Industry-Leading Vapor Barrier Systems

Increased Protection. More Cost-Effective.

Land Science®
a division of REGENESIS®

www.landsciencetech.com

Land Science Vapor Intrusion Solutions

As experts in the field of contaminant vapor intrusion (VI) mitigation, Land Science® works with leading engineering firms, environmental consultants, building owners, and real estate developers to offer safe and effective contaminant VI mitigation solutions in the redevelopment of brownfield sites.

As risk standards and other compliance issues associated with contaminant VI continually evolve, engineered controls like those offered by Land Science provide a practical, cost-effective solution to eliminate risks. Recent advances in contaminant vapor intrusion mitigation developed by Land Science have assisted developers, engineering firms, regulators, and land owners by providing technically sound solutions effectively mitigating these issues.

Contaminant Vapor Intrusion Defined

What is contaminant vapor intrusion? Simply stated, it is the transport of chemical vapors from subsurface soils and/or groundwater into buildings through diffusion and advection due to barometric pressure changes, wind load, thermal currents, or depressurization from building exhaust fans. Contaminant vapor intrusion is highly site-specific due to varying natural conditions, contaminants and migration pathways. A few of the common variables affecting contaminant vapor intrusion include: contaminant type (i.e. petroleum compounds or chlorinated solvents), type of soils beneath the structure, contaminant concentration, exposure/contaminant migration pathways (like foundation cracks and utility trenches) depth and location of contaminants relative to the structure, and building ventilation system design.

Why Is VI Mitigation Important?

For developers and engineers, successful mitigation of vapor intrusion is paramount to protect human health for regulatory compliance and liability protection. In the past, regulatory closures typically evaluated soil and groundwater exposure pathways, but did not always include evaluation of vapor migration into buildings. As a result, closed regulatory cases in several states have been reopened in order to include evaluation of vapor intrusion, and in many cases, installation of vapor mitigation systems.

In addition, vapor intrusion cases are becoming topics of litigation, which could potentially cause property owners or lenders severe monetary and reputational risks. Due to the fact that many past regulatory closures left soil contamination in place, many existing developments - even if constructed in the last few years - are being scrutinized for vapor intrusion by lenders and regulatory authorities.

Why Mitigate?

- Protect human health
- Reduce cost of site remediation
- Expedite site construction
- Reduce site investigation and evaluation
- Protect client's investment
- Reduce risk and liability
- Comply with new regulatory requirements

TerraShield™
Aluminum Nitrile Vapor Barrier

TerraShield™ is a significant step forward for vapor barriers. Employing an innovative, dual-metallized film technology, TerraShield provides superior chemical resistance over any existing vapor barrier currently on the market. It is the ideal vapor mitigation solution for residential, industrial, and commercial developments with volatile contaminant impacts that represent significant health hazards and economic liabilities.

TerraShield Benefits Include:

