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VAPOR INTRUSION

SUPERFUND

The Environmental Protection Agency's draft "final" guidance for conducting vapor intrusion evaluations released April 16, 2013, appears to take a significant step toward establishing a comprehensive and consistent approach to vapor intrusion investigations. However, according to the authors of this article, EPA's inclusion of a series of overly conservative assumptions and steps throughout the guidance will exacerbate existing challenges for vapor intrusion investigations and burden property owners, communities, and responsible parties with vapor intrusion studies that may not be warranted. They urge all interested parties to review the guidance thoroughly and provide EPA with comments and insight based on practical experience gained from years of these investigations.

Lawyers' View of EPA's Draft Final Guidance for Vapor Intrusion: Public Comments Are Needed to Advocate for a More Practical Approach

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Introduction

On April 16, 2013, the Environmental Protection Agency's Office of Solid Waste and Emergency Response (OSWER) surprised the regulated community by posting for public comment draft "final"

guidance documents for conducting vapor intrusion evaluations. The two documents are OSWER's *Final Guidance for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Sources to Indoor Air (Guidance)*¹ and the Office of Underground Storage Tank's *Guidance for Addressing Petroleum Vapor In-*

¹ See <http://www.epa.gov/oswer/vaporintrusion/documents/vaporIntrusion-final-guidance-20130411-reviewdraft.pdf>. See also 74 DEN A-3, 4/17/13.

trusion and Leaking Underground Storage Tank Sites.² OSWER recently extended the deadline for submission of comments on both documents to June 24, 2013.³

Statements by EPA personnel in the last year had indicated that the documents would only be issued as “final.” We were among the parties that formally petitioned EPA to release the drafts for public comment.⁴ We are pleased that EPA has taken this step, and we urge all interested parties to review the documents closely and provide comments by the deadline. This article focuses only on the general Guidance.

For this article, we performed an initial review of the Guidance with an eye toward how it addresses or fails to address key challenges that we, as lawyers, have seen arise in vapor intrusion investigations over the last ten years. This article is intended to foster discussion that will lead to the submission of constructive comments in the public process.

Overall, the revised Guidance does a thorough job of incorporating many of the technical nuances, developments, and lessons learned from the last 10 years of investigations. In addition, the Guidance and the associated documents establish a comprehensive framework for evaluating vapor intrusion under the Comprehensive Environmental Response, Compensation, and Liability Act and Resource Conservation and Recovery Act. Once issued as final guidance, this should help make the “rules” for conducting evaluations more consistent, especially among EPA regional offices.

However, in the process of thoroughly addressing technical developments, focused on creating conservative guidelines to address the “variation” inherent in vapor intrusion sampling results, EPA has created an approach that is in many ways impractical. Unless reasonable thresholds and flexibility are incorporated into the Guidance in response to public comment, this approach will pull many more sites into long, detailed, and intrusive vapor intrusion studies, even where there is little to no risk of vapor intrusion.

In addition, this Guidance will exacerbate a significant issue that already confronts building owners, employers, and occupants, as well as responsible parties. Vapor intrusion guidance directs the search for low, common, and otherwise unregulated levels of chemicals that exist in the air, including outdoors, and identifies them as cancer causing or otherwise harmful to people. Further, EPA appears to set the stage in this Guidance, especially in changes that it has consolidated in the draft since the version leaked in November 2012,⁵ for establishing as national EPA policy what certain EPA regions have already concluded, namely that, based on a new Integrated Risk Information System (IRIS) reference concentration, low levels in indoor air of the most common contaminant at superfund sites may justify the evacuation of homes and workplaces. The Guidance does not sufficiently acknowledge and address the broader implications and challenges that will predictably arise from its pursuit of whatever the science may support.

² See <http://www.epa.gov/oust/cat/pvi/petroleum-vapor-intrusion-review-draft-04092013.pdf>. See also 74 DEN A-3, 4/17/13.

³ See 90 DEN A-12, 5/9/13.

⁴ See <http://www.regulations.gov/contentStreamer?objectId=0900006481180708&disposition=attachment&contentType=pdf>.

⁵ See 237 DEN A-13, 12/11/12.

