

# Cross-Team Collaboration Moves New Public Library and Town Hall Complex Forward

Threat of Vapor Intrusion Effectively Mitigated  
to Enable Use of Former Gas Station Site





## Site Details

### Site Type

Municipal - Public Library and Town Hall

### Contaminants of Concern

Petroleum Hydrocarbons

### Mitigation Approach

Nitra-Seal®

## Highlights



Former Gasoline Station Transformed into Library and Town Hall Complex



Collaboration Between Environmental Teams Eliminates Potential Exposure

## Project Background

A growing community near Charlotte, North Carolina was seeking a site to construct a new town hall and public library complex. The city planners had identified a land parcel that would meet the spatial requirements for the new complex, but the site was a former gasoline service station which operated on a portion of the land for nearly two decades. As part of the city's due diligence, a Phase I Environmental Site Assessment (ESA) was completed and revealed the underground storage tank (UST) system was decommissioned in 1991 with the tanks abandoned in place. However, no records existed which documented environmental conditions at the time of UST removal. Consequently, the USTs were listed as a recognized environmental concern (REC) in the Phase I ESA. In early 2020, a geotechnical investigation identified soil with odors and elevated photoionization detector (PID) readings, a further indication of petroleum hydrocarbon (PHC) contamination in the subsurface.

SUMMIT Engineering, Laboratory & Testing, P.C. (SUMMIT) conducted an environmental assessment at the property in April 2020, confirming that PHC contamination was present. Specifically, sampling data revealed benzene, ethylbenzenes, xylenes, naphthalene, and trimethylbenzene concentrations in groundwater exceeding North Carolina's Department of Environmental Quality (NCDEQ) non-residential vapor intrusion screening levels (VISL). Other common PHC contaminants such as toluene and total petroleum hydrocarbons were also detected. These findings indicated a potential vapor intrusion risk for any future building construction at the site.

**SUMMIT Engineering identified two options available to allow site development to continue:**

**Option 1**

Completion of a targeted soil gas assessment to determine if groundwater concentrations were migrating to soil gas and presenting a vapor intrusion condition or,

**Option 2**

Completion of vapor intrusion mitigation as part of any future development at the subject property if a targeted soil gas assessment was not completed.

SUMMIT recommended Option 2 - installing a vapor intrusion mitigation system (VIMS) - to the property development team knowing it would be the most effective approach to address PHC contaminant vapors exceeding VISLs at the site. This solution would provide much greater certainty that the potential vapor intrusion issue was being addressed regardless of whether contaminants were detected as part of a soil gas survey.



## VIMS Selection, Design, and Installation

In considering their options, Nitra-Seal, a state-of-the-art VIMS offering proven chemical resistance and vapor intrusion protection, was selected by the development team. Although the property's future use as a town hall and library would likely qualify for commercial vapor intrusion level of protection, the complex was conservatively treated as if it were a residential building with potential long periods of occupant exposure. This level of conservatism factored into the decision to install a Nitra-Seal VIMS and provide a high level of vapor intrusion protection.

### Project Summary

COCs Exceeding Non-Residential VI Screening Levels	Maximum Groundwater Concentrations
Benzene	300 µg/L
Ethylbenzene	5,600 µg/L
Xylenes	13,300 µg/L
Napthalene	1,400 µg/L
1,2,4 Trimethylbenzene	4,300 µg/L
1,3,5 Trimethylbenzene	1,000 µg/L

