PARSONS

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December 22, 2010

Mr. Jeffrey A. Konsella, P.E.
NYSDEC
Region 9
270 Michigan Avenue
Buffalo, New York 14203-2399

RE: Sub-slab Depressurization System Installation
Ekonol Polyester Resins Facility, Town of Wheatfield, New York
NYSDEC Site # V00653-9

Dear Mr. Konsella:

This letter was prepared to document the installation and testing of the sub-slab depressurization (SSD) system in the office area of the building currently being leased by St. Gobain at the referenced Site. In an April 13, 2010 letter the Atlantic Richfield Company (ARC) agreed to install the SSD system to limit the potential migration of volatile organic compounds (VOCs), primarily tetrachloroethene (PCE) from soil gas into indoor air in the office area of the building.

The SSD system was installed, tested, and began operation on November 17, 2010. Installation and testing of the SSD system was performed in accordance with the NYSDEC approved work plan. Details regarding the installation and testing are provided in the attached installation report. Based on the measurements and testing that was completed, the SSD suction point located centrally within the office area is expected to induce a consistent vacuum and rapid flow to a distance of at least 40 feet and a meaningful flow at modest vacuum to a distance of up to about 70 feet.

As stated in the September 27, 2010 work plan ARC agreed to examine potential mitigation options with the expectation that the current owner or tenant would manage operations and maintenance as well as any additional sub-slab or indoor air testing. The owner or tenant should complete periodic monitoring of the system to verify that the fan remains operational. If the audible alarms sounds, the owner or tenant should troubleshoot the cause of the alarm (i.e., malfunction of the alarm and/or fan) and repair or replace the malfunctioning component.

If you have any questions concerning this report, please contact Bill Barber at (216) 271-8038.

Sincerely,

George W. Hermance

George W. Hermance
Project Manager

Attachment

cc: M. Forcucci, NYSDOH
W. Barber, Atlantic Richfield Co.
T. Ciarlone, Patriot Equities
G. Brown, RT Environmental Services
W. Hungarter, RT Environmental Services
File (446213, No. 9)

Attachment

Geosyntec
consultants

130 Research Lane, Suite 2
Guelph, Ontario, Canada N1G 5G3
PH 519.822.2230
FAX 519.822.3151
www.geosyntec.com

December 20, 2010 Project TR0318

George Hermance
Parsons
40 La Riviere Drive
Suite 350
Buffalo, NY 14202

Subject: Sub-slab Depressurization System Installation at Ekonol Site, 6600 Walmore Road, Wheatfield, New York.

Dear Mr. Hermance:

This letter was prepared by Geosyntec Consultants, Inc. (Geosyntec) for the Atlantic Richfield Company (ARC), under subcontract to Parsons, to document the installation and testing of the sub-slab depressurization (SSD) system installed within the office area of the building currently being leased by St. Gobain at the Ekonol Site in Wheatfield, New York (the "Site"). The purpose of the SSD system is to limit the potential migration of volatile organic compounds (VOCs), primarily tetrachloroethene (PCE) from soil gas into indoor air in the office area located on the northeast corner of the building currently being leased by St. Gobain, as described in a letter from BP to the NYSDEC dated April 13, 2010 (BP, 2010).

Scope of Work

The scope of work for the mitigation system installed in the office area of the building occupied by St. Gobain consisted of the following tasks:

- Communications and meetings with Parsons and St. Gobain staff to coordinate system installation;
- Installation and startup testing of the SSD system November 17, 2010 including communication testing and measurement of the extraction flow rate and vacuum;
- Transient response (drawdown and recovery) testing; and
- Documentation of the installation and testing activities.

Sub-slab Depressurization System Installation

The SSD system was installed by Mitigation Tech (a New York State licensed Radon Contractor) of Brockport, New York, under the direction and oversight of Geosyntec. An as-built drawing is included in Attachment 1, the completed SSD system installation and commissioning checklist in Attachment 2, and photographs documenting the installation are provided in Attachment 3.

The SSD system consists of one suction point centrally located within the office area at the St. Gobain building as shown in Attachment 1. A three-inch diameter hole was drilled through the concrete and sub-grade materials were excavated to a depth of about six inches below the bottom of the existing concrete floor. A Schedule 40 polyvinyl chloride (PVC) vent-pipe, three-inches in diameter, was installed vertically within the sump. The bottom of the suction pipe was installed so that it was flush with the bottom of the concrete slab, and then sealed using polyurethane sealant.

The suction pipe was constructed to run vertically from the floor to the rafters, then horizontally overhead to the outer wall where it exited the building. At the outer building wall, the horizontal pipe was connected to an electrically operated RadonAway GP-501 fan mounted to the exterior of the building via flexible couplings for vibration suppression. The fan was used to draw vapors from beneath the building slab to the exterior of the building. The fan discharge was connected to a vertical pipe extending to approximately two feet above the roofline. The top of the pipe was fitted with a rain cap to limit water infiltration. The suction point was equipped with a U-tube manometer which indicates the measured vacuum induced at the suction point and an audible alarm that notifies the facility management in the event that the fan stops operating.

Sub-slab Depressurization System Testing

After the SSD system suction point was installed and operating, the flow and vacuum were monitored to assess the performance. The extraction flow rate was 80 standard cubic feet per minute (scfm) with an applied vacuum level of 2 inches of water column (in H_2O). The ratio of the flow rate divided by the applied vacuum is the specific capacity, which is linearly proportional to the permeability of the subsurface materials. The specific capacity was calculated to be 40 scfm/in H_2O, indicating that the subsurface was highly permeable.

Communication test points (CTPs) were installed at the locations shown in Attachment 1 and consisted of ½-inch diameter holes drilled through the concrete floor and fitted with a short length of tubing to measure the induced vacuum as a function of radial distance. Vacuum measurements recorded at each CTP are presented in Attachment 1. The measurements ranged between non-detect (CTP-6, furthest southern location) to 0.120 in H_2O (most northwestern point). The measurements indicate that applied vacuum surrounding the test point are not isotropic. This was shown by vacuum measurements at a 36 ft radius of 0.120 in H_2O (CTP-7) and a vacuum measurement at 32 ft radius of 0.023 in H_2O (CTP-4), which are at orthogonal directions to each other. Anisotropy can be associated with sub-slab construction features such as utility lines and building footings. The concrete floor at CTP-5 was greater than 14 inches thick and a CTP measurement was not possible. At CTP-3 the concrete was also greater than 14 inches and the slab was not completely penetrated; therefore, the vacuum measurement (0.012 in H_2O) was lower than expected based on its close proximity (about 4 feet) to the suction point.

In addition to the communication testing, a transient response (drawdown and recovery) test was conducted at communication test point CTP-2, located 12 feet from the suction point. The test consisted of cycling the extraction fan on and off and monitoring the vacuum response at CTP-2. The fan was left on until readings at CTP-2 had stabilized (drawdown) and then the fan was shut off until the readings at CTP-2 returned to near-zero (recovery). Pressure differential readings were recorded at five-second intervals with a Zephyr II data-logging micromanometer. The drawdown and recovery data are shown on Figure 1, and by visual inspection, the trends follow the expected pattern and are very reproducible.

