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California Poised to Make Infill Development Harder and More Costly – Again *A look at the past and future of vapor intrusion guidance in California*

By [*Maureen Gorsen*](#) and [*Megan Ault*](#)

When people wonder why California has a housing crisis, why housing is built in the suburbs and exurbs, and why the problem keeps getting worse, they will be able to add California's vapor intrusion guidance to the ever-growing list of reasons.

In February 2020, the California Environmental Protection Agency (CalEPA) released [draft Supplemental Guidance for Screening and Evaluating Vapor Intrusion](#). Following extensive public comment that concluded last summer, a revised Supplemental Guidance is expected in early 2021.

What Work on Vapor Intrusion Work Was Done in 2020?

In February 2020, a CalEPA workgroup consisting of the Department of Toxic Substances Control (DTSC), San Francisco Bay Regional Water Quality Control Board, and State Water Resources Control Board released draft Supplemental Guidance aimed at establishing a uniform, statewide approach for vapor intrusion screening and decisions regarding when and where cleanup and mitigation may be needed.

Various agencies around the state had previously established and applied their own policies, sometimes inconsistent with one another, for evaluating vapor intrusion risks and determining whether those risks warrant further action. The Supplemental Guidance is meant to provide a standard approach that incorporates federal guidance and establishes a consistent process for assessing vapor intrusion risks statewide.

A key area of concern for industry is the **attenuation factor** selected in this guidance.

What Is Vapor Intrusion, Anyway?

Vapor intrusion describes the process by which vapors from chemical contamination in soil and groundwater can migrate into buildings where people live and work. Under certain conditions, toxic chemical vapors from the subsurface surrounding a building can reach indoor air and affect the health of the building's

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occupants. Many complex factors control whether and how much subsurface chemical vapors will affect indoor air. Vapors can migrate into a building through cracks in foundations, as well as sewer lines and utility pipes, and diffusion through the concrete building slab. A region's weather, a building's age and condition, and the operation of HVAC systems can all influence vapor intrusion.

Vapor intrusion can be assessed through a variety of different methods, including soil gas sampling either directly beneath the building slab or deeper using soil vapor probes, subsurface soil sampling, and monitoring of groundwater using wells to evaluate vapors below a building's foundation. Sampling of indoor air can confirm whether and how much of the subsurface chemical vapors have actually made their way inside. However, this methodology can lead to false positives due to the other potential sources of chemicals that may confound the results.

What Does the Supplemental Guidance Do?

In its 44 pages, the Supplemental Guidance establishes a recommended framework for evaluating vapor intrusion, introduces some changed considerations affecting that evaluation, and facilitates improved data collection and future policy developments.

The four-step screening & evaluation process

The Supplemental Guidance sets out a four-step process for vapor intrusion screening and evaluation.

Step One: Under the Supplemental Guidance, the first step in an investigation should prioritize acute and short-term hazard responses in the wake of a spill or other discovery of contamination, followed by evaluation of buildings using a "worst first" approach. Evaluation of buildings nearest to the source and with the greatest concentrations of contamination should be prioritized. Currently occupied buildings should also be given priority, particularly residences and buildings with sensitive receptors such as schools, hospitals, and childcare centers.

In an ordinary case, a site's investigation may proceed to Step Two, evaluation of soil gas data. But certain circumstances may merit immediate acceleration to Step Three, where indoor air sampling begins alongside the screening of other media. Such circumstances would include when a known or suspected release exists directly below a building, when buildings are located near a significantly contaminated groundwater plume, when groundwater lies shallower than five feet below a building, or when buildings are connected to vapor conduits such as sewer lines or electrical pipes that cross through areas of significant contamination. The Supplemental Guidance lays out these examples but indicates that other situations may also warrant immediate advancement to Step Three. With immediate advancement to Step Three, indoor air sampling will occur earlier in the investigation process than it otherwise would under existing guidance.

