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Symposium:
Continuing to Fight Today's
Environmental Challenges: Climate
Change, Health Concerns, Energy,
and Food Supply
Articles

VAPOR INTRUSION UNDER JUDICIAL
SCRUTINY: A LOOK AT EXPERT TESTIMONY
IN RECENT OPINIONS

Matthew Cohn & Elizabeth Austermuehle*

I. INTRODUCTION

Vapor intrusion is the general term given to the migration of hazardous vapors from contaminated groundwater or soil into an overlying building or structure.¹ Exposure to these hazardous vapors by building occupants can pose health and environmental risks.² Therefore, vapor intrusion assessments are now a routine part of environmental contamination investigations that concern volatile organic compounds

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¹ See Office of Solid Waste and Emergency Response, *OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air*, U.S. ENVTL. PROTECTION AGENCY (June 2015), https://www.epa.gov/sites/production/files/2015-09/documents/oswer-vapor-intrusion-technical_guide-final.pdf [<https://perma.cc/ZCP9-RKF7>] [hereinafter *OSWER*] (explaining vapor intrusion as the general term given to the migration of hazardous vapors from any subsurface vapor source).

² See *id.* at xii (claiming concentrations of chemical vapors arising from a vapor intrusion pathway may pose health risks).

such as chlorinated solvents and petroleum compounds.³ Attorneys, scientists, engineers, and other professionals whose work concerns contaminated properties know how rapidly the science, technology, and law of vapor intrusion are evolving. At the federal and state level, there are many new and changing guidance documents, policies, rules, and regulations.

Vapor intrusion is now a topic that gets litigated. This Article analyzes what some of the environmental experts are saying about vapor intrusion when they are under the scrutiny of discovery and litigation, how the courts are reacting, and what we can all learn.⁴ While vapor intrusion experts do not exclusively rely on the guidance and rules from the United States Environmental Protection Agency (“U.S. EPA”) and state environmental agencies, the federal and state agencies’ directives are relevant considerations.⁵ Therefore, a brief summary of recent vapor intrusion developments at the U.S. EPA and some state environmental agencies is also provided.⁶ Part II provides a background on vapor intrusion.⁷ Part III analyzes the guidance afforded by the U.S. EPA and how environmental experts should approach environmental contamination.⁸ Part IV then summarizes the issues surrounding environmental contamination and how courts and litigants should address this growing concern.⁹

II. BACKGROUND

Vapor intrusion is the general term given to the migration of hazardous vapors into an overlying building or structure.¹⁰ Common volatile organic compounds associated with most vapor intrusion sites are chlorinated solvents, including tetrachloroethylene (“PCE”), trichloroethylene (“TCE”), trichloroethane (“TCA”), and their related

³ See *id.* at 2 (discussing an increasing awareness that anthropogenic chemicals in the ground and water may pose a threat to the air quality).

⁴ See *infra* Part III.B (summarizing case law addressing expert testimony in vapor intrusion litigation).

⁵ See *infra* Part II.B–C (detailing the U.S. Environmental Protection Agency’s (“EPA”) technical guide for assessing and mitigating vapor intrusion and summarizing state laws and regulations regarding vapor intrusion remediation).

⁶ See *infra* Part II.B–C (summarizing vapor intrusion developments).

⁷ See *infra* Part II (providing a background on vapor intrusion).

⁸ See *infra* Part III (discussing the guidance afforded by the U.S. EPA).

⁹ See *infra* Part IV (summarizing the lessons afforded by the existing case law that addresses expert testimony in vapor intrusion litigation).

¹⁰ See *Vapor Intrusion Overview*, ENVTL. PROTECTION AGENCY, https://clu-in.org/issues/default.focus/sec/Vapor_Intrusion/cat/Overview/ [<https://perma.cc/498J-KY6P>] (providing a general definition of vapor intrusion).

degradation products, and petroleum compounds.¹¹ When groundwater or soil is contaminated with a volatile organic compound, the compound can vaporize and migrate into overlying structures.¹² The vapors are able to enter overlying structures in many different ways, including through cracks in the foundation of the building, cracks in the floors or walls of a basement, utility lines, drain lines, and sewers.¹³ All types of buildings, regardless of foundation type, including single-family homes, trailer or mobile homes, multi-unit apartments and condominiums, office buildings, retail establishments, schools, gymnasiums, and industrial facilities, are potentially vulnerable to vapor intrusion.¹⁴

People living, working, or otherwise using buildings that have underlying contaminated soil or groundwater may therefore come into contact with volatile organic compounds through vapor intrusion.¹⁵ This can result in adverse health effects, which vary depending on the type and degree of contamination at issue.¹⁶ Accordingly, vapor intrusion assessments are now a routine part of all environmental contamination investigations that concern volatile organic compounds.

However, vapor intrusion as an exposure pathway is a more recently developed concept and generally involves a more complex analysis when compared to other exposure pathways, such as physical contact or ingestion.¹⁷ That is, while physical contact or ingestion involves a relatively straightforward analysis (i.e., did the individual touch or consume the contaminant?), exposure to a contaminant via vapor inhalation can be affected by numerous factors.¹⁸ Volatile organic compound levels in a structure are affected by the air flow in and out of a building, which can vary based on the building's ventilation.¹⁹ Both natural ventilation, such as open windows or doors, and mechanical ventilation, such as fans, or heating and cooling systems, impact the level of volatile organic compounds present in a building through vapor

¹¹ See Larry Schnapf, *Vapor Intrusion Basics*, 22 PRAC. REAL EST. LAW. 17, 28 (2006) (providing a list of the principal contaminants of concern).

¹² See *id.* at 21 (explaining how vapors can move through pore spaces to infiltrate buildings).

¹³ See *id.* at 20 (providing that vapors can be introduced into buildings through the foundation or subsurface walls of buildings).

¹⁴ See *id.* (discussing how vapors can enter buildings regardless of foundation type).

¹⁵ See OSWER, *supra* note 1, at 19 (noting people may encounter hazardous vapors while performing day to day activities).

¹⁶ See *id.* at xviii (stating human health risks and adverse health effects are a consideration when evaluating a potential vapor intrusion site).

¹⁷ See *id.* at 19 (discussing exposure pathways for vapor intrusion).

¹⁸ See *id.* at 34 (observing that indoor air in buildings often contains vapor-forming chemicals whether or not the building overlies a subsurface source of vapors).

¹⁹ See *id.* at 30 (explaining air exchange in buildings).

intrusion.²⁰ Moreover, volatile organic compounds may be present in a building independently of vapor intrusion.²¹ Consumer products, including cleaners, air fresheners, or insect repellents, for example, may release volatile organic compounds similar to those that are commonly found in vapor intrusion scenarios.²² Similarly, volatile chemicals may enter a building due to releases from nearby industrial facilities, vehicles, yard maintenance equipment, or paint.²³ These “background” or “ambient” volatile chemicals complicate the analysis associated with vapor intrusion.²⁴ Therefore, as discussed with the U.S. EPA’s guidance and the cases below, it is imperative that experts providing their opinions on vapor intrusion matters use good science and provide good professional judgment when doing so. First, Part II.A discusses vapor intrusion litigation in U.S. history.²⁵ Then, Part II.B examines the new guidance provided by the U.S. EPA. Specifically, Part II.B.1 demonstrates how the new process under the U.S. EPA should be familiar to those involved in the investigation and remediation of contaminated properties. Part II.B.2 establishes that the process provided by the U.S. EPA is simply guidance, not a mandate.²⁶ Part II.C then explains that the states may have their own vapor intrusion regulations.²⁷

A. Vapor Intrusion Litigation in the Past

In the past ten or so years, vapor intrusion litigation has become a rapidly growing area of focus in environmental litigation.²⁸ With the U.S. EPA recently issuing technical guidance on vapor intrusion and some state environmental protection agencies also issuing guidance and regulations, the regulatory agencies are showing they expect vapor

²⁰ See *id.* (articulating air exchange may mitigate the effects of vapor intrusion or introduce ambient vapors into buildings).

²¹ See OSWER, *supra* note 1, at 34 (reviewing indoor and outdoor sources of volatile organic compounds).

²² See *id.* (listing various sources of indoor volatile organic compounds).

²³ See *id.*

²⁴ See *id.* at 189 (defining ambient air and background sources of contaminants).

²⁵ See *infra* Part II.A (reflecting on the history of toxic fume and vapor intrusion litigation).

²⁶ See *infra* Part II.B (examining the new guidance on vapor intrusion issued by the U.S. EPA).

²⁷ See *infra* Part II.C (summarizing various state law approaches to assessing and remediating vapor intrusion risks).

²⁸ See, e.g., Michael J. Hecker et al., *Vapor Intrusion Regulatory and Litigation Continues to Grow*, HODGSON RUSS LLP (Apr. 8, 2011), <http://www.lexology.com/library/detail.aspx?g=7e2907b8-7200-420f-8bc7-6f9d4c543924> [https://perma.cc/DRY9-5CU7] (discussing the increased frequency of vapor intrusion litigation).

intrusion to be addressed at contamination sites.²⁹ While these guidance documents are extensive in their content and detail, they essentially memorialize what has become the policy and practice for many years at federal, state, and even unsupervised, contamination sites. Indeed, vapor intrusion is not a new environmental concern.³⁰ It has been recognized for years that volatile organic compounds, such as chlorinated solvents and petroleum compounds, present in the soil and groundwater beneath homes and buildings, can enter the indoor air by migrating as a vapor through openings such as cracks, seams, gaps, utility conduits, and sump pits.

Indeed, even before the term “vapor intrusion” was coined, tort cases concerning toxic fumes, both from underground sources and other sources like nearby factories were litigated.³¹ For example, in *Collins v. Armour & Co.*, a plaintiff brought a Workmen’s Compensation Act claim in 1942 in Louisiana state court.³² The plaintiff suffered severe injuries after he was required to work in close proximity to (and even inside) a sump tank that released noxious fumes.³³ After reviewing medical evidence showing that inhalation of either sewer or ammonia gas from the tank caused his injuries, the Louisiana appellate court awarded damages to the plaintiff.³⁴ While air quality standards have become much more stringent and the medical science regarding inhalation of toxic fumes has developed since 1942, this case demonstrates that injury resulting from inhalation of fumes or vapors as a basis for litigation is nothing new. Similarly, in *Strzelczyk v. Marki*, the plaintiff, a tenant in an apartment building, brought a nuisance claim against the plaintiff’s landlord.³⁵ The plaintiff alleged that a sump-type sewer, negligently maintained below the plaintiff’s bedroom, emitted noxious and toxic gases that the plaintiff inhaled, resulting in sickness and injury.³⁶ While the court dismissed the complaint on statute of limitations grounds, this case is another example of how plaintiffs have been suing over toxic fume inhalation for decades.³⁷

²⁹ See *infra* Part II.B-C (describing the recently published U.S. EPA technical guide regarding assessment and mitigation of vapor intrusion risks).

³⁰ See *infra* Part II.A (examining toxic fume and vapor intrusion litigation).

³¹ See *Collins v. Armour & Co.*, 11 So. 2d 621, 621 (La. Ct. App. 1942) (exemplifying a case concerning injuries caused by toxic fumes brought pursuant to the Workmen’s Compensation Act).

³² See *id.* (noting the plaintiff filed a Workmen’s Compensation Act claim).

³³ See *id.* at 621-22 (stating the plaintiff suffered injuries after inhaling ammonia gas).

³⁴ See *id.* at 623-24 (holding the inhalation of poison gas caused the plaintiff’s injuries).

³⁵ See 337 P.2d 846, 847 (Cal. Ct. App. 1959) (summarizing the plaintiff’s allegations against his landlord regarding injury caused by inhalation of toxic fumes).

