Introduction

Land Science®, a division of REGENESIS®, develops vapor intrusion mitigation solutions that protect people and invigorate renewal of contaminated properties. We leverage our industry expertise to assist clients in developing site-specific solutions that are technically sound and cost-effective.

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

As risk standards and other compliance issues associated with contaminant vapor intrusion 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.

TABLE OF CONTENTS

Leadership / page 3
Achievement / page 4
Vapor Intrusion Mitigation / page 5
Case Studies / page 6
Vapor Intrusion Mitigation Products/Technologies / page 11
A Certified Network for Quality Assurance / page 13
Our World-Class Clients / page 14
The World’s Leading Vapor Barrier System Warranty / page 14
Land Science Team / page 15

“Your engineers provide solid information and backup for your technical assessments of sites; your products work; your company provides excellent case studies to compare and evaluate. I love working with technically competent people who are nice on top of it!”

– Yen-Vy Van, Senior Hydrogeologist, MAUL FOSTER & ALONGI, INC.
Leadership

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 vapor intrusion mitigation issues. These products and solutions include patented vapor mitigation and environmental remediation technologies supported by the highest levels of scientific research.

Land Science leads the environmental remediation industry in:

Vapor mitigation technologies - Land Science has installed vapor mitigation technologies at over 800 project sites across the United States, totaling over 15,000,000 square feet. Our three core technologies, each supported by the highest levels of scientific research, include the Geo-Seal® composite sub-slab vapor intrusion barrier for new construction, Retro-Coat™ concrete vapor intrusion coating for existing buildings (retro-fit), and Vapor-Vent™, a low profile, passive, sub-slab vapor venting system.

Federal and state regulatory approval - Land Science has worked with state and federal regulators to obtain regulatory approval of our technologies throughout North America.

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 warranty and up to a 20-year system warranty.

Quality assurance of vapor mitigation systems - Only certified contractors are allowed to install Geo-Seal. This allows us to have oversight on the quality of the installation. Geo-Seal is guaranteed to be installed properly because we will require the owner to hire a 3rd party certified inspector, i.e. the specifying engineer, or a manufacturer’s representative.
Achievement

For over a decade, Land Science has been supporting environmental engineering firms with expert technical advice related to vapor intrusion mitigation. Success is not achieved until our clients’ goals are met or exceeded.

To produce this outcome, we build project teams with the experience, discipline and dedication to work hand-in-hand with our clients to address the unique requirements of each project site. Technical insight, timely response, and direct, honest communication are all hallmarks of Land Science.

Pictured: A 17.5-acre Brownfield site in Detroit that was redeveloped into a medical supply warehouse using the Land Science vapor mitigation technologies, Geo-Seal and Vapor-Vent. The project won the US EPA Brownfields Phoenix Award, and the new facility is expected to bring 140 jobs to the area.
Vapor Intrusion Mitigation

Contaminant Vapor Intrusion Defined
What is contaminant vapor intrusion? Simply stated, contaminant vapor intrusion 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 Mitigation of Contaminant Vapor Intrusion 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 cases are becoming topics of litigation, which could potentially cause property owners or lenders severe monetary and reputational risks. The “end game” is this: due to the fact that many past regulatory closures left contamination in place in soil on a site, many existing developments, even if constructed in the last few years, are being scrutinized for vapor by lenders and regulatory authorities.
Case Studies

Brownfield Site Receives “No Further Action” Status within One Year of Implementation

Challenge
At a former industrial magnet manufacturing facility in Ohio, site investigation activities identified chlorinated VOC’s in groundwater and vapors above the state standards, requiring remediation and mitigation.

Result
Initially, reductive dechlorination was implemented within the defined 24,000 sq. ft. treatment area using the REGENESIS remediation technologies, 3-D Microemulsion® and BDI Plus®. A Geo-Seal® contaminant vapor intrusion barrier was then installed. A combined approach of vapor mitigation and enhanced reductive dechlorination helped address the immediate risk of vapor intrusion, in addition to the long-term risk of groundwater impacts. By implementing this strategy, the site was allowed to be redeveloped as an apartment complex roughly six months following the groundwater treatment rather than waiting years for remediation to be complete.
VOC Contaminants Reduced by 99% in One Month for Homeowners in Virginia Following Retro-Coat Installation

Challenge
At a residential site in Virginia, vapor intrusion affected the interior living space of a private building due to release of heating oil from an Above-Ground Storage Tank (AST) to the sub-slab environment beneath the structure. Indoor air quality sampling after the release revealed several petroleum compound contaminants at concentrations above EPA Residential Screening Levels. To minimize the displacement of the homeowners for an extended period of time, the vapor intrusion mitigation system had to produce good indoor air quality results as quickly as possible. Leading environmental firm, Duncklee & Dunham, designed and installed an active, sub-slab vapor mitigation system and sealed the surface of the slab in the interior of the building with 1000 sq. ft. of Retro-Coat applied.

