Key MCP Vapor Intrusion Changes

- Widespread VI changes from beginning to end of MCP process from Notification through Closure…. And everything else in between.
- **NOTIFICATION:**
  - Broadening of Substantial Release Migration Definition (72 hour reporting) to include
    - >GW-2 Standards within 30 ft. of building & depth to gw is 15 ft or less
    - Evidence of vapor migration along preferential pathways exist
    - Explicitly includes “Daycare” and “Child Care Center” to receptor list (previously in definition of “school”)

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Key MCP Vapor Intrusion Changes

- **ASSESSMENT**:
  - Process/Approach generally follows VI guidance documents (12/11 and 3/13 update)
  - Critical Exposure Pathway (CEP) exists if indoor air concentration > Residential Threshold Value (RTV)
  - Differentiation between CEPs that pose an Imminent Hazard vs. not
  - Modeling for future buildings not permitted

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Key MCP Vapor Intrusion Changes

- PCE
  - USEPA and many states relaxed indoor air and soil gas screening levels
  - MADEP recently changed number for toxicity – approximately three times less stringent, so risk-based indoor air values increase accordingly. MCP revisions do not yet reflect this change.
  - But, GW-2 dropped from 50 to 20 µg/L due to lower background values.
- TCE
  - GW-2 standard and RCGW-2 dropped from 30 to 5 µg/L
  - RTV dropped from 0.8 to 0.4 µg/m^3; background between 0.7-0.8 µg/m^3 (guidance, not MCP revision)
  - Imminent Hazard trigger of 2 µg/m3 for residential, 8 µg/m^3 for commercial/industrial (interim guidance, not MCP revision)

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Key MCP Vapor Intrusion Changes

- **MITIGATION/REMEDIATION:**
  - "Exposure Pathway Mitigation Measures" (EPMM) such as SSDS different from Remedial Systems – Active vs. Passive
  - Active EPMM will require performance & monitoring criteria in AUL
  - Other requirements
    - Telemetry
    - Shutdown notification, limitations and evaluations
    - Annual certification

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Key MCP Vapor Intrusion Changes

- **MITIGATION/REMEDIATION** (cont'd)
  - TCE Sites – can they reach closure with AEPMMs?
  - Existing requirement for Remedial Additives near sensitive receptors highlighted, expanded; presumptive approval within 30 days replaces written approval
  - Potential flexibility in schedule for RMRs where active O&M needed to address Imminent Hazard

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Key MCP Vapor Intrusion Changes

- **CLOSURE:**
  - VI Sites will be living in the “Permanent Solution with Conditions” world
  - Two types of Conditions:
    - AUL
    - Non-AUL
  - AUL Conditions
    - Needed for Sites where limit usage/activities or require maintenance of slab, etc.
    - Active EPMM (e.g., SSDS, “radon” systems)

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Key MCP Vapor Intrusion Changes

- **CLOSURE** (cont'd)
  - Non-AUL Conditions
    - Residual/shallow VOC contamination at undeveloped sites with potential VI in future
  - Permanent Solution requires:
    - NSR
    - Source control/remediation/mitigation
  - Source definition clarified? broadened?
  - Additional requirements for demonstrating "Control"

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Key Technical Documents/References for VI beyond the MCP

- Residential Typical Indoor Air Concentrations(12/2008)
- Vapor Intrusion Guidance Document, 12/2011 and 3/2013 updates, including appendices (TVs and SGSLs)
- BWSC SOP – Indoor Air Contamination (August 2007)
- MassDEP Indoor Air Blog – http://indoorairproject.wordpress.com/

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ROBINSON & COLE LLP
ATTORNEYS AT LAW

Chlorinated Solvent Issues in Property Transactions & The 2014 MCP Regulatory Changes

I. SELLER CONSIDERATIONS

Goals:

i. Avoid retained obligations?
ii. As is/where is?
iii. Minimize long term risk
iv. Brownfields liability protections
    i. Statutory
    ii. Covenant Not to Sue (response costs)
    iii. Subsidized insurance

SELLER CONSIDERATIONS (CONT'D)