TerraBase is 100x More Effective Against Vapor Intrusion

Nitrile-Modified Core is 10X More Effective Than Asphalt Latex Core

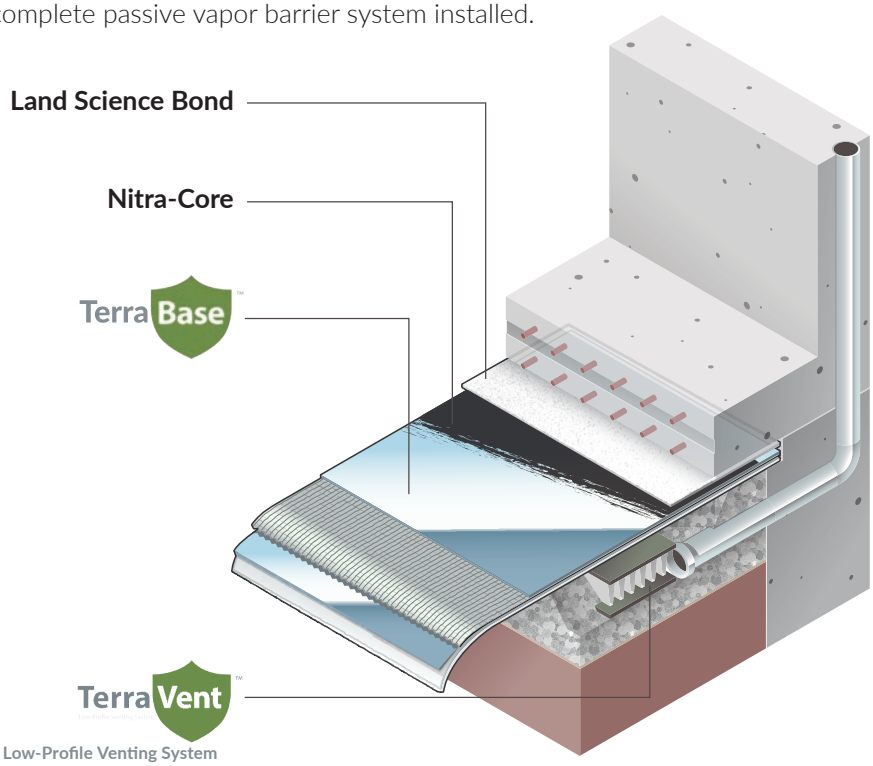
Highest Chemical Resistance

Certified Applicators Ensure Proper Installation, Reducing Risk

The Difference is a Multi-Layer Base with Dual-Metallized Film Technology

The Land Science research and development team (R&D) has invested years in developing the TerraShield vapor barrier system. TerraShield delivers orders of magnitude higher VI protection as compared to the leading vapor barrier system. The new, innovative dual-metallized material and multiple layers of protection are key to the increased performance. The R&D team also improved on the core material, incorporating nitrile, known for its chemical resistance, as a key component. The resulting product has been shown to be 100x more effective at protecting against vapor intrusion than 10-mil high density polyethylene (HDPE) sheets in recent laboratory tests.

TerraShield was designed specifically to eliminate risk of exposure by employing innovative technologies to provide best-in-class chemical resistance and durability. Backed by a robust warranty and installed by Land Science Certified Applicators, each TerraShield installation is rigorously tested to ensure the quality of every seal and ultimately the complete passive vapor barrier system installed.



Nítra-Seal™

Nitrile-Advanced Vapor Barrier

Ideal Blend of Constructibility and Chemical Resistance

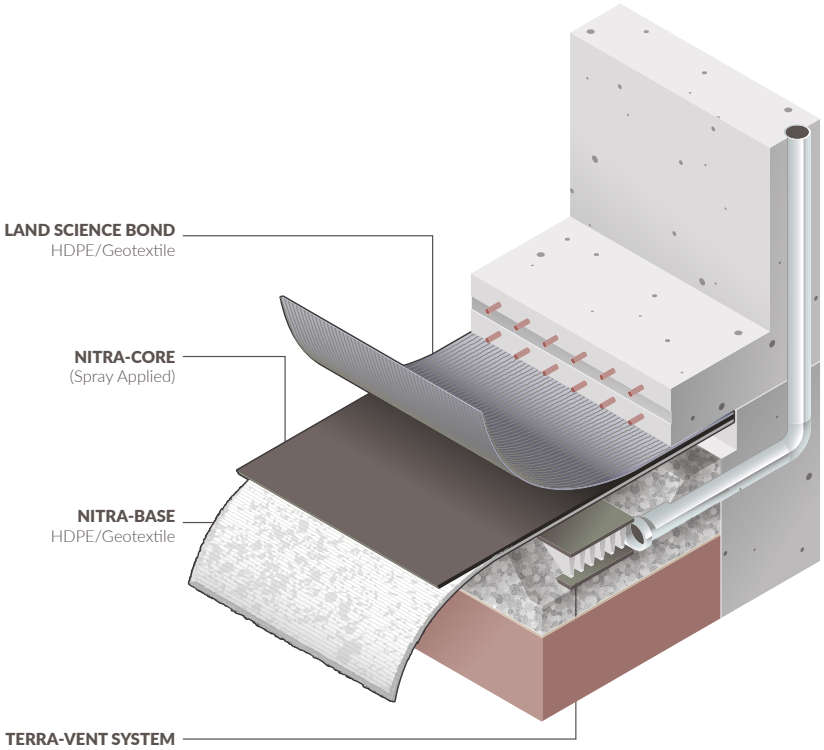
Enhanced Curing In Range of Temperatures