The transient vacuum response data were analyzed to calculate the pneumatic conductivity of the sub-surface soil and determine radius of influence of the system using the leaky aquifer solution (Hantush and Jacob, 1955, Beckett and Huntley, 1994; Thrupp et al., 1996, 1998). The fitted leaky aquifer type-curve is shown on Figure 2, which shows a very good match to both the drawdown and recovery data. The leaky model curve flattens out at the top of the chart on Figure 2, relative to the confined response in proportion to the amount of leakance (r/B) (infiltration of air).

The leakage factor, B, is a characteristic length of the leaky aquifer defined as follows:

$$B = \sqrt{\frac{K_A b' b}{K'}} \qquad (1)$$

with

K_A = Pneumatic Conductivity of the zone of extraction (L/T),

b = Thickness of the zone of extraction (L),

b' = Thickness of the semi-confining zone (L),

K' = Vertical Pneumatic Conductivity of the semi-confining zone (L/T).

The leakage factor is useful for estimating vertical pneumatic conductivity of the soil above (and below) the interval of extraction, and for quantifying the radius of influence of soil vapor extraction (SVE).

An approximation of the leaky aquifer solution for steady-state flow conditions is a useful tool for estimating the subsurface pressure drawdown (vacuum) with distance from an SVE extraction point (Bear, 1979):

$$S(r) = \frac{Q_W}{2\pi K_A b} K_o(r/B) \qquad (2)$$

where B, the is the leakage factor is defined above (Equation 1), and

S(r) = Pressure drawdown (vacuum) with radial distance from the extraction point (L),

r = distance from extraction point (L),

Q_W = Discharge from the extraction point (L^3/T),

K_A = Pneumatic Conductivity of the zone of extraction (L/T),

b = Thickness of the zone of extraction (L), and

K_O = Modified Bessel Function of the second kind of order zero of (r/B), unitless.

Figure 3 shows calculated vacuum versus radial distance from the extraction point using Equation 2. Figure 3 also shows the measured steady-state vacuum data. With an allowance for spatial variability, there is a reasonably good fit between the measured and modeled values. This provides confidence in the usefulness of the model for extrapolating the vacuum profile to greater distances. ASTM (2003) recommends a sub-floor vacuum of at least 6 pascals (0.024 in H_2O) for active sub-slab depressurization systems, which Figure 3 shows would correspond to a radius of influence of about 44 feet from the extraction point. However, this figure also shows that the induced vacuum may be greater than 1 pascal (0.004 in H_2O) over a radial distance of up to 70 feet.

From Darcy's Law, the flow velocity can be calculated from the gas-permeability and the pressure gradient, as shown in Figure 4. At a radius of 40 feet, the flow velocity is calculated to be approximately 1,000 feet/day, which is rapid relative to the rate of upward diffusion from below. As a result, this region will be flushed quickly and the concentrations will be expected to decrease accordingly. At a radial distance of 70 feet, the flow velocity is calculated to be more than 200 feet/day, which is still an appreciable velocity.

Figure 5 shows the same information a different way, plotting travel time for vapors at a certain distance to reach the point of extraction. Figure 5 shows that soil gas flows from 40 feet away to the point of extraction in about 20 minutes. From 70 feet, the travel time to the point of extraction is about 150 minutes (2 ½ hours). Within a single day, vapors from 95 feet away from the extraction well would be withdrawn. This shows that the flushing rate is extremely rapid for the region within the radius of influence that would be derived from the ASTM (2003) specification of 6 pascals (0.024 in H_2O) induced vacuum and that appreciable flushing rates are induced to much greater distances.

The leakage factor also provides basis for quantitative assessment of the radius of influence of SVE (Bear, 1979). The equation below expresses the proportion of flow through the zone of extraction with distance from the SVE point:

$$Q(r)/Qw = \frac{r}{B} K_1(r/B) \qquad (3)$$

where, r, and B are as defined above, and

Q(r)/Qw is the proportion of the total flow originating in the subsurface at distance r from extraction well (L^3/T), and

K_1 = Modified Bessel Function of the second kind of order one of (r/B), unitless.

Figure 6 illustrates that the amount of air originating as leakage of atmospheric air increases with increasing radial distance from the point of extraction. The proportion of flow originating in the subsurface is about 25% at a radial distance of 40 feet, but is still 5% at a radial distance of 70 feet.

Summary

Based on the measurements and testing that was completed, the SSD suction point located centrally within the office area is expected to induce a consistent vacuum and rapid flow to a distance of at least 40 feet and a meaningful flow at modest vacuum to a distance of up to about 70 feet. This encompasses most of the area of interest.

Periodic monitoring of the system should be performed to verify that the fan remains operational. This can be accomplished by visual inspection of the U-tube manometer on the suction-pipe or by verifying the fan performance with a measurement of the flow velocity. A flow rate of 80 scfm at a vacuum of 2 in H_2O is the expected operational condition, and any differences greater than about 25% should be considered a trigger for fan replacement or reassessment of the performance. If the audible alarms sounds, Site management should troubleshoot the cause of the alarm (i.e., malfunction of the alarm and/or fan) and repair or replace the malfunctioning component.

Please let us know if you have any questions.

Sincerely,
Geosyntec Consultants, Inc.

David Bertrand

David Bertrand, B.Sc., P. Geo.
Project Manager

Todd McAlary

Todd McAlary, M.Sc., P.Eng.
Principal

Cc: William Barber – Atlantic Richfield

Attach/
Figure 1 - Vacuum versus Time at CTP-2 in Response to Cyclic Operation of Fan
Figure 2 - Graphical Output of Hantush-Jacob Model Fit to Transient Vacuum versus Time Data
Figure 3 - Comparison Between Calculated Vacuum versus Radial Distance and Measured Vacuum at CTP Locations
Figure 4 - Comparison Between Sub-slab Soil Gas Velocity Calculated From Leaky Aquifer Model and Non-Leaky Model
Figure 5 - Calculated Travel Time to Extraction Point vs. Radial Distance
Figure 6 – Percentage of Total Flow Originating below the Slab versus Radius

Attach/
Attachment 1 - As-Built Drawing
Attachment 2 - SSD System Installation and Commissioning Checklist
Attachment 3 – Photographs

References

ASTM, 2003. Standard Practice for Installing Radon Mitigation Systems in Existing Low-Rise Residential Buildings, E2121-03, ASTM International, Conshohoken, PA.

Bear J., 1979. Hydraulics of Groundwater. McGraw-Hill, New York, 560 pp.

Beckett G.D. & Huntley D., 1994. Characterization of Flow Parameters Controlling Soil Vapor Extraction, *Groundwater*. Vol. 32. pp. 239-247.

BP, 2010. Letter Re: Mitigation for Potential Indoor Issue at Ekonol, April 13, 2010.

GZA GeoEnvironmental, 2009. Letter Re: Soil Vapor Intrusion Air Sampling. June 29, 2010.

Hantush M.S. & Jacob C.E., 1955. Non-steady Radial Flow in an Infinite Leaky Aquifer, *Transactions of the American Geophysics Union*. Vol. 36. pp. 95-100.

New York State Department of Health, 2006. Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006.

Thrupp G.A. Gallinatti J.D. & Johnson K.A., 1996. Tools to Improve Models for Design and Assessment of Soil Vapor Extraction Systems, *Subsurface Fluid-flow (Groundwater and Vadose Zone) Modeling*, ASTM STP 1288, J.D. Ritchey and J.O. Rumbaugh (eds.). American Society for Testing and Materials, Philadelphia, pp 268-285.

