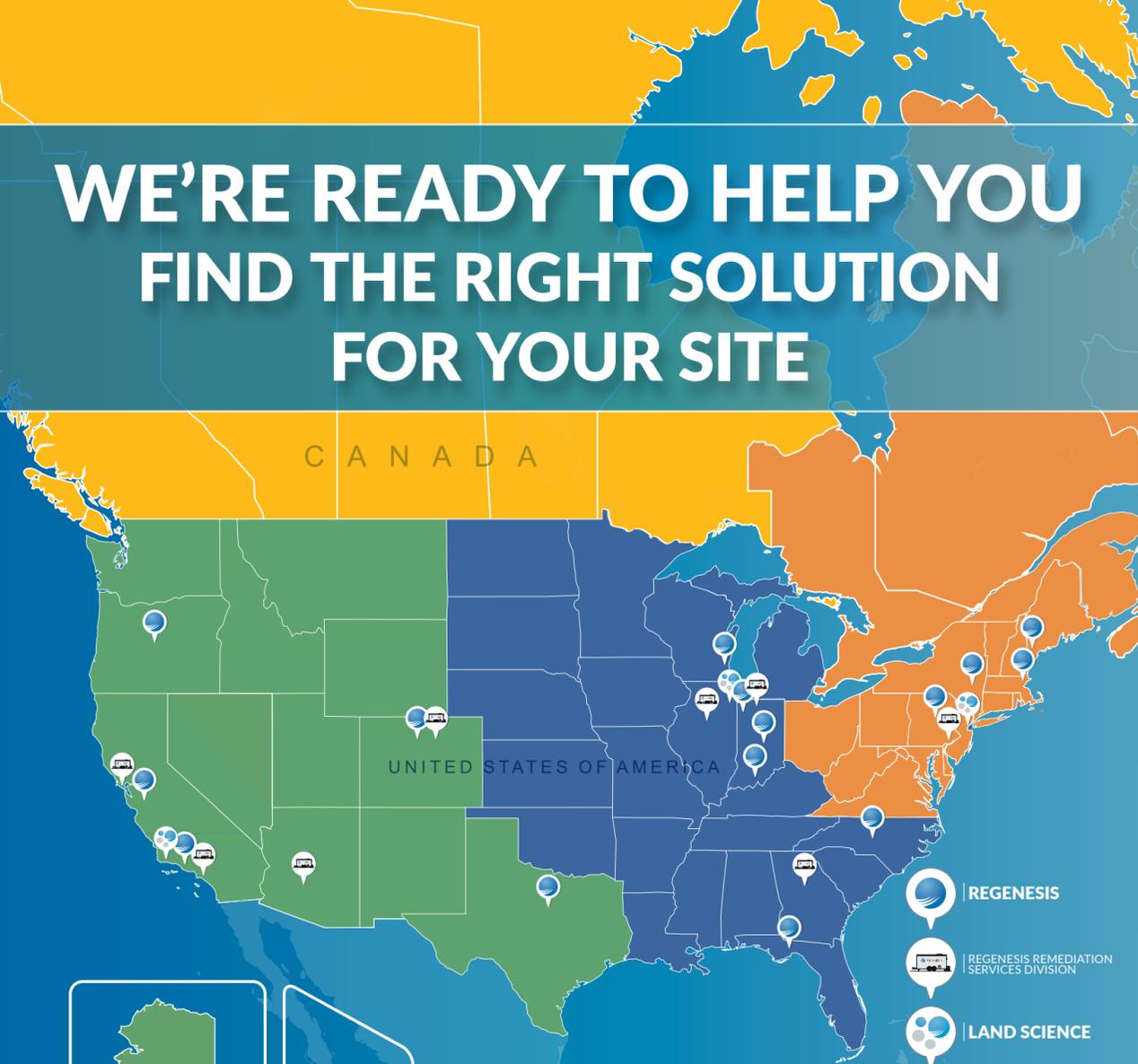


WE'RE READY TO HELP YOU FIND THE RIGHT SOLUTION FOR YOUR SITE



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To receive a custom vapor intrusion solution, please call 949.481.8118 or e-mail info@landsciencetech.com. One of our Technical Solutions Managers will review your project details and provide you with a customized vapor intrusion solution designed to achieve your goals.

Advancements in Vapor Intrusion Mitigation



Links to Additional Resources:

<https://www.cecinc.com/blog/2019/02/08/history-and-state-of-vapor-intrusion-2019/>
https://cdn.ymaws.com/www.floridabrownfields.org/resource/resmgr/imported/VaporIntrusion_FBA2011_v2.pdf
<https://www.itrcweb.org/GuidanceDocuments/VI-1.pdf>
<http://lawatlas.org/datasets/state-laws-on-soil-vapor-intrusion>

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a division of REGENESIS

PRESENTS
Advances in Vapor Intrusion Mitigation

A History of the Evolution of Vapor Intrusion Mitigation



1960's

Discovery and the practice of assessing vapor intrusion risk begins...