Our initial observations are noted below. Our hope is that in response to public comments, EPA will step back and fully evaluate the real world implications of its current draft and revise the Guidance, by including more flexibility and a more practical approach that is consistent with the science and the uncertainties inherent in it.

Background

“Vapor intrusion is the general term given to migration of hazardous vapors from any subsurface contaminant source, such as contaminated soil or groundwater, through the vadose [unsaturated soils] zone and into indoor air.”⁶ EPA explains that, “vapor intrusion is a potential human exposure pathway—a way that people may come into contact with environmental contaminants while performing their day-to-day indoor activities.”⁷

The concept of vapor intrusion is not new. The pathway is discussed in superfund guidance dating to 1992. The Johnson-Ettinger model has been used to predict vapor intrusion since 1991. In the mid-to-late 1990s vapor intrusion was found to be more significant than expected at certain sites, and it became a consideration in the environmental indicators evaluations conducted under RCRA and CERCLA. With the release of EPA’s draft vapor intrusion guidance in November 2002,⁸ and with the growing number of states that had developed their own guidance or adopted EPA’s approach, vapor intrusion evaluations became more commonplace. There is now a great deal of experience among agencies and the regulated community in conducting vapor intrusion evaluations.

Some of the challenges that we have seen arise in these investigations include:

A. Evaluating the risks associated with the low levels of chemicals detected in breathing air in the course of vapor intrusion investigations.

B. Communicating appropriately about the pathway, detections and the risk.

C. Determining what properties merit vapor intrusion investigation.

D. Gaining access to properties to sample for and/or mitigate vapor intrusion.

E. Determining how much testing is enough, especially in the face of the communication and access issues highlighted above.

F. Needing legal mechanisms to be put in place in conjunction with most vapor mitigation steps.

G. Ever-evolving guidelines and changing rules.

A. Understanding the Risks

Chemicals exist in outdoor ambient air and in the indoor air of homes and workplaces regardless of

⁶ *Final Guidance for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Sources to Indoor Air* (Guidance) at Section 1.1.

⁷ *Id.* at Section 2.0.

⁸ See *OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)* (2002 Draft Guidance), available at <http://www.epa.gov/epawaste/hazard/correctiveaction/eis/vapor/complete.pdf>.

whether the property overlies soil or groundwater contamination. Chemicals in indoor air may originate from chemical-containing products, from outdoor ambient air, and other sources. The vapor intrusion guidance flags as potentially harmful levels of chemicals in the indoor air that are otherwise not regulated or, where they are regulated, are considered acceptable.

Consider for example, the following situations:

1. In the course of a vapor intrusion investigation, trace amounts of chemicals are detected in the indoor breathing air of homes or offices at levels that EPA guidance suggests put people at risk of cancer. In many cases, no further investigation or response will be required by EPA. Why? Because, as EPA acknowledges, chemicals detected in the indoor air often are caused by the cars that stream by on the nearby highway (benzene), or the dry cleaning hanging in the closet (tetrachloroethylene or PCE), or the correction fluid in the desk drawer (trichloroethylene or TCE), *not* by vapors from pollution in the subsurface. Where the chemicals detected in indoor air are determined to be from sources other than vapor intrusion, building owners and occupants are left in the position of having data that indicates that EPA considers their buildings unhealthy, but with no applicable legal standards that require that these conditions be corrected, if that is even possible. The proposed Guidance acknowledges the “background” issue, but EPA seems to have completely abandoned the wariness of the 2002 Draft Guidance about rushing to gather indoor air data where that may be unnecessary for sound decisionmaking related to vapor intrusion. To the contrary, the Guidance repeatedly urges indoor air sampling without any significant threshold considerations. For example, EPA even suggests that indoor air sampling might be helpful in such preliminary stages as determining which buildings should be considered “near” a groundwater plume.⁹ The real world interests of building owners and occupants who cooperate in vapor investigations warrant more thoughtful criteria for determining when sampling of indoor air is appropriate.