³⁶ See *id.* (discussing noxious gasses entering the plaintiff’s bedroom).

³⁷ See *id.* at 848 (dismissing the plaintiff’s complaint on statute of limitations grounds).

More recent cases have also focused on toxic fume inhalation. In *Snyder v. Jessie*, the plaintiffs sued their neighbor pursuant to New York state statutes and common law trespass, after the neighbor's underground petroleum tank leaked, resulting in the plaintiffs' home being contaminated and their health impaired by the toxic fumes.³⁸ In *Bruni v. Exxon Corp.*, plaintiffs filed a class action lawsuit against Exxon Corporation and a gas station owner, alleging that gasoline leaked from the gas station, migrated through telephone vaults and various other underground structures, then fumes from the migrating gasoline entered the basements of approximately 300 residential dwelling units in the area.³⁹ In this class action, the plaintiffs sought damages for sickness, discomfort, emotional distress, trespass, and substantial interference with the private use and enjoyment of their property, as a result of their exposure to the gasoline fumes.⁴⁰ Like in the vapor intrusion cases discussed below, both the plaintiffs and defendants offered expert testimony regarding the source, flow pattern, and causation of the gasoline fumes in the plaintiffs' homes.⁴¹ Again, while the court and the parties to this case did not have the benefit of the environmental agencies' guidance, or years of legal precedent, this case nonetheless provides another example of how litigants have been shaping the development of vapor intrusion litigation for many years.

B. The U.S. EPA's New Guidance

In June of 2015, the U.S. EPA's Office of Solid Waste Management and Emergency Response issued its 268 page *Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air*.⁴² At the same time, the U.S. EPA also issued its complimenting 129 page *Technical Guide for Addressing Petroleum Vapor Intrusion at Leaking Underground Storage Tank Sites*.⁴³ These two technical guides superseded

³⁸ See 164 A.D.2d 405, 407 (N.Y. App. Div. 1990) (summarizing the plaintiffs' allegations regarding injury caused by inhalation of toxic fumes).

³⁹ See 52 Pa. D. & C.4th 484, 486-87 (Com. Pl. 2001) (describing the allegations in the plaintiffs' class action component).

⁴⁰ See *id.* (explaining the plaintiffs sought damages for injuries caused by exposure to toxic fumes).

⁴¹ See *id.* at 491-92 (describing the expert testimony offered by the parties).

⁴² See OSWER, *supra* note 1, at i (providing the U.S. EPA's technical guide regarding vapor intrusion).

⁴³ See Office of Underground Storage Tanks, *Technical Guide for Addressing Petroleum Vapor Intrusion at Leaking Underground Storage Tank Sites*, U.S. ENVTL. PROTECTION AGENCY (June 2015), <https://www.epa.gov/sites/production/files/2015-06/documents/pvi-guide-final-6-10-15.pdf> [<https://perma.cc/6EV8-TGUZ>] (providing the U.S. EPA's technical guide regarding underground storage tanks).

the U.S. EPA's prior draft guidance on vapor intrusion, which was released in November of 2002.⁴⁴

1. The Process in the New Guidance is Familiar

The new guidance first recognizes that the U.S. EPA and authorized state agencies have authority under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 ("CERCLA") and Resource Conservation and Recovery Act ("RCRA") to require that vapor intrusion risks be investigated, mitigated, and remediated.⁴⁵ That authority includes obtaining access to private property and taking early action to address urgent threats to health and welfare.⁴⁶ The guidance then details a methodical process for addressing vapor intrusion concerns that should be familiar to all who have been involved with the investigation and remediation of contaminated properties in any context.

The *investigation process* is familiar.⁴⁷ Environmental investigators collect soil, groundwater, and soil gas samples.⁴⁸ Indoor air samples can also be collected, but the indoor air data must be analyzed with an awareness that substances used inside homes and buildings can sometimes be the same as those found in the subsurface plumes originating from industrial operations.⁴⁹

The *risk assessment process* is also familiar.⁵⁰ Measured concentrations of contaminants in environmental samples collected during the

⁴⁴ See OSWER, *supra* note 1, at 6 (explaining how the newly published technical guides supersede the U.S. EPA's prior draft guidance regarding vapor intrusion).

⁴⁵ See 42 U.S.C. §§ 9601(8), (24) (2012) (codifying the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA")); § 6901(c) (codifying the Resource Conservation and Recovery Act ("RCRA")); OSWER, *supra* note 1, at 3–4 (describing the U.S. EPA's authority to investigate, mitigate, and remediate vapor intrusion risks pursuant to CERCLA and the RCRA).

⁴⁶ See OSWER, *supra* note 1, at 4 (noting the authority of the U.S. EPA to access private property to investigate and perform response actions and to take early action to mitigate risks to human health).

⁴⁷ See, e.g., ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL INVESTIGATIONS STANDARD OPERATING PROCEDURES AND QUALITY ASSURANCE MANUAL 2-1 (2001) (detailing the U.S. EPA Region 4's guidance regarding environmental investigations).

⁴⁸ See OSWER, *supra* note 1, at 87 ("Sampling of indoor air, outdoor air, soil gas, and groundwater and analysis for vapor-forming chemicals can play an important role in vapor intrusion investigations.").

⁴⁹ See *id.* at 88 (noting that a "potential shortcoming of indoor air testing is that indoor sources and outdoor sources unrelated to subsurface contamination and to releases from the subject site . . . may contribute to the presence of volatile chemicals in occupied buildings").

⁵⁰ See, e.g., *About Risk Assessment*, U.S. ENVTL. PROTECTION AGENCY (May 2016), <https://www.epa.gov/ris/about-risk-assessment> [<https://perma.cc/8M5X-CHVB>] (explaining that the U.S. EPA uses risk assessments to characterize the nature and magnitude

investigation are compared to risk-based cleanup objectives.⁵¹ To assist with the calculations and data analysis, the U.S. EPA has posted on its webpage a *Vapor Intrusion Screening Level Calculator* spreadsheet in which chemical and site-specific data can be entered to calculate the cleanup objectives.⁵²

Finally, the *response actions* are familiar.⁵³ Remediation and building mitigation is performed with the focus being on long-term and not short-term solutions.⁵⁴ The U.S. EPA's guidance explains that "[t]he preferred long-term response to the intrusion of vapors into buildings is to eliminate or substantially reduce the level of contamination in the subsurface vapor source (e.g., groundwater, subsurface soil, sewer lines) by vapor-forming chemicals to acceptable-risk levels, thereby achieving a permanent remedy."⁵⁵ Remediation techniques include excavating contaminated soil, pumping and treating contaminated groundwater, decontaminating and rehabilitating sewer lines, and implementing in-situ treatment technologies, such as soil vapor extraction, dual phase extraction, bioremediation, and natural attenuation.⁵⁶ Building mitigation, such as the installation of a sub-slab depressurization system, is viewed as an interim or temporary fix.⁵⁷

of health risks to humans and ecological receptors from chemical contaminants that may be present in the environment).

⁵¹ See OSWER, *supra* note 1, at 124 (describing the risk assessment process).

⁵² See *id.* at 131 (directing readers to the Vapor Intrusion Screening Level ("VISL") calculator). The U.S. EPA explains that the VISL calculator:

uses chemical property and toxicity information to determine whether a chemical, if present in soil, is sufficiently volatile and toxic to pose an inhalation risk through vapor intrusion and whether a chemical, if present in groundwater, is sufficiently volatile and toxic to pose an inhalation risk through vapor intrusion at the selected cancer risk or hazard quotient levels.

Office of Solid Waste and Emergency Response, *Vapor Intrusion Screening Level (VISL) Calculator: User's Guide*, U.S. ENVTL. PROTECTION AGENCY (May 2014), https://www.epa.gov/sites/production/files/2015-09/documents/visl-usersguide_1.pdf [<https://perma.cc/PDS2-7EX2>] [hereinafter *VISL*].

⁵³ See, e.g., *Response Action*, ALS ENVTL. (2016), http://www.caslab.com/Response_Action_Meaning/ [<https://perma.cc/Y8FB-MVRA>] (explaining that "response action" is a generic term for actions taken in response to actual or potential health-threatening environmental events such as spills, sudden releases, and asbestos abatement/management problems).

⁵⁴ See OSWER, *supra* note 1, at 143 (describing the preferred long-term response to vapor intrusion into buildings).

⁵⁵ *Id.*

⁵⁶ See *id.* (listing various remediation techniques).

⁵⁷ See *id.* at 144 (recommending that "building mitigation for vapor intrusion be regarded as an interim action that can provide effective human health protection"); U.S. ENVIRONMENTAL PROTECTION AGENCY, EPA 542-F-12-021, *A CITIZEN'S GUIDE TO VAPOR INTRUSION MITIGATION* (2012), <https://www.epa.gov/sites/production/files/2015->

2. It is Just Guidance

As those who work on matters regulated by the U.S. EPA know all too well, the U.S. EPA guidance is just that. The U.S. EPA disclaims its, or anyone's, reliance on the guidance:

This document presents current technical recommendations of the U.S. Environmental Protection Agency (EPA) based on our current understanding of vapor intrusion into indoor air from subsurface vapor sources. This guidance document does not impose any requirements or obligations on the EPA, the states or tribal governments, or the regulated community. Rather, the sources of authority and requirements for addressing subsurface vapor intrusion are the relevant statutes and regulations. Decisions regarding a particular situation should be made based upon statutory and regulatory authority. EPA decision-makers retain the discretion to adopt or approve approaches on a case-by-case basis that differ from this guidance document, where appropriate, as long as the administrative record supporting its decision provides an adequate basis and reasoned explanation for doing so.⁵⁸

Thus, in the litigation and enforcement of vapor intrusion matters, following the U.S. EPA guidance should only be seen as a reasonable approach to addressing the vapor intrusion issue and nothing more.⁵⁹

C. *The States Are All Different*

In recent years, many states have adopted their own vapor intrusion regulations.⁶⁰ For example, in 2013, Illinois amended its *Tiered Approach to Corrective Action Objectives* ("TACO") rules to include a new risk-based approach for evaluating indoor air exposures using soil gas and

04/documents/a_citizens_guide_to_vapor_intrusion_mitigation_.pdf [https://perma.cc/D9NX-NKHJ] (providing the definition for sub-slab depressurization).

⁵⁸ OSWER, *supra* note 1, at i.

⁵⁹ *Id.* at i (discussing the guidance paradigm).

⁶⁰ See Jocelyn Allison, *States Beef up Guidance on Vapor Intrusion*, LAW360 (Aug. 13, 2009), <http://www.law360.com/articles/109774/states-beef-up-guidance-on-vapor-intrusion> [https://perma.cc/Z5BC-T7Q8] (noting the increase in the number of states that have adopted vapor intrusion regulations).

groundwater sampling data.⁶¹ California's Department of Toxic Substances Control has issued its *Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion*.⁶² New York has its *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*.⁶³ Wisconsin's Department of Natural Resources has issued guidance on *Addressing Vapor Intrusion at Remediation & Redevelopment Sites in Wisconsin* and *Sub-Slab Vapor Sampling Procedures*.⁶⁴

Every state does things a little differently. There is a lack of consistency and uniformity across the country. That variability will continue to exist as the states are not going to abandon their own rules and policies and start following the U.S. EPA's new guidance.