Thrupp, G., J. Baker, and J. Gallinatti, 1998. Leakage Controls Radius of Influence of Landfill Gas Extraction Wells. *Proceedings of the 20th International Madison Waste Conference*, pp. 363-372.

Figure 1: Vacuum Versus Time at CTP-2 in Response to Cyclic Operation of the Fan

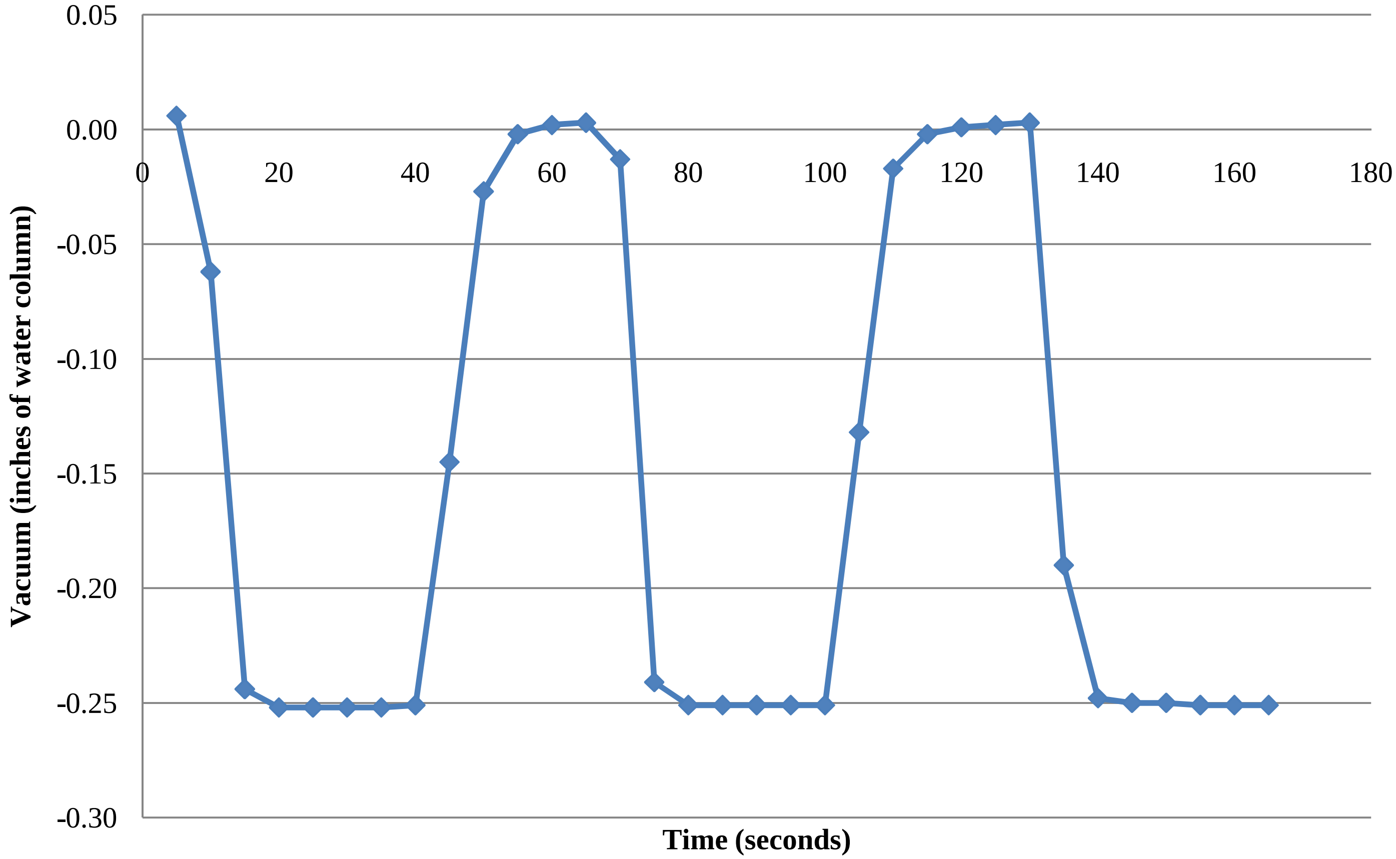
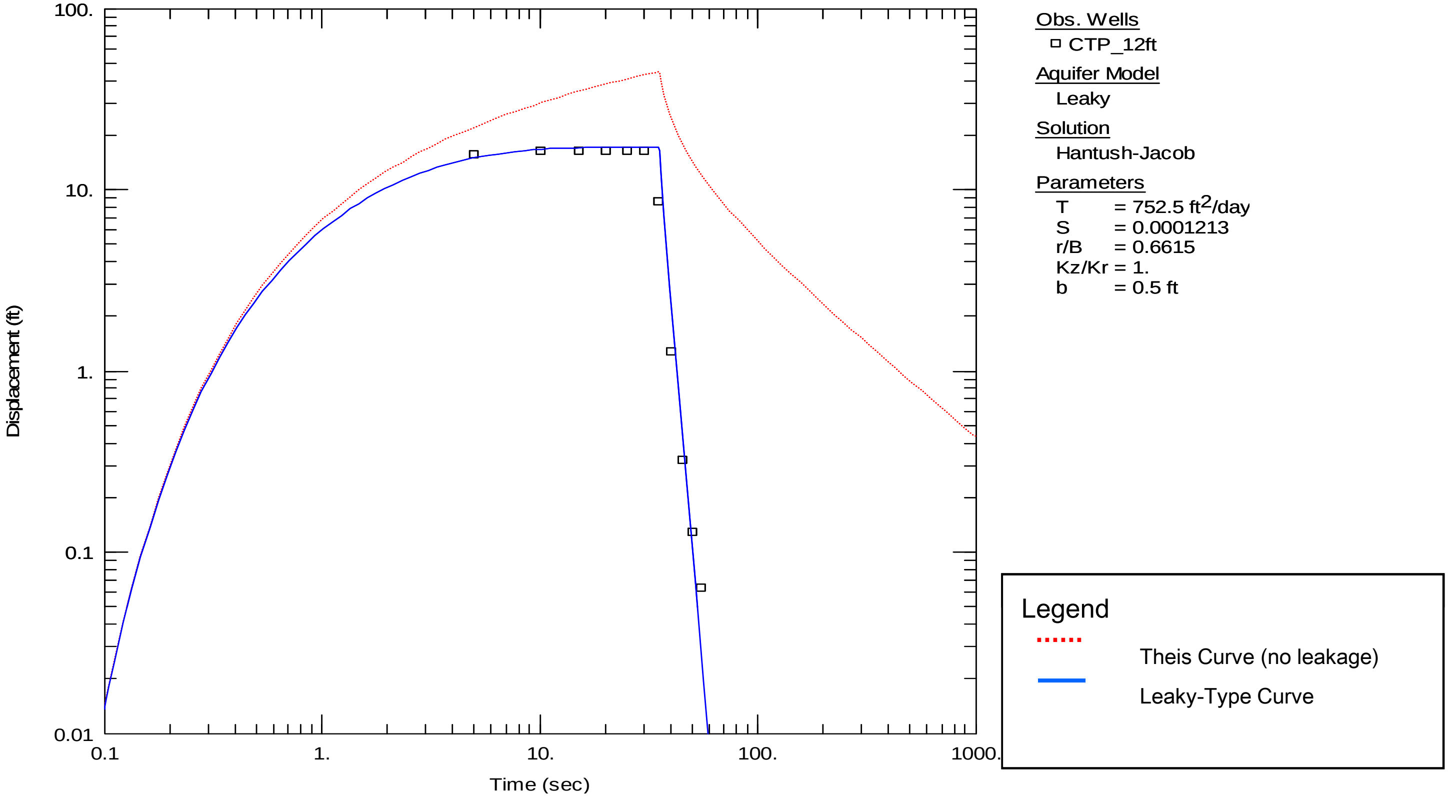
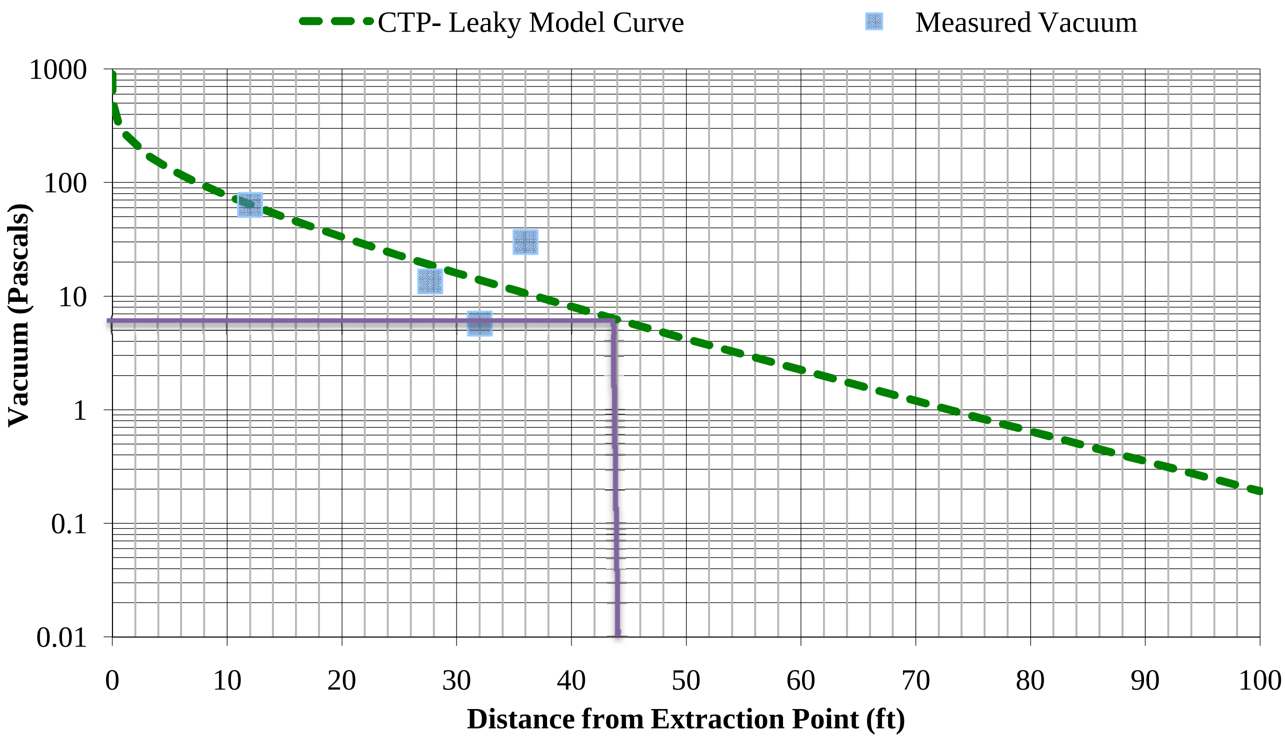