### Additional Information

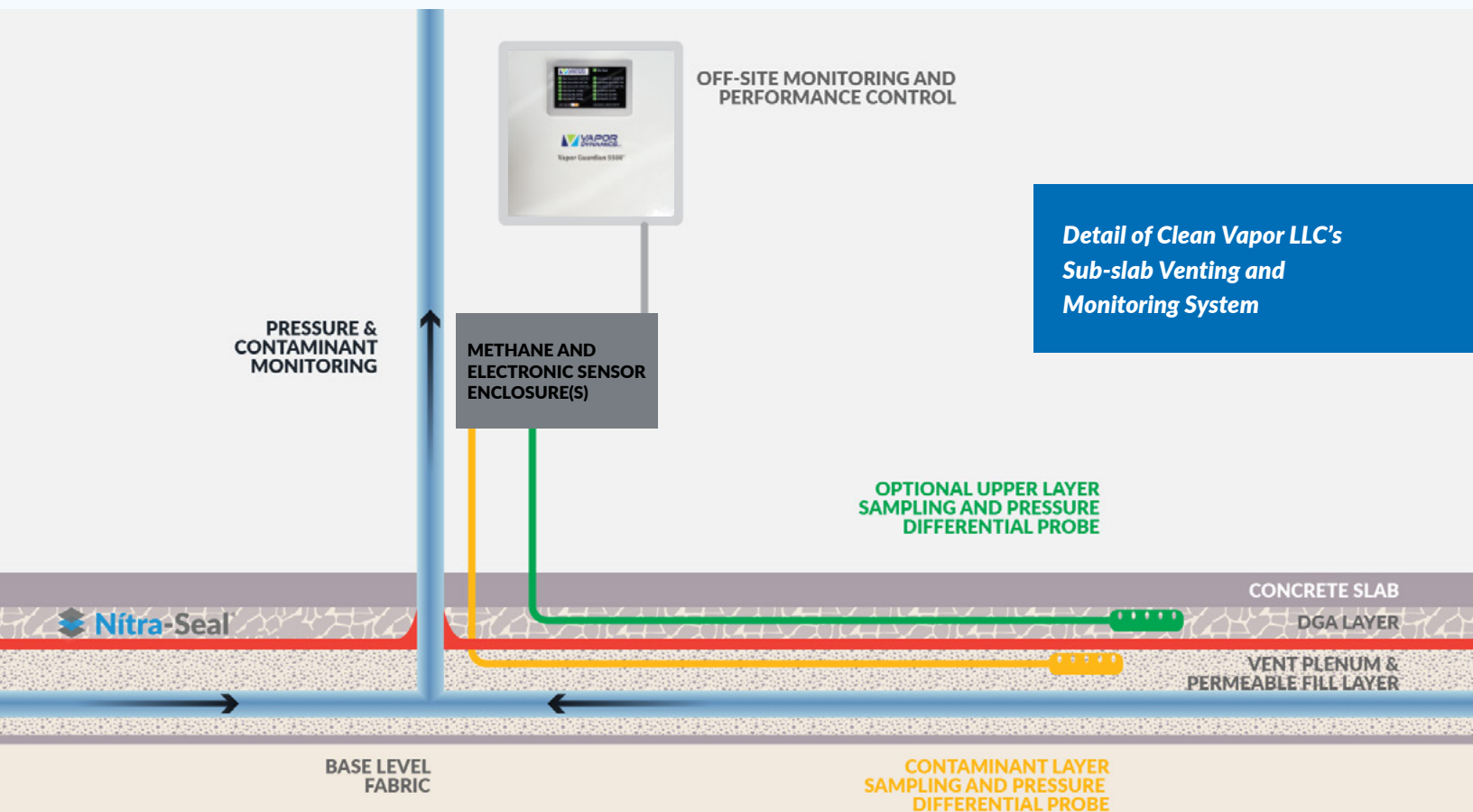
Chosen Remedy	Nitra-Seal with TerraVent <sup>®</sup>
Remedy Areal Extent	20,000 square feet
Construction	Slab on Grade
Foundation Type	Spread Footings



SUMMIT contracted Clean Vapor, LLC, a company specializing in vapor intrusion mitigation, to design the VIMS per the building plan. Clean Vapor has been designing and installing the most protective VIMS since 1987 and has a long history of collaboration with SUMMIT. According to Tom Hatton, President and CEO of Clean Vapor, "We've learned to work with each other [and we share] a lot of common thinking to support the client, which is the end goal."

Clean Vapor's highly evolved VIMS design incorporates an engineered plenum between the soil and concrete slab. This plenum allows for venting, monitoring of pressure differential, and, importantly, collecting vapor samples--if required after the VIMS installation. This embedded monitoring and sampling infrastructure design means that samples can be collected without puncturing the VIMS, rendering it ineffective.

A geosynthetic membrane separates the soil from a layer of engineered stone that constitutes the plenum. TerraVent®, a low-profile, passive venting system, was designed for installation into the plenum along with return vent piping and pressure differential/sampling tubing leading to sampling access ports in a centralized access panel above-grade. The venting occurs passively and naturally across a barometric pressure gradient (i.e., barometric pumping). In this process, air moves over the building and, vapors entering the plenum are drawn through the venting system, all of which can be monitored to ensure effectiveness.