Puncture Resistance

Passive or Active Venting System Option

Nitra-Seal™ is an updated improvement on current vapor barrier systems. Originally, passive vapor barrier systems were waterproofing systems adapted for use as contaminant vapor barriers. Land Science identified the need to improve both the chemical resistance and puncture resistance over the Styrene-Butadiene (SBR) based modified asphalt. Nitra-Seal offers a substantial upgrade as it employs a more chemically resistant nitrile latex instead of the more susceptible SBR modified asphalt material.

Nitra-Seal has been lab-tested and proven to be highly effective against VOCs like chlorinated solvents, petroleum contaminants, and methane. The Nitra-Core component of this system is laboratory tested to be up to 10x more effective than typical spray-applied SBR modified asphalt material.



Geo-Seal®
Composite Barrier

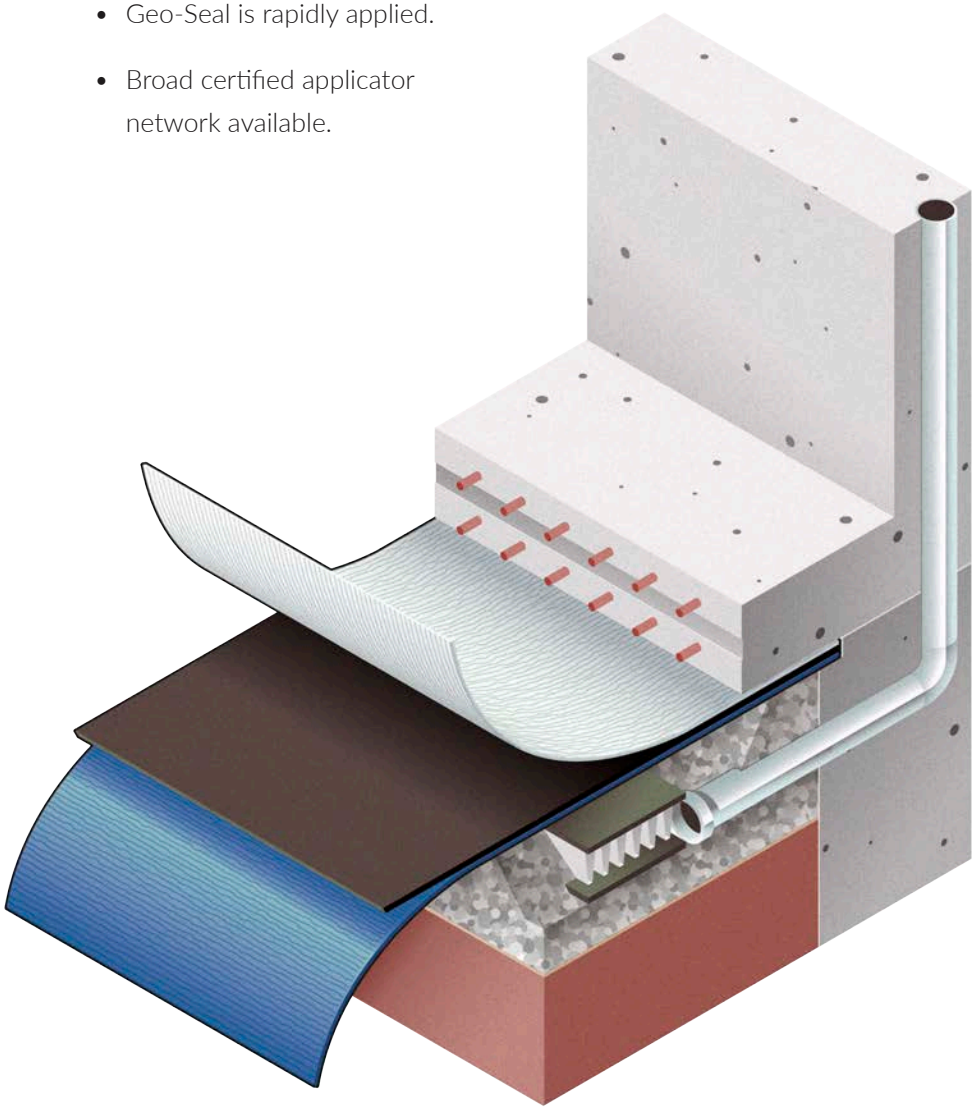
Chemical Resistance to Wide Range of Vapor Contaminants