Figure 2: Graphical Output of Hantush-Jacob Model Fit to Transient Vacuum Versus Time Data



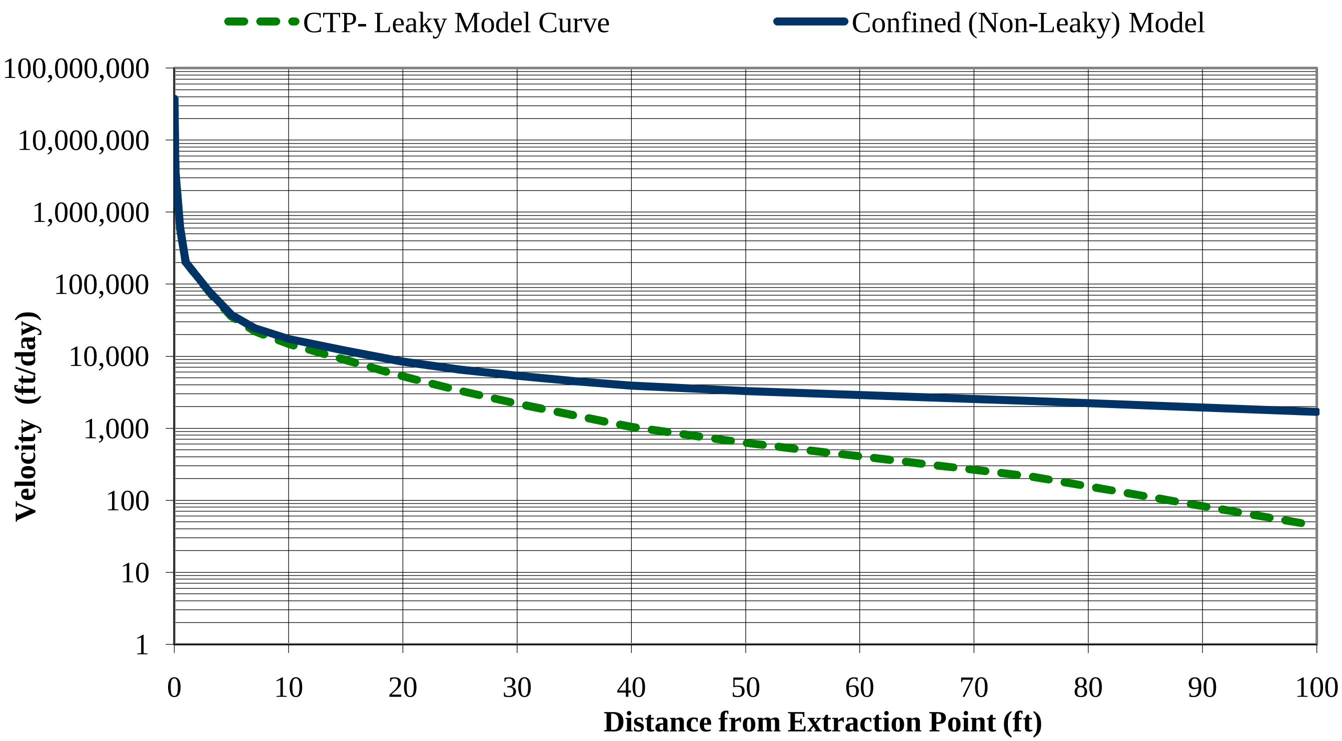
Geosyntec consultants

Figure 3: Comparison Between Calculated Vacuum Versus Radial Distance and Measured Vacuum at CTP Locations