2. In the course of a vapor intrusion investigation, a consultant concludes that vapor intrusion is likely occurring; harmful vapors from the subsurface are intruding into a home through cracks in the basement floor. No response may be required. Why? Because the air testing may show that chemical vapor intrusion, which EPA regulates to avoid allowing more than one additional cancer among a million people (1×10^{-6}), is not occurring. Vapors containing radon, according to EPA the second leading cause of lung cancer, are very likely migrating into the home (and many homes, schools, and offices over a broad geographic area) due to regional geology. Vapor intrusion investigations do not typically test for radon. In addition, EPA does not seek to protect people from radon-caused cancers to the degree it seeks to protect people from vapor-intrusion related chemical cancer risks. By its own calculation, EPA’s recommended “action” level for radon (4 pCi/L) is designed to avoid more than seven additional cancers among a thousand people (7×10^{-3}). The draft guidance mentions radon vapor intrusion several times, but nowhere does it highlight the fact that by EPA’s own measures, radon vapor intrusion represents a vastly greater health threat than the chemical vapor intrusion that the

proposed guidance seeks to identify and eliminate. While we understand that OSWER lacks authority to require investigation and mitigation of naturally occurring radon, it seems inappropriate for EPA to issue such a comprehensive guidance on the vapor intrusion pathway and to not more directly address what EPA has identified as the far greater human health risk posed by radon vapor intrusion.

3. The average TCE concentration in a workplace’s breathing air is 500,000 $\mu\text{g}/\text{m}^3$. No response may be required by EPA. Why? Though EPA now calculates that workers are exposed to unacceptable cancer risks at levels above $3 \mu\text{g}/\text{m}^3$ over years of exposure — and some EPA regions have concluded that developing fetuses are at risk of heart malformations if pregnant women are exposed above $5 \mu\text{g}/\text{m}^3$ for even 24 hours **and would evacuate workers from workplaces at $15 \mu\text{g}/\text{m}^3$** — TCE is used in this workplace, and workers have access to a Material Safety Data Sheet explaining its risks under OSHA rules. In the 2002 Draft Guidance, EPA acknowledged and discussed the overlap of OSHA limits and standards and EPA’s vapor intrusion screening levels. In the current proposed Guidance, EPA simply asserts jurisdiction over indoor air quality in workplaces to the extent air quality is affected by subsurface contamination, without addressing the challenges employers and employees face now that EPA has declared “safe” levels far lower than OSHA permissible exposure limits. At minimum, the Guidance should acknowledge the OSHA standards expressly and provide some guidance on how the discrepancies can be understood by employers and employees.

As noted above, a potentially significant underlying issue to be considered in review of the Guidance is the recent move by certain EPA regions to impose short-term, noncancer risk-based action levels for TCE, orders of magnitude lower than the ATSDR numbers that had been used previously in vapor intrusion investigations, to evaluate short term risks. In fact, there are significant signs in the Guidance that OSWER is moving toward the approaches taken by these regions. For example, a subsection that was added to the draft since November 2012, Section 7.5.2, consolidates a framework for the adoption of “health protective concentration levels” based on noncancer endpoints over short exposure durations. Another example added since November is an additional bullet in Section 8.2.1, identifying “evacuation, which may include temporary relocation,” as a potential temporary measure for existing buildings. The implications of implementing these low action levels for TCE are far reaching and could potentially lead to the raising of significant fear and disruption in homes and workplaces that may have low levels of TCE in indoor air. EPA’s approach seems to be to compound the most conservative assumptions one on top of another without building into the Guidance the flexibility that may be justified by the weaknesses of the underlying science or the potentially disruptive nature of this course for people and businesses. We would urge EPA to consider that at some point following the most conservative path that can be supported leads to an unreasonable result and may be a disservice to those the agency seeks to protect.

⁹ See Guidance at Section 6.2.1.

B. Communicating about the Pathway, Detections, and Risk

Throughout the Guidance, EPA stresses the need for effective communications related to vapor intrusion investigations with parties affected by investigations. However, because of some of the issues raised above, and inherent sensitivity of building occupants regarding the quality of the air they breathe, communications about vapor intrusion investigations are difficult. To substantively assist the parties that will need to communicate, as well as the parties affected by the investigations and results, we urge that EPA develop as part of this Guidance a list of the most difficult issues and questions that it knows will arise, and the best responses that EPA has at this point to them. These would include, for example, “Why are OSHA permissible exposure limits orders of magnitude higher than levels that EPA considers unhealthy over the short and long term?” “What do I do if the ambient outdoor air in my community exceeds levels that EPA has identified as an unacceptable cancer risk?” We hope that a rigorous review of these difficult questions might lead EPA to seek a better balance in the substantive requirements of the Guidance. In any event, offering answers to such questions would provide a better basis for the open communications and trust that EPA acknowledges in the Guidance are so crucial to these investigations.

