

Environmental Due Diligence: Soil Vapor Intrusion

Wednesday, May 23
12:00 p.m. - 1:00 p.m.

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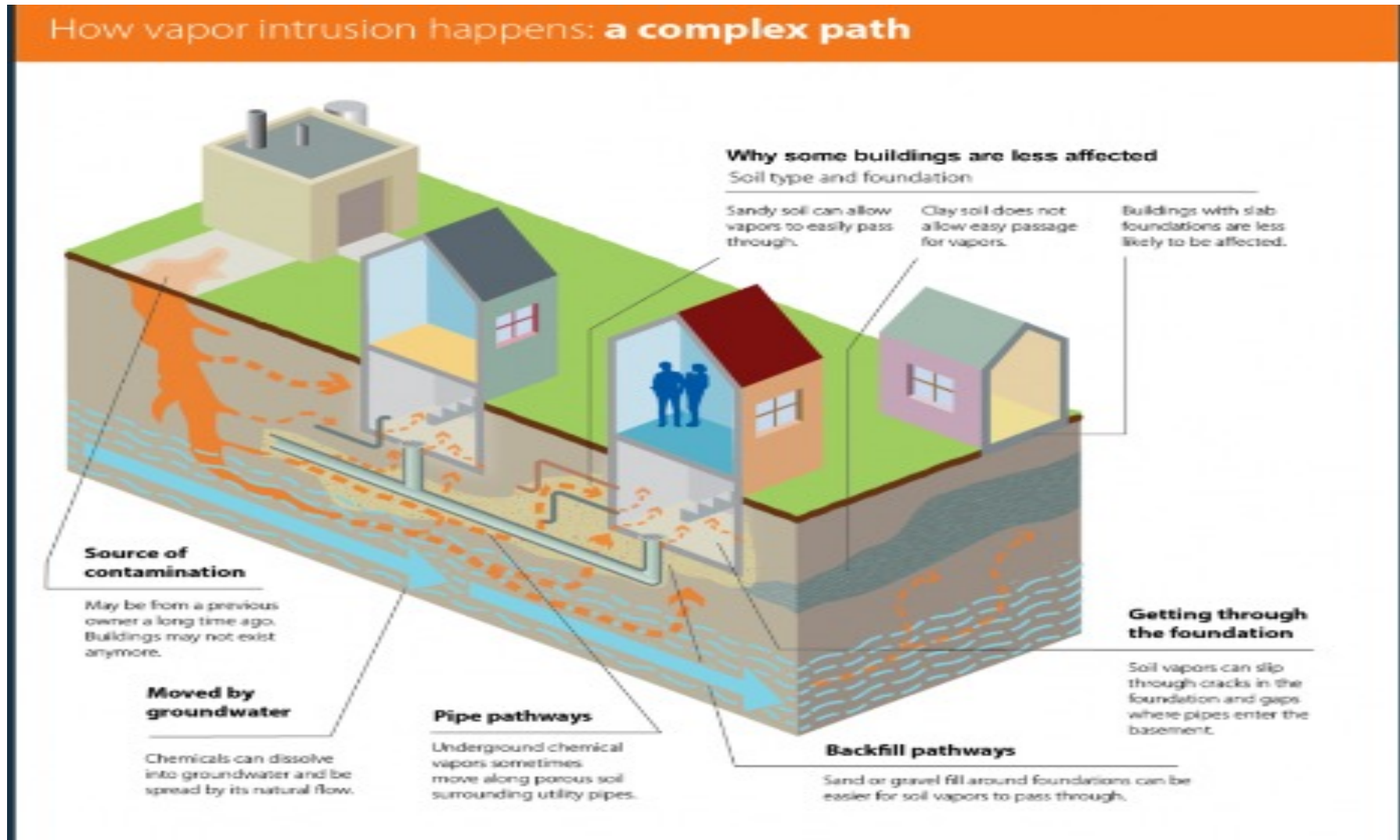
Environmental Due Diligence- Vapor Intrusion