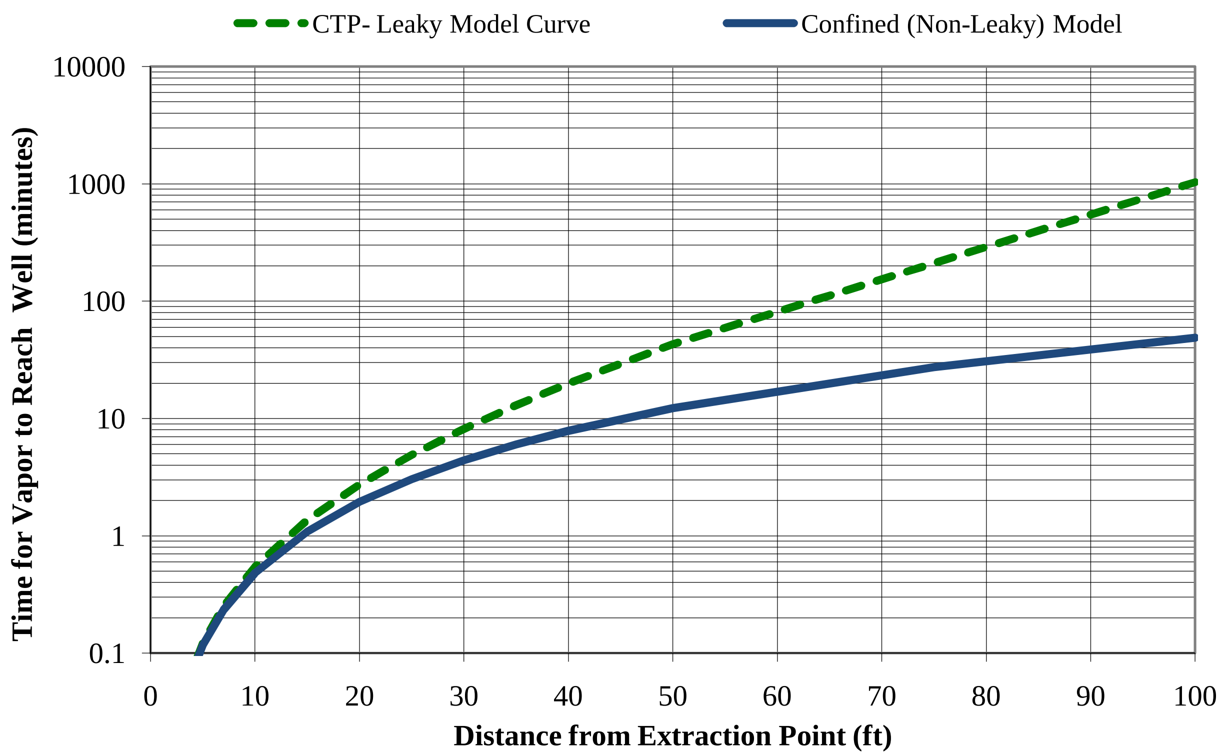
Geosyntec consultants

Figure 4: Comparison Between Sub-slab Soil Gas Velocity Calculated From Leaky Aquifer Model and Non-Leaky Model



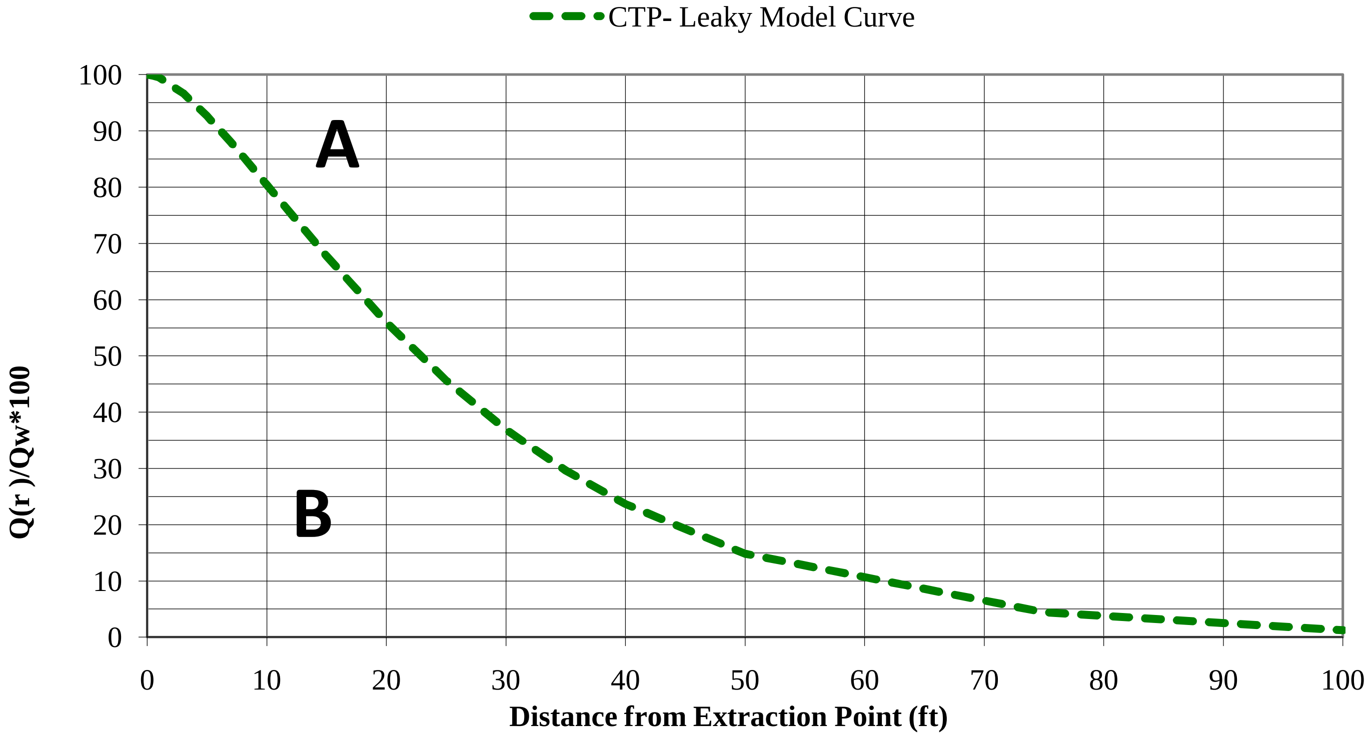
Note: Induced velocity of 10 ft/day or more extends to a radial distance of 90 feet