Result
The vapor mitigation system reduced VOCs in the exhaust gas by 99% within one month of operation, and reduced levels of petroleum compounds in indoor air to the extent that the building was suitable for occupancy six weeks after the system startup.

Ohio EPA Generates a Covenant Not To Sue Following Geo-Seal/Vapor-Vent Installation At Former Manufacturing Site

Challenge
Ohio cities are experiencing a building boom and real estate investors are eager to build multi-family apartments on available land. A well-known real estate developer recently purchased the site of a former manufacturer where chlorinated and other solvent levels exceeded regulatory guidelines. The developer needed a quick and effective solution to mitigate the vapor intrusion present and turned to Geotechnical Consultants, Inc. (GCI), an experienced environmental consultant. The Geo-Seal and Vapor-Vent systems were selected by GCI to mitigate the vapor intrusion found.

Result
The certified contractor successfully installed Geo-Seal and Vapor-Vent on multiple new buildings. Vapor intrusion levels were addressed and the project moved forward with the development of a multi-family apartment complex. GCI provided a No Further Action Letter for the property to Ohio EPA to address the vapor intrusion and other pathways. Ohio EPA issued a Covenant Not to Sue for the project, eliminating concern over potential future liability for contamination.
Historic Building Achieves Site Closure Using Retro-Coat to Meet Environmental Screening Levels

Challenge
Retro-Coat was selected to mitigate vapor intrusion within a structure built in 1907 that had been impacted by both a former underground storage tank and a local dry cleaner. Indoor air samples taken prior to application showed chlorinated solvent-based PCE and TCE levels above the Regional Water Quality Control Board Environmental Screening Levels (RWQCB ESL). Existing wood flooring, CMU block walls, framing obstructions on the wall, and conduits penetrating both the basement floor and walls presented challenges to successfully providing vapor intrusion mitigation to the entire basement area. The age of the structure was also a factor because little was known about how the building was constructed or expansion/improvements made over the years. The building owner sought to provide the future occupants of the building with vapor intrusion protection using a durable and slip resistant coating. Retro-Coat was applied to the existing wall surface (CMU block walls) and across the floor. Additionally, a silica sand was broadcast across the floor during the Retro-Coat application to achieve a non-slip surface.

Result
Upon completion of the Retro-Coat application, indoor air samples were collected. Because the building use was mixed use, indoor air concentrations needed to meet both residential and commercial screening levels. The application of Retro-Coat achieved orders of magnitude reduction similar to those of Sub-Slab Depressurization (SSD) Systems without the need to operate and maintain finicky mechanical systems. Post-application indoor air data confirmed Retro-Coat compliance with residential and commercial ESLs, and the site achieved closure due to the successful Retro-Coat application.
Construction Moves Forward on New Bank Location Once Geo-Seal is Installed to Mitigate Vapor Intrusion Risk

Challenge
The construction of a new Compass Bank location was scheduled to be built over a site with chlorinated solvents residing in the subsurface. A vapor intrusion membrane was sought to prevent vapor intrusion entering the building from the contamination below. Initially, a simple spray-applied asphalt/latex material was specified. However, TGE Resources requested Geo-Seal be approved by the design engineer because of its superior chemical resistance and ability to prevent chlorinated solvent vapors from migrating into the new building’s construction. Geo-Seal was approved by Brownfield Subslab and favored as a superior alternative to the specified barrier because of its ability to resist contaminant permeation breakthrough for periods 18 times longer than a simple asphalt/latex membrane. Geo-Seal proved to be a cost-effective choice for the owner and was successfully installed along with Vapor-Vent trenchless venting system. Overseeing the installation was Brownfield Subslab, a certified Geo-Seal inspector.

