	Floyd	INTERNAL RWQCB-Region 5	64.012	08. Step 4: Concurrent and Future Risk Evaluation and Management Decisions	08d. Step 4C – Managing Future Vapor Intrusion Risk	29	Page 29, Step 4C. The last sentence of the first paragraph has a different font.

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584	7. Other	65	06/01/2020	Thaddeus	McCormack	City of Lakewood	65.001	16. Other	16a. Other		The City of Lakewood hereby requests that California EPA (CalEPA) delay implementation of the issued draft Vapor Intrusion (VI) Guidance. During this current Covid-19 pandemic, many cities are not aware of the potential impacts that implementation of the guidance will have on their communities. Lakewood is concerned that the guidance could have an effect on real estate investment and development. The CalEPA VI Guidance gives no consideration to impacts on real estate development projects and the effects on blighted communities, nor does it use scientifically defensible criteria. We believe that CalEPA should cease implementation of the VI Guidance Document until California-specific data are developed and after municipalities have effectively addressed COVID-19 priorities. The CalEPA Vapor Intrusion (VI) Guidance results in unreasonably low soil and ground water cleanup levels compared to current practices (which are already some of the strictest in the nation), thereby negatively impacting commercial and residential development costs. We are aware of no current public health crisis prompting this proposed VI Guidance. The new VI Guidance is based on empirical US EPA data from only six (6) locations throughout the State, which seems insufficient for such a drastic change. Contaminated sites can no longer be cleaned up to make way for badly needed housing or commercial development. The absence of No Further Action letters will thwart financing for thousands of projects in the region. Finally, CalEPA's VI Guidance has the potential to exacerbate blight and the housing crisis in our communities as developers are unable to buy, finance, and insure sites in the absence of No Further Action letters.

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585	1. Formal/ Official	66	06/01/2020	Avery	Whitma rsh	Wood Environment & Infrastructure Solutions, Inc.	66.001	14. Attachment 5 – Building Survey and Indoor Air Source Screen Forms	14a. General Comment s	Attachment 5	The revised Building Survey is more thorough that the previous DTSC building survey in order to capture additional information that is critical for understanding building construction and vapor intrusion pathways. Additional clarity may be helpful on Page 2 where the survey asks for “Number of Floors”. This question can be interpreted in multiple ways for multi-story, multi-unit buildings. Is the question asking for the number of floors in the unit being sampled, or number of floors in the entire building? For example, how would one note a unit that occupies 1 story on the 2nd floor of a 10 story, multi-unit building? Perhaps a follow up question is warranted about what floor the unit being sampled is on. This question has an (*), which means it is imported into Geotracker, so clarity is important for consistency across the state.
586	1. Formal/ Official	66	06/01/2020	Avery	Whitma rsh	Wood Environment & Infrastructure Solutions, Inc.	66.002	03. Flowchart (Steps)	03b. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluatio n	19	The use of a 100-foot buffer has been often referenced with regard to vapor intrusion, but it tends to be in vague terms. The USEPA 2015 guidance includes their perspective of the 100-foot buffer, noting the background on the value and the circumstances under which it may not be appropriate. This guidance references “prioritizing buildings for VI evaluation” if they are “within 100 feet of the area of estimated vadose zone soil contamination extending from a source.” Finally, there is mention of 100-foot spacing might be appropriate in open-space scenarios. This could be an opportunity for the Cal/EPA to expand on where and how the 100-foot buffer is appropriate, including the following: Does it apply vertically as well as horizontally? Does it apply from the center or the edge of the zone of detected contamination? If it applied from the edge, would the 100 feet be measured from the edge of the zone that is above the VI-based screening level, or from a point where the concentrations reach non-detect? If a building is outside the 100 ft buffer, can it be excluded from any VI-related investigation or evaluation?

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587	1. Formal/ Official	66	06/01/2020	Avery	Whitmarsh	Wood Environment & Infrastructure Solutions, Inc.	66.003	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07e. Step 3D – Evaluate Temporal Variability	26	Section 3.D.1 (Sampling Frequency) includes the following statement: “One of the sampling events described above should include both HVAC-On and HVAC-Off scenarios to determine the effects of the HVAC operation on VI.” The paragraph that includes this statement then goes on to say that the HVAC should be on or off for at least 36 hours prior to sampling. We would assume the intention is also to sample during roughly the same time of day for consistency. As such, it seems that this paragraph could be clarified to note that what is considered one of the sampling events would actually include two rounds of sampling that start at least 48 hours apart at approximately the same time of day. It would also be helpful to clarify if this is expected in a residential setting as well as a commercial one (which could be deemed overly intrusive to residents). For example, for a commercial building: start sampling at 8am on Day 1, complete sampling at 4pm on Day 1, turn on (or off) HVAC at 5pm on Day 1, 36 hours will have passed by 5am on Day 3, and the second sampling event can begin at 8am on Day 3.