Figure 5: Calculated Travel Time to Extraction Point vs. Radial Distance

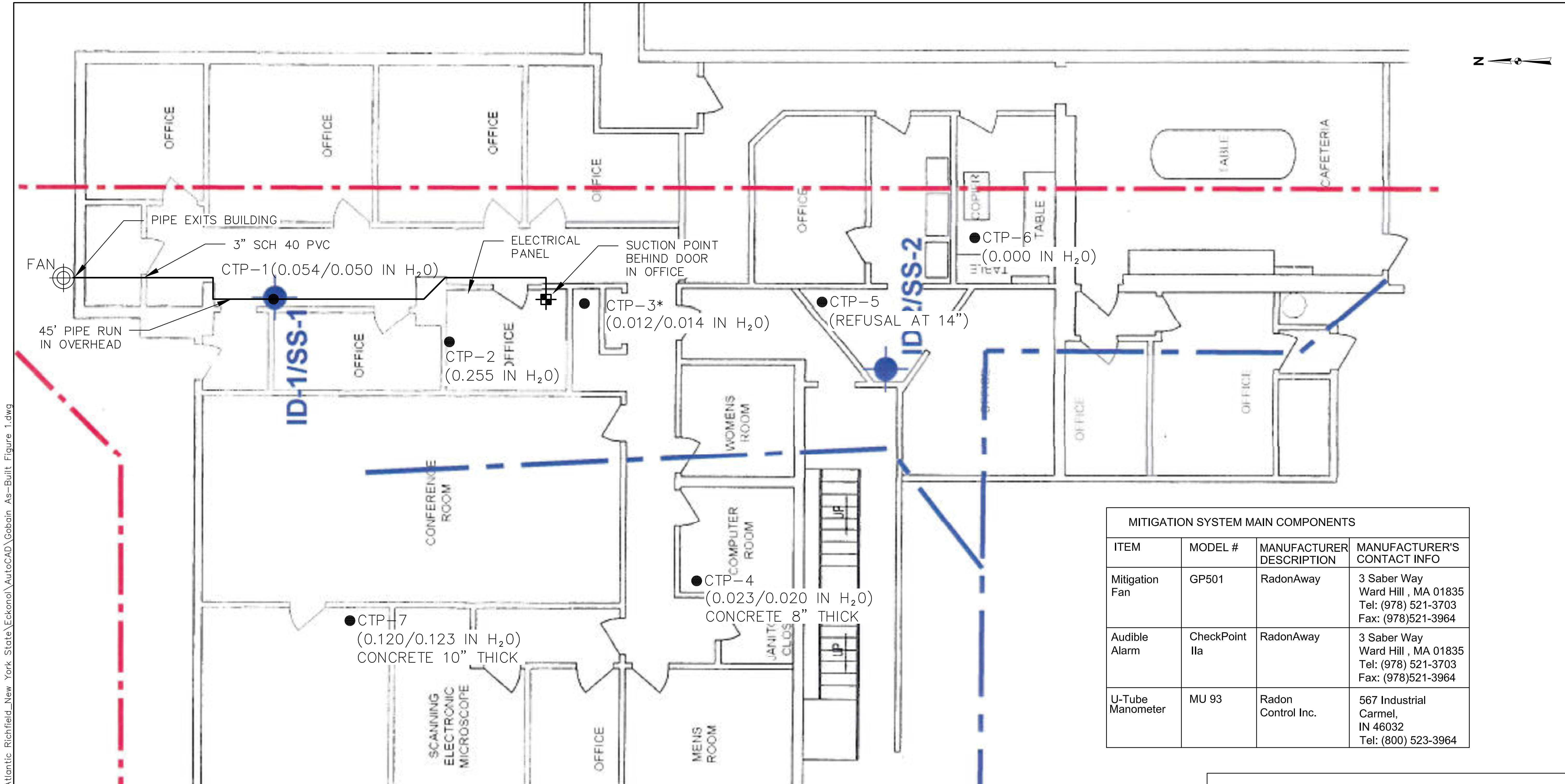


Note: Travel time of 1 day (1440 minutes) extends to a radial distance of 95 feet from extraction point

Figure 6: Percentage of Total Flow Originating below the Slab vs. Radius



A - Area intergrated above the curve represents leakage
B - Area intergrated below the curve represents soil gas extracted from subslab region
Proportion of sample consisting of soil gas = B/(B+A)



MITIGATION SYSTEM MAIN COMPONENTS

ITEM	MODEL #	MANUFACTURER DESCRIPTION	MANUFACTURER'S CONTACT INFO
Mitigation Fan	GP501	RadonAway	3 Saber Way Ward Hill , MA 01835 Tel: (978) 521-3703 Fax: (978)521-3964
Audible Alarm	CheckPoint IIa	RadonAway	3 Saber Way Ward Hill , MA 01835 Tel: (978) 521-3703 Fax: (978)521-3964
U-Tube Manometer	MU 93	Radon Control Inc.	567 Industrial Carmel, IN 46032 Tel: (800) 523-3964

LEGEND:

- ID-1/SS-1 — APPROXIMATE LOCATION AND DESIGNATION OF INDOOR AND SUB-SLAB AIR SAMPLES. COLLECTED BY GZA GEOENVIRONMENTAL
- APPROXIMATE LOCATION OF SANITARY SEWER LINE
- APPROXIMATE LOCATION OF STORM SEWER LINE
- SUCTION POINT
- ● CTP-1 — COMMUNICATION TEST POINT. VACUUM MEASURED IN INCHES OF WATER (IN H_2O)
- * — COMMUNICATIONS TEST POINT WAS NOT DRILLED COMPLETELY THROUGH SLAB (>14" THICK)

NOTES:

1. BASE MAP ADAPTED FROM A SITE PLAN PROVIDED BY THE CLIENT AND FIELD OBSERVATIONS.
2. THE SIZE AND LOCATIONS OF EXISTING SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.
3. UTILITY LOCATIONS ADAPTED FROM A COPIED PORTION OF A UTILITY DRAWING PROVIDED BY ST. GOBAIN.
4. APPLIED VACUUM AT EXTRACTION POINT IS 2 IN H_2O.
5. CONCRETE AT EXTRACTION POINT IS 6" THICK.

10 5 0 10 Feet

As-Built Sub-Slab Depressurization System

Saint Gobain Office Area
6600 Walmore Road Facility
Wheatfield, New York

Geosyntec consultants

Figure: 1

Guelph | 07-Dec-2010

SUB-SLAB DERESSURIZATION SYSTEM
INSTALLATION AND COMMISSIONING CHECKLIST
GEOSYNTEC CONSULTANTS, INC.

Checklist Completed by: David Bertrand Date: Nov 17, 10

Property Location: 6600 Walmore Road, Wheat Field, NY

Geosyntec Project Number: TR0318.05

The purpose of this field form is to document the installation and performance monitoring of the sub-slab depressurization system in mitigating subsurface vapor intrusion of volatile organic compounds to indoor air. The goal in completing this checklist is to provide assurance that the system is functioning as intended or identify and execute action items required to achieve the intended task.

1) BUILDING INVESTIGATION / Limited to Office Area

Building's exterior construction material (wood, stone, concrete, etc.)
red brick / cinder blocks

Cracks, holes and unsealed joints in the slab or concrete/cinder block/flagstone walls (seal and document accessible openings) — Yes No

Cracks that are determined to be inaccessible or beyond the ability of the contractor to repair/seal have been disclosed to the client and included in the documentation. — Yes No N/A

Exposed earth in basement or crawlspace — Yes No N/A

Standing water in basement or crawlspace — Yes No N/A

Dehumidifier being used in basement — Yes No N/A

Open stairways to basements (no doors leading to or from basement) — Yes No N/A

Continuously running HVAC system that may affect the design, installation, and/or effectiveness of mitigation system. — Yes No N/A

Floor drains – how many and locations — Yes No N/A
one in kitchen and one in each of the bathrooms.