III. ANALYSIS

Given the existence of non-binding U.S. EPA guidance, complimented by diverse vapor intrusion regulations and policy in the states, how do property owners, regulated parties, plaintiffs, defendants, attorneys, environmental consultants, and others go about evaluating and making decisions regarding vapor intrusion? The answer is the same as what it has always been as to all matters concerning environmental contamination—look for and do good science, and look for and display good professional judgment. Good science and good professional

⁶¹ See ILL. ADMIN. CODE tit. 35, § 742 (2013), *et seq.* (introducing legislation concerning indoor air exposure evaluations); see also § 742 at App. B, Tab. H (providing soil gas and groundwater evaluation data); § 742 at App. B, Tab. I (illustrating further data regarding soil gas and groundwater sampling in the new risk-based approach); *Indoor Inhalation Amendments*, ILL. ENVTL. PROTECTION AGENCY (2015), <http://www.epa.illinois.gov/topics/cleanup-programs/taco/vapor-intrusion/index> [<https://perma.cc/76XU-6NPN>] (explaining the Illinois Pollution Control Board added the indoor inhalation exposure route to the Illinois EPA's risk-based cleanup methodology).

⁶² See Department of Toxic Substances Control, *Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (Vapor Intrusion Guidance)*, CAL. ENVTL. PROTECTION AGENCY (Oct. 2011), http://www.dtsc.ca.gov/assessingrisk/upload/final_vig_oct_2011.pdf [<https://perma.cc/M7RT-UCER>] (listing California's vapor intrusion regulations).

⁶³ See generally *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*, N.Y. ST. DEP'T OF HEALTH (2006), http://www.health.ny.gov/environmental/investigations/soil_gas/svi_guidance/docs/svi_main.pdf [<https://perma.cc/34YV-4V5M>] (stating New York's vapor intrusion regulations).

⁶⁴ See generally *Addressing Vapor Intrusion at Remediation & Redevelopment Sites in Wisconsin (RR-800) Update: July 2012*, WIS. DEP'T OF NAT. RESOURCES (Jul. 2012), <http://dnr.wi.gov/files/pdf/pubs/rr/RR800.pdf> [<https://perma.cc/BG6K-3TJN>] (providing Wisconsin's vapor intrusion regulations); *Sub-Slab Vapor Sampling Procedures*, WIS. DEP'T OF NAT. RESOURCES (Jul. 2014), <http://dnr.wi.gov/files/PDF/pubs/rr/RR986.pdf> [<https://perma.cc/FW8D-YJ9W>] (stating Wisconsin's regulations regarding sub-slab vapor sampling procedures).

judgment should be the work of the environmental experts.⁶⁵ First, Part III.A analyzes evidence and experts in the legal system.⁶⁶ Then, Part III.B provides a variety of environmental cases involving vapor intrusion, with each subsection dedicated to a different piece of litigation.⁶⁷

A. *Background on Evidence and Experts*

In federal courts, expert testimony is governed by Federal Rule of Evidence 702, which states:

A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if: (a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue; (b) the testimony is based on sufficient facts or data; (c) the testimony is the product of reliable principles and methods; and (d) the expert has reliably applied the principles and methods to the facts of the case.⁶⁸

In 1993, in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, the United States Supreme Court imposed a requirement that with respect to scientific evidence, the trial court under Federal Rules of Evidence 702 must act as a “gatekeeper.”⁶⁹ That is, the trial court is responsible for screening scientific evidence to ensure reliability.⁷⁰ Whether or not a piece of scientific evidence is reliable is a “flexible” inquiry, and the Court suggested an appropriate analysis would include looking into whether a

⁶⁵ See Mark D. Coldiron & Connie M. Bryan, *The Use of Experts in Environmental and Natural Resource Litigation and Enforcement Matters*, GEN. PRAC., SOLO & SMALL FIRM DIVISION BEST OF A.B.A. SEC. (1997), http://www.americanbar.org/newsletter/publications/gp_solo_magazine_home/gp_solo_magazine_index/coldiron.html [https://perma.cc/N5NY-AZ8R] (reinforcing the importance of expert opinions in environmental litigation).

⁶⁶ See *infra* Part III.A (summarizing the standards applied to expert testimony in the federal legal system).

⁶⁷ See *infra* Part III.B (analyzing cases addressing expert testimony in vapor intrusion litigation).

⁶⁸ FED. R. EVID. 702.

⁶⁹ See FED. R. EVID. 104(A) (requiring courts to “decide any preliminary question about whether a witness is qualified, a privilege exists, or evidence is admissible”); FED. R. EVID. 702 (addressing expert witnesses); see also 509 U.S. 579, 597 (1993) (giving trial judges “the task of ensuring that an expert’s testimony both rests on a reliable foundation and is relevant to the task at hand”).

⁷⁰ See *Daubert*, 509 U.S. at 590. (holding that “[p]ertinent evidence based on scientifically valid principles” is required).

theory or technique can be (and has been) tested, peer reviewed, and/or published; the known or potential error rates associated with the theory or technique; and the “general acceptance” of the theory or technique within the scientific community.⁷¹ The Court also held that while

an expert is permitted wide latitude to offer opinions, including those that are not based on firsthand knowledge or observation[,] . . . [a] trial judge must determine . . . whether the expert is proposing to testify to (1) scientific knowledge that (2) will assist the trier of fact to understand or determine a fact in issue.⁷²

It is not uncommon in rapidly developing areas of law that rely on scientific evidence, including vapor intrusion litigation, to see *Daubert* challenges to the scientific evidence introduced by experts.⁷³ As discussed in some of the cases below, however, like in other areas of environmental litigation, courts will typically allow vapor intrusion evidence from experts where it is clear that the experts have exercised good professional judgment and good science.⁷⁴

B. *Environmental Cases with Expert Testimony Regarding Vapor Intrusion*

The remainder of this Article looks at what experts have been saying in the courts about vapor intrusion.⁷⁵ There are numerous environmental cases in which expert testimony on the subject of vapor intrusion has been offered.⁷⁶ A selection of the relatively recent reported decisions is discussed below, enabling us to learn both from the vapor intrusion expert opinions and testimony, and importantly, to also learn from the courts’ reactions to the experts.⁷⁷

1. *Leese v. Lockheed Martin Corp.*

In *Leese v. Lockheed Martin Corp.*, a case before the United States District Court for the District of New Jersey, homeowners alleged that chlorinated

⁷¹ See *id.* at 592–94 (explaining the factors courts may look to in determining whether expert evidence is reliable).

⁷² *Id.* at 592.

⁷³ See BARBARA J. ROTHSTEIN & RALPH J. CICERONE, REFERENCE MANUAL ON SCIENTIFIC EVIDENCE, 22–23 (3d ed. 2011) (describing *Daubert* challenges).

⁷⁴ See *infra* Part III.B (analyzing cases addressing expert testimony in vapor intrusion litigation).

⁷⁵ See *infra* Part III.B (discussing expert opinions about vapor intrusion).

⁷⁶ See *infra* Part III.B (citing instances where experts have testified about vapor intrusion).

⁷⁷ See *infra* Part III.B (summarizing environmental case law concerning expert witnesses).

solvent contamination, particularly the chemicals TCE and PCE, migrated through the subsurface from a Lockheed Martin plant to their homes.⁷⁸ The homeowners further alleged that the contamination may present an “imminent and substantial endangerment” within the meaning of the federal RCRA statute.⁷⁹ The plaintiffs and the defendant filed cross-motions for summary judgment.⁸⁰ The plaintiffs’ failure to provide an expert opinion supporting their vapor intrusion allegations was critical to the court’s decision against the plaintiffs.⁸¹

At the plaintiffs’ properties, the concentrations of TCE and PCE that had been detected in indoor air and subsurface vapor samples were below the screening levels for vapor intrusion in certain New Jersey and U.S. EPA guidance documents looked to by the court.⁸² Even though the district court recognized that “proof of contamination in excess of state standards is not an element of RCRA,” the court nevertheless utilized the screening levels in the guidance documents.⁸³ The court found that because the TCE and PCE concentrations did not exceed the vapor intrusion screening levels in the guidance, it could not be inferred that the contamination may present an imminent and substantial endangerment.⁸⁴ This finding, explained the court, was necessary, given that the plaintiffs failed to submit any expert opinions on the vapor intrusion risk to the contrary.⁸⁵

Plaintiffs have not provided testimony from a toxicologist or any other expert to aid the Court’s comprehension of the data or the complicated science at the heart of this case. Plaintiffs seem to take the position that the numbers speak for themselves. In light of the [New Jersey]

⁷⁸ See No. 11-5091, 2014 WL 3925510, at *1-2 (D.N.J. Aug. 12, 2014) (stating the plaintiffs’ allegations regarding vapor intrusion into their homes).

⁷⁹ See *id.* at *11 (listing the evidence plaintiffs presented to establish an “imminent and substantial endangerment”).

⁸⁰ See *id.* at *1 (introducing the plaintiffs’ and defendant’s cross motions for summary judgment).

⁸¹ See *id.* at *14-15 (explaining that the lack of expert testimony for the plaintiff was crucial in granting defendant’s motion for summary judgment).

⁸² See *id.* at *4-5 (comparing the New Jersey Department of Environmental Protection (“NJDEP”) and U.S. EPA screening levels with the concentrations of trichloroethylene (“TCE”) and tetrachloroethylene (“PCE”) found on the plaintiffs’ properties).

⁸³ See *id.* at *4 (highlighting the reliance given by the court to the 2013 NJDEP screening levels).

⁸⁴ See *Leese*, 2014 WL 3925510, at *11 (explaining how the TCE and PCE levels detected on plaintiffs’ property did not exceed the screening levels, and therefore, did not present an imminent and substantial endangerment to human health or the environment).

⁸⁵ See *id.* at *14-15 (commenting on the plaintiffs’ failure to provide an expert witness to testify about the dangers posed by the TCE and PCE found on plaintiffs’ property).

screening levels and the threshold levels in EPA primers, the undisputed evidence plainly suggest that the very low levels of TCE and PCE detected at Plaintiffs' properties do *not* pose a substantial threat to health or the environment [T]he detected levels of TCE and PCE are several orders of magnitude below the EPA's scientific benchmarks for the threshold of concern for harm to humans. In order for Plaintiffs to survive summary judgment, they need to provide some evidence to enable a factfinder to reasonably infer that TCE and PCE may pose an imminent and substantial threat to health or the environment at the levels existing in this case.⁸⁶

The *Leese* decision thus points out how important it is for plaintiffs to obtain expert opinions of harm to human health to support their vapor intrusion claims.⁸⁷ The mere existence of contamination is not enough.⁸⁸ Without an expert opinion, screening levels contained in guidance documents will, as designed, presumptively be treated as the *de facto* levels at which there is no endangerment.⁸⁹ In the *Leese* case, because of the absence of an expert opining that the measured levels of contamination were harmful to health or the environment at concentrations below the screening levels, the plaintiffs were unable to establish that the contamination may present an imminent and substantial endangerment within the meaning of the RCRA.⁹⁰

2. *Baker v. Chevron*

The plaintiffs in *Baker v. Chevron* were over 200 former and current neighbors of a refinery in Hooven, Ohio.⁹¹ The plaintiffs alleged that

⁸⁶ *Id.* at *13.

⁸⁷ *See id.* at *13 (stressing the importance of expert testimony for plaintiffs to meet their burden of providing evidence sufficient to "enable a factfinder to infer that TCE and PCE may pose an imminent and substantial threat to health or the environment at the levels existing in this case").

⁸⁸ *See id.* (noting "that the very low levels of TCE and PCE detected at Plaintiffs' properties do not pose a substantial threat to health or the environment").

⁸⁹ *See id.* at *4 (showing the court's reliance on the 2013 NJDEP levels as a threshold to determine whether the contamination posed a substantial threat to personal health or the environment).

⁹⁰ *See Leese*, 2014 WL 3925510, at *11 (holding that plaintiffs' lack of expert testimony regarding the risk posed by the TCE and PCE detected on plaintiffs' property resulted in plaintiffs' loss on their RCRA claim).