Step Two: The second step outlined in the Supplemental Guidance provides recommendations for sampling locations and depths for soil gas plume investigation as well as methods for improving sampling plans for current and future buildings. The Supplemental Guidance incorporates, by reference, the sampling methods described in CalEPA's [2015 Active Soil Gas Investigations Advisory](#) but makes specific

recommendations for where and when sampling should occur. The Supplemental Guidance emphasizes the importance of collecting soil gas probe samples at least twice in different seasons and at two different depths at minimum. Based on this sampling, the human health risk from vapor intrusion can be calculated and the next steps for further investigation and risk management can be taken.

Step Three: Step three of the Supplemental Guidance addresses the need for concurrent sampling of multiple media—including indoor air—for a more complete understanding of vapor concentrations and attendant risk. Sampling should be conducted using methods in accordance with CalEPA's existing guidance and be performed at multiple locations and in multiple seasons. The Supplemental Guidance accounts for the effects of HVAC systems by advising that at least one sampling event reoccur with a building's system on and one with the system turned off.

As part of Step Three, sampling indoor air, soil gas, slab soil gas, and outdoor air can be complemented with sampling conduits such as sewers and other pipes as well as radon or other tracer data collection.

Results from this robust sampling will then be used to guide current and future risk evaluation and management decisions as part of Step Four.

Step Four: Step Four guides risk management decisions based on potential harms to both current and future occupants of a property. At the lower end, potential actions range from doing nothing to additional investigation or refined risk assessment. Greater risk may warrant mitigation and remediation, as well as possible temporary relocation of building occupants. Compared with existing procedures, the Supplemental Guidance encourages greater consideration of future exposures using underground vapor concentrations in addition to consideration of current occupants' health risks based on indoor air concentrations.

On the whole, the four-step framework established by the Supplemental Guidance aligns with federal guidance promoting multiple rounds and types of sampling. The processes outlined in the Supplemental Guidance apply a "multiple lines of evidence" approach intended to generate a more comprehensive picture of vapor intrusion risks than the traditional "stepwise" approach that only resorts to indoor air sampling after other media have been analyzed. Along with the U.S. EPA, California is one of a few states leading the shift to a multiple lines of evidence approach, encouraging contemporaneous collection of samples from various media including indoor air. By encouraging California agencies to adopt this process, the Supplemental Guidance may cause indoor sampling to occur earlier in a site's investigation and more often than would occur under other existing approaches.

What is the attenuation factor? And why is it so critical?

A key part of assessing vapor intrusion risk is determining subsurface gas concentrations and predicting the ability of those concentrations to reach indoor air. "Attenuation factors" are ratios used to determine whether a risk to human health exists by estimating the degree to which concentrations of chemical vapors contained in groundwater, soil, or soil vapor are reduced and diluted as they migrate to indoor air. The Supplemental Guidance's recommended attenuation factors constitute its most consequential change.

Historically, agencies have used a variety of attenuation factors based on site-specific conditions evaluated using mathematical analyses such as the Johnson and Ettinger model. The Supplemental Guidance expressly rejects the use of model-derived attenuation factors in initial site screening, saying that the widely accepted previous approach is now “not recommended.”

Instead, the Supplemental Guidance recommends using empirically derived attenuation factors provided by the U.S. EPA in its [2015 Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air](#).

The new attenuation factors are medium-specific, assigned based on sample type:

- For crawl space gas: an attenuation factor of 1
- For subslab soil gas: an attenuation factor of 0.03
- For soil gas: an attenuation factor of 0.03
- For groundwater: an attenuation factor of 0.001

With these extremely conservative attenuation factors—far different from many previously used under existing DTSC and local agency guidance—the new Supplemental Guidance is likely to dramatically increase the number of building sites requiring additional screening and possible remediation.

There is great concern and even alarm about new attenuation factors. First, the new attenuation factors are based on underlying U.S. EPA nationwide data, and many experts do not think these attenuation factors can be properly applied to California. Specifically, only a small portion of the sites evaluated by the U.S. EPA were in California, with the majority of sites found in colder and wetter climates in the Northeast and Midwest. The average building construction date and building type do not necessarily reflect California’s building stock or future developments, including the presence of basements in the majority of the buildings used in the U.S. EPA study. Because vapor intrusion is influenced by weather, building structure, and other site-specific conditions such as geology, experts believe it is erroneous to use these numbers as default attenuation factors in California when they were developed under conditions that vary widely from those that exist in most of California.