- I. What is Vapor Intrusion and Why Do We Care?**
- II. Due Diligence Practices**
- III. Risk and Liability Mitigation**

I. What is vapor and why do we care?

- Volatile Organic Compounds
- Releases to soil and groundwater
- Migrate, Congregate and Infiltrate
- Exposure to humans

I. What is vapor and why do we care?



II. Due Diligence Practices

Evaluation/Solution Path

ESA Identifies a VEC



File review/desktop VI evaluation



LSI for vapor intrusion, as needed



Report, as needed



Vapor Mitigation, as needed

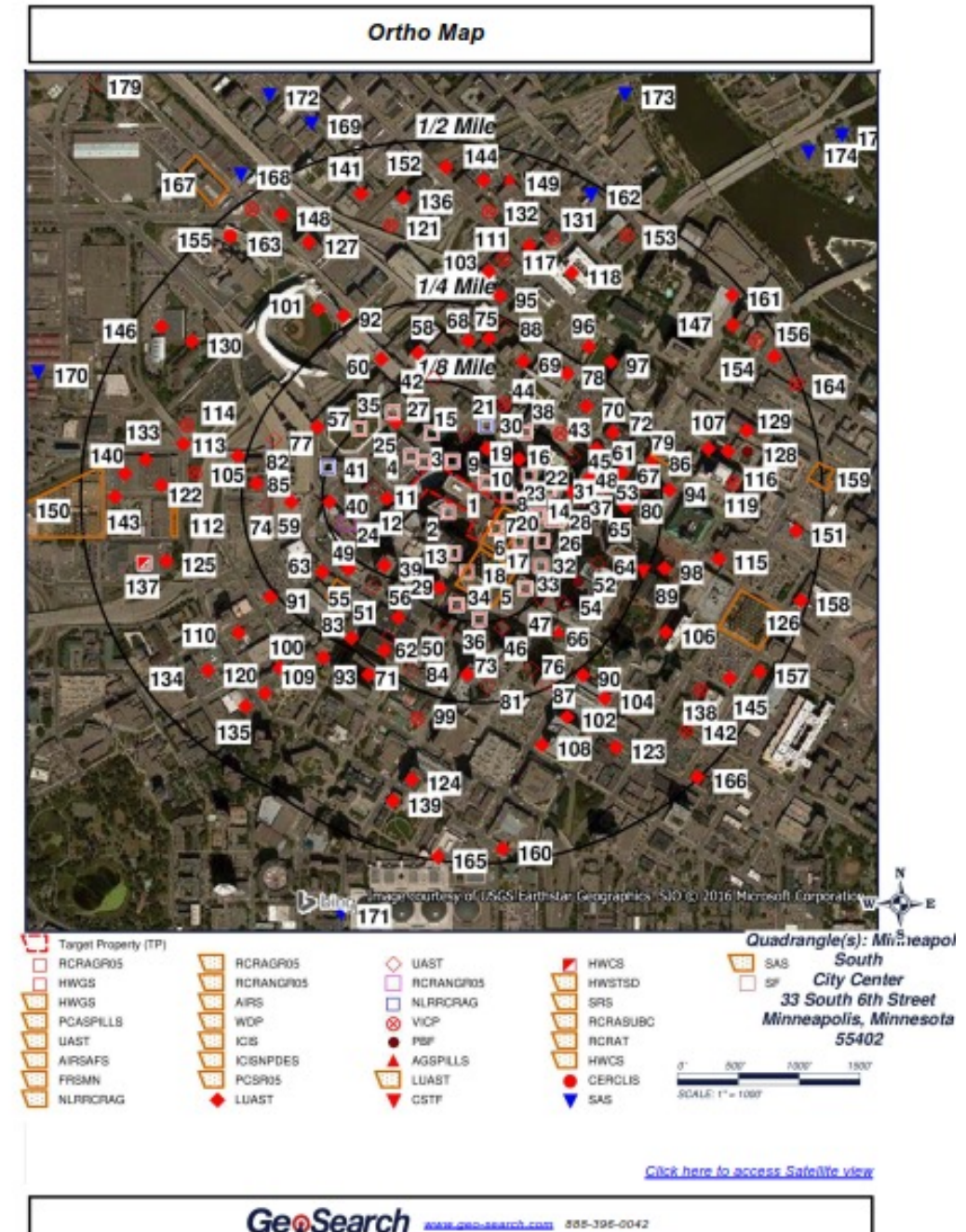
II. Due Diligence Practices

Phase I Environmental Assessments

•Using ASTM E1527-13 and E2600-15

- Identification of Recognized Environmental Conditions (RECs) from current or past on- or off-site industrial uses of hazardous substances and/or petroleum products which were released into the subsurface.
- Evaluation of vapor encroachment/intrusion to the Site (buildings) from on- or off-site sources

Many potential sources to evaluate in some locations.