⁹¹ *See Baker v. Chevron U.S.A., Inc.*, No. 1:05-CV-227, 2011 WL 3652249, at *2 (S.D. Ohio Aug. 19, 2011) (acknowledging the plaintiffs' place of residence).

vapors from a petroleum plume originating from the Chevron refinery migrated into their homes.⁹² The plaintiffs brought personal injury and property damage claims under Ohio state law in the United States District Court for the Southern District of Ohio.⁹³ A summary judgment decision in favor of the defendant was appealed to the Sixth Circuit Court of Appeals.⁹⁴

The first expert issue in this case concerned something that is not unique to vapor intrusion cases.⁹⁵ Rather it was something fundamental to all environmental cases—the nature and extent of the plume.⁹⁶ In this case, the definition of the plume area was determined to be the critical factor in determining which of the plaintiffs' claims would be dismissed and which would survive.⁹⁷ It was only the homes located over the plume that were recognized by the court as having a potentially complete pathway for vapor intrusion.⁹⁸ One of the plaintiffs' experts opined that the plume of contamination stabilized and did not travel west of Adams Street in the Village of Hooven.⁹⁹ However, some of the plaintiffs' homes were west of Adams Street.¹⁰⁰

That expert then later prepared a supplemental affidavit suggesting that the plume may actually have traveled further west than Adams Street.¹⁰¹ However, the court was not convinced by the new opinion.¹⁰² The court found that the supplemental affidavit prepared by the expert was not credible, as the affidavit contradicted the expert's initial opinion, which stated that the plume did not migrate west of Adams Street, a

⁹² See *id.* at *1–2 (explaining that the plaintiffs alleged a petroleum plume had migrated to their residences).

⁹³ See *id.* at *2 (stating the plaintiffs' claim in the dispute).

⁹⁴ See *Baker v. Chevron U.S.A. Inc.*, 533 Fed. App'x 509, 511 (6th Cir. 2013) (indicating that the district court's decision was appealed to the Sixth Circuit).

⁹⁵ See *id.* at 513–14 (analyzing Dr. Bedient's expert testimony regarding vapor intrusion).

⁹⁶ See *id.* (discussing Dr. Bedient's opinion regarding groundwater contaminant plume); see also, e.g., IND. DEP'T OF ENVTL. MGMT., CONCEPTUAL SITE MODEL (CSM) DEVELOPMENT: PLUME BEHAVIOR 49, 52 (2012), http://www.in.gov/idem/landquality/files/remediation_closure_guide_sect_04.pdf [<https://perma.cc/8NEJ-4CRM>] (describing groundwater contaminant plume behavior).

⁹⁷ See *Baker*, 533 Fed. App'x at 511–13 (discussing the extent of the plume area and pathways created).

⁹⁸ See *id.* at 523–24 (explaining that the plaintiffs failed “to offer sufficient evidence showing the presence of subsurface contamination or soil vapors originating from the plume on each and every property involved in this case”).

⁹⁹ See *Baker v. Chevron U.S.A., Inc.*, No. 1:05–CV–227, 2011 WL 3652249, at *4 (S.D. Ohio Aug. 19, 2011) (explaining that two of the plaintiffs' experts generally agreed that the plume did not extend west of Adams Street).

¹⁰⁰ See *id.* at *2–3 (presenting the locations of the plaintiffs' residences).

¹⁰¹ See *id.* at *6 (discussing the contents of the expert's supplemental affidavit).

¹⁰² See *id.* (rejecting the supplemental affidavit).

position that was never retracted in the supplemental affidavit.¹⁰³ Based on the lack of reliable expert testimony that contamination extended beyond Adams Street, the court decided that the claims brought by those plaintiffs with homes west of Adams Street must fail, as there could be no complete vapor intrusion pathway to those homes.¹⁰⁴

As to the properties over the plume, citing Ohio law, the Sixth Circuit explained that the plaintiffs had to show (1) that soil vapors invaded their properties, and (2) that the invasion caused either substantial physical damage to the land or substantial interference with their reasonable and foreseeable use of the land.¹⁰⁵ Because there was not a certified class, it was necessary that each plaintiff show soil vapors had invaded each home.¹⁰⁶ However, the plaintiffs' experts only offered opinions regarding the presence of contamination in and throughout the Village of Hooven generally.¹⁰⁷ One expert for the plaintiffs testified that he did not perform a vapor pathway analysis for each of the plaintiffs' homes.¹⁰⁸ The court determined another expert for the plaintiffs had not performed such an analysis, and therefore found the individual unqualified as an expert.¹⁰⁹ The district court and appellate court on review found that the evidence and opinions presented by the plaintiffs were insufficient to establish that there was a complete vapor intrusion pathway at each of the plaintiffs' homes, and the defendant's motion for summary judgment was granted.¹¹⁰ The appellate court further explained that even assuming that vapor intrusion into the plaintiffs' homes could be established, the

¹⁰³ See *id.* (challenging the validity of the supplemental affidavit).

¹⁰⁴ See *id.* at *6-7 (holding that claims regarding homes west of Adams Street would not prevail).

¹⁰⁵ See *Baker v. Chevron U.S.A.*, 533 Fed. App'x 509, 522-23 (6th Cir. 2013) (holding that the plaintiffs must show "something more than the 'mere detection' of soil vapors on their properties to establish the physical damage prong of an indirect trespass claim").

¹⁰⁶ See *Baker*, 2011 WL 3652249, at *13 (reiterating that each plaintiff in this case bore the burden of directing the court to facts in the record that supported each element of the plaintiffs' claims).

¹⁰⁷ See *id.* at *21 (finding the plaintiffs' experts' testimonies too general to find in favor of the plaintiffs).

¹⁰⁸ See *Baker*, 533 Fed. App'x at 523-24 (noting that Dr. Cheremisinoff did not complete a vapor pathway analysis).

¹⁰⁹ See *id.* at 514 (explaining that the district court excluded Dr. Bedient's opinions "because he admitted he was not a soil vapor expert and, even if he was, his opinions were unreliable, vague, and conclusory because he did not perform any analysis to determine whether there is a completed soil vapor pathway from the plume to the surface"); see also *id.* at 523-24 (holding that the district court did not abuse its discretion by excluding Dr. Bedient's opinion).

¹¹⁰ See *id.* at 511 (addressing the district court and appellate court holdings).

plaintiffs did not present any medical doctors or health experts to establish that the vapors found on the properties were harmful to humans.¹¹¹

The *Baker* case exemplifies how vapor intrusion cases are in many respects like other environmental cases. Experts, using good science and good professional judgment, are needed for the fundamental task of establishing precisely where the contamination is and the degree of impact.¹¹² Moreover, the court focused on the plaintiffs' experts' inability to establish causation.¹¹³ The court looked for clear expert testimony that vapors migrated into each of the plaintiffs' homes.¹¹⁴ Evidence of contamination throughout the area of interest was not enough.¹¹⁵ Even if a vapor connection was found in each home, the court indicated it would be looking for health and medical expertise to establish that the vapors were harmful.¹¹⁶

3. *Ebert v. General Mills, Inc.*

The plaintiffs in *Ebert v. General Mills, Inc.* were residents of a neighborhood in Minneapolis.¹¹⁷ Claims were brought under CERCLA, the RCRA, and state law.¹¹⁸ The United States District Court for the District of Minnesota was asked to decide whether two of the plaintiffs' expert witnesses, an environmental scientist and an epidemiologist, should be disqualified under *Daubert* and Federal Rule of Evidence 702.¹¹⁹

The plaintiffs' environmental scientist offered opinions that a General Mills facility was the source of substantially all of the groundwater

¹¹¹ See *id.* at 524 (finding that "evidentiary deficiencies mean[t] that plaintiffs have failed to create a genuine issue of material fact regarding whether the plume and its soil vapors invaded their properties").

¹¹² See *id.* (rejecting the plaintiffs' claims because the plaintiffs' experts failed to establish the location and impact of the alleged contamination).

¹¹³ See *Baker*, 533 Fed. App'x at 519–20 (concluding the plaintiffs' experts failed to create a jury question regarding causation).

¹¹⁴ See *id.* at 523–24 (requiring the plaintiffs to affirmatively establish the "presence of subsurface contamination or soil vapors originating from the plume on each and every property involved in this case").

¹¹⁵ See *id.* (rejecting expert testimony that contamination was found generally in the area, and requiring instead, that the plaintiffs' experts establish a complete soil vapor intrusion pathway for each property).

¹¹⁶ See *id.* at 524 (requiring the plaintiffs to establish that any vapor intrusion into their homes resulted in "substantial physical damage or substantial interference with use and enjoyment" of their properties) (emphasis in original).

¹¹⁷ See *Ebert v. General Mills, Inc.*, No. 13-3341, 2015 WL 867994, at *1 (D. Minn. Feb. 27, 2015) (describing the plaintiffs' residences).

¹¹⁸ See *Ebert v. General Mills, Inc.*, 823 F.3d 472, 476 (8th Cir. 2016) (explaining the claims brought against the defendant).

¹¹⁹ See *Ebert*, 2015 WL 867994, at *1 (noting that the defendants moved to exclude the plaintiffs' expert witnesses).

contamination at issue and that there was no other known source of vapor contamination in a residential neighborhood.¹²⁰ The court recognized that the environmental scientist expert had decades of experience in groundwater, soil, and vapor intrusion issues.¹²¹ The court was also impressed with the environmental scientist's use of the "multiple lines of evidence" methodology.¹²² This methodology considers a number of factors and scientific data and is recognized by courts as being reliable.¹²³ The court determined that the environmental scientist, in forming his opinions, followed an appropriate methodology and that the defendant's real issue with this expert was simply his scientific conclusions.¹²⁴ The defendant's concerns were thus with the credibility of the testimony and not with its admissibility.¹²⁵

The epidemiological expert opined that the contamination and vapor intrusion in the residential area posed a public health risk to the affected population.¹²⁶ This expert's opinion was based on and made use of the same data that was also relied upon by the defendant.¹²⁷ The court again found that the defendant's issue was with the credibility of the witness, which could be addressed through cross-examination.¹²⁸ The epidemiological testimony was essential to establishing that the vapor intrusion may present an "imminent and substantial endangerment," which was a critical element of the plaintiffs' RCRA claim.¹²⁹

The *Ebert* case illustrates the importance of utilizing well-qualified experts who use a defensible methodology to reach their conclusions.¹³⁰ In exercising its "gatekeeping" function, this court found that the "multiple lines of evidence" methodology, which quite logically considers and weighs all available data and information, was sufficiently reliable so

¹²⁰ See *id.* at *4 (summarizing Dr. Everett's expert opinion regarding the source of the contamination).

¹²¹ See *id.* at *5 (finding the environmental expert had substantial expertise in groundwater, soil, and vapor intrusion issues).

¹²² See *id.* (explaining the court found Dr. Everett "considered a number of factors and scientific data consistent with the multiple lines of evidence methodology").

¹²³ See *id.* (relying on *Abrams v. Ciba Specialty Chem. Corp.* as an example of a case where an expert applied the multiple lines of evidence methodology).

¹²⁴ See *id.* ("At its essence, Defendant's dispute lies with Dr. Everett's scientific conclusions, not his adherence to his own methodology.").

¹²⁵ *Ebert*, 2015 WL 867994, at *5.

¹²⁶ See *id.* at *6 (summarizing the epidemiological expert's, Dr. Ozonoff, opinion).

¹²⁷ See *id.* at *1, *7 (describing how the epidemiological expert based his opinion on the data that the defendant relied upon when deciding to install vapor mitigation systems in 2013).

¹²⁸ See *id.* at *7 (providing the defendant could challenge the data with different data on cross examination and that the defendant's data did not speak to Dr. Ozonoff's reliability).