Based on the PHC contaminant concentrations, the building's physical structure and air pressure dynamics, and the engineered plenum layer, Clean Vapor could calculate and design the maximum venting efficiency with a high degree of accuracy.



Nitra-Seal's triple-layer protection, incorporating a highly chemically resistant nitrile-modified asphaltic membrane emplaced between two HDPE/geotextile layers, was installed between the plenum and the concrete slab. Nitrile's superior chemical performance results in a superior, long-term vapor mitigation solution purposefully engineered to last over the building's life span.



The team contracted Buckeye Elm Contracting (Buckeye Elm), a Land Science Certified Applicator, to complete the installation. Buckeye Elm has many years of experience installing contaminant vapor barrier systems. As an industry leader in the proper installation of Nitra-Seal, they seamlessly integrated into the project team and accommodated the project demands. Following Land Science's strict protocols, Buckeye Elm completed all the manufacturer-recommended quality assurance measures to ensure the barrier's effectiveness, including smoke testing.

## Results

Following the installation of the Nitra-Seal vapor barrier system, the new library and town hall complex meets safety and environmental regulatory requirements by eliminating potential vapor intrusion exposure. The safe breathing environment for future building occupants is further ensured by the ability to monitor the sub slab and barrier performance as needed. Nitra-Seal's excellent constructability and Buckeye Elm's expert installation enabled the installation to be completed quickly, keeping the building of the new library complex moving forward unhindered. With the engineering controls to mitigate vapor intrusion risk, the environmental incident is pending closure by the NCDEQ.

***"I think what made the project so effective, was that there was a professional trust-level that has been established between the companies. And we know that we all expect a very high standard from each other. So, when we knew what the goal was, it was very easy for the people and the personalities to come together."***

***- Tom Hatton***

## Nitrile-Advanced Asphalt Latex Compared to Generic SBR Asphalt Latex

### Nitrile-Advanced Asphalt Latex

- ✓ Lab-proven to provide 10x higher chemical resistance
- ✓ Easier and faster to apply
- ✓ Equipment requires only soap and water to clean

### Generic SBR Asphalt Latex

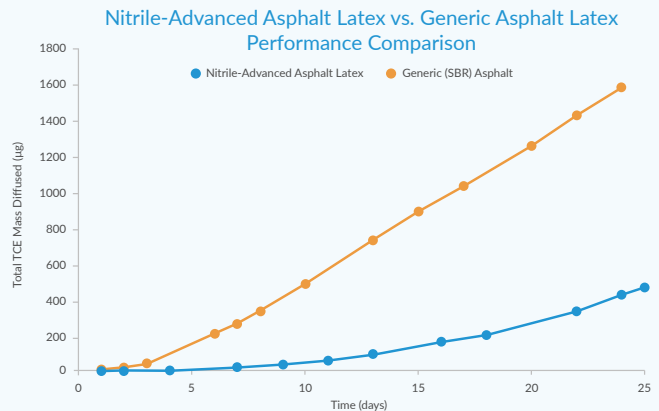
- ✗ Higher permeability increases risk of contaminant sorption
- ✗ Longer, slower application time
- ✗ Equipment requires petroleum-based solvents to clean

## Technology

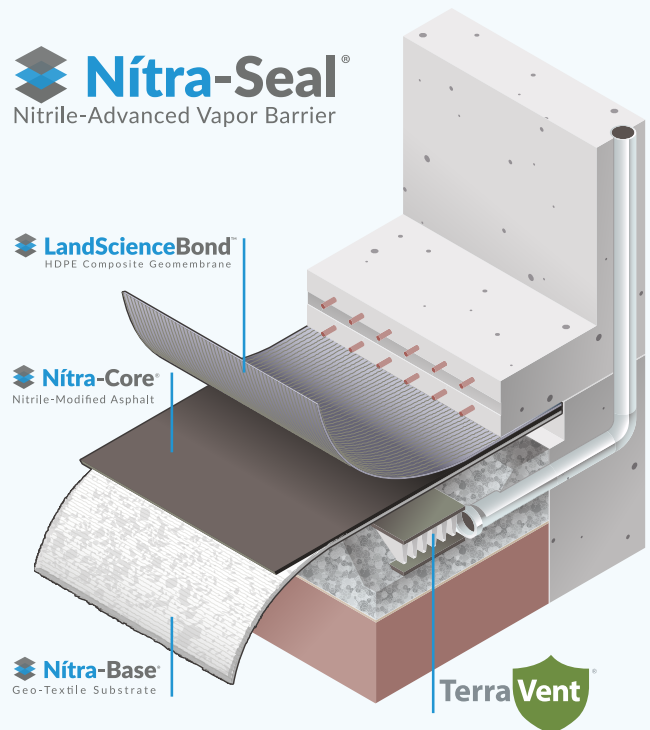
### A Multi-Layer Base with Innovative Nitrile-Advanced Asphalt Latex Technology

