

Vapor Intrusion Guidance Changes for the Petroleum Remediation Program

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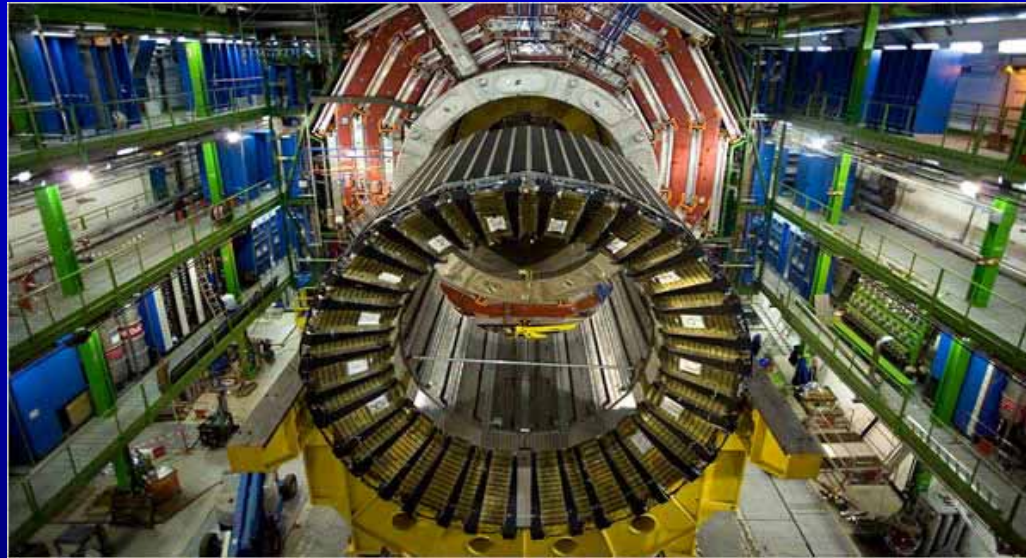
**Petroleum Remediation Program
Consultants Day
September 25, 2008**



Minnesota
Pollution
Control
Agency

Good News!

CERN LHC: Large Hadron Collider



What is Vapor Intrusion?

- The migration of volatile chemicals into buildings (US EPA, 2002 OSWER)

Commercial or Industrial

Residential: basement or slab on grade



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National & State VI Guidance

- National Documents & Training
- State Guidance
 - Half of U.S. states have policy for VI