¹²⁹ *Id.* at *6.

¹³⁰ See *id.* at *5 (stating Dr. Everett was a well-qualified expert and that the methods he used were defensible).

as not to disqualify the expert.¹³¹ In vapor intrusion cases, environmental scientists and other experts who utilize the “multiple lines of evidence” methodology should be well positioned to fend off a *Daubert* motion.¹³²

4. *Parker Shattuck Neighbors v. Berkeley City Council*

In *Parker Shattuck Neighbors v. Berkeley City Council*, a group of citizens petitioned for a developer to be required to prepare an environmental impact report for a redevelopment project pursuant to the California Environmental Quality Act (“CEQA”).¹³³ Under the CEQA law, an environmental impact report must be prepared for development projects that have a significant effect on the environment.¹³⁴ Contaminated materials were present in the subsurface beneath the petitioners’ property. The petitioners presented a hydrogeologic and air quality expert to testify about the project’s potential to release the contamination.¹³⁵ The expert testified that vapors from two volatile compounds, a chlorinated solvent and a petroleum chemical, had the potential to travel through the soil and expose the building’s residents to contaminated air.¹³⁶ Based on the levels of contamination, the expert opined that a vapor intrusion study should be performed.¹³⁷

While the California court did not disqualify the expert’s opinion, the court did find that the testimony was insufficient to find a “significant effect on the environment” as required by the CEQA.¹³⁸ The court stated “a suggestion to investigate further is not evidence, much less substantial evidence, of an adverse impact.”¹³⁹

In this case, the expert’s recommendation that a vapor intrusion investigation be performed was apparently appropriate based on the data. However, it was the CEQA statute that was at issue.¹⁴⁰ An expert was

¹³¹ See *Ebert*, 2015 WL 867994, at *5 (denying the defendant’s *Daubert* motion where the expert in question utilized the trustworthy “multiple lines of evidence” methodology).

¹³² See *id.* at *3 (noting the *Daubert* inquiry scrutinizes the reliability of an expert’s testimony).

¹³³ See *Parker Shattuck Neighbors v. Berkeley City Council*, 222 Cal. App. 4th 768, 772 (Cal. Ct. App. 2013) (describing the plaintiffs’ action brought under the California Environmental Quality Act (“CEQA”) to challenge a proposed project approved by the City of Berkeley without requiring an environmental impact report (“EIR”).

¹³⁴ See *id.* at 776 (providing instances in which an EIR must be prepared).

¹³⁵ See *Parker Shattuck Neighbors*, 222 Cal. App. 4th at 775 (relying on expert testimony regarding the project’s potential contamination).

¹³⁶ See *id.* at 786 (reporting on the risks of certain chemicals if released into the air).

¹³⁷ See *id.* (concluding a study should be done).

¹³⁸ See *id.* at 781 (explaining why the expert’s opinion was insufficient).

¹³⁹ *Id.* at 786.

¹⁴⁰ *Id.* at 781 (demonstrating why the CEQA was at issue).

needed to offer an opinion of substantial evidence of an adverse impact, not to explain that more vapor intrusion investigation data was needed.¹⁴¹

5. *Voggenthaler v. Maryland Square, LLC*

The *Voggenthaler v. Maryland Square, LLC* litigation concerns PCE contamination from a dry cleaning operation at a shopping center.¹⁴² This litigation has resulted in several decisions from the United States District Court, District of Nevada and the Ninth Circuit Court of Appeals.¹⁴³ The plaintiffs alleged that solvent released from a dry cleaning operation resulted in a plume of PCE contamination extending into a residential neighborhood.¹⁴⁴ The plaintiffs further alleged that PCE vapors from the plume were entering their homes.¹⁴⁵

One group of defendants had a theory that some of the contamination in the neighborhood was not caused solely by the drycleaner source in the mall.¹⁴⁶ That group of defendants then sought to conduct a fairly extensive soil gas investigation on a portion of the shopping center that had not yet been tested.¹⁴⁷ Unable to get site access for the proposed soil gas testing, the group of defendants filed a motion to compel.¹⁴⁸ Two environmental scientist experts for the opposing sides squared off on the need for the testing.¹⁴⁹ The court considered arguments from both sides,

¹⁴¹ See *Parker Shattuck Neighbors*, 222 Cal. App. 4th at 786 (showing why the expert's opinion was insufficient to create a fair argument that the proposed project would have "a significant effect on the environment").

¹⁴² See *Voggenthaler v. Maryland Square, LLC*, No. 2:08-cv-01618-RCJ-GWF, 2011 WL 112115, at *1 (D. Nev. Jan. 13, 2011) (stating that the PCE contamination allegedly came from a dry-cleaning facility (the "Al Philips Facility")).

¹⁴³ See, e.g., *Voggenthaler v. Maryland Square, LLC*, 724 F.3d 1050, 1068 (9th Cir. 2013) (concluding that the "district court properly rejected Maryland Square's constitutional challenge to the application of CERCLA," and furthermore, "correctly granted judgment . . . in favor of NDEP on its state law claims"); see also *Voggenthaler*, 2011 WL 112115, at *14 (ruling that the defendant's motion to compel with subpoena #476 was granted).

¹⁴⁴ See *Voggenthaler*, 2011 WL 112115, at *2 (asserting that a plume of PCE was released from the Al Philips Facility).

¹⁴⁵ See *id.* at *3 (summarizing the plaintiffs' claims).

¹⁴⁶ See *id.* at *2-3 (indicating that some defendants speculated that some of the contamination came from another dry-cleaning business, Dr. Clean).

¹⁴⁷ See *id.* at *5 (articulating that these defendants wished to perform soil gas testing involving "the drilling of core holes, 3 inches in diameter and 18 inches deep, at approximately 100 locations across the property").

¹⁴⁸ See *id.* (summarizing the failed negotiations for the soil testing the defendants desired).

¹⁴⁹ See *id.* at *9-11 (providing that Mr. Howe indicated that "the soil gas test results will provide a basis for placing new monitoring wells down gradient 'of the Goodyear and Firestone facilities and any other facilities that may have used PCE in past operations'" and that in response, The Boulevard Mall, LLC, argued that there was "simply no basis to believe

particularly focusing on whether the proposed testing was a “fishing expedition” or whether there was a sufficient basis to look for a potential new and not yet identified source of contamination.¹⁵⁰ Noting the more lenient factual threshold showing required for discovery purposes, as compared to the evidentiary requirements for a motion for summary judgment, the *Voggenthaler* court granted the motion to compel.¹⁵¹

It was clear that this court would be unwilling to allow just any investigation proposed by any party to look for new sources of vapor intrusion contamination.¹⁵² However, because the group of defendants proposing the investigation presented expert support substantiating a theory as to a potential new source of contamination that could have contributed to the vapor intrusion concern in the neighborhood, and because that expert proposed an investigation plan that was tailored to test that theory, this court was willing to allow the discovery to proceed and granted the motion to compel.¹⁵³

6. *Tri-Realty Company v. Ursinus College*

Tri-Realty Company v. Ursinus College is a recent RCRA summary judgment decision from the United States District Court for the Eastern District of Pennsylvania.¹⁵⁴ The court first exhaustively summarized a complex fact pattern and history of a fuel oil tank leak that migrated to a nearby apartment complex.¹⁵⁵ A vapor control system was installed in the apartment complex’s clubhouse in 2010, a year before the case was filed.¹⁵⁶

The plaintiff’s litigation expert opined that there could be a serious risk associated with exposure to the oil through inhalation.¹⁵⁷ However,

that the soil gas testing will produce evidence of other sources of PCE to the AI Philips plume”).

¹⁵⁰ See *Voggenthaler*, 2011 WL 112115, at *8 (compiling prior court decisions on fishing expeditions in the discovery process and evaluating the basis for allowing additional discovery regarding a new and unconfirmed source of contamination).

¹⁵¹ See *id.* at *13 (noting that in discovery, there is a low threshold to establish relevance).

¹⁵² See *id.* (cautioning the defendants moving to compel the soil gas testing “that they should not view this soil test gas testing as prelude to seeking other testing regardless of the results of the soil gas tests”).

¹⁵³ See *id.* at *1, 3, 5, 13 (highlighting the defense’s theory as to a potential new source of contamination and an investigation plan tailored to test that theory).

¹⁵⁴ See *Tri-Realty Co. v. Ursinus Coll.*, 124 F. Supp. 3d 418, 424 (E.D. Pa. 2015) (holding that the defendant’s motion for summary judgment was granted in part and denied in part).

¹⁵⁵ See *id.* at 424–27 (providing a detailed factual background and history of a fuel oil tank leak).

¹⁵⁶ See *id.* at 427 (explaining that a vapor mitigation system was installed at the apartment complex’s clubhouse).

¹⁵⁷ See *id.* at 434 (stating that the Environmental Consulting, Inc. (“ECI”) recognized that the oil “posed a risk to humans by way of direct contact, ingestion, and inhalation”).

outside of the litigation, Tri-Realty also happened to hire an environmental consultant to perform a Phase I Environmental Site Assessment of the apartment complex for the purpose of obtaining a loan.¹⁵⁸ The Phase I environmental consultant concluded “that the risk of harm from vapor intrusion ‘is low and is unlikely to occur’ due to the age of the discharge, the mitigation systems in place, and the absence of data showing high concentrations in indoor air.”¹⁵⁹ The experts for the defendant, similar to the Phase I environmental consultant, also concluded “indoor air exposures are highly unlikely to occur because tests have revealed no problem with vapor intrusion other than at the Clubhouse, and the situation at the Clubhouse has been remediated by way of the installation of the vapor mitigation system.”¹⁶⁰

The conflicting opinions between the plaintiff’s litigation expert and the Phase I environmental consultant were ultimately not fatal to the plaintiff’s case on summary judgment, but the conflict left an impression on the court.¹⁶¹ The court wrote:

Indeed, a separate report commissioned by Tri-Realty specifically concluded that the risk of harm from vapor intrusion in the buildings located at College Arms [the apartment complex] “is low and is unlikely to occur.” However, as described above, Tri-Realty has presented evidence suggesting that there may be a risk of [repeated] exposures . . . due to the potential spread of oil. Therefore, whether or not there is a serious risk of complete exposure pathways is a disputed issue of fact that is material to the outcome of Tri-Realty’s RCRA claim.¹⁶²

While this court did allow the plaintiffs to continue to litigate further, the issue of whether the contamination posed an imminent and substantial endangerment, the Phase I “opinion” describing a low risk of harm from vapor intrusion, which conflicts with the plaintiff’s litigation expert suggesting otherwise, will continue to be a burden to the plaintiff.¹⁶³

¹⁵⁸ See *id.* (citing that Tri-Realty hired ECI to create a Phase I Environmental Site Assessment for College Arms).

¹⁵⁹ *Id.* at 435.

¹⁶⁰ *Tri-Realty Co.*, 124 F. Supp. 3d at 435.

¹⁶¹ See *id.* at 447–48, 473 (finding that Tri-Realty’s evidence was “sufficient to establish that the human presence in Bum Hollow may result in acute human exposures to oil, and that the spread of oil may result in prolonged human exposures to oil”).

¹⁶² *Id.* at 448 (internal citations omitted).

¹⁶³ See *id.* at 432–33 (highlighting the conflicts between the Phase I study and the plaintiff’s litigation expert’s opinion).