Nitra-Seal is an update/improvement on current vapor barrier systems, providing a more chemically resistant spray-applied core material.<sup>1</sup> Nitra-Seal is a triple-layer system. The Nitra-Base layer (bottom) and the Land Science Bond layer (top) are composed of a HDPE material bonded to a geo-textile on the out-facing side. HDPE is known for chemical resistance, high tensile strength, excellent stress-crack resistance and highly reliable subsurface containment. The geo-textile, which is physically bonded to the chemical resistant layer, accomplishes two goals; it allows the Land Science Bond layer to adhere to the slab, and provides friction course between the Nitra-Base layer and the soil. The Nitra-Core layer is composed of a unique, nitrile-advanced asphalt latex which also provides additional protection against vapor transmission. Nitrile has been proven to offer exceptional chemical resistance in a wide range of applications. This layer creates a highly-effective seal around slab penetrations and eliminates the need for mechanical fastening at termination points.

1. U.S. and international patents pending.



TCE diffusion rates in Nitrile-Advanced Asphalt Latex barrier systems vs those utilizing Generic (SBR) Asphalt.



Scan Here to Review  
Technical Data Sheets



## About the Consultant

SUMMIT Engineering, Laboratory & Testing, Inc. ("SUMMIT") is a multi-disciplinary consulting firm offering engineering expertise through full-service departments including Environmental, Geotechnical, Subsurface Drilling, Special Inspections, Materials Testing, Forensic and Structural Engineering, all backed by a full-service, 5,000 SF, NCDOT Tier III-, AMRL-, CCRL- and AASHTO-certified Laboratory.

Since SUMMIT's founding, the company has experienced consistent and steady expansion in all of its service sectors, capabilities, clientele and staff size. SUMMIT has five office locations across North and South Carolina. SUMMIT is poised for continued growth within our existing markets in addition to exploring new opportunities throughout the Southeast. We serve our clients from offices located in Charlotte and Raleigh, NC, and Columbia, Greenville and Charleston, SC.

In 2021, SUMMIT partnered with Universal Engineering Sciences, Inc. (UES) to become part of one of the largest, most experienced, resource-rich organizations of its kind in the nation. UES is comprised of 2,000 professionals and 38 national branches featuring a broad range of services in both the public and private sectors, including Geotechnical Engineering, Construction Materials Testing & Inspection, Building Code Compliance, Environmental, Health & Safety, and Building Envelope Inspections. For more information visit [www.universalengineering.com](http://www.universalengineering.com)

Our top priority is to work closely with our diverse client base to assist them in obtaining the quality engineering and testing services they require and achieve success on any project. Our clientele know that they can trust the services SUMMIT offers.







## About the Land Science Certified Applicator

Buckeye Elm Contracting is a SBA Certified Woman Owned Small Business (WOSB). A full service, self-performing environmental services and remediation solutions partner, Buckeye Elm has been certified to install the full suite of Land Science vapor barrier systems.