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588	1. Formal/ Official	66	06/01/2020	Avery	Whitmarsh	Wood Environment & Infrastructure Solutions, Inc.	66.004	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07e. Step 3D – Evaluate Temporal Variability	26	Section 3.D.1 (Sampling Frequency) includes the following statement: At least one of the indoor air sampling events should be conducted when conditions are expected to favor VI, as verified by cross-slab pressure differential readings, during sampling.” The prior page includes information regarding scenarios that might favor VI. Is the intention of this statement that one set of samples be collected during a time of year when VI is likely to be occurring, and that pressure differential monitoring be conducted concurrently (e.g., for 8 or 24 hours, to correspond to the indoor air sampling) to assess if there is a negative pressure indoors relative to sub-slab air, as measured at soil gas probes? Additional clarification might be beneficial.

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589	1. Formal/ Official	66	06/01/2020	Avery	Whitmarsh	Wood Environment & Infrastructure Solutions, Inc.	66.005	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07c. Step 3B – Evaluate Spatial Distribution	22	Section 3B.6 (Complementary Lines of Evidence) includes the following statement: "Vapor Conduit Air Sampling – Sampling inside sewers and other vapor conduits concurrently with indoor air and subslab sampling is recommended to determine if such preferential pathways are enhancing VI." It then refers back to Section 1B.2 (Contaminated Vapor Conduits), which includes the following statement: "If indoor air results indicate the presence of VFCs, but these VFCs do not appear to be migrating through subsurface soil, then sampling the air inside the vapor conduit should be considered." It appears that the intention of the document is to recommend sampling of sewer air only if the data indicate the sewer is a likely source. If this is true, it may be helpful to add a sentence in 3B.6 that mirrors what is noted in Section 1B.2 to avoid confusion.
590	1. Formal/ Official	66	06/01/2020	Avery	Whitmarsh	Wood Environment & Infrastructure Solutions, Inc.	66.006	09. Application to Other Building Types	09b. Building I – Large Buildings and Multistory Buildings	30	The following text is in the included in the section on Large Buildings and Multistory Buildings: "For multistory buildings, sampling in occupied spaces on upper floors may be warranted in addition to sampling on the ground floor. Samples should be collected near conduits, such as utilities, stairwells, or elevator shafts, that may provide a vapor pathway to the upper floors." Additional clarity would be helpful on when sampling on upper floors is expected, and if there is a difference if the buildings are residential or commercial.

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591	1. Formal/ Official	66	06/01/2020	Avery	Whitmarsh	Wood Environment & Infrastructure Solutions, Inc.	66.007	03. Flowchart (Steps)	03c. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	24	Step 3C.2 – Estimate Risk from Indoor Air Data. The guidance indicates that the results of the first indoor air sampling event should be used to assess potential human health risks posed by VI. However, if data from multiple indoor sampling events have been collected, suggest adding clarification that if indoor air samples from multiple events (if available) have already been collected, all the indoor air data can be used in the human health risk assessment.
592	1. Formal/ Official	66	06/01/2020	Avery	Whitmarsh	Wood Environment & Infrastructure Solutions, Inc.	66.008	14. Attachment 5 – Building Survey and Indoor Air Source Screen Forms	14a. General Comments	Attachment 5	Factors Potentially Influencing Indoor Air Quality – Suggest adding another line item asking about usage of scented products (e.g. air fresheners, scented candles). These products may influence indoor air sampling results and are quite common in residences. For example, we have measured significant concentrations of chlorinated VOCs (including PCE and 1,2-DCA) in scented candles.
593	1. Formal/ Official	66	06/01/2020	Avery	Whitmarsh	Wood Environment & Infrastructure Solutions, Inc.	66.009	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11e. Collection of Samples	Attachment 2	Sewer systems are dynamic, and their flow rates vary over periods of time (peak use) during the day and night, depending on the type of local land use (e.g. residential, commercial/industrial). The guidance appears to indicate that a grab sample is appropriate after purging 3 times the tubing/sampling train volume. Would it be more appropriate to collect a time weighted average sample over an appropriate period of time (say 8 or 24 hours) depending on the nature of the VI investigation?

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594	1. Formal/ Official	66	06/01/2020	Avery	Whitmarsh	Wood Environment & Infrastructure Solutions, Inc.	66.010	07. Step 3: Indoor Air Investigation – Identify Buildings Where Vapor Intrusion is Occurring Using Concurrent Indoor Air, Subslab Soil Gas, Soil Gas, and Outdoor Air Sampling Data	07d. Step 3C – Assess Risk from Contaminated Indoor Air and Subslab Soil Gas	23	All steps in this section recommend using only the maximum detected concentration in indoor air and sub-slab soil gas as the exposure point concentration (EPC) for risk assessment. We recommend adding an option to use 95% UCL or other upper-bound estimates if the data set is robust enough, with sufficient sampling density and frequency, to support the estimation and use of alternative EPCs in a site-specific risk assessment.
595	1. Formal/ Official	66	06/01/2020	Avery	Whitmarsh	Wood Environment & Infrastructure Solutions, Inc.	66.011	10. Attachment 1 – Petroleum Specific Considerations	10a. General Comments	Attachment 1	We recommend adding some discussion of and any new recommendations for VI evaluation at sites with NAPL (non-aqueous phase liquid).