There is a lesson here: be aware of and sensitive to any environmental work being performed for due diligence purposes that may be going on alongside litigation, as the possibility exists that different environmental professionals working apart from each other will see and report things differently.¹⁶⁴

7. *United States v. Apex Oil Co.*

This RCRA enforcement case brought by the United States against Apex Oil Co. in the United States District Court for the Southern District of Illinois was one of the first cases in which a vapor intrusion claim was fully litigated.¹⁶⁵ A large plume of free-phase petroleum emanated from a refinery in Hartford, Illinois.¹⁶⁶

The United States moved to disqualify the defendant's environmental expert under Federal Rule of Evidence 702 and *Daubert*.¹⁶⁷ Apex's expert opined that "non-aqueous phase liquid hydrocarbons ("NAPL") 'on the groundwater table under Hartford[,] Illinois is not causing odor problems in indoor air in Hartford, nor causing or contributing to (in any meaningful way) dangerous levels of hydrocarbon vapors in the shallow soil gas in Hartford.'"¹⁶⁸ The United States moved to disqualify the witness by arguing the witness was not qualified to testify on topics such as toxicology and statistics, and he employed methodologies that could not be tested and were not subject to peer review.¹⁶⁹ The court accepted Apex's witness, finding that his background in environmental chemistry and forensic chemistry qualified him as an expert in his field.¹⁷⁰ Moreover, the court found the expert used methodologies that were discussed in scientific publications and generally accepted in the scientific community.¹⁷¹ The court said that any attacks on the weight of the expert's

¹⁶⁴ See *id.* (describing the different reports of each environmental consultant).

¹⁶⁵ See *United States v. Apex Oil Co.*, No. 05-CV-242-DRH, 2007 WL 809641, at *1 (S.D. Ill. Mar. 15, 2007) (discussing the United States's issue with the defendant's expert); see also *United States v. Apex Oil Co.*, No. 05-CV-242-DRH, 2008 WL 2945399, at *1 (S.D. Ill. Jul. 28, 2008) (containing a lengthy decision following the bench trial of this case).

¹⁶⁶ See *Apex Oil Co.*, 2007 WL 809641, at *1 (describing the subsurface hydrocarbon contamination that was the subject of the litigation).

¹⁶⁷ See *id.* (explaining that the United States moved to strike the declaration of the defendant's expert and to exclude his expert report and related testimony under Federal Rule of Evidence 702 and *Daubert*).

¹⁶⁸ *Id.* at *3.

¹⁶⁹ See *id.* at *1 (describing the United States's argument that Dr. Butler was not qualified and that his methods were not generally accepted in the relevant scientific communities).

¹⁷⁰ See *id.* at *3 ("Dr. Butler's academic background in environmental chemistry, as well as his experience in forensic chemistry qualify him as an expert in this field").

¹⁷¹ See *id.* (finding Dr. Butler's testimony was sufficiently reliable and relevant and may assist the trier of fact in understanding the evidence or determining a fact in issue).

opinion were reserved for cross-examination and consequently denied the motion.¹⁷²

The United States also moved for summary judgment.¹⁷³ Because of the difference in opinions between the experts, including on the issue of vapor intrusion, the court found there were issues of fact to be resolved at trial and denied the motion.¹⁷⁴ The court stated:

Defendant disputes, for example, the degree of contamination and whether such contamination poses any threat to the public or the environment These factual disputes are supported by declarations provided by Defendant's [experts] Defendant disputes that the vapor intrusion cited in the Health Consultation [report] is attributable to the hydrocarbon plume. In turn, the United States disagrees that these facts are in dispute. Given the nature of this case and the specialized knowledge that the facts entail, the Court is not in a position to make factual findings at this stage. Accordingly, the United States'[s] motion for summary judgment is [denied].¹⁷⁵

This decision is unremarkable in the sense that this court simply chose to allow each sides' apparently qualified vapor intrusion experts to duel it out at trial.¹⁷⁶ What is perhaps noteworthy is the broad latitude given by the court in allowing an expert to testify on the subject of vapor intrusion.¹⁷⁷ The defendant's expert in this case was identified as having a background in environmental chemistry and forensic chemistry.¹⁷⁸ Yet vapor intrusion and all aspects of the migration of vapors in the subsurface involve issues of geology, hydrogeology, and soil physics. Nevertheless, the court found the defendant's witness was sufficiently trained and experienced to be an "expert in this field."¹⁷⁹ This court, on

¹⁷² See *Apex Oil Co.*, 2007 WL 809641, at *3 (providing that an attack by the United States on Dr. Butler's testimony was best reserved for cross-examination, and denying the United States's motion to strike the expert's testimony).

¹⁷³ See *id.* at *3 (stating the United States had moved for summary judgment on its RCRA claim).

¹⁷⁴ See *id.* at *5 (noting there were conflicting and disputed facts requiring credibility determinations, which precluded the court from entering summary judgment).

¹⁷⁵ *Id.*

¹⁷⁶ See *id.* (denying the United States's motion for summary judgment).

¹⁷⁷ See *id.* at *5 (summarizing the expert's opinions regarding vapor intrusion).

¹⁷⁸ See *Apex Oil Co.*, 2007 WL 809641, at *3 (describing Dr. Butler's academic background in environmental chemistry and forensic chemistry).

¹⁷⁹ *Id.* at *3.

summary judgment and in a motion to disqualify, was willing to give the environmental consulting expert some space to testify on environmental science matters that were not precisely in his area of expertise.¹⁸⁰

8. *In re: Wysong & Miles Company*

In this bankruptcy case, the debtor, an owner of property in Greensboro, North Carolina, historically used an underground storage tank containing the chlorinated solvent TCA.¹⁸¹ Contamination migrated off-site onto an adjacent property.¹⁸² The claimant, who was the owner of the adjacent property, sought to make the property marketable for development, and to do so, enrolled the property in the North Carolina Brownfields Program.¹⁸³ A major element of the Brownfields Program is a document called a brownfields agreement.¹⁸⁴ The brownfields agreement identifies the remediation work and land use restrictions that the applicant agrees to perform and implement.¹⁸⁵ Upon accepting the claimant to the Brownfields Program, the state environmental agency sent the claimant a letter describing “initial impressions” of likely land use restrictions.¹⁸⁶ After receipt of the letter, the claimant sought from the debtor \$990,000 in diminution in property value associated with the anticipated land use restrictions, including restrictions for vapor intrusion, as well as the costs associated with participating in the Brownfields Program.¹⁸⁷

The claimant relied on the “initial impressions” letter to support its position that a land use restriction for vapor intrusion would be

¹⁸⁰ See *id.* (allowing an environmental and forensic chemist to testify about vapor intrusion).

¹⁸¹ See *In re Wysong & Miles Co.*, Debtor, No. 04-10005C-11G, 2011 WL 3911110, at *1 (Bankr. N.C. Sept. 6, 2011) (summarizing the facts of the case).

¹⁸² See *id.* at *2 (explaining how groundwater solvents migrated in a northeasterly direction, through and off the debtor’s property, and into the groundwater beneath the claimant’s property).

¹⁸³ See *id.* at *6 (describing the purpose of the North Carolina Brownfields Program as a “program to encourage the redevelopment of environmentally contaminated sites”).

¹⁸⁴ See *id.* (elaborating that to obtain a brownfields agreement, “a prospective developer must demonstrate several factors to the satisfaction of [the North Carolina Department of Environment and Natural Resources (“DENR”)]”).

¹⁸⁵ See *id.* (noting “[l]and use restrictions are a common component of brownfields agreements” and that “[t]he exact nature of the land use restrictions will vary from site-to-site and are dependant [sic] on the contamination profile of the property”).

¹⁸⁶ See *id.* at 7 (providing that the DENR sent the claimant “a letter concerning the status of the application and an initial impression of likely land-use restrictions”).

¹⁸⁷ See *In re Wysong & Miles Co.*, 2011 WL 3911110, at *21 (Bankr. N.C. Sept. 6, 2011) (stating the claimant contended that “the total amount that should be allowed for diminution in value is \$990,000”).

required.¹⁸⁸ However, the court gave little weight to this letter, as it was sent by the state environmental agency early on in the process and the author of the letter was not present in court for cross-examination.¹⁸⁹ The debtor produced two experts in response.¹⁹⁰ An environmental consultant for the debtor opined that the risk of vapor intrusion was highly unlikely and remediation of vapor intrusion would most likely not be required.¹⁹¹ Another environmental consultant, who had a long prior career at the state environmental agency, testified that the claimant should be able to obtain a brownfields agreement without any vapor intrusion-imposed land use restriction.¹⁹² Finding the expert testimony of the debtor more persuasive than the state agency's "initial impressions" letter, the court concluded that it was unlikely that a vapor intrusion restriction would be included in the brownfields agreement.¹⁹³

The court also agreed with the defendant that any vapor intrusion-based land use restriction would have minimal effect.¹⁹⁴ "The type of land use restrictions that likely will be included in the brownfields agreement have been revealed and even if a restriction regarding vapor intrusion is included, the restriction will not prevent or significantly limit the development of the property."¹⁹⁵ The court rejected the claimant's expert's opinion of substantial diminution for environmental contamination, finding the expert was an "alarmist" and did not take into account the fact that the uncertainty associated with the contamination had been minimized.¹⁹⁶ The court agreed with the debtor's proposal for a nominal five percent property value reduction.¹⁹⁷

¹⁸⁸ See *id.* at *20 (relaying the claimant "relied almost entirely on a letter from a DENR employee stating his 'first-blush perspective' regarding the land use restrictions 'likely' to be included in a BFA").

¹⁸⁹ See *id.* (noting the DENR letter "was written before the property had been accepted into the program and before any discussions or negotiations with DENR regarding the likelihood of soil intrusion on the property" and that the author of the letter was not present in court for cross examination).

¹⁹⁰ See *id.* (acknowledging the debtor relied on "two highly qualified expert witnesses" in opposition to this claim).

¹⁹¹ See *id.* (describing Mr. Moretz's opinion).

¹⁹² See *id.* (identifying Ms. Jones's opinion).

¹⁹³ See *In re Wysong & Miles Co.*, 2004 WL 3911110, at *20 (holding the claimant "failed to show by a preponderance of the evidence that a soil vapor land use restriction more likely than not would be included" in the claimant's brownfields agreement).

¹⁹⁴ See *id.* at *21 (analyzing the cost for soil testing or remediation would arise after the course of building and development, not before).

¹⁹⁵ *Id.* at *26.

¹⁹⁶ See *id.* (noting the expert did not show any knowledge or experience in determining the true value of contaminated property).

¹⁹⁷ See *id.* at *27 (accepting the expert's conclusion that "a discount of 5% was representative of the value impact created by the contamination... which yielded a diminution in value of \$94,400").

This decision illustrates a couple of points. The existence of volatile organic compounds in the subsurface does not mean there is a vapor intrusion risk.¹⁹⁸ Reliable expert testimony establishing the existence of a migration pathway and an increased risk to human health is essential.¹⁹⁹ Mere inferences, speculations, assumptions or initial impressions of the data will not be adequate.²⁰⁰ Also, vapor intrusion risks can be managed with appropriate mitigation and restrictions.²⁰¹ Vapor intrusion restrictions do not always interfere with land use and development plans. Consequently, experts can certainly credibly argue that vapor intrusion issues, if appropriately managed and addressed, will have a nominal impact on property value.

9. *SPPI-Somersville, Inc. v. TRC Companies, Inc.*

In this Northern District of California case, the plaintiffs purchased property adjacent to a landfill and sued the current and former owner-operators of the landfill pursuant to CERCLA, the RCRA, and state law for groundwater and soil gas contamination that resulted from the landfill's operation.²⁰² The parties filed cross motions for summary judgment on the plaintiffs' RCRA claim.²⁰³

¹⁹⁸ See *id.* at *1, 2, 20 (finding that the presence of 1, 1, 1-trichloroethane ("TCA"), a chlorinated solvent, and other "related compounds arising from the natural breakdown of the TCA molecules[.]" in the soil of the debtor's property did not mean a vapor intrusion risk because the letter from the DENR employee indicating that a land use restriction was likely to be included in the BFA was "written before the property had been accepted into the program and before any discussions or negotiations with DENR regarding the likelihood of soil vapor intrusion on the property and whether such restrictions should be included in the BFA," and that the debtor's experts opined that "the risk of soil vapor intrusion on the Claimant's property was highly unlikely and that remediation of soil vapor intrusion most likely would not be required . . .").