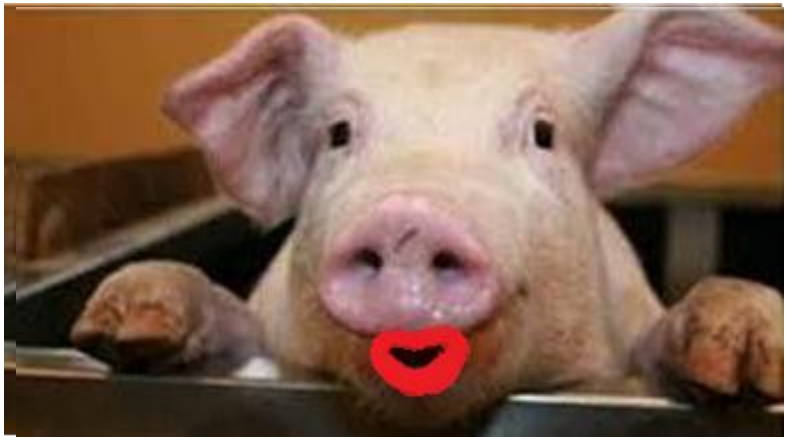
a) Status of the site/property?

i. Phase I – Not usually enough, but . . .

ii. Phase II – Better but how much uncertainty?

iii. Phase III, IV – Looking better!

iv. RAO – Good but Audit? AUL/EPMM?



II. SELLER CONSIDERATIONS (CONT'D)

b) Representations & Warranties?
c) Indemnification
d) Who controls?
    i. What constraints?
        1) Cap
        2) Duration
        3) Commercial/industrial use
        4) Least costly & required
e) Insurance?

II. SELLER CONSIDERATIONS (CONT'D)

e) What Buyer due diligence will Seller permit?
   i. Phase I
   ii. Phase II?
      i. Sample existing wells?
      ii. New wells?
   iii. Vapor intrusion sampling?
   iv. Confidentiality

II. SELLER CONSIDERATIONS (CONT'D)

f) Structuring the deal

What is the end game

i. No liability tail (a pipe dream?)

ii. Post-closing obligations

i. Indemnity? Cap? Duration?

ii. Escrow? Cap? Duration?

iii. Insurance

g) Careful consideration to giving up control

i. Is the site better to hold on to?

III. Buyer Considerations

a) Goals
   i. Full price/no risk?
   ii. Some risk?
   iii. Buying the obligations willing to take risk?
      - Exposure pathway mitigation measures
      - Activity and use limitation
      - Certification
      - Financial Assurance

III. Buyer Considerations (CONT'D)

b) Due Diligence
   i. Buyer Phase I?
   ii. Rely on Seller information?
   iii. Review web based data bases
   iv. Clear understanding of
      1) Site history
      2) Scope of historic investigations
      3) Offsite impacts
      4) Potential for change:
         a) Standards
         b) Use
         c) Construction/Subsurface work

III. Buyer Considerations (CONT'D)

c) Protections
   i. Solid remedial plan
      1) Independent LSP review
      2) RAO/Audit
      3) Indemnification
         a) Subslab system
         b) Vapor barrier
         c) Source control
         d) Offsite issues

III. Buyer Considerations (CONT'D)

a) Insurance (careful)

b) Post-closing performance obligations

   i. Offset on purchase price

   ii. Escrow & Indemnity

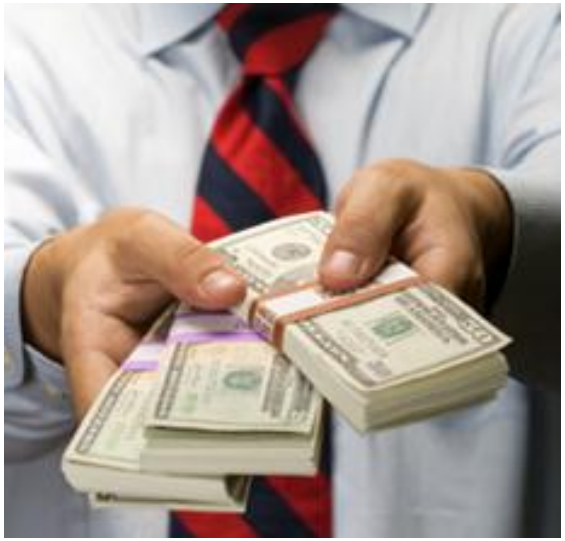
   iii. Seller Contractual obligation:

      1) Basket?

      2) Cap?

III. Lender Considerations

d) Financing:
   i. Like a Buyer
   ii. Conservative
   iii. Pass through protections
      1) Reliance
      2) Indemnity
      3) Insurance
   iv. How will Lenders react to certifications and financial assurance?