In its current form, though, the Guidance likely overstates the threat to public health that chemical vapor intrusion represents. For example, without a supporting citation, the Guidance broadly states, “Vapor intrusion is widely recognized as a potentially significant cause of human exposure to ‘volatile’ (i.e., vapor-forming) hazardous chemicals in indoor air.” Overstatement of the problem in the relevant guidance is not a good basis for effective communications later.

Within the recommended sampling protocols (e.g., in Section 6.3.3), the Guidance calls for steps, for example, turning the heating, ventilation, and air conditioning (HVAC) systems off during sampling, that artificially heighten the potential that chemicals will be detected at levels that EPA deems unacceptable. Building owners who cooperate and bear the inconvenience of having their HVAC systems turned off during sampling may end up having their buildings unnecessarily stigmatized (and potentially burdened with long term “mitigation”) where sampling under typical building occupancy conditions, such as with the HVAC on, would indicate that the indoor air meets the EPA standards.

C. Determining the Sites and Properties to Investigate

The Guidance sets very broad criteria for determining what sites and buildings need detailed vapor intrusion evaluations and will encompass sites that pose little to no vapor intrusion risk. Section 3 of the Guidance contains a flow diagram for the process to determine if a detailed vapor intrusion investigation is warranted. Under the Guidance, all that is needed to require a detailed vapor intrusion investigation is information that indicates a potential for vapor forming chemicals to be present in the subsurface and the actual

or potential future presence of buildings nearby.¹⁰ Once this line is crossed, “multiple lines of evidence” are required to support a decision that no further assessment or response action is necessary.

Similarly, Section 6 of the Guidance EPA calls for “site specific” determinations of whether existing and potential future buildings are “near” sources of volatile contaminants, such as groundwater plumes. The often-used delineation guideline of 100 feet vertically or horizontally from the source is acknowledged, but is not adopted. By eliminating even presumed bright lines in favor of layers of site specific data, EPA will make it very difficult for parties to quickly screen out any properties or buildings where there is little to no risk of vapor intrusion.

In addition, for defining the boundaries of plumes that would be used to delineate the scope of the “source area,” the Guidance at Section 6.2.1 recommends use of the values generated in the Vapor Intrusion Screening Level calculator. By way of example, through this approach a TCE plume source area would be delineated by the concentration of 1.1 µg/L, below even the maximum contaminant level for TCE in drinking water of 5 µg/L. Consider that the MCL defines the level of TCE that would be permitted to be delivered to the shower heads and other faucets within the home over a lifetime. Use of 1.1 µg/L is extremely conservative, and it will expand areas of investigation greatly — well beyond levels that, in our experience, are warranted.

The Guidance’s recommendation in Section 6.2.2 of phasing of an investigation from the highest levels of source contamination outward is a good one, which we have seen serve as a reasonable and efficient means to set a reasonable scope for the investigation (as well as limiting the number of building owners and occupants that need to be disrupted by indoor air sampling). But even in the discussion of phasing, the Guidance emphasizes potential for variability. “Therefore, it may be difficult to identify *a priori* a ‘representative’ or ‘reasonable worst case’ building or group of buildings, when it is determined that sampling all buildings is not possible.” This mindset in the Guidance that more data gathering is always better, even in the face of a reasonable basis to determine that vapor intrusion is not occurring or is a very low risk, may undermine reasonable decision making in the field.