Sump in basement – how many and locations — Yes No N/A

Standing water in sump – height in inches? — Yes No N/A

Water sump pump operates — Yes No N/A

Practices observed which may affect efficiency of the mitigation system (Windows and/or door left opened) — Yes No N/A

Actions completed:

Actions not completed needing followup:

2) MITIGATION SYSTEM INSTALLATION

Description of soil Characteristics Gravel 4 inches thick and brown silty soil beneath. Sump excavated to 10 inches below floor surface. Concrete floor 6 inches thick.

Permits

List all permits obtained or applied for by contractor and current status:

- Dig Safe Notified For Work.
- Parsons permit to work at heights
- Parsons ground disturbance permit

Piping Installation

For any "No", complete an action item of comment.

Materials were excavated from the area immediately below the slab penetration point of the suction point to provide optimum pressure field extension. Yes No

Vent pipes are sealed and secured so that they do not drop into suction pits or sumps. Yes No

Where portions of structural framing material must be removed to accommodate vent pipes, material removed is no greater than that permitted for plumbing installations by applicable building or plumbing codes. Yes No N/A

Where mitigation system installation requires pipes or ducts to penetrate a firewall or other fire resistant rated wall, floor or ceiling penetrations shall be protected in accordance with applicable building or plumbing codes. Yes No N/A

Fire collar/dampener appears to be present if vent pipe penetrates fire rated wall. Yes No N/A

Vent pipe/fittings are schedule 40 PVC Yes No

All pipe joints and connections in the mitigation system (both interior and exterior) were primed and permanently sealed using PVC glue. (Exceptions include mitigation fan connections) Yes No

Horizontal piping installed prior to the mitigation fan is pitched back to the extraction point to permit any water vapor/condensation which has collected in the pipe to drain back into the hole. Yes No

Vertical and horizontal pipe runs are secured either above or below the points of penetration through floors, ceilings and roofs. Yes No

Vertical and horizontal pipe runs are secured at least every 6 feet. Yes No

Vent pipe extends at least 10-feet above the ground, and at the exhaust point ends above the eave/roof (12-24" is typical). Yes No

Vent pipe ends at least 10-feet from any opening into a conditioned space (e.g., window or door), or at least 2-feet above any opening. Yes No

Vent pipe ends at least 10-feet from any opening into a conditioned space (e.g., window or door), belonging to an adjacent or nearby building. Yes No

Vent pipes are fastened to the structure of the building with newly installed hangers and/or strapping and are not attached to pre-existing piping, duct or mechanical equipment. Yes No

Piping routed exteriorly is rated against deterioration from ultra-violet radiation Yes No

Vent pipes do not block access to any areas requiring maintenance or inspection or interfere with any light, opening, door, window or equipment access area required by code. (HVAC system, etc.) Yes No

A placard with a description of the system information and contact information is mounted on the vent pipe adjacent to the U-Tube manometer pipe and is visible. Yes No N/A

Actions completed:

Actions not completed needing follow up:

Placard needs to be installed – Mailed to Parsons for Installation on Dec 8, 10

Vent pipe system integrity

There are no visible openings or breaks in the pipe system. Yes No

A pressure monitor is present and operating, and is accessible. (U-Tube manometer, magnehelic gauge, or audible alarm.) Yes No

Comments:

Vertical vent pipe penetration(s) (to subsoil beneath the basement floor or slab)

The sealing/caulking around the extraction point or points through the basement floor, crawl space floor and/or crawl space/basement wall interphase is intact. Yes No

A vertical or horizontal vent pipe penetration is present in a (full or partial) crawl space. Yes No N/A

The crawl space vapor barrier (polyethylene sheeting, rubber membrane, etc.) extends to the foundation walls and is secured. Seams are secured and overlapped by at least 12" Yes No N/A

Comments:

Electrical

Electrical connections secure	Yes No
Junction boxes are closed	Yes No
Conduit appropriately supported	Yes No
If outside the building, the mitigation fan is hard wired to a disconnect switch located internally or externally depending on local electrical code.	Yes No N/A
Mitigation fan appears to be wired into a dedicated circuit. (That is, not wired through any other switches, e.g., lighting wall switch.)	Yes No
The circuit/breaker controlling (hard-wired)the mitigation fan is labeled "Mitigation System".	Yes No
Wiring is not located in or chased through the mitigation installation ducting or any other heating or cooling ductwork	Yes No
If the rated electricity requirements of a mitigation system fan exceeds 50 percent of the circuit capacity into which it will be connected, or if the total connected load on the circuit (including the mitigation fan) exceeds 80 percent of the circuit's rated capacity, a separate, dedicated circuit is installed to power the fan.	Yes No N/A
An electrical disconnect switch and circuit breaker is installed in the mitigation system fan's circuits to permit deactivation of the fan for maintenance or repair.	Yes No N/A
Circuit breakers controlling the circuits on which the mitigation fan and system failure warning devices operate are labeled "Mitigation System".	Yes No N/A

Comments: Electrical Checklist information confirmed by Doug Wright on December 7, 10 @ 15:40.

Mitigation Fan(s)

Mitigation fan is mounted in a vertical (not horizontal) section of pipe.	Yes No
Fan cover installed	Yes No N/A
Fan mounted securely	Yes No
Coupling connections secure	Yes No

Fan Model: RadonAway GP501 Number of fans: 1

Valve located at each extraction point (two or more extraction points in system) Yes No N/A

Manometer located at each extraction point Yes No

Audible alarm present and operating Yes No

On/off switch for mitigation fan installed Yes No

Rain cap installed at vent pipe discharge Yes No

Comments: Fan cover not requested – Approved by St. Gobain.

Water Sump (if no water sump present, skip section)

Sump pit is <u>not</u> the primary suction point for mitigation system Yes No N/A

If sump is used, does it contain a sump pump – submersible or pedestal Yes No N/A

Sump pit cover installed Yes No N/A

If sump is present, it is sealed to prevent the influx of conditioned air Yes No N/A

If the sump is sealed, a trapped drain (or equivalent) should be present and located in the sump cover. (Independent of whether the vent pipe(s) passes through the floor/slab or is installed in the sump.) Yes No N/A

Penetrations of sump covers to accommodate electrical wiring, water ejection pipes, or vent pipes is designed to permit air-tight sealing around penetrations, using caulk or grommets Yes No N/A

Sump pits used as suction pits are identified with a label that reads, "Removal of this cover may result in failure of the Mitigation System. Consult <GeoSyntec Consultants – toll free # > before removing this cover and for instructions on the correct procedure for replacing it". Yes No N/A

Mitigation System Layout (Drawing)

Identifying landmarks illustrated (road, North, etc.) Yes No

Includes illustration of the building foundation Yes No

The location of all walls, drain fixtures, and sumps Yes No

The location of communication testing points Yes No

The layout of mitigation system piping — Yes No

The location of mitigation fan, extraction points and system warning devices — Yes No

Breaker box/switches identified — Yes No

Measured distances from identified objects — Yes No

Comments:____

3) VERIFICATION OF SYSTEM COMPONENTS AND CONDITION

Electrical System Performance Checklist

Manometer reading with electrical switch in OFF position: 0.0 Units: in H_2O

Mitigation fan starts when switch is in ON position — Yes No

Verify audible alarm activates when mitigation fan is turned off — Yes No

Manometer reading with electrical switch in ON position: 2.0 Units: in H_2O

Fan stops when switch is in OFF position — Yes No

Return fan to the ON position ✓ (check when completed)

Comments:____

Pipe System Performance Checklist

Excessive noise heard in pipe joints/valve — Yes No

Smoke test of influent joints — Yes No

Did smoke enter influent joints — Yes No

Comments:____

Slab Repair Performance Checklist

Smoke tested each identified slab crack/repair — ~~Yes~~ DB No N/A

No cracks were repaired.