¹⁹⁹ See *In re Wysong & Miles Co.*, 2004 WL 3911110, at *2 (noting while "the groundwater solvents have migrated in a northeasterly direction, through and off the Debtor's property and into the groundwater beneath the Claimant's property," the Debtor's solvent contamination sampling "has not detected any solvent levels of concern within surface water . . .").

²⁰⁰ See, e.g., *id.* at *24-25 (criticizing an expert's opinion for being "nothing more than guesswork on his part[.]" and explaining that, "given the deficiencies in the Claimant's evidence regarding such value, it would be highly speculative and a matter of conjecture for the court to attempt to divine a market value from such evidence . . .").

²⁰¹ See generally *id.* at *25-26 (rejecting the claimant's evidence regarding diminution in value because land use restrictions and other remedial measures can mitigate vapor intrusion risks).

²⁰² See *SPPI-Somersville, Inc. v. TRC Companies, Inc.*, Nos. C-04-2648 SI, 07-5824 SI, 2009 WL 2612227, at *1 (N.D. Cal. Aug. 21, 2009) (summarizing the plaintiffs' claims).

²⁰³ See *id.* at *10-13 (addressing the parties' cross motions for summary judgment on the plaintiffs' RCRA claim).

In their motion for summary judgment, the defendants argued that because the landfill had been the subject of an ongoing state remedial action and consent order, the plaintiffs' RCRA claim was superfluous and barred for three reasons: (1) plaintiffs lacked constitutional standing because they sought an injunctive order that did not redress the harm they alleged; (2) plaintiffs were not entitled to injunctive relief because they could not demonstrate irreparable harm; and (3) under the primary jurisdiction doctrine, the administrative forum provided by the state environmental agency was the appropriate forum for the plaintiffs to resolve their dispute.²⁰⁴ Plaintiffs responded by arguing their RCRA claim was not barred or superfluous because the state agency's action failed to address the vapor intrusion issues on the plaintiffs' property caused by the defendants' groundwater plume.²⁰⁵ The court disagreed and found in favor of the defendants, and granted their motion for summary judgment on the RCRA claim.²⁰⁶ In doing so, the court emphasized that the plaintiffs' vapor intrusion expert only testified that if the property were developed, there would be a vapor intrusion threat, but without any planned development of the property, there was not a current danger posed by soil vapor.²⁰⁷ Therefore, the court found the plaintiffs failed to establish that there was an imminent and substantial endangerment to health or the environment.²⁰⁸

This case highlights the need for experts to offer opinions that clearly prove up the elements required for the cause of action.²⁰⁹ Expert testimony could be presented in a way to show that vapor intrusion is not a hypothetical possibility and rather is the type of real possibility that may create an imminent and substantial endangerment.

²⁰⁴ See *id.* at *14 (noting the "gravamen of all three arguments is that plaintiffs are already receiving the relief they seek—remediation of the groundwater plume—through implementation of the Consent Order and [remedial action plan] pursuant to the oversight of the [state agency]").

²⁰⁵ See *id.* (summarizing the plaintiffs' argument that the California Department of Toxic Substances' ("DTSC") remedial action plan assumed that the properties to the north of the landfill that were then undeveloped (including plaintiffs' property) would remain undeveloped).

²⁰⁶ See *id.* at *15 (granting the defendants' motion for summary judgment).

²⁰⁷ See *id.* at *16 (explaining if and when the plaintiffs develop their property, the plaintiffs can approach the DTSC about the contamination).

²⁰⁸ See *SPPI-Sommerville Inc.*, 2009 WL 261227, at *16-17 (holding the plaintiffs failed to establish the necessary element of "imminent and substantial endangerment").

²⁰⁹ See *id.* at *11 (highlighting the utilization of experts to establish the element of "imminent and substantial endangerment to health or environment").

10. *Grace Christian Fellowship v. KJG Investments, Inc.*

In *Grace Christian Fellowship v. KJG Investments, Inc.*, a case filed in the Eastern District of Wisconsin, a church congregation sued a neighboring gas station under the citizen suit provision of the RCRA and several state law claims.²¹⁰ Grace Christian Fellowship purchased the church without knowing that the previous gasoline spills had migrated to the church site and contaminated the building.²¹¹ After Grace Christian Fellowship purchased the church, a new spill also migrated to the church, causing the city to temporarily close the building for safety reasons, including a school that operated in the church's basement.²¹² Residuary toxic benzene was found in nearby soil and water, and the congregation argued that benzene and gasoline vapors from the spill continued to endanger the building's occupants.²¹³ The gas station defendant maintained that, once the city cleared the church for occupancy after its temporary closure, there was no evidence of danger to the health and safety of the congregation.²¹⁴

Grace Christian Fellowship had initially moved for a preliminary injunction, which was denied in 2009.²¹⁵ In denying the request for a preliminary injunction, the court ruled that the congregation failed to show that a complete exposure pathway existed to transport the toxic benzene vapors from the sub-slab under the church's basement or a utility trench into the church building.²¹⁶ At the preliminary injunction stage, Grace Christian Fellowship relied on the testimony of two experts: one expert collected soil and groundwater beneath the concrete floor of the basement of the building and confirmed that "vapors beneath the basement floor slab . . . represent a *potential* threat to the occupants of the buildings."²¹⁷ The plaintiff's second expert further testified that periodic

²¹⁰ See *Grace Christian Fellowship v. KJG Invs. Inc.*, No. 07-C-0348, 2012 WL 1069023, at *1, *3 (E.D. Wis. Mar. 29, 2012) (discussing the cause of action between a church and a gas station).

²¹¹ See *id.* at *3 (noting Grace Christian Fellowship was unaware of gasoline spills and contamination before purchasing the property).

²¹² See *id.* at *4 (describing the effects on the Grace Christian Fellowship after a new gasoline spill).

²¹³ See *id.* at *18 (noting petroleum hydrocarbons in excess of the Wisconsin Department of Natural Resources standards existed in soil and groundwater below and adjacent to the Grace Christian Fellowship building).

²¹⁴ See *id.* at *19 (describing the defendants' counterargument).

²¹⁵ See *Grace Christian Fellowship v. KJG Invs. Inc.*, No. 07-C-0348, 2009 WL 2460990, at *12 (E.D. Wis. Aug. 7, 2009) (denying Grace Christian Fellowship's motion for a preliminary injunction).

²¹⁶ See *id.* (holding Grace Christian Fellowship did not establish a complete exposure pathway between the vapors under the building and the breathable space inside the building, and therefore, denying the plaintiff's motion for a preliminary injunction).

²¹⁷ *Id.* at *9.

presence of gasoline odors created an imminent threat to the health of the building's occupants.²¹⁸ However, Grace Christian Fellowship's experts failed to present evidence that gasoline odors had been detected in the basement during the relevant time period and instead only presented hearsay evidence from various occupants that at various unconfirmed dates, they smelled gasoline odors in the basement of the building.²¹⁹ Without evidence of the sub-slab vapors migrating into the building, the court found there was not a complete exposure pathway and denied Grace Christian Fellowship's motion for a preliminary injunction.²²⁰

Several years later, both parties moved for partial summary judgment on Grace Christian Fellowship's RCRA claim and state law claims.²²¹ Grace Christian Fellowship presented new evidence that a complete exposure pathway may exist, but the defendants' experts disputed the plaintiff's experts' opinions and testing upon which the opinions were based.²²² Specifically, the defendants' experts maintained that the plaintiff's experts' opinions were based on testing performed before a sub-slab vapor extraction system was installed, or based on testing performed when the sub-slab vapor extraction system was turned off.²²³ Accordingly, the court found that there was a "factual dispute [regarding] whether a complete exposure pathway exist[ed,]" and therefore "whether an imminent and substantial endangerment exist[ed,]" and denied the defendant's motion for summary judgment on Grace Christian Fellowship's RCRA claim.²²⁴

²¹⁸ See *id.* at *10 (noting that the plaintiff's second expert testified that the "periodic presence of gasoline odors 'creates an imminent threat . . . a current threat' to the health of the children, teachers, and members of the church while they are present in the Grace basement").

²¹⁹ See *id.* (summarizing the statements that the plaintiff's second expert relied upon to form his opinion).

²²⁰ See *id.* at *12 (holding that the plaintiff did not show that gasoline vapors were present in the building creating an imminent and substantial endangerment of health or environment).

²²¹ See *Grace Christian Fellowship v. KJG Invs. Inc.*, No. 07-C-0348, 2012 WL 1069023, at *1 (E.D. Wis. Mar. 29, 2012) (describing the motions at bar before the court: plaintiff's motion for summary judgment on the liability of defendants for trespass, nuisance, and negligence and partial determination of liability under RCRA; plaintiff's motion for summary judgment as to defendant Colony Insurance; defendants KJG and PSK's motion for summary judgment; and plaintiff's motion to reconsider the court's August 4, 2011, decision denying in part and granting in part defendants KJG and PSK's motion to strike).

²²² See *id.* at *18-19 (summarizing Grace Christian Fellowship's new evidence regarding the exposure pathway and the defendants' objections to that evidence).

²²³ See *id.* at *19 (explaining why the defendants argued that the plaintiff's evidence was inaccurate).

²²⁴ *Id.* at *19-20 (explaining Grace Christian Fellowship had moved for summary judgment on only the first two elements of its RCRA claim: (1) whether the defendants "have generated solid or hazardous waste" and (2) whether the defendant has "contributed to or [is]

This case emphasizes the need for an expert's opinion to be based on the most current evidence possible.²²⁵ If a vapor extraction system was installed, an expert should be clear in his or her opinion as to what the potential dangers are when the system is turned on and off, as well as clear about what portions of his or her opinion are based on evidence collected before and after installation of the extraction system.²²⁶ Failing to disclose this information only leaves the expert's opinion open to attack by the opposing party.²²⁷

11. *Newark Group v. Dopaco, Inc.*

In *Newark Group v. Dopaco, Inc.*, Newark Group purchased property the defendant, Dopaco, previously occupied as a tenant.²²⁸ Dopaco operated a rotogravure printing operation in the basement of the area it leased, and in doing so, utilized a chemical called toluene.²²⁹ Dopaco stored the toluene it used in storage and waste tanks on the property.²³⁰ After Newark Group purchased the property, it found toluene in the soil and groundwater in excess of the environmental cleanup standards set by state and federal regulatory agencies.²³¹ Newark Group sued Dopaco pursuant to the RCRA's citizen suit in the Eastern District of California.²³²

Newark Group moved for summary judgment on its RCRA claim in April of 2010, presenting evidence from two environmental consultants who confirmed there was toluene present in the soil and groundwater of

contributing to the . . . handling, storage, treatment, transportation[,] or disposal of solid or hazardous waste"). The court found that Grace Christian Fellowship established both these factors, but that issues of fact precluded a finding of the third RCRA citizen suit factor: whether the solid or hazardous waste may present "an imminent and substantial endangerment to health or [the] environment." *Id.*

²²⁵ See *id.* at *19 (finding that a factual dispute existed in part because the plaintiff's expert failed to consider the vapor extraction system in his opinion).

²²⁶ See *Grace Christian Fellowship*, 2012 WL 1069023, at *19 (noting the defendants questioned the expert's testing because it was conducted while the vapor extraction system was not in operation).