The Guidance is also very quick to declare a “complete” vapor intrusion pathway. In Section 2.0, EPA states that the vapor intrusion pathway is complete if: 1) a source of hazardous vapors is present in the soil or groundwater underneath or near a building; 2) vapors form and have a pathway along which to migrate toward the building; 3) entry routes exist for vapors to enter the building, and driving forces exist to draw the vapors into the buildings. Note that by this definition the pathway is deemed “complete” even if hazardous vapors have *not* migrated into the building and even if the building, or an area within the building into which the vapors may migrate, is not occupied. This approach appears at odds with the recently issued EPA guidance for *Assessing Protectiveness at Sites for Vapor Intrusion, Supplement to the “Comprehensive Five-Year Review Guidance”* OSWER Directive 9200.2-84 (Five-Year Re-

¹⁰ *Id.* at Section 3.2, Figure 3-1.

view Guidance)¹¹ which states in the Overview, “having a complete vapor intrusion pathway means that humans are exposed to vapor originating from site contamination.” At minimum, the conflicting guidance should be reconciled on this important determination, and we urge in favor of requiring all of the elements of a complete exposure pathway.

Worth noting in this discussion of the scope of the vapor inclusion area is that EPA includes a recommendation in Section 1.3 that the Guidance be used at “brownfield properties.” In Section 5, the Guidance includes a recommendation for the gathering and consideration of information similar to that which would be gathered and reviewed as part of an environmental site assessment for the purposes of satisfying all appropriate inquiries under CERCLA and ASTM International’s E 1527-05 *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*. It is unclear what EPA intends by this “recommendation” of the application of the Guidance to brownfield sites (perhaps only for EPA brownfield grantees?) and whether it believes that it has identified the information and analysis that would be expected to satisfy all appropriate inquiries as to sources of potential vapor intrusion. Assuming this is not EPA’s intent, we would urge that it say so in the revised Guidance. Already, there is significant concern and confusion about how vapor intrusion should be considered or accounted for in the performance of Phase I property assessments.

Finally, the implications of EPA’s intended application of this Guidance in the process of determining which sites qualify for the National Priorities List needs to be considered now. The expectation is that the Hazard Ranking System will be amended in the near future to require consideration of vapor intrusion exposures. It was clear in the November 2012 leaked draft that EPA intends to use the Guidance in the hazard ranking process. Given the conservative approach taken by the Guidance to identify areas subject to detailed vapor intrusion studies, many additional sites may qualify for the National Properties List when that process is finally amended.

D. Gaining Access to Properties to Sample for and/or Mitigate Vapor Intrusion

A very practical problem with many vapor intrusion investigations is gaining access to the indoor spaces to conduct sampling. Even where a responsible party owns and operates a building, it can be disruptive to that party’s employees to confront a sampling device in their immediate work areas. For locations where the responsible party no longer owns the site, or where the contamination has migrated in the groundwater plume off-site, access challenges for conducting sampling and taking any mitigative steps are compounded greatly. In our experience, access negotiations can be challenging and delay investigations. Access is very often denied by building owners who fear the stigma on their property and disruption to their business or daily activities. Owners may not permit HVAC systems to be turned off, but the Guidance has a strong preference for sampling under these conditions.

¹¹ See http://www.epa.gov/superfund/cleanup/postconstruction/pdfs/VI_FYR_Guidance-Final-11-14-12.pdf.

The Guidance calls for the EPA to consider the characteristics of the populations potentially exposed to vapor-forming chemicals in the indoor air of nonresidential buildings, including whether “minority, low-income, or indigenous populations are or may be present under current conditions who may experience disproportionate impacts.”¹² The Guidance does not explain how this information would be used to make decisions about access, sampling or mitigation.

Overall, the lack of thresholds for screening properties out of the detailed investigation process, the Guidance’s repeated emphasis on obtaining indoor air and sub-slab data at multiple locations at each building and across sites, requirements for repeated rounds of sampling, the direction to take samples with HVAC systems off, the framework for potentially requiring immediate and potentially disruptive actions upon receipt of sample results, and other aspects of the new Guidance will likely compound the already difficult problem of gaining access. EPA notes its authority to order access in footnote 8 of the Guidance, but in our experience EPA is reluctant to order individuals to grant access. Gaining access and implementing mitigation of buildings owned by others can be significant challenges that are not reflected in EPA’s overall approach, and warrant additional discussion in the Guidance.