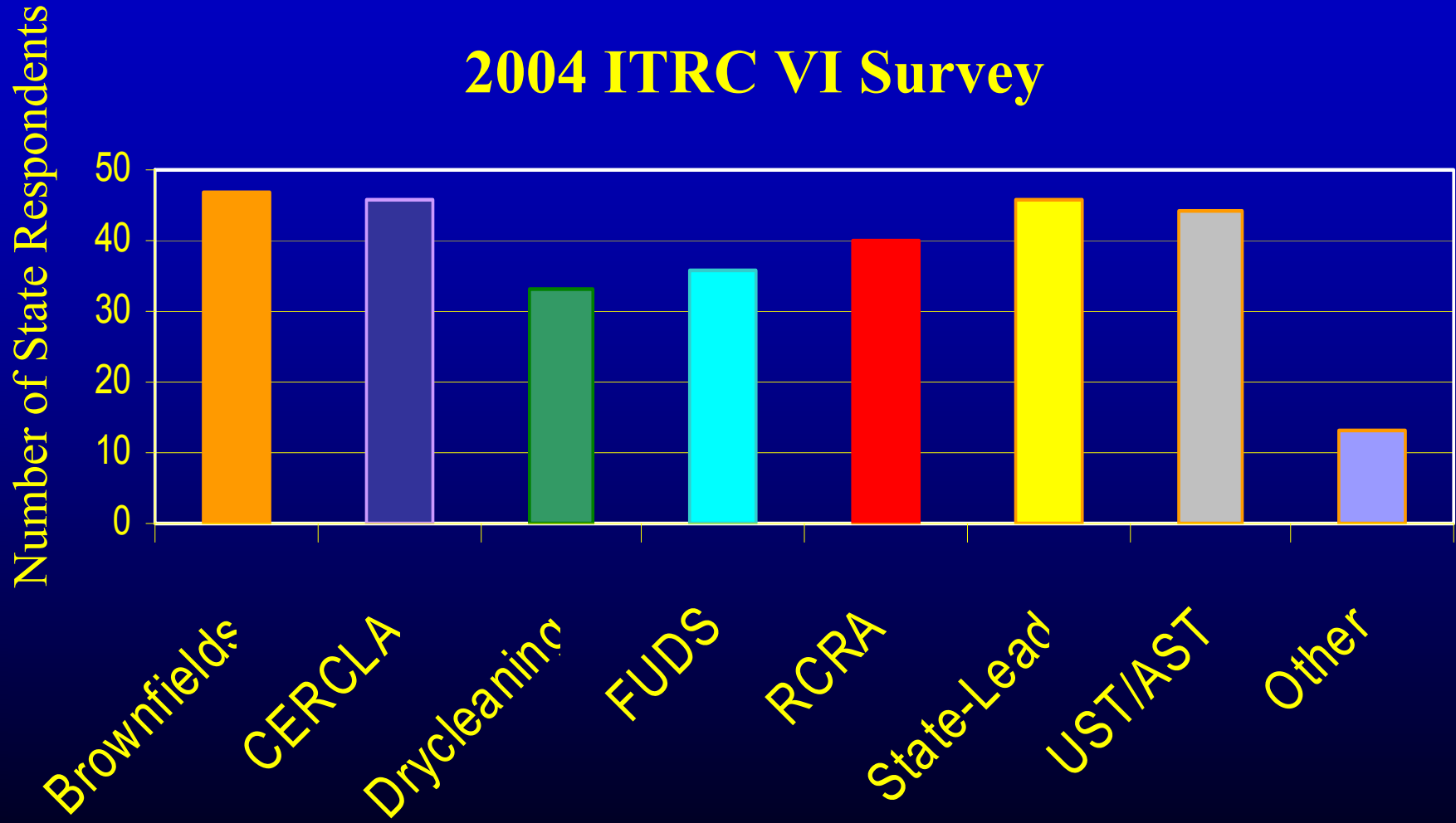


- ITRC Survey (2004)
 - 37 of 43 states did not have procedures for VI
 - 23 deferred to EPA Draft



Vapor Intrusion Site Scenarios

2004 ITRC VI Survey



2005 MPCA PRP VI Guidance

- PRP 4-01a, “Vapor Intrusion Assessments Performed During Site Investigations.”
 - Sampling at new and active PRP sites
 - Sampling to evaluate VI potential at PBP sites
- PRP Investigative Framework
 - Source → subsurface migration route → receptor
 - For vapor intrusion – all three components must be present
 - Sampling focused at identified receptors w/i 100ft
 - no receptors = no sampling