Result
Geo-Seal was applied to 150,000-square-feet of retail space and the applicator was able to meet union labor guidelines for the project. Vapor intrusion risks were also mitigated at a fast-food restaurant and bank on-site through the application of Geo-Seal. The site was issued a draft “No Further Remediation” letter with the final letter issued upon completion of the engineered barriers constructed as part of the redevelopment.
Retro-Coat and Vapor-Vent Treat High TCE Vapor Levels at Former Michigan Manufacturing Facility

Challenge
St. Johns-based F.C. Mason company was provided a $1 million Clean Michigan Initiative Brownfields grant from the Michigan Department of Environmental Quality (MDEQ) to move its operations to the former Federal Mogul manufacturing facility which was vacated in 2008. F.C. Mason Company was founded in 1898 and specializes in manufacturing parts for agricultural, construction and industrial equipment. The acquisition of the 265,000-square-foot facility allows F.C. Mason to expand operations and bring back valuable jobs to Clinton County. Michigan-based Soil and Materials Engineers, Inc. (SME) was consulted to address the suspected environmental and vapor intrusion concerns resulting from years of manufacturing activities at the site.

Trichloroethylene (TCE) contaminated areas were present in one section of the building, and a vapor intrusion condition was identified and mitigation was needed. Retro-Coat was selected to be used in conjunction with an active sub-slab depressurization (SSD) system. By simultaneously utilizing the two mitigation approaches, SME was able to reduce the number of SSD points in the design and the total area requiring the vapor intrusion barrier coating.

Result
Approximately 30,000 square feet of Retro-Coat was successfully applied. As a result, the facility was redeveloped, delivering jobs to the Michigan community. Retro-Coat provided a durable finish for vehicle traffic and heavy equipment in a manufacturing setting.
Vapor Intrusion Mitigation Products/Technologies

Effective vapor intrusion mitigation can be accomplished using a range of approaches, which includes vapor intrusion barriers, alone or combined with passive or active venting technologies. These turn-key solutions physically block contaminated vapor from entering the structure while safely protecting building occupants.

**Geo-Seal Vapor Intrusion Barrier**
Geo-Seal is a sub-slab vapor intrusion barrier system designed to eliminate vapor intrusion for brownfields or any type of environmentally-impaired site. Geo-Seal is a chemically-resistant material placed between the foundation of the building and the soil pad to eliminate vapor intrusion pathways and stop contaminant vapors from permeating through the slab. By deploying Geo-Seal, developers can ensure a healthy indoor environment while reducing the cost of site remediation and expediting site construction.

- Geo-Seal is a composite system that creates the ideal blend between constructability and chemical resistance by using both high density polyethylene (HDPE) and spray applied asphalt latex.
- Geo-Seal has been tested and proven to be highly effective against VOCs like chlorinated solvents and petroleum contaminants and methane.
- Geo-Seal is the 1st patented vapor intrusion barrier system in the U.S.
- Geo-Seal has gained wide approval among various regulatory agencies across the country.

**Vapor-Vent Vapor Collection System**
Vapor-Vent is a low-profile vent system that can be used in conjunction with Geo-Seal and in lieu of slotted PVC pipe. The speed of installation, reduction of trenching and gravel layer, and the proximity of the vent to the barrier provide cost savings and performance benefits compared to other technologies. Along with Geo-Seal, Vapor-Vent can be installed to passively or actively vent vapors from under the building. The movement toward energy efficient buildings and the cost to maintain active venting systems make passive systems an attractive alternative to active venting systems. In addition, a passive system can be designed to become active if needed.
Retro-Coat Vapor Intrusion Coating

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.

- Tested and proven to be resistant to aggressive chlorinated compounds such as TCE, PCE and petroleum hydrocarbons.
- Functions as a wearing surface, meaning no additional concrete protection is necessary.
- No odor and fast curing time reduce building downtime.
- Carpet, tile, linoleum or other floor coverings can be applied directly over Retro-Coat, if desired.
- Eliminates the need to remove the existing slab or add additional concrete.
- Retro-Coat can aid in the retiring of existing active sub-slab depressurization systems or provide greater efficiency to ongoing SSDS systems.
A Certified Network for Quality Assurance

To ensure the installation of our world-leading vapor barriers is performed correctly and will result in the best possible performance, Land Science has established a network of certified applicators and inspectors for our technologies. Only a certified Geo-Seal applicator can install Geo-Seal. These certified contractors ensure only the highest quality work goes into the installation of your vapor mitigation system.

Certified Applicator Network

Land Science trains and certifies contractors to install the Geo-Seal membrane system, as well as the Retro-Coat Vapor Intrusion Coating System. The application of Geo-Seal, Vapor-Vent, and Retro-Coat can be performed by any one of many certified installers throughout the country.

To find a certified applicator in your area, contact your regional Land Science representative or visit our website at landsciencetech.com/applicators.