Did smoke enter crack/repair	Yes ~~No~~ N/A DB
If yes, sealed with approved sealant	Yes No N/A
Leak sealed	Yes No N/A

Comments:____

Wall Performance Checklist N/A

Smoke test each visible wall crack	Yes No N/A
Smoke enters visible wall cracks	Yes No N/A
If yes, sealed with approved sealant	Yes No N/A
Leak sealed	Yes No N/A
Smoke test of open course/sill at top of wall	Yes No N/A
Smoke enters top course/sill	Yes No N/A
If yes, open block sealed with approved sealant	Yes No N/A
Leak sealed	Yes No N/A

Comments:____

Fan Performance Checklist

Does fan produce excessive noise/vibration	Yes No
Vibration dampeners installed on fan	Yes No
Fan is secure when running	Yes No
Does fan produce vacuum	Yes No

Note: All fans running and winter conditions simulated for the following test

System Operation Checklist

Negative sub slab pressure Yes No

Valves secured and power switch tagged with a seal Yes No

System operating per design Yes No

Installation/Operation accepted as complete Yes No

Comments External power switch is elevated, power switch tag not required (>10 feet above ground)

Crawlspace Performance Inaccessible Crawlspace Checklist N/A

Parameter	Calculation/(Units)	Crawlspace 1	Crawlspace 2
Volume of void space beneath crawlspace	length x width x height of void (feet)		
Measured velocity at extraction point	(feet per second)		
Diameter of extraction point	(inches)		
Flow rate of air removed from beneath crawlspace	Measured velocity x cross sectional area of suction point (cubic feet per second)		
Time for single air exchange	Volume of air beneath slab / Flow rate (seconds)		

Velocity at suction side of valve measured with thermal digital anemometer. Yes No

Comments

4) COMMUNICATION TEST

Sub-slab permeability must be understood prior to system installation to determine design parameters and to ensure an appropriate negative pressure field will be induced underneath the slab. This process is undertaken by performing a Communication Test which assesses the permeability of the sub-slab materials by measuring the flow of air being removed from beneath the slab and its associated induced vacuum.

A Communication test is designed to qualitatively measure the ability of a suction field and air flow through the material beneath a concrete slab floor and thus evaluate the permeability of the subsurface material. This qualitative test is commonly conducted by applying suction on a centrally located extraction well drilled through the concrete slab while simultaneously taking measurements with a digital manometer from small holes drilled in the slab at locations separated from the central suction hole.

	Test Point 1	Test Point 2	Test Point 3	Test Point 4	Test Point 5	Test Point 6	
*Location (NE, SE, NW, SW)	CTP-1	CTP-2	CTP-3	CTP-4	CTP-5	CTP-6	CTP-7
Micromanometer (in H_2O)	-0.054	-0.255	-0.012	-0.023	N/A	0.000	-0.120
Distance from extraction point to test point	28ft	12ft	5ft	32ft	Refusal	45ft	36ft
Smoke Test Completed	✓	✓	✓	✓	✓	✓	

Vacuum ≥ 6 Pascals (0.024 in H_2O) at each point Yes No

Each fan runs when switch is in ON position Yes No

All smoke tests successful Yes No

Communication test completed Yes No

Date 17 Nov 10 by [illegible] (signature) [illegible] (print name)

*Refer to Drawing for locations

5) BACK-DRAFT TEST

No Gas Appliances or Gas Furnaces In Office Area

The back-draft test is performed to assess whether the flow of air through any appliance with combustion of fuel results in venting of the combustion products to outdoor air through the chimney, flue, or vent (as expected). If the flow is in the opposite direction, the condition is referred to as a back-draft, which can result in the accumulation of carbon monoxide, which is poisonous and potentially fatal. Seasonal and extreme weather conditions should be considered when evaluating pressure differentials and the potential for back-drafting. Winter conditions (heating season) are preferred over summer, and unusually windy days should be avoided.

Procedure: (check when completed)

- Close all windows and doors, both external and internal. ____
- Open all HVAC supply and return air duct vents/registers. ____
- Close fireplace and wood stove dampers. ____
- Turn on all exhaust and air distribution fans and combustion appliances EXCEPT the appliance being tested for backdrafting. ____
- Wait 5 minutes. ____
- Test to determine the indoor-outdoor pressure differential in the room where the appliance being tested is located. If the pressure differential is a negative 5 Pascals or more, assume that a potential for backdrafting exists. ____
- To begin a test for actual spillage of flue gases, turn on the appliance being tested. (If the appliance is a forced air furnace, ensure that the blower starts to run before proceeding.) ____
- Wait 5 minutes. ____
- Using either a smoke tube or a carbon dioxide gas analyzer, check for flue gas spillage near the vent hood. ____

N/A

Repeat steps (4) through (9) for each natural draft combustion appliance being tested for backdrafting.

Back-draft Test Results:

Appliance	Back-draft?
Hot water heater	Yes No N/A
Furnace/boiler	Yes No N/A
Fireplace	Yes No N/A
Dryer	Yes No N/A
Other__________	Yes No N/A
Other__________	Yes No N/A
Other__________	Yes No N/A

Home owner and occupant (if different) must be notified of any back-draft conditions identified. This notification is intended to help protect the owner and occupants from potentially serious health risks associated with carbon monoxide poisoning. If backdraft conditions are observed, the sub-slab depressurization system must not be operated until the back-draft condition is corrected by a qualified HVAC Contractor. A carbon monoxide alarm is also a good secondary line of defense.

Contractor Verification of System Installation and Operation Checklist

I have reviewed this form with the client's onsite representative and hereby acknowledge that the information provided is true, accurate and complete to the best of my knowledge and ability.

Contractor's Signature ________________ Date Nov 17, 10

Comments: ________________

6) REFERENCES:

EPA Training Manual, "Reducing Radon In Structures," (Third Edition), January 1993.

"Radon Reduction Techniques for Detached Houses, Technical Guidance (Second Edition)," EPA/625/5-87/019, January 1988.

"Application of Radon Reduction Methods," EPA/625/5-88/024, August 1988.

USEPA "A Citizen's Guide to Radon (Second Edition)"

USEPA "Consumers Guide to Radon Reduction."

3 inch schedule 40 PVC in the ceiling overhead

Suction Point

Sub Slab Depressurization Photos

Saint Gobain, Office Area

6600 Walmore Road Facility, Wheatfield, NY

Geosyntec consultants

Attachment 3

Guelph | 7-Dec-2010

internal info: path, date revised, author

Audible Alarm

U-tube Manometer

Sub Slab Depressurization Photos

Saint Gobain, Office Area

6600 Walmore Road Facility, Wheatfield, NY

Geosyntec consultants

Attachment

3

Guelph | 7-Dec-2010

internal info: path, date revised, author

Mitigation fan with rain cap

Communication Testing

Sub Slab Depressurization Photos Saint Gobain, Office Area 6600 Walmore Road Facility, Wheatfield, NY		
Geosyntec consultants		Attachment 3
Guelph	7-Dec-2010	

internal info: path, date revised, author