

Chlorinated Vapor Mitigation with Horizontal Vapor Extraction Wells Prevents Interior Disruption

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Introduction

Vapor Intrusion (VI) is a potential concern at any building- existing or planned, located near soil or groundwater contaminated with volatile organic compounds (VOCs). The usual mitigation method is to depressurize the slab, extract the vapors, and maintain negative pressure (vacuum) to ensure that any vapors migrating under the slab are captured and removed before they can enter the structure.

Typically, a subsurface extraction well vapor mitigation system has the primary objectives of:

- Vadose zone source removal
- Reduction of soil gas concentrations
- Soil moisture control
- Subslab depressurization

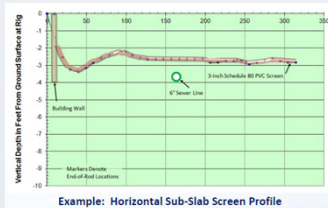
Case Study 1:

Former Industrial Site Turned Residential

A former industrial site had been redeveloped with several buildings containing a large number of multi-tenant apartment units and commercial tenants. PCE and TCE concentrations within the soil vapor exceeded the screening levels for a residential area, threatening indoor air quality for the tenants. Assessment of the contaminant plume revealed that the former source areas were located directly beneath various occupied first floor apartment units. The building owner asked the environmental consultant if they could find a way to solve the vapor intrusion issues without requiring tenants to vacate their units and also avoid damaging the structure of the building.

To solve their client's problem, the consultant reached out to Directional technologies to install 11 horizontal vapor extraction wells into precisely targeted locations. The horizontal wells ranged in lengths from 140 feet to 370 feet long and targeted soil vapors at approximately 6 feet to 10 feet below land surface (bls).

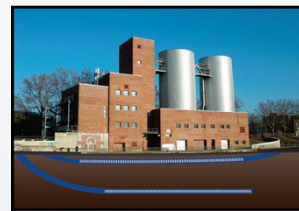
The horizontal vapor mitigation system was installed with no impact to the occupants and no damage to the building. When the horizontal wells were connected to the vapor extraction blower, better than expected vacuum influence provided more than enough subsurface air movement to reduce soil vapor concentrations to safe levels for the residents.



Remediation with Horizontal Wells:

For over 30 years, Horizontal Directional Drilling (HDD) technology has been used to install Horizontal Remediation Wells for the environmental industry.

Horizontal wells can effectively remediate subsurface areas, even at sites with challenging site conditions. Many remediation projects that use horizontal wells would find it difficult, if not impossible, to achieve the same remediation goals using traditional vertical wells. Directional drilling can allow horizontal wells to span across entire plumes, targeting hot zones and staying completely clear of any activity or infrastructure located at the surface.



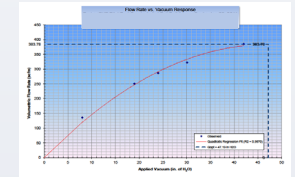
Advantages of Horizontal Remediation Wells:

- Eliminate disturbance to activities and structures located at the surface.
- Precise targeting of critical areas of the soil or groundwater plume, often accessing areas that could not be directly targeted through traditional means
- Increased radius of influence resulting from increased screened interval contact with impacted media
- Reduce the overall number of wells required to operate the remediation system
- Achieve remediation goals in shorter timeframes
- Overcome challenges commonly posed by complex site conditions

Case Study 2: Manufacturing Facility

A manufacturing facility in the Midwest operated for more than 70 years machining a wide variety of stainless-steel products. Prior to environmental regulations, the facility used in-ground degreaser pits as part of their operations which resulted in significant TCE impacted soil and groundwater across a wide area. Based on subsequent environmental investigations, vapor intrusion was found to pose indoor air quality issues for workers. The facility interior was not only crowded with large machining equipment but also operated two shifts around the clock. The facility owners were sensitive to the disruption of their operations, estimating that the lost revenue from shutting down their typical business activity for even a few days would cost them vastly more than the price to install the remediation system. These factors significantly complicated the installation of a vapor mitigation system that would address the vapor intrusion concerns.

To help them find a solution that would satisfy the facility owners while also not compromising on the effectiveness of their planned SVE system, they reached out to Directional Technologies for assistance. A plan was ultimately approved to install 7 horizontal sub-slab vapor extraction wells. The wells were installed from outside of the building and connected to vapor extraction system. Drilling was conducted via blind (single-entry) bores staged on the side of the building that would not impact facility operations. The horizontal SVE wells were installed at depths of 5 feet to 9 bls.



Above Left: Plan-view layout of typical horizontal SVE well.

Above Right: Chart of flow rate vs vacuum of typical horizontal SVE well

The use of horizontal wells prevented an estimated 200 hours of manufacturing downtime that would have been caused by using traditional installation methods. Subsequent O&M of the system could be accomplished from the wellheads situated at the building exterior without causing disruptions from system operation in the future.