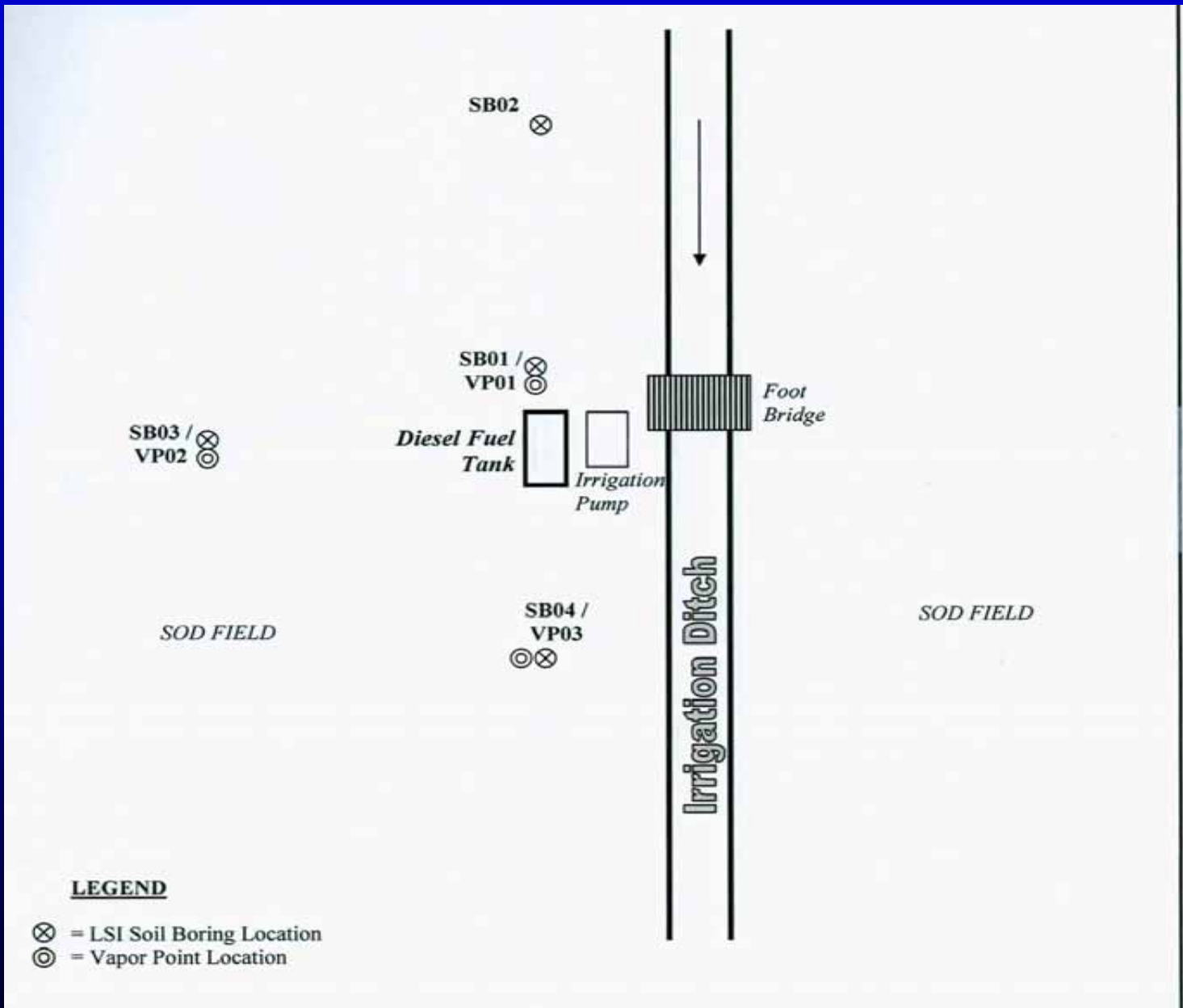
PRP 4-01a Changes

Terminology

- Vapor Intrusion Receptor
- Vapor Intrusion Source
- Subsurface Migration Pathway

Sampling during LSI/RI

- Soil gas sampling based on presence of VI receptors
- Absence of VI receptors should be documented in LSI/RI



LEGEND

- ⊗ = LSI Soil Boring Location
- ⊙ = Vapor Point Location

PRP 4-01a Changes

Site Conceptual Model (SCM)

- SCM info in PRP GD 1-01
- Tool for data interpretation
 - Qualitative & quantitative
- Design investigative strategy & support recommendations
- Iterative process

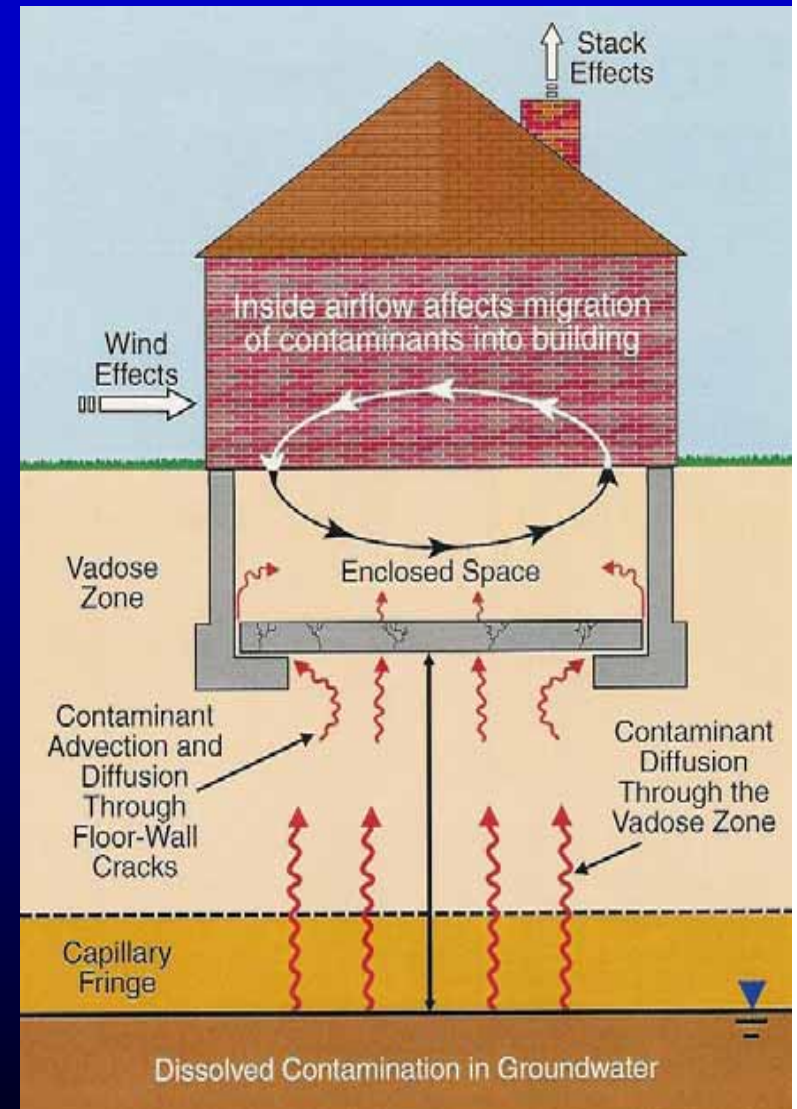


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PRP 4-01a Changes

MPCA ISV's: Intrusion Screening Values

- Developed using 2007 MDH HRV model
- ISV's Used by MPCA Remediation Division
- Table provided in Appendix B (4-01c)