IV. New Transactional Considerations In CVOC Sites

a) Certification

b) Financial Assurance

c) AUL Notice

Vapor Intrusion Mitigation

Massachusetts LSPA – Vapor Intrusion Seminar

March 13, 2014

Lucas Hellerich, PhD, PE, LEP (Rocky Hill, CT)

AECOM Environment

Contributions from Ron Curran (CTDEEP)

Overview

- Regulatory considerations and guidance
- Mitigation techniques
  - Options
  - Sub-slab depressurization (SSD) systems
    - Considerations
    - Performance metrics
- Case study

Design Guidance Documents

- USEPA. Application of Radon Reduction Methods (EPA 625-5-88-024, August 1988)
- USEPA. Handbook, Sub-Slab Depressurization for Low-Permeability Fill Material (EPA 625-6-91-029, July 1991)
- USEPA. Radon Reduction Techniques for Existing Detached Houses, Technical Guidance (3rd Ed.) for Active Soil Depressurization Systems (EPA 625-R-93-011 , October 1993)
- USEPA. Model Standards and Techniques for Control of Radon in New Residential Buildings (EPA 402-R-94-009, March 1994)
- USEPA. Radon Mitigation Standards (EPA 402-R-93-078, Rev. April 1994)
- USEPA. Radon Prevention in the Design and Construction of Schools and Other Large Buildings (EPA 625-R-92-016, June 1994)
- USEPA. Standard Practice for Installing Radon Mitigation Systems in Existing Low-Rise Residential Buildings for Residential Radon Mitigation, ASTM E-2121 (EPA 402-K-03-007, February 2003)

Design Guidance Documents

- Massachusetts Department of Environmental Protection – NERO. Guidelines for the Design, Installation, and Operation of Sub-Slab Depressurization Systems. (December 1995)
- Cal. EPA, Department of Toxic Substances Control, Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air, Interim Final, December 15, 2004 (Step 11; page 35) http://www.dtsc.ca.gov/ScienceTechnology/HERD_POL_Eval_Subsurface_Vapor_Intrusion_interim_final.pdf
- NYS Dept. of Health, Guidance for Evaluating Soil Vapor Intrusion in the State of New York, February 2005 Public Comment Draft, Section 4.0: Soil Vapor Intrusion Mitigation http://www.health.state.ny.us/nysdoh/gas/svi_guidance/
- Department of Toxic Substances Control Cal EPA. Vapor Intrusion Mitigation Advisory. April 2009.
- **MassDEP Interim Final Vapor Intrusion Guidance December 2011 - WSC#-11-435 – Section 3 Mitigation & Appendix IV**

MassDEP Interim Final Vapor Intrusion Guidance December 2011 - WSC#-11-435 – Section 3 Mitigation

- Active SSDs → considered most-effective
- Low VOC concentrations or site conditions preclude use of SSD → consider other mitigation measures
- Monitoring program recommendations (Table 3-1)
  - Active vs Passive Systems
  - Equilibration time
  - Sampling to demonstrate effectiveness
  - Maintenance and monitoring
  - Monitoring to support closure
- Assessment
  - Building Survey Considerations
  - Sub-Slab Materials
  - Depth to Groundwater

MassDEP Interim Final Vapor Intrusion Guidance December 2011 - WSC#-11-435 – Section 3 Mitigation

- Mitigation Techniques
  - Depressurization Systems
    - Active SSD (*Appendix IV – Design Guidance*)
    - Active Drain Tile Depressurization
    - Active Block Wall Depressurization
    - Active Sub-Membrane Depressurization
  - Indoor Air Treatment
  - Alternative Mitigation Approaches
  - Passive Techniques

MassDEP Interim Final Vapor Intrusion Guidance December 2011 - WSC#-11-435 – Section 3 Mitigation

- Mitigation Demonstration of Effectiveness, Maintenance and Monitoring
  - Effectiveness for Active SSDs
    - Confirmation of Negative Pressure Field
    - Indoor Air Quality Monitoring
    - Maintenance and Monitoring
  - Effectiveness for Passive Mitigation Approaches
    - Indoor Air Quality Monitoring
    - Maintenance and Monitoring
  - Monitoring Reports
- Closure Sampling