Vapor intrusion risk is determined to be from acute exposure or fire/explosion, mostly from petroleum landfill gas and radon surveys

1970's

- ✔ Volatile organic compounds (VOC) viewed as inhalation carcinogens
- ✔ VOC plume mapping by soil gas surveys developed

1980's

Resource Conservation and Recovery Act (RCRA) Office of Solid Waste and Emergency Response (OSWER) Corrective Action Directive required investigation to characterize subsurface gasses from hazardous constituents

Characterization of subsurface gasses was included in the 1986 RCRA Corrective Action Directive guide document



1990's

In the 1990's, some states begin requiring evaluation of the Vapor Intrusion Pathway.

The American Society for Testing and Materials (ASTM) develops Risk-Based Corrective Action (RBCA) standard for petroleum releases including vapor intrusion.

It wasn't until investigative work of the Massachusetts Department of Environmental Protection (MassDEP) in the 1990's that regulators began to understand the significance of vapor intrusion

By mid - 1990's, some states (MA, MI, CT, and RI) required the vapor intrusion exposure pathway be

evaluated during environmental site assessments

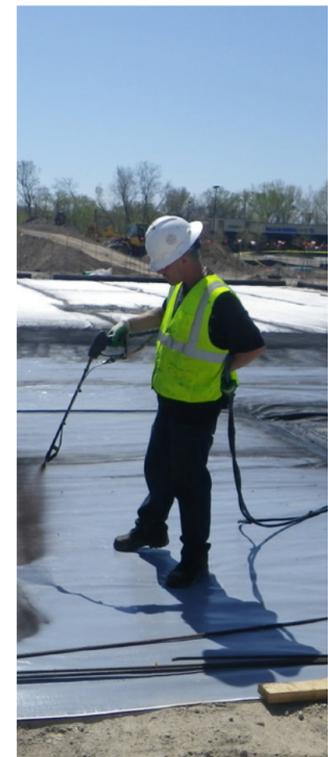
The Redfield site in Colorado was one of the first major sites to bring the vapor intrusion issue to the attention of the U.S. Environmental Protection Agency (USEPA) and the nation in the late 1990's

- ➔ Relatively low concentrations of 1,1-dichloroethene (1,1-DCE) in groundwater were found to have impacted indoor air in a large number of homes overlaying the solvent plume

Vapor intrusion was not a regulatory concern when the HRS was revised in 1990, the vapor intrusion pathway was (is) not one of the pathways that are evaluated when scoring a site

2002

USEPA introduced "Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater & Soils" (Subsurface Vapor Intrusion Guidance), 67 Fed. Reg. 71169



2009

EPA's Office of the Inspector General (OIG) recommends that EPA update its Vapor Intrusion Guidance.

REGENESIS' new Land Science division focusing on vapor intrusion solutions established



- ➔ Geo-Seal is the first composite contaminant vapor barrier system. This system was adapted from the waterproofing industry by our scientists and was an advancement over simple spray-applied products being promoted as contaminant vapor barriers at the time.

- ➔ Accepted by state environmental agencies across the USA
- ➔ Lowest diffusion rates in the industry

2010

✘ Vapor intrusion was not recognized as a component of an ASTM International environmental site assessment (ESA) until 2010, when ASTM introduced its Vapor Encroachment Screening Standard (E2600-10)

2011

EPA began soliciting public feedback on topics related to the potential revisions to the HRS including vapor intrusion

2012

Retro-Coat™
Vapor Intrusion Coating

REGENESIS develops Retro-Coat

- ➔ Chemically resistant coating designed to stop vapor intrusion within existing structures

2013

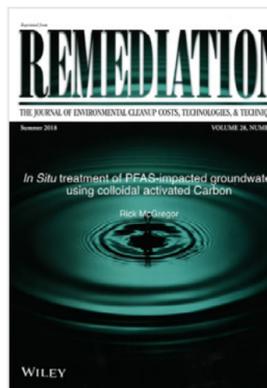


Vapor intrusion was incorporated into the Phase I ESA Standard (E1527-13)



2015

U.S. EPA issues "Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air"



^[1] (2018; 28:23-25)

2018

According to publication in the journal *Remediation*¹, as of Dec. 2018, 42 states have issued draft or final vapor intrusion guidance documents.

The remaining 8 states (GA, MS, SC, AR, OK, TX, ND, and WO) without individual guidance documents continue to adopt the federal guidance or regulate vapor intrusion on a case-by-case basis.

Of the 42 states with vapor intrusion guidance documents, screening levels for volatile chemicals vary widely depending on the cancer risk parameters (10⁻⁵ or 10⁻⁶), attenuation coefficients, and chemical data (toxicity and exposure factors) adopted by each state.

These findings have been extrapolated to the inhalation exposure pathway, prompting 11 states (AR, CA, CO, CT, MA, MI, MN, NH, NJ, NY, and OH) and the U.S. EPA region 9 to adopt trigger concentrations for short-term TCE exposure.

2019



MonoShield launched by Land Science

- ➔ MonoShield is a chemically resistant and easy-to-apply barrier specifically designed as a preemptive solution for vapor intrusion at brownfield redevelopment sites



TerraShield launched by Land Science

- ➔ TerraShield effectively mitigates volatile contaminant impacts that represent significant health hazards and economic benefits. The TerraShield system has been lab tested and proven to be chemically resistant over any existing vapor barrier currently on the market.