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596	1. Formal/ Official	66	06/01/2020	Avery	Whitmarsh	Wood Environment & Infrastructure Solutions, Inc.	66.012	09. Application to Other Building Types	09b. Building I – Large Buildings and Multistory Buildings	30	The use of the DQO process in developing the data needs for the VI evaluation sampling approach is key. All too often not enough thought regarding DQOs is given to VI investigations. We appreciate the focus on DQO here.]
597	1. Formal/ Official	66	06/01/2020	Avery	Whitmarsh	Wood Environment & Infrastructure Solutions, Inc.	66.013	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06b. Step 2A – Evaluate Spatial Distribution of Soil Gas Contamination	12	While Step 2 is focused on soil gas data (presumably deeper), would it be appropriate to add an option to conduct sub-slab soil gas sampling as part of Step 2A, as an alternative to exterior sampling near the building foundation?

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598	1. Formal/ Official	67	06/01/2020	Peter	Weiner	Lennar Housing of California (LHOC)	67.001a	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	1. The DSVIG Should Be Withdrawn Until the Agencies Speak With One Voice Agency representatives have stated that the Draft Supplemental Vapor Intrusion Guidelines (DSVIG) would provide a unified approach to investigating, regulating, and mitigating vapor intrusion. To the contrary, even after the DSVIG was published for public comment, management-level staff at the Department of Toxic Substances Control (DTSC) have stated that they will use different Attenuation Factors (AF) for new residential (.001) and commercial (.0005) buildings that DTSC staff announced during the December 19, 2019 National Brownfields Conference in Los Angeles. Similarly, various Regional Water Quality Control Board managers have stated that they will continue to use AFs ranging from .002 to .03 for new residential buildings. There is great confusion among the regulator community as well as those who are regulated, leading to disinvestment in affordable housing and widespread distrust of the ability of the various agencies to approach vapor intrusion issues on a unified, scientific basis. This confusion undermines the credibility of the DSVIG and the agencies responsible for its development. The only appropriate remedy is for Cal-EPA, DTSC and the State and Regional Water Boards to withdraw the DSVIG and resolve obvious implementation conflicts before progressing further with public review and comment.

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599	1. Formal/ Official	67	06/01/2020	Peter	Weiner	Lennar Housing of California (LHOC)	67.001b	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	1. The DSVIG Should Be Withdrawn Until the Agencies Speak With One Voice Agency representatives have stated that the Draft Supplemental Vapor Intrusion Guidelines (DSVIG) would provide a unified approach to investigating, regulating, and mitigating vapor intrusion. To the contrary, even after the DSVIG was published for public comment, management-level staff at the Department of Toxic Substances Control (DTSC) have stated that they will use different Attenuation Factors (AF) for new residential (.001) and commercial (.0005) buildings that DTSC staff announced during the December 19, 2019 National Brownfields Conference in Los Angeles. Similarly, various Regional Water Quality Control Board managers have stated that they will continue to use AFs ranging from .002 to .03 for new residential buildings. There is great confusion among the regulator community as well as those who are regulated, leading to disinvestment in affordable housing and widespread distrust of the ability of the various agencies to approach vapor intrusion issues on a unified, scientific basis. This confusion undermines the credibility of the DSVIG and the agencies responsible for its development. The only appropriate remedy is for Cal-EPA, DTSC and the State and Regional Water Boards to withdraw the DSVIG and resolve obvious implementation conflicts before progressing further with public review and comment.

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600	1. Formal/ Official	67	06/01/2020	Peter	Weiner	Lennar Housing of California (LHOC)	67.002	16. Other	16a. Other		2. The Workshop Schedule And Comment Deadline Should Be Extended Given the Covid-19 outbreak and still-emerging government responses, including newly issued "shelter-in place" orders in many California counties, local government agencies, developers, responsible parties and other vapor intrusion stakeholders are focused on the immediate tasks of protecting their employees and restructuring their operations. This public health crisis greatly diminishes the ability of interested parties to devote the time and attention necessary to develop substantive comments on the Draft Supplemental Vapor Intrusion Guidance (DSVIG). At best, the utility of the guidance will be compromised by a lack of public input. However, we are more concerned that it will preserve features that create significant new impediments to vapor intrusion mitigation and brownfield redevelopment projects. Cal-EPA should reschedule the planned workshops to later dates and extend the April 30 public comment deadline by at least 30 days to ensure that all interested parties have a reasonable opportunity to participate in the public review process.