E. Determining How Much Testing is Sufficient

EPA’s emphasis on the variability of results over space, time, and building use leads to a process that will be very difficult to ever complete.

More flexibility and common sense approaches are needed in the Guidance. Regulators and the regulated community should have the ability to assess the actual risk presented by the actual conditions at the site and reasonably anticipated future uses to determine if, and to what extent, vapor intrusion should be investigated. For example, the Guidance should acknowledge that judgments often can be made based upon existing soil and groundwater data, depth to groundwater, site geology, etc. without a full blown study of soil gas, and indoor air samples taken on multiple occasions and multiple sample locations. In addition, the guidance should acknowledge that in some instances, a single round of samples may be enough to conclude that vapor intrusion is unlikely and that no further action is warranted.

The Guidance, along with the separate Five-Year Review Guidance, creates a significant potential for five-year review processes to generate the reopening of the remedies for many sites.

Under the Five-Year Review Guidance if *new information* raises the potential for a complete vapor pathway, the five-year review process may offer an appropriate opportunity to identify issues, review data, make recommendations, and develop a protectiveness determination for vapor intrusion. The Five-Year Review Guidance also indicates that to determine if the exposure assumptions, toxicity data, cleanup levels, and Remedial Action Objectives used at the time of the remedy selection are still valid, an evaluation of available data and *the collection of additional data* should be undertaken. Given the focus in the Guidance to collect mul-

¹² See Guidance Section 4.0.

multiple samples from multiple locations and to develop multiple lines of evidence, it may be unlikely that any site will have sufficient data to develop a protectiveness determination for vapor intrusion during its five-year review. It is difficult to estimate the number of closed sites that may become subject to the requirement to conduct a comprehensive vapor intrusion investigation under the Guidance. Also, there may be conflict with state programs, since many state programs allow that once a site receives a “no further action” determination the site is closed and unlikely to be reopened.

F. Ability to Put Legal Constraints in Place

The Guidance notes that institutional controls such as legal covenants and restrictions will be required where mechanisms are employed to mitigate vapor intrusion.¹³ The Guidance includes detailed criteria for continued operation and maintenance of engineered controls that may go on for years. Likewise, the Guidance’s insistence on sampling with HVAC systems off and the presumed need for engineered controls to address these unrealistic conditions will increase the likelihood that legal mechanisms will be needed. Where the responsible party owns the property at issue, mitigation and an accompanying legal restriction or covenant can be an efficient and effective approach to eliminate concern about vapor intrusion. However, in many instances properties at issue are not owned by the responsible party, and that party will have no ability as a legal matter to put the covenant or restriction that the agency requires in place.

G. Ever-Changing and Conflicting Guidelines

The relevant vapor intrusion guidance and the toxicity values of key vapor intrusion chemicals have changed dramatically over the last 10 years. At one site, we have completed a vapor intrusion evaluation three times using different evaluation methods and toxicity values. The evaluation methods were: 1) comparing groundwater values to agency groundwater-to-indoor air screening levels; 2) evaluation of groundwater-to-indoor air screening values and soil gas sampling; and 3) evaluation of groundwater, soil gas and indoor air sampling. Each evaluation, when it was concluded, received the relevant agency approvals. Even while indi-

¹³ See Guidance, especially Section 8.6.

vidual vapor intrusion studies were proceeding, regulatory agencies have altered their guidelines and action levels in those studies.

The Guidance offers a detailed and comprehensive approach that should provide more consistency and therefore certainty for responsible parties and others with a stake in their investigations. This is needed not only in the context of RCRA and CERCLA projects, but in evaluating properties for transaction and other purposes.

Conclusion

The new Guidance appears to take a significant step toward establishing a comprehensive and consistent approach to vapor intrusion investigations. However, EPA’s inclusion of a series of overly conservative assumptions and steps throughout the Guidance will exacerbate existing challenges for vapor intrusion investigations and burden property owners, communities, and responsible parties with vapor intrusion studies that may not be warranted and may cause unnecessary alarm. Commenters are urged to review the Guidance thoroughly and provide EPA with comments and insight based on the substantial practical experience gained from years of these investigations, with the goal of urging EPA to generate a more balanced approach.

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