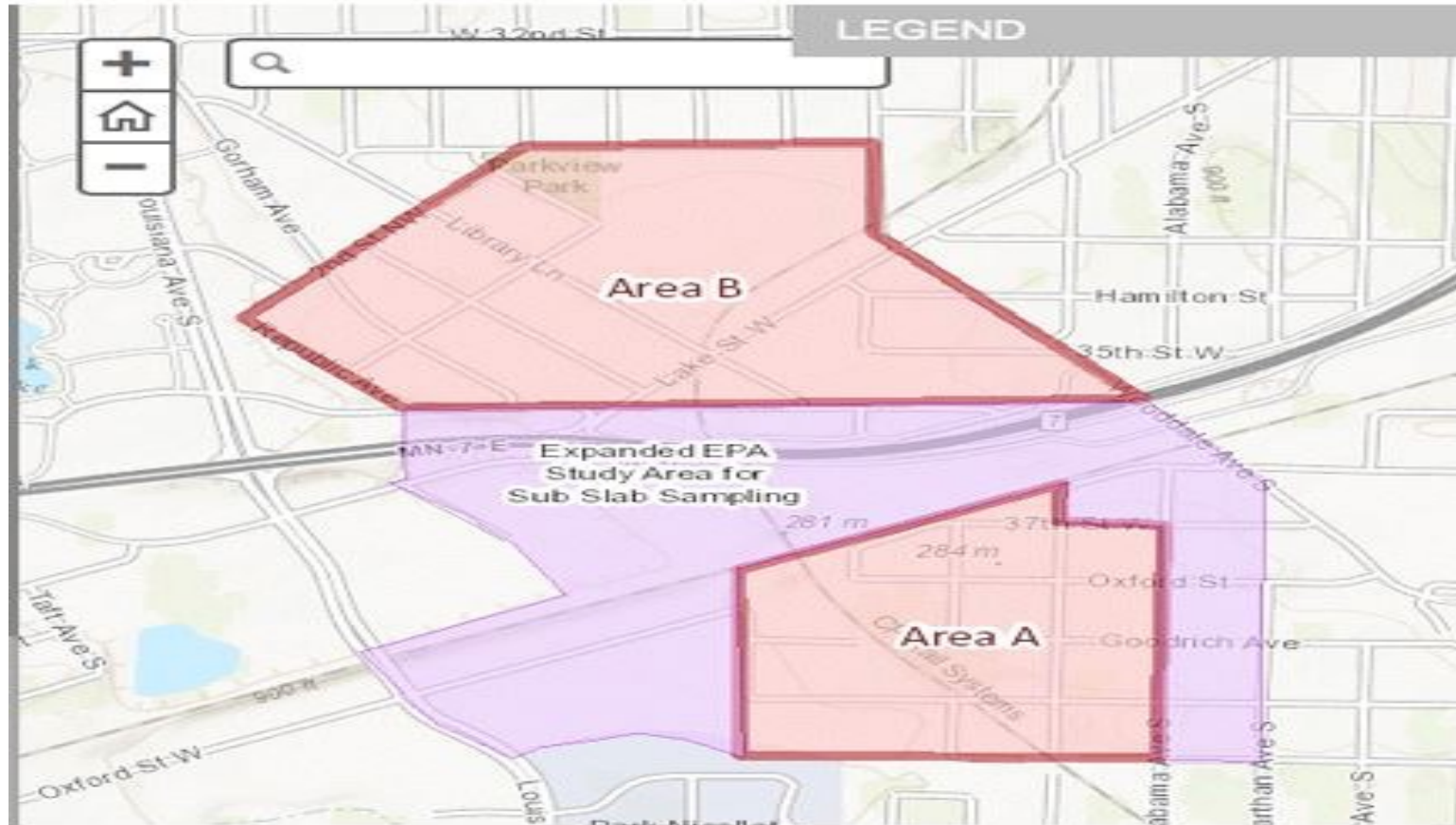
II. Due Diligence Practices

Soil Vapor: Como Neighborhood – Minneapolis Building Mitigation Status



II. Due Diligence Practices

St. Louis Park solvent plume and vapor intrusion site



Source: MPCA

II. Due Diligence Practices

Type of Project- dictates approach and response

- Sale
- Acquisition
- Refinance
- Lease
- Redevelopment

II. Due Diligence Practices

Phase II May Be Required

- Assess RECs/VECs.