A second major concern is that the new attenuation factors do not differentiate between residential and commercial applications. That is, under previous guidance, attenuation factors would be developed based on a building’s anticipated or existing uses—for instance, the 2011 DTSC vapor intrusion guidance recommended a default attenuation factor of 0.001 for commercial buildings and 0.002 for residential buildings. The Supplemental Guidance uses the default attenuation factor of 0.03 for subslab and soil gas concentrations without regard to a building’s structure or use as a residential or commercial facility. The Supplemental Guidance itself acknowledges that the U.S. EPA’s database on which its attenuation factors are based contains few commercial or industrial buildings. This means that the attenuation factor for commercial buildings is far stricter and far less tailored than under existing policies, and the underlying data appears to be short on support for the change.

The Supplemental Guidance does allow for use of alternative approaches supported by “adequate technical and site information,” but this language is vague and may require extra sampling and be subject to additional regulatory scrutiny.

Sewer as a pathway

Based on increasing evidence that sewer lines act as a potential preferential pathway for vapor migration, the Supplemental Guidance emphasizes that soil gas and groundwater sampling alone may fail to capture the full risk involved at a site. The Supplemental Guidance therefore incorporates sewer conduit evaluation into the four-step process for identifying when indoor air testing should occur. Specifically, indoor air sampling should be conducted when there is a known chemical discharge to a sewer or drain, or if sewer conduits intersect or overlie soil or groundwater contamination. Sampling of air inside a sewer should be considered if indoor air testing results cannot be explained through vapor migration in the subsurface soil alone.

California Vapor Intrusion Database

Recent updates to the state’s GeoTracker database will allow collection and analysis of vapor data and building-specific information from sites across California. The Supplemental Guidance indicates that this data will be used to assess whether California-specific attenuation factors can be developed. The database’s reported information could potentially help CalEPA develop attenuation factors specifically tailored to California’s climate and various building types. Reporting of sampling from multiple rounds and multiple locations at a given site is expected to improve upon U.S. EPA data, which typically included only one indoor air sample and one subsurface sample per building. Improved data collection should help better inform future guidance and any forthcoming state regulatory policies or rules.

How Does the Supplemental Guidance Interact with Other Existing Policies?

The Supplemental Guidance does not provide instruction on sampling protocols, how to use mathematical models for site assessment, or methods for cleanup or remediation. Parties are advised to use the Supplemental Guidance alongside the DTSC’s [2011 Vapor Intrusion Guidance](#) and [2011 Vapor Intrusion Mitigation Advisory](#), as well as the SF Bay Regional Water Board’s [2014 Interim Framework](#) and the U.S. EPA’s [2015 Technical Guide](#). If any conflict occurs between the older policies and the Supplemental Guidance, it appears that CalEPA intends for the Supplemental Guidance to take precedence.

The Supplemental Guidance also does not establish cleanup targets—the Supplemental Guidance stresses that goals for any specific project should be worked out with the lead agency involved.

Though the Supplemental Guidance does have some petroleum-specific applications, releases from underground storage tanks (UST) should still be evaluated using the low-threat UST case closure policy adopted as State Water Board’s Resolution 2012-0062 on November 6, 2012.

What Are Some Expected Impacts?

As agency guidance, the Supplemental Guidance is not binding and lacks the force of law. There is risk it may be applied as an underground regulation. And even if not, its influence on agency practices and

policies will be significant. In fact, many real estate developers have reported that some agencies have already implemented the draft Supplemental Guidance's approach, throwing into question the viability of prospective and ongoing projects.