<http://www.pca.state.mn.us/publications/c-prp4-01c.xls>

Table 1: Intrusion Screening Values (ISVs) for Vapor Intrusion Risk Evaluation - August 2008 Version

Note: 10x and 100x ISVs are used for screening soil gas and sub-slab concentrations

Chemical	CAS #	Intrusion Screening Values (ISVs) (µg/m ³)	Basis	Source	10X ISVs (µg/m ³)	100X ISVs (µg/m ³)	Acute Intrusion Screening Values (µg/m ³)	Source
Acetone	67-64-1	400	NC	V	4,000	40,000	63,000	A
Benzene	71-43-2	4.5	C	M	45	450	1,000	M
Benzyl chloride	100-44-7	0.2	C	C	2	20	240	C
Bromodichloromethane	75-27-4	0.6	C	V	6	60	NA	
Bromoform	75-25-2	9	C	I	90	900	NA	
Bromomethane (Methyl Bromide)	74-83-9	5	NC	M	50	500	2,000	M
1,3-Butadiene	106-99-0	0.3	C	M	3	30	NA	
2-Butanone (Methylethylketone)	78-93-3	5,000	NC	I	50,000	500,000	10,000	M
Carbon disulfide	75-15-0	700	NC	M	7,000	70,000	6,000	M
Carbon tetrachloride	56-23-5	0.7	C	I	7	70	1,900	C
Chlorobenzene	108-90-7	50	NC	E	500	5,000	NA	
Chloroethane (Ethyl chloride)	75-00-3	10,000	NC	I	100,000	1,000,000	100,000	M

PRP 4-01a Changes

10X & 100X Subsurface Screening Levels

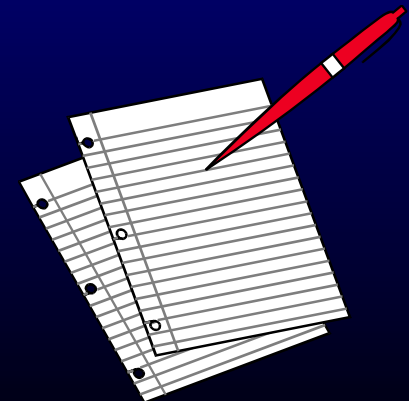
- Established to evaluate soil gas & sub-slab data
 - attenuation of low level soil gas near receptors
- Framework (soil gas & sub-slab data)
 - Concentrations less than 10X ISV's
 - Between 10X – 100X ISV's
 - Greater than 100X ISV's
- Indoor air samples compared directly to ISV

If Concentrations Less Than 10X ISVs

- No further work at VI receptor if supported by...
 - Stable source conditions
 - Lack of susceptible populations
 - No observable preferential pathways from LSI/RI process (e.g. elevator shaft, sump, ect)
- Site Conceptual Model (SCM) should provide evidence supporting no further work

If Concentrations are Between 10X and 100X ISVs

- Additional pathway characterization required
- Exterior data options
 - Confirmation soil gas sampling
 - “near-slab” soil gas sampling
- Interior data options
 - MPCA Indoor Building Survey: (4-01b)
 - Sub-slab soil gas
 - HVAC evaluation & air exchange



If Concentrations Greater than 100X ISVs

- Interior investigation required
- Indoor Building Survey (4-01b)
 - Preferential pathways
 - Building air exchange rates
 - Background contaminants
- Additional quantitative data required for closure
 - Sub-slab & Indoor air (constituent ratio's)
- Evaluate for mitigation



Other Changes

- Recommended SOP's
 - Permanent soil gas monitoring points
- Supplemental Field QA/QC
 - Flow rate & leak check compounds
- Lab QA/QC
 - Certification available from MDH for TO-15, soon for TO-14. Obtain by 3/25/09
- Appendix B – ISV's (4-01c)
- Appendix C – Indoor Building Survey (4-01b)

Coming Soon

- MPCA Remediation Division Vapor Intrusion Technical Supplement
 - Supplement existing GD's for division programs
- Additional information on...
 - Data evaluation & lines of evidence
 - Building mitigation options
 - Investigative flow diagrams & more...
- Release Date: TBD
- Interest in Vapor Intrusion Training Day?