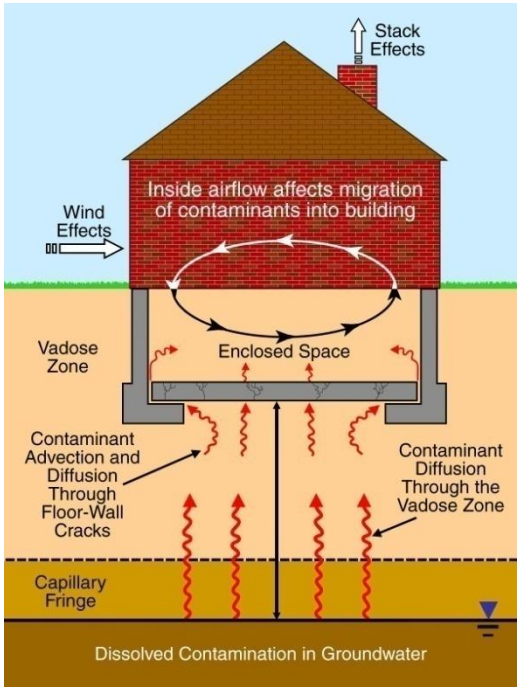
Vapor Intrusion Control Methods and Selection Factors

Two Types of Control Methods: Active and Passive

- Active – Ventilation, depressurization, pressurization, air treatment
- Passive – Sealing, vapor barriers, passive vents

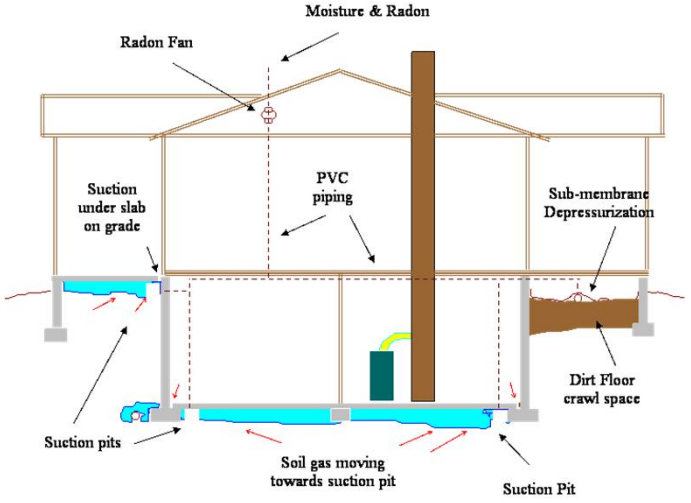
Control Method Selection Based on:

- Environmental conditions
  - Soil type
  - Proximity of building to source and the potential for future impacts
- Building conditions and construction
  - Basement, slab-on-grade, crawl space, utility corridors, etc.
  - Existing HVAC system
- Building occupancy and use
  - Commercial, industrial, residential
- Cost
- Regulatory acceptance