Lab Tested Against VOCs

Wide Regulatory Approval

Geo-Seal® is a sub-slab composite barrier system designed for water-proofing and adapted for use in blocking low concentrations of chemical vapors on brownfield sites. Geo-Seal is placed between the building foundation and the soil pad to minimize water vapors and minor concentrations of chemical vapors from permeating through the slab. If moderate or elevated concentrations of chemical vapors may be present, a more chemically resistant barrier system is recommended such as TerraShield or Nitra-Seal.

- Geo-Seal is a composite system that is proven to block water vapors and low concentrations of certain chemicals.
- Geo-Seal is rapidly applied.
- Broad certified applicator network available.



MonoShield™
Reinforced Aluminum Contaminant Vapor Barrier

MonoShield™ is a chemically-resistant and easy-to-apply vapor barrier specifically designed as a preemptive solution for VI at brownfield redevelopment sites. It is backed by unparalled design support, robust warranty options, and a network of certified applicators who can ensure quality installation.

Quick and Simple Installation

Excellent Constructability

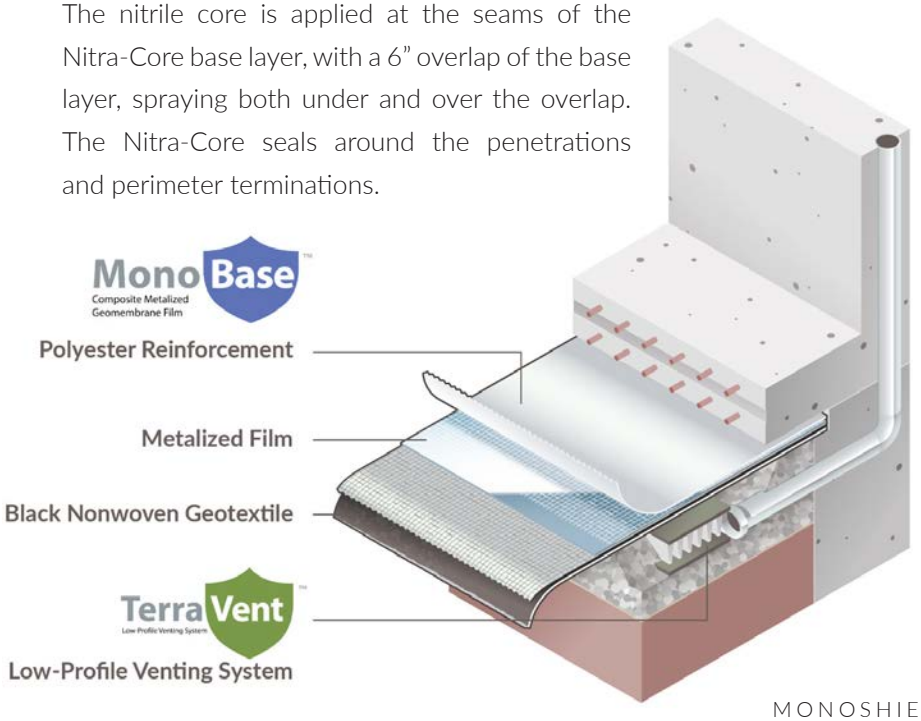
Highest Chemical Resistance on the Market

