MCCUE CONTRACTING

Design & Construction of a Sub Slab Depressurization System to Meet New BCMOE Soil Vapour Mitigation Requirements

presented by

Stephen Sumsion, B.A.Sc., PEng

McCue Environmental Contracting Inc.

MCCUE CONTRACTING

Introduction

Overview of changes to BC environmental regulations

Technical Guidance 4 Overview and requirements for vapour management

Historical approach to vapour management

Project example





New BC Standards

Soil vapour added as a regulated environmental medium in BC in 2009

Numerical soil vapour quality standards enacted for protection of human health (Contaminated Sites Regulation Schedule 11)

Standards provided for CSR prescribed volatile substances: -Henry's Law constant > 1 x 10-5 atm-m3/mol -Vapour Pressure > 0.05 Torr at 1 atm, 25 C

MOE provided new technical guidance (Technical Guidance 4) for soil vapour investigation and remediation in 2010

Technical Guidance 4

Technical Guidance 4 (TG4) provides information on:
-identifying site use, areas of potential environmental concern (APEC's), and potential contaminants of concern (PCOC's)
-refining the list of vapour PCOC's
-characterizing vapour contamination

-remediating vapour contamination

This presentation focuses on soil vapour remediation under the new requirements



Remediation Requirements

"Risk management of vapour contamination – is also an acceptable remedial option for contaminated Sites."



Where vapour management is used note the following:

- Choice of system is up to the applicant
- Site under vapour management is only eligible for AIP or a risk-based COC
- Documents must be submitted before a risk-based COC will be issued
- Until all documents are submitted the site will only be eligible for an AIP

MCCUE

Before 2009

Soil vapour assessed to characterize soil and groundwater contamination or for riskbased soil and groundwater remediation



If potential or actual human health risks from soil

vapour were identified, soil vapour mitigation requirements would be appended (in Schedule B) to the Certificate of Compliance

Soil vapour mitigation requirements listed were usually very vague

Requirements typically did not include requirements for long term monitoring of mitigation systems

Project Site





Building Design

Building is 272 ft in length and 120 ft in width and slab on grade

Ground floor is 75% commercial and 25% residential

Residential townhomes on west side of development at a base elevation 4 ft higher than commercial space

Subgrade structures included stone columns, concrete footings and foundation walls, drainage layer, vapour barrier and utilities

Rooftop is occupied

CONTRACTING

Building Schedule



A Quantitative HHRA would not be undertaken for an approximate period of 1 year from the building completion

MCCUE

SSV Systems

SSV systems rely on natural thermal and wind effects

Layer of venting material placed below the foundation slab to allow soil gas to move to a collection piping system for discharge



SSV systems include a sealed liner installed above the venting layer

May naturally reduce the air pressure below the slab but there is no requirement to maintain a lower pressure below the foundation slab

SSD Systems

Main objective is to continuously lower pressure beneath the slab relative to the building pressure

A pressure differential of -4 to -10 Pa or less beneath the slab is recommended (USEPA, 2008a)

Depressurization typically with a fan or blower



Sub slab liner is a redundant feature for instances when the blower fails

Performance is evaluated by monitoring the blower operation and the reduced pressure beneath the slab



Options Evaluation

Due to uncertainty regarding actual potential risk to human health at the site and that wind turbine vents are not possible, a SSD system was selected

A SSD system offers many benefits for the project site



Detailed Design

Primary design objectives:

-To eliminate the exposure pathway between the contaminated subsurface and future building occupants (both residential and commercial)

-To continuously lower pressure beneath the slab relative to inside building pressure

Main components included sub slab vapour collection piping, sub slab liner and equipment

ssp Piping Layout



Vapour Collection Piping



Slub Slab Liner



CONTRACTING

Vapour Monitoring Ports







Equipment and Controls



Quality Assurance



Quality Assurance



Repairs



E3



Repairs



Es





63(0)



Repairs

es



Repairs







Monitoring & Maintenance

Monitoring will be conducted on semi annual basis during wet and dry conditions

Maintenance will be conducted at least semi annually

5 Year Reviews required to re-evaluate operational requirements of the system

Guidance on termination of building controls outlined



MCCUE CONTRACTING

Conclusion

The approach and documentation for soil vapour management has changed

Technical Guidance 4 and recommended external documentation critical

Preparation of submittals by a qualified engineer prior to receiving a COC



QUESTIONS??