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601	1. Formal/ Official	67	06/01/2020	Peter	Weiner	Lennar Housing of California (LHOC)	67.003	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	3. The DSVIG Creates Major New Barriers To Affordable Housing Projects It is notable that one of the “Essential Businesses and Activities” exempted from even the most stringent COVID-19 “shelter-in-place” orders is the “construction of affordable housing.” However, the success of in-fill housing developments in many California communities will depend on avoiding the imposition of unnecessary costs. This reality argues for more refined vapor intrusion guidance that actually screens out lower risk sites. Conceptual site models and other screening tools must use inputs that are representative of actual site conditions. A multiple-lines-of-evidence approach using site-specific information should be encouraged in lieu of default assumptions. This approach is consistent with EPA guidance and long standing DTSC and Water Board practice. Deficiencies in these aspects of the DSVIG will make redevelopment of urban brownfields much more difficult and expensive and will serve as a major barrier to resolving California’s affordable housing crisis.

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602	1. Formal/ Official	67	06/01/2020	Peter	Weiner	Lennar Housing of California (LHOC)	67.004	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	4. Default Attenuation Factor Must Be Replaced With California-Specific Values The DSVIG proposes to use USEPA's default soil vapor attenuation factor (AF; 0.03) for various purposes ranging from indoor air screening of existing buildings to risk management decisions for future buildings, irrespective of the use of the building (residential or commercial/industrial). The DSVIG appropriately acknowledges some of the shortcomings in the USEPA AF database (very few California data; a limited number of buildings designed for commercial or industrial use; lack of site-specific outdoor air data; a limited number of paired indoor air and subsurface samples; see pages 7-8) and it commits to developing a California-specific database. These statements implicitly recognize that a single default value based predominantly on data from residential sites in Colorado and New York cannot reasonably represent the VI conditions that exist at sites in California. In the best case, use of a 0.03 AF as interim policy would substantially increase the number of sites the state characterizes as "high risk" for purposes of vapor intrusion investigation, diverting limited regulatory and private resources from truly high-risk sites to lower risk sites. Adoption and field use of a final supplemental VI guidance document should be conditioned on completion of a California database and development of California-specific AFs. If Cal-EPA must establish an interim statewide policy while it works toward this goal, it should utilize a range of values derived from the soon-to-be-completed DTSC database (see next comment) and other relevant, published and peer reviewed sources.

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603	1. Formal/ Official	67	06/01/2020	Peter	Weiner	Lennar Housing of California (LHOC)	67.005a	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	5. DTSC's Data Base Should Be The Foundation For Any Interim Attenuation Factors The DSVIG invites many unanswered questions about how the California database will be developed, in what timeframe, and whether this work will actually lead to California-specific values that supplant the default USEPA value. More importantly, it fails to acknowledge that this work is already underway at the Department of Toxic Substances Control (DTSC), which is nearing completion of a California AF database using available data from EnviroStor that meets more rigorous data quality requirements and is far more representative of actual California sites than the USEPA database. DTSC staff openly discussed their "Attenuation Factor Study" during USEPA's recent national brownfields conference in Los Angeles (December 2019). It should be foundational to any interim guidance and to a future statewide VI policy
604	1. Formal/ Official	67	06/01/2020	Peter	Weiner	Lennar Housing of California (LHOC)	67.005b	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	5. DTSC's Data Base Should Be The Foundation For Any Interim Attenuation Factors The DSVIG invites many unanswered questions about how the California database will be developed, in what timeframe, and whether this work will actually lead to California-specific values that supplant the default USEPA value. More importantly, it fails to acknowledge that this work is already underway at the Department of Toxic Substances Control (DTSC), which is nearing completion of a California AF database using available data from EnviroStor that meets more rigorous data quality requirements and is far more representative of actual California sites than the USEPA database. DTSC staff openly discussed their "Attenuation Factor Study" during USEPA's recent national brownfields conference in Los Angeles (December 2019). It should be foundational to any interim guidance and to a future statewide VI policy