- Determine relative extent and magnitude of releases.
- Identify possible receptors.
- Obtain sufficient data to assess materiality of issues.
- Assist with cost opinion (pro forma) for acquisition and possible change in use including redevelopment.

II. Due Diligence Practices

Vapor Intrusion Risk

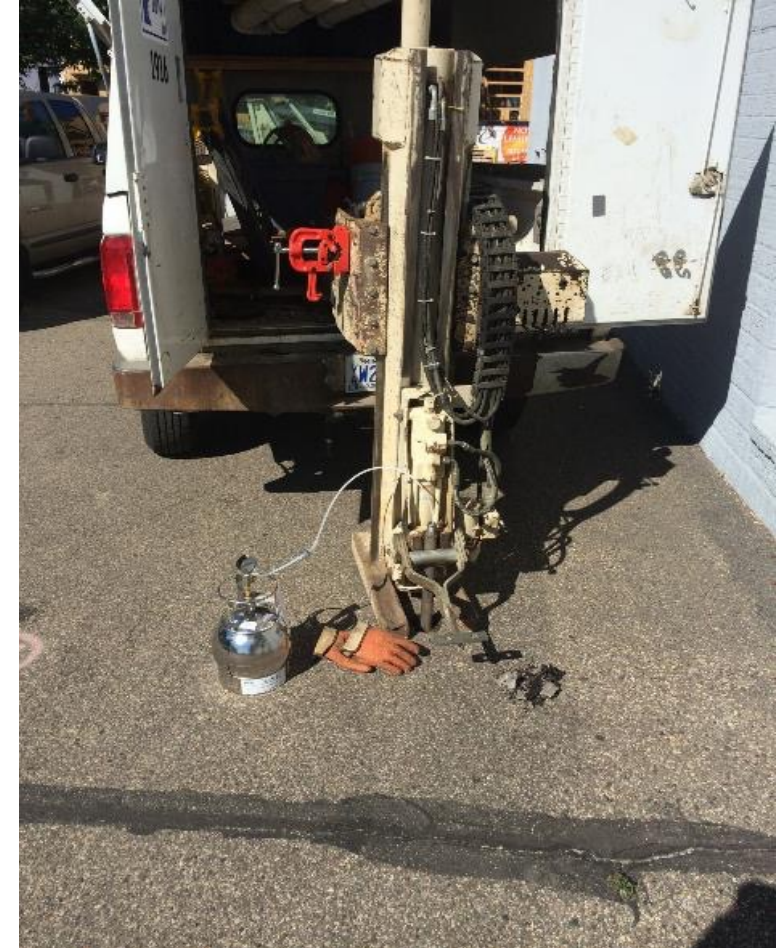
Testing

- PRT
- Sub-slab
- Indoor Air

II. Due Diligence Practices

How do we assess for vapors?