Competitively Priced

Prior to MonoShield, solutions for VI mitigation at large warehouses or retail developments, where regulatory requirements are not a driving factor, were easily-punctured thin-mil plastic sheets or inflexible and difficult-to-seal HDPE barriers. These solutions offered either chemical resistance or constructability, but not both. Composed of an innovative metallized film seamed with nitrile-modified asphalt, MonoShield sets the standard for preventing diffusion and permeation of chemical vapors. The spray-applied seal is far more effective and easier to apply than tape-based or heat-welded systems. MonoShield offers the best of both worlds, providing developers with a viable long-term solutions for reducing liability and protecting human health at a competitive price.

The MonoShield VI Barrier System is Comprised of MonoBase and Nitra-Core

MonoBase is a patent pending 30-mil composite geomembrane comprised of flexible chemically resistant metallized film laminated to a geotextile, a copolymer polyethylene and a tear resistant polyester reinforced grid structure. It is designed to act as a stand-alone vapor barrier in combination with Nitra-Core sealing around seams, penetrations and terminations. The nitrile core is applied at the seams of the Nitra-Core base layer, with a 6" overlap of the base layer, spraying both under and over the overlap. The Nitra-Core seals around the penetrations and perimeter terminations.



Retro-Coat™
Vapor Intrusion Coating

Tested and Proven Against TCE, PCE & PHCs

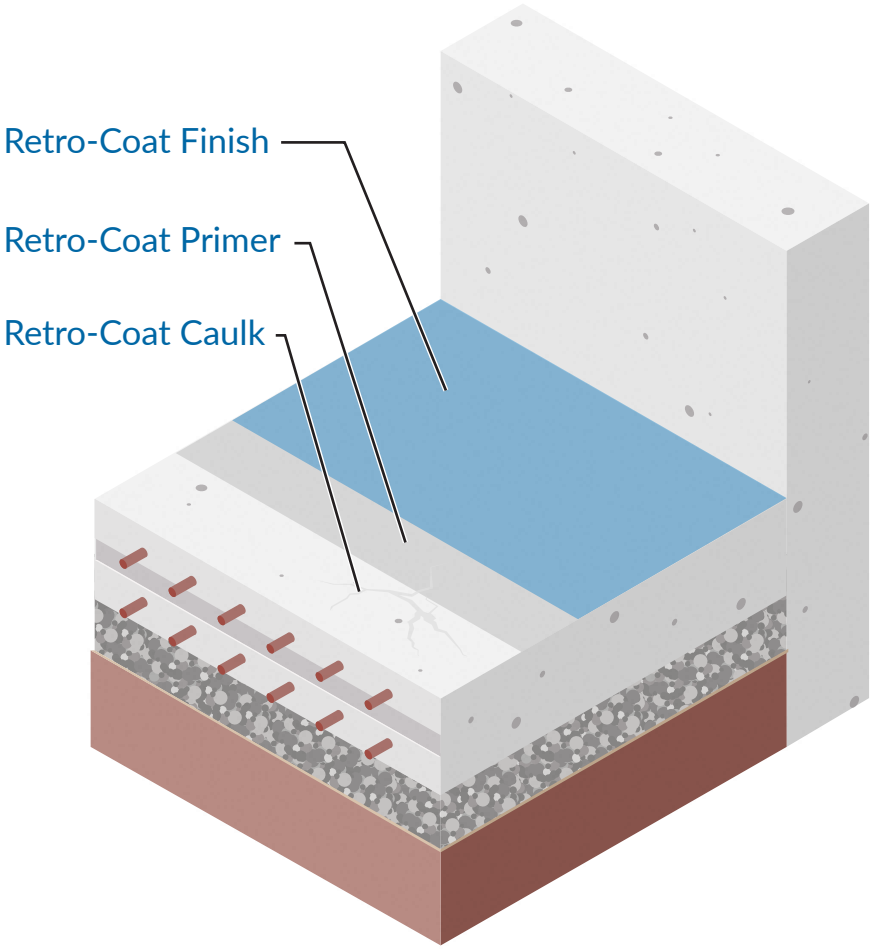
Quick Install and Curing Time

Functions as Wearing Surface, Eliminating Need For Sub-Slab Removal

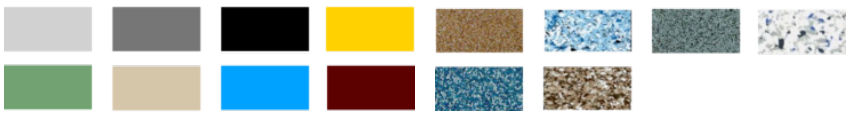
Can Aid in Retiring Active Sub-Slab Systems

The Retro-Coat™ Vapor Intrusion Coating System is a chemically-resistant coating technology which protects existing structures from the threat of contaminant vapor intrusion. Retro-Coat is installed on top of existing concrete and provides a durable, finished surface eliminating the need for additional concrete protection.

The Retro-Coat system has been subjected to rigorous testing procedures to prove its ability to combat the most aggressive chemical vapors. The system is rated for industrial use suitable for foot and forklift traffic and can be designed to allow vehicular traffic. Retro-Coat coating technology was specifically developed for vapor intrusion protection.



Available Finishes:



MonoShield Aluminum Nitrile Vapor Barrier System Installed at Liberty Park Site

Challenge

Liberty Park is located in Sterling Heights, Michigan, 23 miles north of downtown Detroit. This region, known colloquially as "Automotive Alley," is home to General Motors, Ford, and Daimler/Chrysler. The area has experienced a growing demand for high-end office and industrial warehouse space. In the last five years in particular, the region has experienced vacancy rates for manufacturing spaces as low as 1.5%.