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605	1. Formal/ Official	67	06/01/2020	Peter	Weiner	Lennar Housing of California (LHOC)	67.006a	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	6. DSVIG Creates Confusion About Its Intended Applicability In anticipation of this guidance, many case managers at many different agencies have been citing 0.03 as the default AF for all potential VI sites, regardless of the presence or absence of occupied buildings on those sites, or building use. A core purpose of the DSVIG should be to clarify that it only applies to initial screening of occupied buildings, with explicit statements restricting its application to a clearly defined set of circumstances. Instead, it contains broad-brush statements that are counter-productive to this purpose. For example, the document states "The same logic and approach can be extended to the evaluation and management of future VI risk for sites with existing buildings or open lots planned for redevelopment." On the one hand, the DSVIG encourages use of other VI guidance and, on the other hand, indicates that where conflicts arise, the DSVIG should take precedence. DTSC announced at the December 2019 brownfields conference that it will recommend AFs of .001 for new residential buildings and .0005 for new commercial buildings. DTSC's values clearly conflict with a 0.03 AF. The DSVIG appears to require across the board use of an AF developed in 2015 from predominantly out-of-state data, rather than DTSC AFs developed on 2019-2020 exclusively from California data. Absent explicit statements restricting its application to a clearly defined set of circumstances, the DSVIG will exacerbate the confusion that already exists in the field about how to evaluate potential VI risk under other circumstances. That confusion will lead to remedies that are more costly than necessary to protect public health. 1 DSVIG, pages 1-2.

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606	1. Formal/ Official	67	06/01/2020	Peter	Weiner	Lennar Housing of California (LHOC)	67.006b	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	6. DSVIG Creates Confusion About Its Intended Applicability In anticipation of this guidance, many case managers at many different agencies have been citing 0.03 as the default AF for all potential VI sites, regardless of the presence or absence of occupied buildings on those sites, or building use. A core purpose of the DSVIG should be to clarify that it only applies to initial screening of occupied buildings, with explicit statements restricting its application to a clearly defined set of circumstances. Instead, it contains broad-brush statements that are counter-productive to this purpose. For example, the document states "The same logic and approach can be extended to the evaluation and management of future VI risk for sites with existing buildings or open lots planned for redevelopment." On the one hand, the DSVIG encourages use of other VI guidance and, on the other hand, indicates that where conflicts arise, the DSVIG should take precedence. DTSC announced at the December 2019 brownfields conference that it will recommend AFs of .001 for new residential buildings and .0005 for new commercial buildings. DTSC's values clearly conflict with a 0.03 AF. The DSVIG appears to require across the board use of an AF developed in 2015 from predominantly out-of-state data, rather than DTSC AFs developed on 2019-2020 exclusively from California data. Absent explicit statements restricting its application to a clearly defined set of circumstances, the DSVIG will exacerbate the confusion that already exists in the field about how to evaluate potential VI risk under other circumstances. That confusion will lead to remedies that are more costly than necessary to protect public health. 1 DSVIG, pages 1-2.

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607	1. Formal/ Official	67	06/01/2020	Peter	Weiner	Lennar Housing of California (LHOC)	67.007	03. Flowchart (Steps)	03d. Step 3: Evaluate VI Using Concurrent Indoor Air, Subslab, and Outdoor Air	19	7. Cleanup Goals Should Be Site-Specific The DSVIG states that cleanup goals should be site-specific and implies that the default attenuation factor of 0.03 is not required to support these decisions. However, no guidance is provided on how site-specific values can be developed. DTSC has stated that it is working on separate guidance to address this information gap, but this work is not acknowledged in the DSVIG. Furthermore, the DSVIG states that risk management decisions for future VI risk should be based on cumulative risk calculations using sub-slab vapor data and an attenuation factor of 0.03. The approach shown in Step 3 of the flow chart does not allow for site-specific assessments of cleanup goals. The ability to use site-specific data to make risk-based decisions for cleanup goals must be clearly delineated in the guidance.
608	1. Formal/ Official	67	06/01/2020	Peter	Weiner	Lennar Housing of California (LHOC)	67.008	06. Step 2: Evaluate Vapor Intrusion Risk using Soil Gas Data	06a. General Comments	11	8. Proposed Investigation Requirements Are Too Prescriptive The DSVIG includes very prescriptive investigation requirements for the collection of soil gas, sub-slab, indoor air, and outdoor air data. The guidance specifies the minimum number of samples to be collected regardless of whether the high sample density described in the guidance provides a more accurate assessment of the vapor intrusion pathway. For example, the guidance requires collection of three outdoor air samples for every sampling event. However, there is typically little difference in outdoor air concentrations around a structure. Such detailed assessments will only serve to increase site investigation costs without a corresponding regulatory or public health benefit.

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609	1. Formal/ Official	67	06/01/2020	Peter	Weiner	Lennar Housing of California (LHOC)	67.009	05. Step 1: Prioritize Buildings and Select Sampling Approach for VI Evaluation	05c. Step 1B – Prioritizing Buildings for VI Evaluation	9	9. Emphasis On Vapor Conduits Without Adequate Guidance Will Disrupt Site Cleanups The DSVIG emphasizes the potential for “vapor conduits” (e.g., sewers) to convey vapor forming compounds (VFCs) beneath or directly into buildings. The DSVIG indicates indoor air sampling may be warranted for “Buildings connected to vapor conduits that intersect significant levels of contamination” (Step 1B.2), but does not provide guidance regarding the likelihood of such conveyance or what levels of contamination would be considered “significant.” This emphasis on vapor conduits without adequate guidance will disrupt most site cleanups because virtually all buildings and many brownfield properties evaluated for a potential vapor intrusion condition contain vapor conduits. However, both the professional literature and decades of field experience indicate that instances of vapor conduits playing a significant role in vapor intrusion are rare. Without further guidance or clarification, the DSVIG’s emphasis on vapor conduits will likely lead to unnecessary investigation, including indoor air sampling.