- **Push probe evaluations**
 - Truck or track-mounted push probe rigs
 - Low-impact sampling
 - Typically for sampling outside the building footprint unless building operations allow space (i.e. garages, warehouse, etc.)
 - Fairly quick due to shallow sampling (upper 8 feet of soils and above water table)



II. Due Diligence Practices

How do we assess for vapors?



■ Sub-Slab Sampling- Vapor Pin

- Using Cox Colvin Vapor Pin® or other sampling techniques
- Used for sampling the lowest level of a building where the floor slab is in good condition (no large cracks or exposed soil)
- Relatively quick means of sampling (“grab sample”)
- Involves drilling a small hole through the floor slab to install the Vapor Pin®
- Can be made permanent for other investigative uses
 - Additional sampling rounds
 - Pressure field extensions (measuring sub-slab air movement)
 - Post-mitigation monitoring

II. Due Diligence Practices

How do we assess for vapors?



■ Indoor air evaluations

- Not ideal in most cases
- Not a primary evaluation tool
- Longer sampling (8-24 hrs)
- Return trip to collect samples
- Can be better if used in conjunction with sub-slab testing (“paired sampling”)
- Could identify compounds that we are not specifically looking for.
 - High potential for other background contaminants.

II. Due Diligence Practices

How do we assess for vapors?



- Indoor air evaluations- cont
- OSHA vs. ISVs

II. Due Diligence Practices

Phase II Findings

Soil Vapor Impacts

- Comparison to Risk Based Regulatory Standards According to Land Use
- Standards constantly evolving- primarily downward
- Vapor Intrusion Risk is recent trend- TCE and PCE

II. Due Diligence Practices

Phase II Findings

Risk Comparison Tools

- Look Up Tables (ISVs, RSLs, State Defaults)
- EPA VISL Calculator
- Johnson Ettinger
- HERO (CA)
- Biovapor

II. Due Diligence Practices

Are Reporting Requirements Triggered?

- Requires Technical and Legal Analysis
- Minn. Stat. § 115.061
- UST Reporting
- MPCA Guidance

III. Risk and Liability Mitigation

Role of Minnesota Voluntary Programs

- Should You Seek Assurances or Not?

III. Risk and Liability Mitigation

Role of Minnesota Voluntary Programs

VIC Program- Non-Petroleum

- No Association Determination
- No Further Action Letter
- Certificate of Completion
- Off-site Source Determination
- Approval of Vapor Response Actions
- Approval of Vapor Assessment
- Approval of Response Action Plans and Implementation

III. Risk and Liability Mitigation

Role of Minnesota Voluntary Programs

Petroleum Brownfield Program

- Tank and Non-Tank Closure
- General Liability Letter
- Tank Removal Verification
- Approval of Development Response Action Plans and Implementation

III. Risk and Liability Mitigation

MPCA Other Guidance/Assurance Letters

- Partial Building Mitigation
 - >30,000 sf
 - Confirmation Sampling
 - Verification Sampling
- MPCA Assurance Letters
 - Completion of Vapor Mitigation Response Actions
 - Completion of Vapor Assessment Action (When Mitigation Not Necessary)

III. Risk and Liability Mitigation

MPCA Updated VI BMP guidance October 31, 2016

- Collect soil gas and/or sub-slab samples if within 100 feet of known or suspected vapor sources
- More sampling needed to ascertain no VI risk (>10,000 sf to <20,000 sf = 6 samples
- Minimum two sample sets: heating and in non-heating season for VI risk determination
- Applied 33X Intrusion Screening Values to determine further testing or mitigative actions
- Established Expedited ISVs.
- If exceedance of 33X EISVs need to undertake response actions within 30 days
- Special measures for TCE and at-risk populations