²²⁷ See *id.* (recognizing a dispute between the parties due to the expert's testing methodology).

²²⁸ See *Newark Grp. v. Dopaco, Inc.*, No. 2:08-CV-02623-GEB-DAD, 2010 WL 1342268, at *3-4 (E.D. Cal. Apr. 2, 2010) (outlining the ownership history of the property).

²²⁹ See *id.* at *1 (explaining toluene was used as a diluent for top lacquer, which was not used on all printing jobs).

²³⁰ See *id.* at *2 (describing the toluene was stored in a 4,000-gallon storage tank and in fifty-five-gallon drums on the Dopaco property).

²³¹ See *id.* at *4 (noting the plaintiff alleged that the concentrations found in the soil and groundwater were in excess of levels toxic to various species).

²³² See *id.* at *1 (stating Dopaco was a former tenant on Newark Group's property before Newark Group purchased the property).

its property.²³³ Through its experts, Newark Group argued that because toluene is known to have adverse effects on human health, the presence of toluene in the soil and groundwater created an imminent and substantial endangerment under the RCRA.²³⁴ Dopaco countered this evidence with testimony from a geo-environmental and civil engineer expert who opined that the Newark Group's experts failed to demonstrate a finding of imminent and substantial endangerment because they had not evaluated whether there was a population at risk of exposure to the toluene and had not evaluated potential exposure pathways.²³⁵ The court found in favor of Dopaco and ruled that Newark Group was required to show more than toluene contamination on the property (in other words that the groundwater was actually being used for drinking purposes).²³⁶

Several months later, in September of 2010, Dopaco moved for summary judgment on the plaintiff's RCRA claim, relying on the April 2010 order in its favor to argue that Newark Group failed to present evidence of an imminent and substantial endangerment.²³⁷ Newark Group, however, engaged a new expert to opine on the potential exposure pathways presented by the toluene in the soil and groundwater.²³⁸ Newark Group's new expert opined that soil vapor samples from under the concrete slab of the basement of the property revealed that toluene was present underneath the building and that dangerous levels of toluene were likely to be encountered by workers who were tasked with demolishing the building.²³⁹ This expert concluded that the toluene vapors present in the subsurface of the building must be remediated to address an imminent and substantial threat.²⁴⁰ The court found that Newark Group's expert's opinion on toluene vapors entering the building

²³³ See *id.* at *5 (summarizing the Newark Group's environmental consultants' positions).

²³⁴ See *Newark Grp.*, 2010 WL 1342268, at *5 (reporting the evidence submitted by Newark Group).

²³⁵ See *id.* (summarizing Dopaco's expert's opinion).

²³⁶ See *id.* at *7 ("In sum, evidence that certain samples taken from the [Newark Property] exceeded [government] standards simply provides an inadequate basis for a jury to conclude that federal law . . . has been violated."). "Absent additional evidence, the mere fact that [Newark] has produced such samples does not support a reasonable inference that [the contamination on its property] presents an imminent and substantial endangerment to health or the environment." *Id.* (internal citations omitted).

²³⁷ See *Newark Grp. v. Dopaco, Inc.*, No. 2:08-cv-02623-GEB-DAD, 2010 WL 3619457, at *1-2 (E.D. Cal, Sept. 12, 2010) (discussing the procedural posture of the case).

²³⁸ See *id.* at *13-14 (examining Newark Group's new expert's opinion).

²³⁹ See *id.* (summarizing the expert's opinion).

²⁴⁰ See *id.* at *14 (quoting Newark Group's experts as stating "[t]he toluene and methyl isobutyl ketone (MIBK) present in the subsurface at 800 West Church Street in Stockton, California must be remediated to address the threat to human health and the environment.").

during demolition created a genuine issue of material fact and denied Dopaco's motion for summary judgment.²⁴¹

Newark Group is another case that emphasizes the need for experts to offer opinions that prove the elements required for the cause of action. Expert testimony that fails to present a complete exposure pathway for the vapors to enter the building is inadequate where it is necessary for the cause of action to actually show that the vapor intrusion creates an imminent and substantial endangerment.²⁴²

12. *Ivory v. International Business Machines, Corp.*

In *Ivory v. International Business Machines, Corp.*, a group of plaintiffs sued International Business Machines ("IBM") in New York state court.²⁴³ In their lawsuit, plaintiffs alleged that IBM released solvents into the environment—including TCE—at one of its facilities and that the contaminants traveled through a groundwater plume, contaminating the soil beneath plaintiffs' homes.²⁴⁴ Plaintiffs alleged that the contaminated soil then released vapors into the indoor air in plaintiffs' basements, causing them injury.²⁴⁵ In 2002, IBM began investigating potential vapor intrusion in Endicott, New York, and in 2008, IBM was the defendant in a class action lawsuit alleging negligence, private nuisance, trespass, and medical monitoring.²⁴⁶ In *Ivory*, the claims of two families were severed from the class action to be tried first.²⁴⁷ IBM moved for summary judgment on all claims, and while the trial court found in favor of IBM on some of the claims, it denied IBM's motion for summary judgment on the plaintiffs' negligence claim.²⁴⁸ On appeal, the New York appellate court upheld the trial court's decision and emphasized that IBM, despite expert testimony on the subject, failed to explain how the pool of TCE and other solvents developed in the groundwater below its facility.²⁴⁹ Therefore, despite IBM's expert testimony stating IBM complied with the standard

²⁴¹ See *id.* at *19–20 (holding that Newark Group's evidence raised a genuine issue of material fact as to whether the toluene contamination on the property presented an imminent and substantial endangerment to health or the environment).

²⁴² See *Newark Grp., Inc. v. Dopaco, Inc.*, 2:08-cv-02623-GEB-DAD, 2010 WL 1342268, at *7 (E.D. Cal. Apr. 2, 2010).

²⁴³ See 116 A.D.3d 121, 125–26 (N.Y. App. Div. 2014) (discussing the plaintiffs' class action lawsuit).

²⁴⁴ See *id.* at 125 (stating the facts of the case).

²⁴⁵ See *id.* (summarizing the plaintiffs' allegations).

²⁴⁶ See *id.* (describing the procedural history of the litigation).

²⁴⁷ See *id.* at 125–26 (analyzing the two main plaintiffs' claims).

²⁴⁸ See *id.* at 126 (discussing the trial court's findings).

²⁴⁹ See *Ivory*, 116 A.D.3d at 127 ("Despite the statements and conclusions of defendant's experts, the record does not contain an explanation as to how a large pool of solvents developed beneath defendant's facility.").

of care, the court found that “an ordinary layperson could conclude that a corporation fails to meet the standard of due care if it allows toxic chemicals to form into a large underground pool and then migrate onto or through properties up to a mile away[.]”²⁵⁰ Moreover, the appellate court discounted IBM’s expert testimony, which opined that TCE is not generally considered carcinogenic in humans, finding that the plaintiffs’ expert testimony, which concluded that TCE exposure was a significant contributing factor to plaintiffs’ development of cancer, to be more credible.²⁵¹ Based on these disputed issues of fact, the appellate court upheld the trial court’s denial of IBM’s motion for summary judgment on the claims for negligence.²⁵²

This case contains two lessons relevant to this Article. First, while at the time the plaintiffs began investigating in 2002, and even when they filed their class action lawsuit in 2008, vapor intrusion was a relatively new area of scientific development; however, the court nonetheless found that IBM potentially owed a duty to the plaintiffs to not contaminate the groundwater below the plaintiffs’ homes resulting in vapor intrusion.²⁵³ That is, even though vapor intrusion was not a “hot” topic at the time the lawsuit was filed, that does not mean that it cannot expose a corporation to liability.²⁵⁴ Second, it is important when offering expert testimony that the expert’s conclusions align with common sense.²⁵⁵ Like IBM’s expert here, a conclusion that IBM complied with the relevant standard of care, while failing to offer an explanation of how a giant pool of solvents appeared below IBM’s facility, does not comport with common sense and may not be accepted by a court.²⁵⁶

²⁵⁰ *Id.*

²⁵¹ *See id.* at 127–28 (“Although some of defendant’s experts opined that TCE is not generally considered carcinogenic in humans, or at least not at the levels to which [plaintiffs] were exposed, plaintiffs submitted proof from a physician who concluded that TCE exposure was a significant contributing factor to [plaintiffs’] development of cancer.”).

²⁵² *See id.* at 128 (stating the trial court appropriately denied summary judgment).

²⁵³ *See id.* at 126–27 (holding the trial court appropriately denied the defendant’s motion for summary judgment on plaintiffs’ negligence claims).

²⁵⁴ *See id.* at 127–28 (determining the corporation was aware of TCE leaking and the health effects of being exposed to those solvents).

²⁵⁵ *See Ivory*, 116 A.D.3d at 127–28 (emphasizing an ordinary layperson could conclude that the defendant failed to meet its standard of care given the circumstances, despite the defendant’s expert’s opinion that the defendant met its standard of care).

²⁵⁶ *See id.* (noting the “plaintiffs countered the defendant’s submissions by presenting documents and affidavits that, without the necessity of expert proof, raised questions of fact as to whether defendant complied with the standard of care set forth by its own experts”).

IV. CONCLUSION

Vapor intrusion is now a routine part of environmental investigations that address volatile organic compounds such as chlorinated solvents and petroleum compounds. Vapor intrusion is also an issue that is now litigated, often as part of CERCLA, the RCRA, and state law claims. In environmental litigation, the need to use qualified experts on the topic of vapor intrusion will only increase. Some of the recent vapor intrusion expert opinions and court decisions analyzed in this Article offer the following lessons:

1. The fundamentals, such as fully defining the nature and extent of contamination, are of critical importance in proving causation. It will be necessary for an expert to clearly show where the plume is located and to show that vapors from that plume migrate into homes and buildings in the area overlying the plume or in areas sufficiently proximal to the plume.
2. Screening levels in vapor intrusion guidance should be used with caution. Courts will be interested in expert opinions showing that the levels of contamination, regardless of the screening levels, actually result in harm to human health.
3. Courts will most likely give reasonable latitude during discovery for investigations designed to link the areas where people are exposed to vapors to viable potential sources of the vapor contamination. A qualified expert with a well thought out investigation plan will be essential to the authorization of such a vapor intrusion investigation.
4. Vapor intrusion experts who utilize reliable methods of analysis will be well-received. In particular, experts who approach forming their vapor intrusion opinions by considering “multiple lines of evidence” will be well-positioned to thwart *Daubert* motions and be persuasive at trial. Vapor intrusion experts who provide opinions that do not comport with common sense will be much less persuasive to a court.
5. Vapor intrusion experts need to offer opinions that clearly prove the elements required for the cause of action. For example, expert testimony that merely identifies a potential vapor intrusion problem and recommends more investigation, or fails to present a complete exposure pathway for the vapors to enter the building, will be inadequate in a situation where it is necessary to actually show that the vapor intrusion causes an endangerment or a substantial impact.

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6. The areas of expertise in the field of vapor intrusion include: geology, hydrogeology, soil physics, chemistry, toxicology, etc. While courts may allow an expert with experience in the environmental sciences to testify on the issue of vapor intrusion, a single expert on vapor intrusion may not be adequate. Litigants will be best served by having more than one expert covering the different specialties at issue in vapor intrusion.
7. While vapor intrusion is a serious concern, under the right circumstances, vapor intrusion can potentially have only a minimal impact on land use, development plans, and property values. Experts have been able to show vapor intrusion risks can be managed and mitigated and done so in a way that results in minimal damages associated with vapor intrusion.

Experts play a critical role in the litigation of vapor intrusion claims. With vapor intrusion experts, like with experts in any other aspect of environmental litigation, it is essential to look for and do good science, and look for and display good professional judgment.