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610	1. Formal/ Official	67	06/01/2020	Peter	Weiner	Lennar Housing of California (LHOC)	67.010	08. Step 4: Concurrent and Future Risk Evaluation and Manageme nt Decisions	08b. Step 4A – Need for Risk Manage ment	28	10. Requirements For Future Risk Evaluation Will Lead to Open-Ended Assessments The DSVIG states that indoor air data should be used for current risk evaluations and soil gas/sub-slab data should be used for future risk evaluations. Under these conditions, even if indoor air concentrations are non-detect, responsible parties could still be required to mitigate if soil gas/sub-slab concentrations exceed screening levels. Specifically, as outlined in the Risk Management Decision Framework for Vapor Intrusion, action may be required if the future risk at a building exceeds a cancer risk of 1 x 10-6 or a non-cancer hazard index of 1. For some of the most common chemicals such as TCE and PCE, this would require action at sites where sub-slab soil gas concentrations are above ~100 ug/m3 (for commercial) or ~20 ug/m3 (for residential), even if indoor air concentrations are non-detect. This policy would impose unnecessary and potentially large costs for developers, responsible parties and even building and homeowners. In many cases, it will lead to on-going assessments that have no realistic endpoint or installation of mitigation systems that are not necessary to protect public health. Although the DSVIG indicates that a refined risk assessment or alternative attenuation factors can be used, it does not provide guidance on how these options could be exercised or how much data would be necessary to support alternative inputs.

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611	1. Formal/ Official	67	06/01/2020	Peter	Weiner	Lennar Housing of California (LHOC)	67.011	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	11. The DSVIG Is An Underground Regulation In California, an agency rule or standard is subject to the rulemaking provisions of the Administrative Procedure Act if: (1) it applies generally rather than to a specific case; and (2) it implements, interprets, or makes specific the law administered by the agency imposing it. (Gov't Code § 11342.600.) By its own terms, the DSVIG applies generally. The stated purpose of the document is to create a "state-wide standard practice" that is "to be used by practitioners and regulators when screening buildings for subsurface vapor risk to building occupants." The DSVIG states that when pre-existing guidance conflicts with it, the provisions of the DSVIG "should be followed." The DSVIG interprets and makes specific the law regarding hazardous substance site cleanups. It sets forth five equations that are to be used in analyzing vapor intrusion risks and specifies the key parameter (an "attenuation factor") that "should be used" in the equations. Among other things, the DSVIG specifies: (1) the number of indoor, outdoor and sub-slab samples that should be collected; (2) the depth of the sub-slab samples; (3) the manner of indoor air sample collection ("time integrated"); (4) whether and when samples in sewers and other "conduits" should be collected; (5) the number of sampling events required; and (6) when remediation and/or mitigation is required.

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612	1. Formal/ Official	68	06/15/2020	Sheila	Joy	NASSCO (the National Association of Sewer Service Companies)	68.001	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11a. General Comment s	Attachment 2	The five basic points outlined below will cover the following topics: First, recent studies have confirmed that functional P-traps will prevent VI from entering into businesses and homes through sewer connections; Second, the VI Supplemental Guidance document primarily focused on volatile organic compounds (VOCs) that have leaked over a lengthy period of time from either aboveground or underground storage tanks, in contrast to the CIPP process which can install in under three hours for small main sewers; Third, CIPP is an important technology because it minimizes environmental impact since the process repurposes the existing pipe structure, thereby reducing air and soil impact from dig and replace methods; Fourth, NASSCO members closely follow Proposition 65 by informing residents and business owners of any potential hazards from the CIPP process; and Fifth, since the Supplemental Guidance document outlines that sewers are a preferential pathway, applying primary responsibility to homeowners for ensuring that their connections to the sewer main meet plumbing standards should be a primary focus.