Liberty Park is a landfill-based brownfield site. Throughout the 1940's and 1950's, a nearby creek was filled with incinerator waste which led to contamination at the site's low-lying areas. Liberty Park was first redeveloped into a recreation facility in the 1980's and operated until 2017.

This site posed multiple remediation challenges with a variety of known contaminants including arsenic, lead, and methane. In addition, the site was historically filled in an uncontrolled manner which left the soils with load-bearing capacity issues. To build on the site would require a unique foundation along with a VI mitigation solution.

Result

With MonoShield in place, Liberty Park is preemptively protected from any harmful VI. Additionally, applying this new technology was extremely cost and time-efficient for the developers. Oliver Hatcher completed construction in August 2019 and Liberty Park will be repurposed for light industrial warehousing and manufacturing. Commercial real estate development company, Ashley Capital, is investing in this property and anticipates that this new space will bring hundreds of new jobs and economic growth into the eastern part of Michigan. All of the involved parties are very pleased with the results from Monoshield and the successful redevelopment of this brownfield site.

Vapor Barrier System Applied at Medical Supply Warehouse Distribution Center

Challenge

A 17.5 acre Brownfield site in Detroit once housed multiple factories, fuel storage operations, a rail yard, paint shops, and commercial structures. The site has been recently developed into a medical distribution center for a major medical supply company. Subsurface investigations within the area identified that the historical operations released VOCs, including chlorinated solvents, which posed a potential risk to the indoor air quality of the proposed medical supply warehouse facility. The environmental consultant (AKT Peerless) was able to secure brownfield funding through the Michigan Department of Environmental Quality (MDEQ), now known as the Michigan Department of Environment, Great Lakes, and Energy (EGLE), and prepared and submitted a Vapor Mitigation System Work Plan to the EGLE which detailed the installation of the system design for the proposed new building.

Land Science assisted with providing details to AKT Peerless to aid in their design of the vapor mitigation system, which included a redundant ventilation and barrier system.

Result

The vapor barrier system was applied to the entire footprint of the medical supply warehouse (275,000-square-feet) to mitigate the vapor intrusion risk. Post-installation smoke and pressure testing were completed to ensure optimum sub-surface ventilation and barrier performance. With a vapor mitigation system in place, construction continued on the $28 million building. The facility is expected to bring 140 jobs to the area.