Certified Inspector Network

Land Science trains and certifies inspectors for the Geo-Seal membrane system, as well as the the Retro-Coat Vapor Intrusion Coating System. The inspection of Geo-Seal and Vapor-Vent can be performed by any one of many certified inspectors throughout the country.

To find a certified inspector in your area, contact your regional Land Science representative or visit our website at landsciencetech.com/inspectors.

“Without Land Science’s Geo-Seal & Retro-Coat vapor barriers, our redevelopment of a downtown Traverse City, Michigan Brownfield Site into upscale residential townhomes would have been impossible.”

– Mike Wills, Project Manager, Uptown Development TC, LLC
Our 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.

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 warranty and up to a 20 year system warranty. System warranties require site-specific evaluations by Land Science prior to installation to determine if a system warranty can be offered.

Land Science offers various material and system warranties* for Geo-Seal and a 1-year material warranty for Retro-Coat.

Material Warranty
Warrants the integrity of the material (Geo-Seal, Retro-Coat, Vapor-Vent, etc.)

OR

System Warranty
Warrants the integrity of the material and the workmanship of the certified installer

*Provided on a site-specific basis and requested prior to installation.
Land Science: A World Class Team

(Detailed resumes available upon request)

Rick Gillespie – Senior Vice President, North America
Mr. Gillespie serves as Senior Vice President North America for REGENESIS and Land Science. In his role, Mr. Gillespie directs a team of technical sales consultants and engineers across North America providing industry-leading support to REGENESIS and Land Science customers. He has over 20 years of experience in the environmental remediation industry.

Nick Mjolsness – Great Lakes District Manager
Nick Mjolsness is the Great Lakes District Manager of the Land Science division of REGENESIS, Inc. Nick’s role includes providing technical support in the design and installation of Geo-Seal and Retro-Coat vapor mitigation systems, and educating the environmental community on advancements in vapor intrusion barrier technology, implementation, and quality control by making presentations to environmental firms, regulatory agencies and developers.

Thomas Szocinski, CEP – Director of Vapor Intrusion
Thomas Szocinski is the Director of Vapor Intrusion of the Land Science® division of REGENESIS, Inc. In his role, he provides executive leadership, market strategy and sales support, while further strengthening relationships with state and federal regulators, applicators and environmental consultants. Szocinski is a nationally recognized vapor intrusion expert with over 14 years’ experience as an environmental scientist, focusing on vapor intrusion assessment and mitigation, remediation, site assessment, and Brownfield site management.

Ryan Miller – Northeast District Manager
Ryan Miller is the Northeast District Manager of the Land Science division of REGENESIS, Inc., and is based in northern New Jersey. His role includes providing technical support in the design and installation of Geo-Seal and Retro-Coat vapor mitigation systems, and educating the environmental community on advancements in vapor intrusion barrier technology, implementation, and quality control by making presentations to environmental firms, regulatory agencies, and developers.

Hieu Nguyen – Senior Research Engineer
Hieu Nguyen is the Senior Research Engineer of the Land Science division of REGENESIS, Inc. In his role, Nguyen oversees product implementation at construction sites and provides technical support to regional and district managers as well as Land Science clients. Hieu offers over nine years of experience supporting Brownfield redevelopment project designs, specifications and installations across United States, Canada and Australia.

Jordan Kleine – Southeast District Manager
Jordan Kleine is the Southeast US District Manager of the Land Science division of REGENESIS, Inc., and is based in Atlanta, Georgia. Her role includes providing technical support in the design and installation of Geo-Seal and Retro-Coat vapor mitigation systems, and educating the environmental community on advancements in vapor intrusion barrier technology, implementation, and quality control by making presentations to environmental firms, regulatory agencies, and developers.

Eric Maben – South Central District Manager
Eric Maben is the South Central District Manager of the Land Science division of REGENESIS, Inc, and is based in Austin, Texas. His role includes providing technical support in the design and installation of Geo-Seal and Retro-Coat vapor mitigation systems as well as educating environmental firms, regulatory agencies, and developers on Advancements in vapor intrusion barrier technology, implementation, and quality control.

Zach Gilmer, P.E. – Southwest District Technical Manager
Zach Gilmer is the Southwest District Manager of the Land Science division of REGENESIS, Inc. and is based in San Clemente, California. His role includes providing technical and budgetary support throughout the design and installation of Geo-Seal and Retro-Coat vapor mitigation systems. He promotes education within the environmental community on advancements in vapor intrusion barrier technology, implementation, and quality control by making presentations to environmental firms, regulatory agencies, applicators, and developers.
GET STARTED TODAY

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.