The stated goal of the Supplemental Guidance is to encourage more consistency across the state. Ralph Waldo Emerson may take issue with this rationale as "consistency is the hobgoblin of little minds." Perhaps this guidance may have the desired effect of reducing disparate treatment of similar sites, but creation of a statewide standard threatens to have the effect of formal regulation without the vetting and public input that formal rulemaking procedures require. This lack of transparency is a major cause for concern because of the sheer breadth of the Supplemental Guidance. The adjustment of attenuation factors alone could drastically increase the number of buildings requiring indoor air sampling and additional screening. Having a more sensitive "trigger" mechanism for additional screening means that more properties will require more extensive (and expensive) investigation, slowing down development and making projects less economical. These effects are especially troubling if the attenuation factors are not justified by relevant data.

CalEPA itself has recognized that the Supplemental Guidance may lead to increased screening of project sites and neighboring properties, which will require coordination with owners and occupants for sampling access and communication of results. Of all methods of investigation, indoor air sampling can be especially intrusive and disruptive to property owners and occupants.

Even absent the need for mitigation or remediation, increased demands for rounds and locations of sampling will make projects slower and more costly. As would be expected, these effects threaten to make brownfield redevelopment, affordable housing, and infill projects much more difficult.

How the Supplemental Guidance will affect ongoing and closed investigations remains to be seen. CalEPA recommends that new investigations follow the Supplemental Guidance, while for ongoing cases, agencies are encouraged to address possible sampling deficiencies on a case-by-case basis. For closed cases, agencies may take a second look based on changing land use or referrals to the agency. Some agencies may decide to systematically review their closed cases. CalEPA expects agencies to pay particular attention to sites affected by TCE (trichloroethylene/trichloroethene) contamination.

Some effects of the Supplemental Guidance may themselves be short term: as directly referenced in the Supplemental Guidance document, one of the goals of improving California-specific data collection would be the development of California-specific attenuation factors and possible future agency action in the form of policy or rulemaking.

All of this adds up to even greater uncertainty for would-be project developers and consultants attempting to plan their investigatory approaches for reuse, recycling, and redevelopment of existing sites, pushing them toward greenfields, where the costs and hurdles are lower and more predictable.

What's Next?

The draft Supplemental Guidance has been available for public review since February 14, 2020, and public comment on the draft was collected by the CalEPA workgroup through June 1, 2020. Release of a revised Supplemental Guidance, as well as the workgroup's response to public comments, is expected in **late winter or early spring 2021**.

When available, the revised Supplemental Guidance and the workgroup's responses to comments will be posted on the vapor intrusion web pages of the [DTSC](#) and [State Water Board](#).

In the meantime, interested parties can review the Supplemental Guidance, the workgroup's fact sheet, and informational videos provided on the agency websites. [Seven videos](#) were presented in May 2020 in lieu of public workshops due to the COVID-19 pandemic and provide helpful information to the general public and practitioners alike. During these video presentations, the workgroup again signaled that CalEPA may be moving forward with the development of a formal vapor intrusion regulation or policy.

California's policies tend to forecast the direction other states may be headed. For that reason, developers, consultants, and counsel nationwide tend to keep an eye on how the state's vapor intrusion guidance and possible regulatory action takes shape. Alston & Bird will continue to monitor agency activity to keep you up to date

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If you have any questions or would like additional information, please contact your Alston & Bird attorney or any of the following:

Environment, Land Use & Natural Resources Group

Lee Ann Anand
404.881.4609
leeann.anand@alston.com

Jeffrey Carlin
213.576.1008
jeff.carlin@alston.com

Ronnie Gosselin
404.881.7965
ronnie.gosselin@alston.com

Geoff Rathgeber
404.881.4974
geoff.rathgeber@alston.com

Gina Angiolillo
213.576.2606
gina.angiolillo@alston.com

Nicki Carlsen
213.576.1128
nicki.carlsen@alston.com

Maya Lopez Grasse
213.576.2526
maya.grasse@alston.com

Phil Sandick
202.239.3632
phil.sandick@alston.com

Doug Arnold
404.881.7637
doug.arnold@alston.com

Edward Casey
213.576.1005
ed.casey@alston.com

Kathleen Hill
213.576.1056
kathleen.hill@alston.com

Shannon Vreeland
404.881.7429
shannon.vreeland@alston.com

Megan Ault
415.243.1056
megan.ault@alston.com

Greg Christianson
415.243.1012
greg.christianson@alston.com

Clay Massey
404.881.4969
clay.massey@alston.com

Andrea Warren
213.576.2518
andrea.warren@alston.com

Greg Berlin
213.576.1045
greg.berlin@alston.com

Ha Chung
213.576.1151
ha.chung@alston.com

Kevin Minoli
202.239.3760
kevin.minoli@alston.com

Sara Warren
404.881.7472
sara.warren@alston.com

Caleb Bowers
415.243.1038
caleb.bowers@alston.com

Jeffrey Dintzer
213.576.1063
jeffrey.dintzer@alston.com

Clynton Namuo
213.576.2671
clynton.namuo@alston.com

Matt Wickersham
213.576.1185
matt.wickersham@alston.com

Meaghan Goodwin Boyd
404.881.7245
meaghan.boyd@alston.com

Maureen Gorsen
916.498.3305
maureen.gorsen@alston.com

Elise Paeffgen
202.239.3939
elise.paeffgen@alston.com

Jessica Williams-Vickery
404.881.7167
jessica.williams-vickery@alston.com

ALSTON & BIRD

WWW.ALSTON.COM

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ATLANTA: One Atlantic Center ■ 1201 West Peachtree Street ■ Atlanta, Georgia, USA, 30309-3424 ■ 404.881.7000 ■ Fax: 404.881.7777

BEIJING: Hanwei Plaza West Wing ■ Suite 21B2 ■ No. 7 Guanghua Road ■ Chaoyang District ■ Beijing, 100004 CN ■ +86.10.85927500

BRUSSELS: Level 20 Bastion Tower ■ Place du Champ de Mars ■ B-1050 Brussels, BE ■ +32 2 550 3700 ■ Fax: +32 2 550 3719

CHARLOTTE: One South at The Plaza ■ 101 South Tryon Street ■ Suite 4000 ■ Charlotte, North Carolina, USA, 28280-4000 ■ 704.444.1000 ■ Fax: 704.444.1111

DALLAS: Chase Tower ■ 2200 Ross Avenue ■ Suite 2300 ■ Dallas, Texas, USA, 75201 ■ 214.922.3400 ■ Fax: 214.922.3899

FORT WORTH: 3700 Hulen Street ■ Building 3 ■ Suite 150 ■ Fort Worth, Texas, USA, 76107 ■ 214.922.3400 ■ Fax: 214.922.3899

LONDON: 5th Floor ■ Octagon Point, St. Paul's ■ 5 Cheapside ■ London, EC2V 6AA, UK ■ +44.0.20.3823.2225

LOS ANGELES: 333 South Hope Street ■ 16th Floor ■ Los Angeles, California, USA, 90071-3004 ■ 213.576.1000 ■ Fax: 213.576.1100

NEW YORK: 90 Park Avenue ■ 15th Floor ■ New York, New York, USA, 10016-1387 ■ 212.210.9400 ■ Fax: 212.210.9444

RALEIGH: 555 Fayetteville Street ■ Suite 600 ■ Raleigh, North Carolina, USA, 27601-3034 ■ 919.862.2200 ■ Fax: 919.862.2260

SAN FRANCISCO: 560 Mission Street ■ Suite 2100 ■ San Francisco, California, USA, 94105-0912 ■ 415.243.1000 ■ Fax: 415.243.1001

SILICON VALLEY: 1950 University Avenue ■ Suite 430 ■ East Palo Alto, California, USA 94303 ■ 650.838.2000 ■ Fax: 650.838.2001

WASHINGTON, DC: The Atlantic Building ■ 950 F Street, NW ■ Washington, DC, USA, 20004-1404 ■ 202.239.3300 ■ Fax: 202.239.3333