613	1. Formal/ Official	68	06/15/2020	Sheila	Joy	NASSCO (the National Association of Sewer Service Companies)	68.002	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11a. General Comment s	Attachment 2	First, let's review scientific studies on the topic of VI as it relates to the CIPP process. The Trenchless Technology Center (TTC) at Louisiana Tech University recently completed a two-year study on the safety of CIPP emissions. TTC partnered with the Engineer Research and Development Center (ERDC) of the U.S. Army Corps of Engineers on the study, and the study met strict technical and peer review standards. NASSCO funded the study (full report may be found at www.nassco.org/news/CIPP-study). Air samples collected at CIPP steam cure jobsites were tested for the EPA's Toxic Organics-15 (TO-15) list of VOCs. Based on testing and modeling results, styrene was the only compound of interest found in CIPP jobsite emissions at concentrations that had the potential to pose any health risks. This is important because previous studies had found other VOCs on the TO-15 list in CIPP jobsite emissions, but the health effects of those VOCs had not been determined. TTC made safety recommendations to mitigate the styrene health risks found in two specific locations on CIPP steam cure jobsites (not in buildings). NASSCO embraced theses safety recommendations through an open webinar (available at nassco.org) to the industry and is preparing more comprehensive safety recommendations. Regarding VI into buildings connected to the sewer being rehabilitated, seven samples were collected by the TTC in four buildings during various stages of CIPP installation and cure. Styrene concentrations found in these samples ranged from 0.00 to 0.010 ppm. It was not determined via the study how these trace amounts entered the building and could have likely been sourced from the existing environments (e.g. carpeting material, etc.). These trace amounts are well below the human odor detection level as well as significantly below concentrations that cause any potential health risks. In addition to the comprehensive TTC study, a recently-concluded study conducted by Waterloo University and a NASSCO member company regarding VI concerns in laterals ("Assessment of health risks from fugitive styrene emissions in laterals during the CIPP lining

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											process") will be submitted to the Journal of Hazardous Materials for peer review and publication (see Attachment A for presentation of findings). The study supports previous Toronto University research (see Attachment B) by providing technical data substantiating that VI cannot occur in homes and businesses through sewer connections adhering to plumbing codes with properly installed and functioning P-traps.
614	1. Formal/ Official	68	06/15/2020	Sheila	Joy	NASSCO (the National Association of Sewer Service Companies)	68.003	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11a. General Comment s	Attachment 2	Second, during the CIPP installation process, a resin-impregnated felt tube is installed through a damaged sewer pipe using water or air pressure. Hot water or steam can be used to accelerate the cure of the resin. Curing of the resin can also be initiated though the use of UV light. As the resin cures, it forms a tight-fitting, fully structural replacement pipe that helps prevent vapor and liquid infiltration and exfiltration along the new jointless pipe. In a typical small main sewer CIPP installation, the process from start to finish can be under three hours. This greatly reduces any possibility of long-term vapor intrusion into a home or business that has faulty plumbing and/or does not meet code.
615	1. Formal/ Official	68	06/15/2020	Sheila	Joy	NASSCO (the National Association of Sewer Service Companies)	68.004	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11a. General Comment s	Attachment 2	Third, CIPP is an important technology because it minimizes environmental impact. Since the process repurposes the existing pipe structure, there is no need to dig up and dispose of the old pipe. Plant life is also protected. Since the damaged pipe remains in place and is lined with a new, structurally-sound pipe (typically using existing access points), there is no disruption to earth and plants growing above the underground pipe. Additionally, any permanent structures above the pipe such as sidewalks, driveways, walls and buildings do not need to be disrupted or materials disposed of, further minimizing environmental as well as social impact. The CIPP process greatly reduces the carbon footprint of the project and, in fact, reduces the entire environmental footprint compared to other technologies and construction methods like dig and replace.

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616	1. Formal/ Official	68	06/15/2020	Sheila	Joy	NASSCO (the National Association of Sewer Service Companies)	68.005	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11a. General Comment s	Attachment 2	Fourth, NASSCO members closely follow the California Prop 65 law by notifying the public whenever working in an area. This includes but is not limited to active communication and awareness campaigns including using doorhangers for each home or business that outline any hazards, face-to-face communication, posting signage in neighborhoods prior to and during CIPP installation and providing technical support to home and business owners when they have questions (see Attachment C).