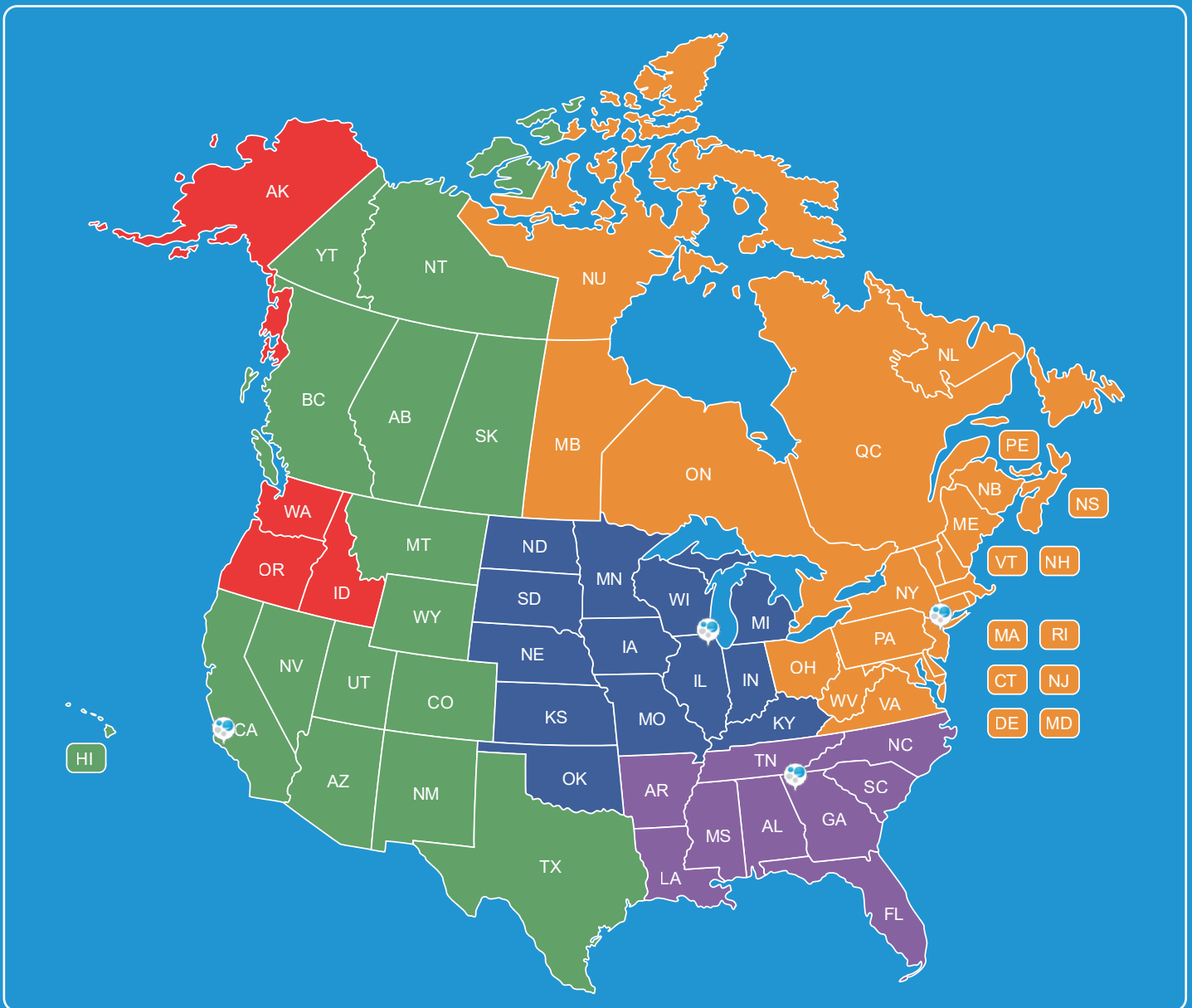
## About Clean Vapor LLC

Headquartered in Blairstown, NJ, Clean Vapor, LLC was founded by Thomas and Kristin Hatton, after spending 20 years developing and implementing vapor intrusion mitigation solutions for residential and commercial clients. Tom's extensive experience includes work on over 11,000 sites in the US and abroad, and positions him as an expert in his field. Since our early days of entrainment modeling in 1985 (on the EPA's first vapor intrusion site in Bowling Green, KY), Clean Vapor has been professionally involved in existing building mitigation (as well as new construction planning), and have contributed to numerous industry codes and standards documents.



# Are You Planning a Vapor Intrusion Mitigation Project?

Contact Us Today For a Free Estimate.



**Land Science**<sup>®</sup>  
a division of REGENESIS<sup>®</sup>

[landsciencetech.com](http://landsciencetech.com)



## Global Headquarters

1011 Calle Sombra  
San Clemente, CA 92673 USA  
Ph: (949) 481-8118  
Fax: (949) 366-8090



© 2021 All rights reserved. Nitra-Seal, Nitra-Core, Nitra-Base, Land Science Bond, TerraVent and Land Science are registered trademarks of REGENESIS Bioremediation Products. All other trademarks are the property of their respective owners.

 **Land Science**<sup>®</sup>  
a division of REGENESIS<sup>®</sup>

[landsciencetech.com](http://landsciencetech.com)     