The Phoenix Awards
Recognition for Excellence in Brownfield Redevelopment

This project was awarded the Phoenix Award at the National Brownfields Conference

Retro-Coat Applied To Former Jazz Club Ensures Protection From Vapor Intrusion

Challenge

Renton, Washington is a bedroom community located just outside of downtown Seattle. As a suburb to downtown Seattle, Renton has seen tremendous growth over the last two decades as technology giants like Microsoft, Amazon, and Nintendo choose the area for their global headquarters. With commercial properties and home values ever increasing, developers are looking for new ways to restore brownfield sites quickly and effectively, to allow them to move forward with future development. In the case of this former popular jazz club in the historic section of downtown Renton, indoor air quality was impacted with volatile organic compounds associated with dry cleaning solvents that had spread from a nearby dry cleaning operation.

The safe, effective and efficient installation of the Retro-Coat Vapor Mitigation System was completed within three days. Environmental consulting firm Maul Foster Alongi conducted an indoor air quality assessment at the property after installation of the Retro-Coat VI System.

Result

The objective of mitigating VI of volatile organic compounds (VOCs) into the building structure for future occupants at the property has been met by the installation of the Retro-Coat VI System. The Retro-Coat VI System provides a long-term solution to the property indoor air quality issues arising from the adjoining dry cleaners facility.

Laboratory analytical results for the indoor air quality assessment after installation of the Retro-Coat vapor intrusion System indicated the following:

- The tetrachloroethylene PCE concentration in the dining room area (JRIA-5 indoor air sample—5.1 µg/m3) measured below the DOE Vapor Intrusion Indoor Air Method B cancer CUL of 9.6 µg/m3 (DOE, 2016).
- Other VOCs associated with dry-cleaning solvents, including carbon tetrachloride, 2 butanone, toluene, and xylenes, were also detected below their respective DOE Vapor Intrusion Indoor Air Method B cancer CULs.

Installation Done Right: Certified by Experts

Make Sure to Choose a Certified Applicator

A vapor barrier is only as effective as the quality of its installation. If installed incorrectly, a vapor barrier will likely fail, regardless of the underlying technology. Because of this, Land Science invests heavily in their applicators. All TerraShield contractors must pass a rigorous applicator certification and training program to ensure their work meets the demanding installation standards. There is a continuing education program available for all applicators to ensure they are up to date on the best practices for installation and inspection. TerraShield components are shipped to and installed on site. Final assembly on-site ensures tight seals between seams, around penetrations, and to terminations. Once installed, applicators perform a full smoke test beneath the barrier to confirm that all seals are secure and that the system will prevent vapor intrusion to the best of its ability. Any leaks are immediately repaired and testing is repeated until the system is shown to be completely secure.

Certified applicators are located throughout North America who can install TerraShield quickly and efficiently.

Choose a VI System with an Industry Leading Warranty

The World's Leading Vapor Barrier System Warranty

Land Science offers industry leading warranty options for its vapor barriers, including material and system warranties with durations from a 1-30 year material and system warranty. System warranties require site specific evaluations by Land Science prior to installation to determine if a system warranty can be offered. So you can rest assured that your investment in vapor intrusion mitigation is protected.

Land Science and REGENESIS Working Together for Your Success

As a wholly-owned division of REGENESIS®, a recognized leader in the environmental industry, Land Science has been at the forefront of vapor intrusion mitigation. With combined experience in vapor intrusion mitigation and environmental remediation that encompasses more than 26,000 projects worldwide in over 27 countries, Land Science has a unique advantage over other vapor intrusion solution providers.

In addition to its own research and science-based product development, Land Science benefits from its close association with REGENESIS by aligning teams and managing a broad range of VI mitigation issues. These products and solutions include patented vapor mitigation and environmental remediation technologies supported by the highest levels of scientific research.

World Class Clients

Environmental consultants, engineers, and real estate professionals trust Land Science to produce results knowing our expertise and industry knowledge has been proven time and again at the job site. Our world class clients include leaders in the food, banking, government, and housing industries.

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

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Get Started Today

To recieve 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 site goals.

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