617	1. Formal/ Official	68	06/15/2020	Sheila	Joy	NASSCO (the National Association of Sewer Service Companies)	68.006	11. Attachment 2 – Sewers and Other Vapor Conduits as Preferential Pathways for Vapor Intrusion	11a. General Comments	Attachment 2	Fifth and finally, by design, building and private sewer laterals that meet state plumbing codes prevent sewer gas and other vapor intrusions from entering buildings. As such, regulations beyond enforcing the current state plumbing codes unnecessarily increase costs that further constrain municipal sewer rehabilitation budgets intended to ensure clean drinking water and proper wastewater treatment. In many communities in California and across the United States, sewer laterals are considered private. Some wastewater agencies take ownership of the "lower" sewer lateral (typically in the Right-of-Way (ROW)), but ownership of the "upper lateral" (typically from the ROW to the building), in conjunction with interior plumbing, remains the responsibility of the private property owner. According to the Sacramento Area Sewer District (SASD), "As a property owner, you are responsible for the private sewer pipe serving your property. This 'upper lateral' connects your home to a 'lower lateral' owned by SASD". The State Water Resources Control Board requires public agencies to manage and maintain the public portion of wastewater systems to minimize the likelihood of sanitary sewer overflows. Unfortunately, no similar statewide program exists that requires property owners to regularly clean, inspect, and otherwise maintain the private laterals. Since the Supplemental Guidance document outlines that sewers are a preferential pathway, homeowners have primary responsibility for ensuring that their connections to the sewer main meet plumbing standards. It is our belief that we must work together as an industry to continue to build awareness of this responsibility among homeowners, communicating the importance of keeping their plumbing and lateral sewer systems operational, just as they would be responsible for anything else on their property, such as cleaning a fireplace chimney or replacing batteries in a smoke detector. In conclusion, NASSCO agrees with DTSC that the CIPP process is a remedy to vapor intrusion in sewer mains as well as laterals [page 29 of Supplemental Guidance Document states "Long-term options

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											for mitigating sewer VI can include sewer venting, installing check valves, lining the sewer pipe, or rerouting the sewer pipeline (Wallace et al., 2017)].” However, we do not believe that the CIPP process should be included in the VI governing Guidance for all of the reasons outlined above, including the fact that a functional plumbing system (P-trap) will prevent VI from entering a home or business through sewer connections. CIPP is a closely regulated process that minimizes disruption while providing an environmentally sustainable and cost-effective solution to prevent VI into a home or business. NASSCO would welcome the opportunity to discuss this issue in further detail or answer any questions. NASSCO’s Technical Advisory Council and Health and Safety Committee representatives are standing by to assist.
618	8. Informal: Air District	69	06/19/2020	Judith	Cutino	Bay Area Quality Management (Air District)	69.001	08. Step 4: Concurrent and Future Risk Evaluation and Management Decisions	08b. Step 4A – Need for Risk Management	27-28	The guidance is not clear what criteria will be used to determine appropriate action for projects with cancer risk from 1x10-6 to 1x10-4 and HI < 1 (Step 4, Page 27-28)? The Air District has adopted a Risk Action Level of 10 in a million for cancer risk from toxic emissions at new and existing sources and facilities. The Vapor Intrusion Guidance document appears to allow for remediation and/or mitigation as potential actions when the cancer risk is greater than 1x10-6, but it is not clear under what conditions action will be taken.

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619	8. Informal: Air District	69	06/19/2020	Judith	Cutino	Bay Area Quality Management (Air District)	69.002	08. Step 4: Concurrent and Future Risk Evaluation and Management Decisions	08b. Step 4A – Need for Risk Management	27-28	The Air District is especially concerned about the occurrence of vapor intrusion by vapor forming chemicals in AB617 communities, which have higher levels of air pollutants than average in the Bay Area and vulnerable populations, such as African Americans with health conditions associated with exposure to pollutants. We strongly advise risk management of mitigation and/or remediation at risk action levels for cancer risk above 10 in a million.
620	1. Formal/ Official	70	06/22/2020	Russ	Brown, Mayor of Hemet	City of Hemet	70.001	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	The City of Hemet would like to express its disagreement with the Draft Guidance for screening and evaluating vapor intrusion, by the California Department of Toxic Substances Control and California Water Resources Control Boards. While the guidance is well intended in promoting more thorough oversight of spill sites and disposal of vapor-forming chemicals, the guidelines demand an extensive degree of oversight that would severely burden local regulatory agencies.
621	1. Formal/ Official	70	06/22/2020	Russ	Brown, Mayor of Hemet	City of Hemet	70.002	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	As local governments grapple with the impacts and effects of the COVID-19 pandemic, the recommendations included in the newest version of the guidelines necessitates resources and attention that our localities simply do not possess at this time.
622	1. Formal/ Official	70	06/22/2020	Russ	Brown, Mayor of Hemet	City of Hemet	70.003	04. Introduction	04b. A – Scope and Applicability	vi-vii, 1-2	As the Hemet City Council, we request that the State make more in depth considerations of the impact the proposed guidelines will have on California cities and our state as a whole. While we support protecting our community's air quality, we strive to take a strategic and regional approach on making priorities with limited resources.
623	1. Formal/ Official	71	7/1/2020	Amy	Romano	WSP USA	71.001	04. Introduction	04e. D – Vapor Intrusion Attenuation Factors	vii, 5	Do you know if the agency will be issuing guidance on how to derive site-specific attenuation factors for commercial sites? The guidance does not give much detail on this and my understanding is that the default attenuation factor of 0.03 is based on chlorinated VOC sampling data from residential buildings with slab foundations.

Note – (1) Topic, Section, Page Number(s) are those from the February 2020 Draft Supplemental VI Guidance.