III. Risk and Liability Mitigation

Table 1 – Residential mitigation decision – based on sub-slab sampling

Sub-slab Concentrations	Mitigation decision	
	33X ISV is valid ¹	33X ISV is NOT valid ¹
SS ² < ISV	Active mitigation is not necessary. Additional sampling not required unless Site or building conditions change ³	Active mitigation is not necessary. Additional sampling not required unless Site or building conditions change ³
SS ² > ISV and < 33X ISV	Active mitigation is not necessary. Additional sampling not necessary unless Site or building conditions change ³	Active mitigation is necessary ⁴ OR Sample paired sub-slab (or soil-gas below building), indoor and outdoor air and report results to MPCA immediately to determine mitigation action ⁴ OR Address building conditions so 33X ISV screening level is valid, then repeat seasonal sub-slab sampling to determine mitigation ⁴
SS ² > 33X ISV and < 33X EISV	Active mitigation is necessary ⁴	Active mitigation is necessary - Contact MPCA to determine the need for expedited ³ action
SS ² > 33X EISV	Active mitigation is necessary - Contact MPCA to determine the need for expedited ³ action	Active mitigation is necessary - Contact MPCA to determine the need for expedited ³ action

Notes:

SS = Sub-slab

ISV = Intrusion screening value

EISV = Expedited intrusion screening value

Active Mitigation Necessary

Expedited Action Evaluation

III. Risk and Liability Mitigation

Table 2 – Commercial/Industrial mitigation decision – Based on sub-slab sampling

Sub-slab concentrations	Mitigation decision	
	33X ISV is valid ¹	33X ISV is NOT valid ¹
SS ² < ISV	Active mitigation not necessary Indoor air sampling not necessary Additional sampling not necessary unless Site conditions change ³	
SS ² > ISV and < 33X ISV	No further investigation or mitigation is necessary unless site conditions change ³	Active mitigation is necessary ⁴ OR Sample paired sub-slab (or soil-gas below building), indoor and outdoor air and report results to MPCA immediately to determine mitigation ⁴ OR Address building conditions so 33X ISV screening level is valid, then repeat seasonal sub-slab sampling to determine mitigation ⁴
SS ² > 33X ISV and < 33X EISV	Active mitigation is necessary ⁴ OR Conduct completed pathway ³ investigation	Active mitigation is necessary ⁴ OR Conduct completed pathway ³ investigation - Contact MPCA to determine the need for expedited ⁶ action
SS ² > 33X EISV	Active mitigation is necessary ⁴ Contact MPCA to determine the need for expedited ⁶ action	Active mitigation is necessary ⁴ Contact MPCA to determine the need for expedited ⁶ action

Notes:

EISV – Expedited ISV

ISV – Intrusion screening value

SS – sub-slab

Active Mitigation or Completed Pathway

Expedited Action Evaluation

III. Risk and Liability Mitigation

Vapor Intrusion Risk

Designed Mitigation- Sub-slab Depressurization

- Sumps
- Risers
- Blowers
- Verification Testing
- Operation and Maintenance

Sub-Slab Depressurization



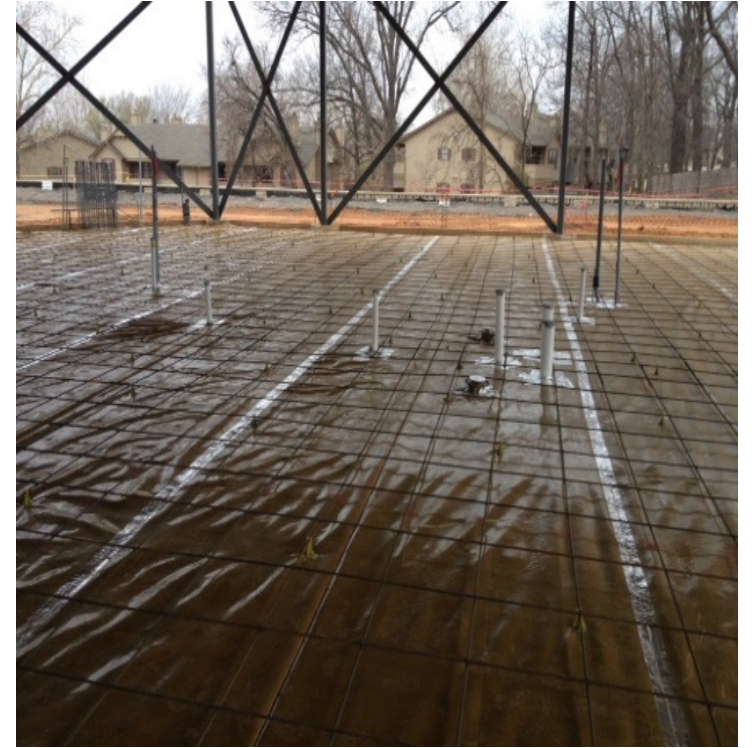
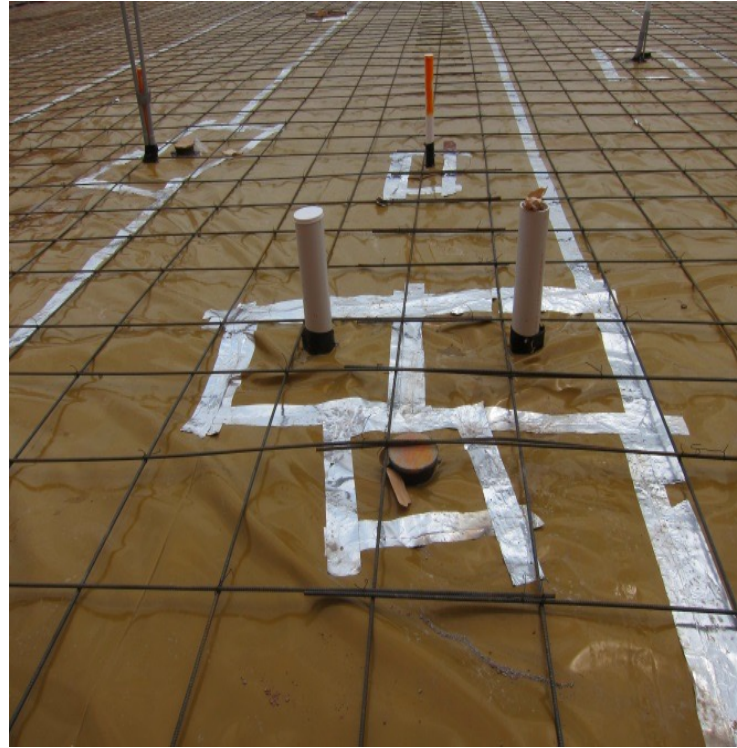
III. Risk and Liability Mitigation

Vapor Intrusion Risk

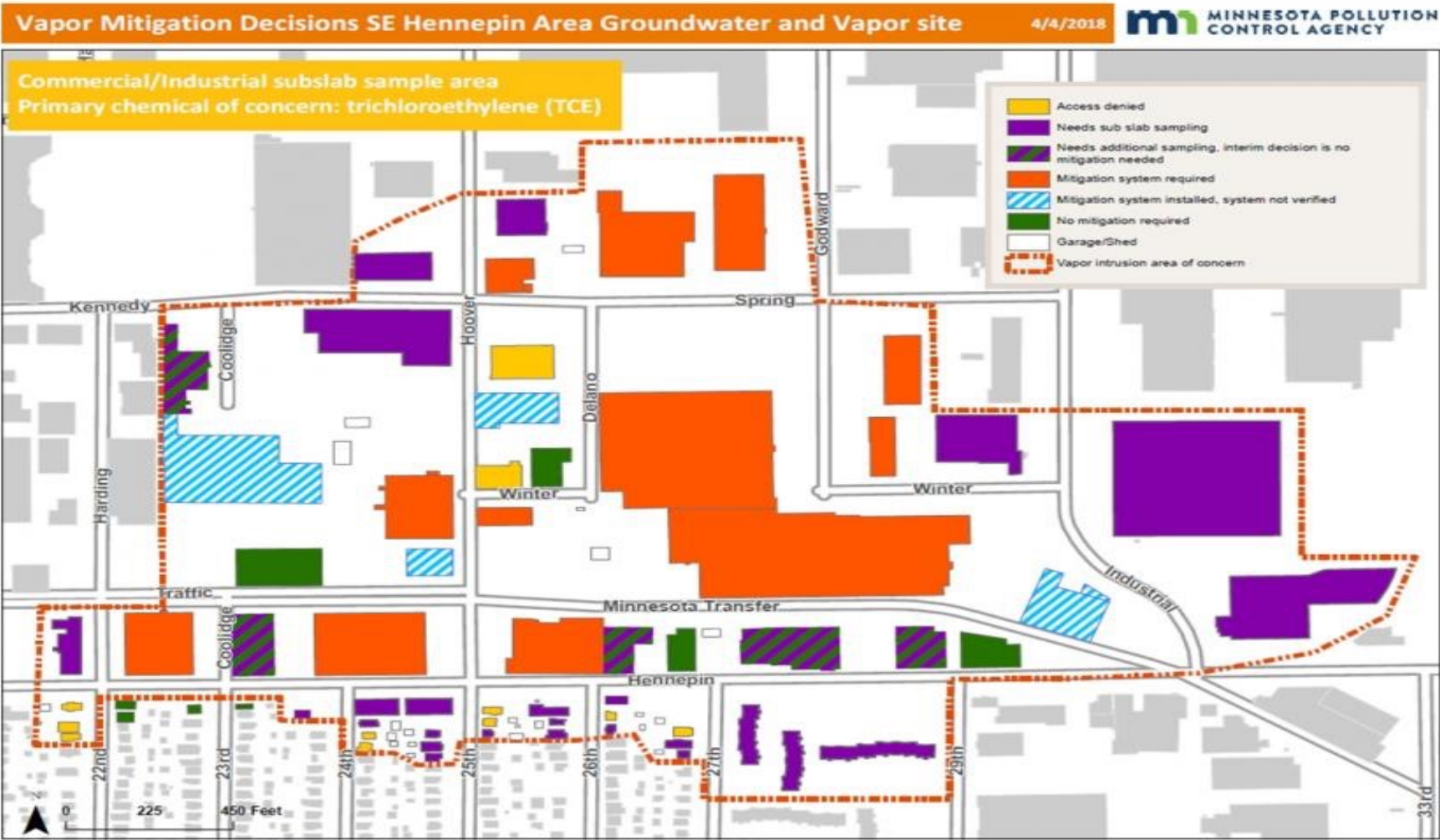
Designed Mitigation- New Construction Vapor Mitigation System

- Bedded Horizontal Runs
- Spray Applied or Sheet Membrane
- Risers
- Blower
- Verification Testing
- Operations and Maintenance

VMS- New Construction



III. Risk and Liability Mitigation



Source: MPCA

Multi-family Apartment Complex

- Transaction- 93 year old Complex
- Indemnity/Escrow
- MPCA and MDH Involvement
- Design and install of SSD
- Deed Record
- Approvals/Closeout



III. Risk and Liability Mitigation

Selected MPCA Vapor Weblinks:

- <https://www.pca.state.mn.us/waste/vapor-intrusion-best-management-practices-0>
- <https://www.pca.state.mn.us/waste/st-louis-park-solvent-plume-and-vapor-intrusion-site>
- <https://www.pca.state.mn.us/waste/minneapolis-se-hennepin-area-groundwater-and-vapor-site>
- [Blaine: Crest Cleaners](#)
- [Bloomington: Lyndale Avenue Corridor](#)
- [Excelsior: Pure Oil Bulk Storage Facility](#)
- [Minneapolis: 55th and Lyndale Avenue South](#)
- [Minneapolis: Diamond Lake Rd. and Nicollet Ave.](#)
- [Minneapolis: Former Waldorf Cleaners](#)
- [Minneapolis: General Mills/Henkel Corp.](#)
- [Minneapolis: Minnehaha Ave. and Snelling Ave.](#)
- [Minneapolis: SE Hennepin Ave.](#)

Questions?

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