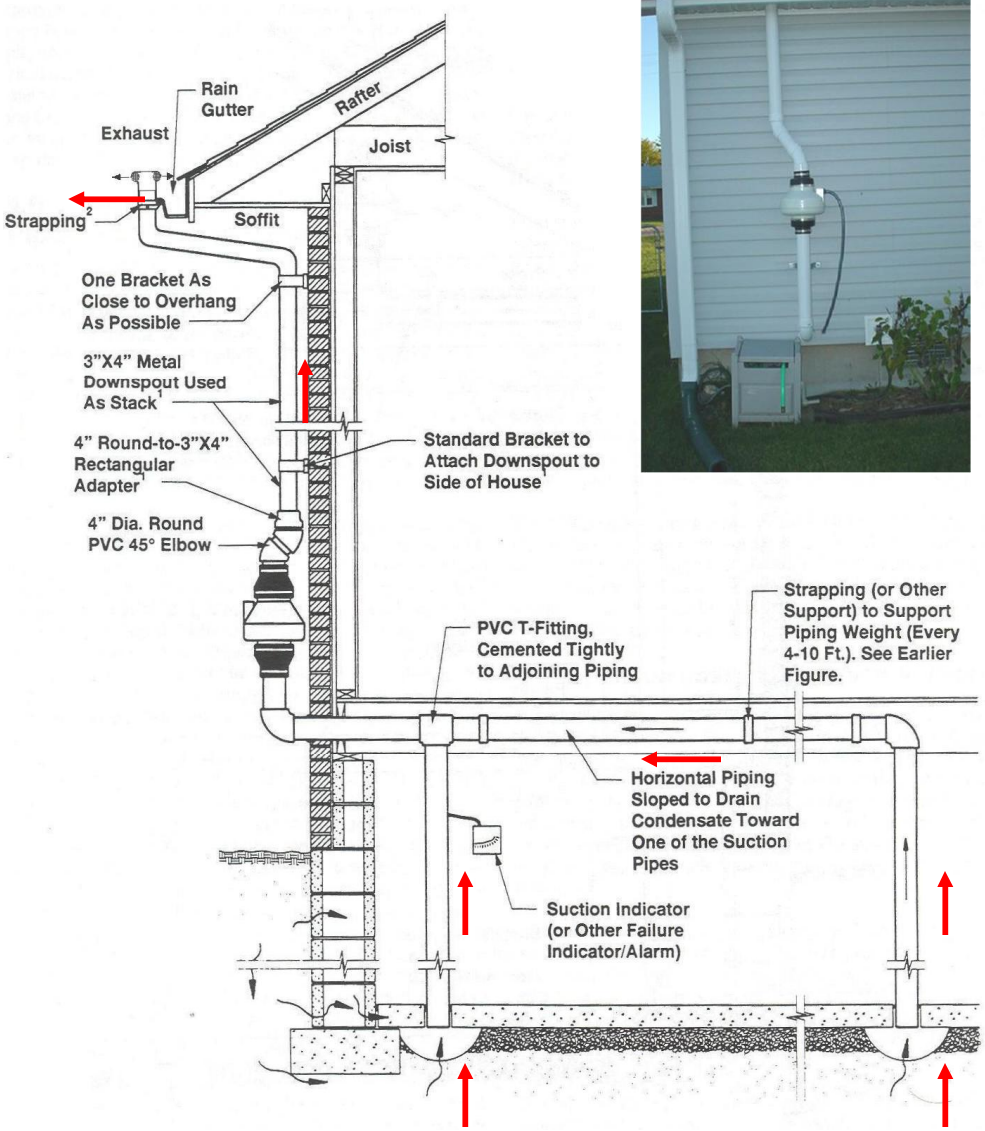


Types of Mitigation Measures

- Passive Systems
  - Sealing
  - Barriers
  - Passive Vent Stacks
- Active Systems
  - Sub-Slab Depressurization
  - Sub-Membrane Depressurization
  - Sub-Slab Pressurization
  - Building Pressurization
  - Enhanced Ventilation
  - Indoor Air Treatment/Heat Recovery Ventilator



Design and Installation of Sub-Slab Depressurization (SSD) Systems in Buildings



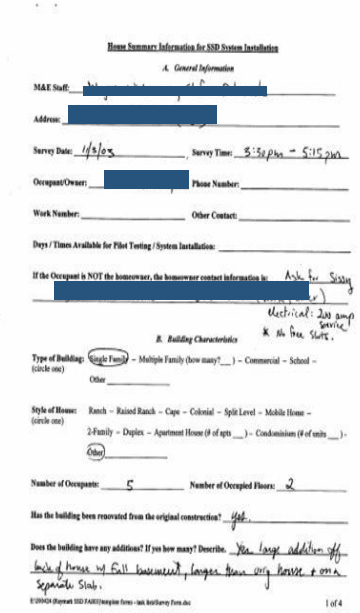
Source: EPA Radon Reduction Techniques for Existing Detached Houses, Technical Guidance (3rd Ed.) for Active Soil Depressurization Systems (Oct. 1993)

METHODOLOGY

- Stakeholder Involvement
- SSD System Installation Approach
  - Work plan
  - Access agreement
  - Site assessment
  - Pilot test / design
  - Permitting
  - Installation
  - Performance testing & report
  - Operation and maintenance

SITE ASSESSMENT AND PREPARATORY WORK

- Inspection
  - Field checklist/form
  - Building layout
    - Foundation walls, basement floors, & slabs
    - Crawl spaces & additions
    - Utilities & HVAC
  - Field Screening
- Sealing
  - Cracks, pits, holes, floor/wall joints
  - Utility penetrations
  - Stone & block walls
- Replace/install slab or vapor membrane?



House Summary Information for SSD System Installation

A. General Information

M&E Staff: [redacted]

Address: [redacted]

Survey Date: 1/8/03 Survey Time: 3:30pm - 5:15pm

Occupant/Owner: [redacted] Phone Number:

Work Number: Other Contact:

Days / Times Available for Pilot Testing / System Installation:

If the Occupant is NOT the homeowner, the homeowner contact information is: [redacted]

Electrical: 200 amp service

B. Building Characteristics

Type of Building: (Single Family) – Multiple Family (how many?) – Commercial – School – Other

Style of House: Ranch – Raised Ranch – Cape – Colonial – Split Level – Mobile Home – 2-Family – Duplex – Apartment House (# of apts) – Condominium (# of units) – (Other)

Number of Occupants: 5 Number of Occupied Floors: 2

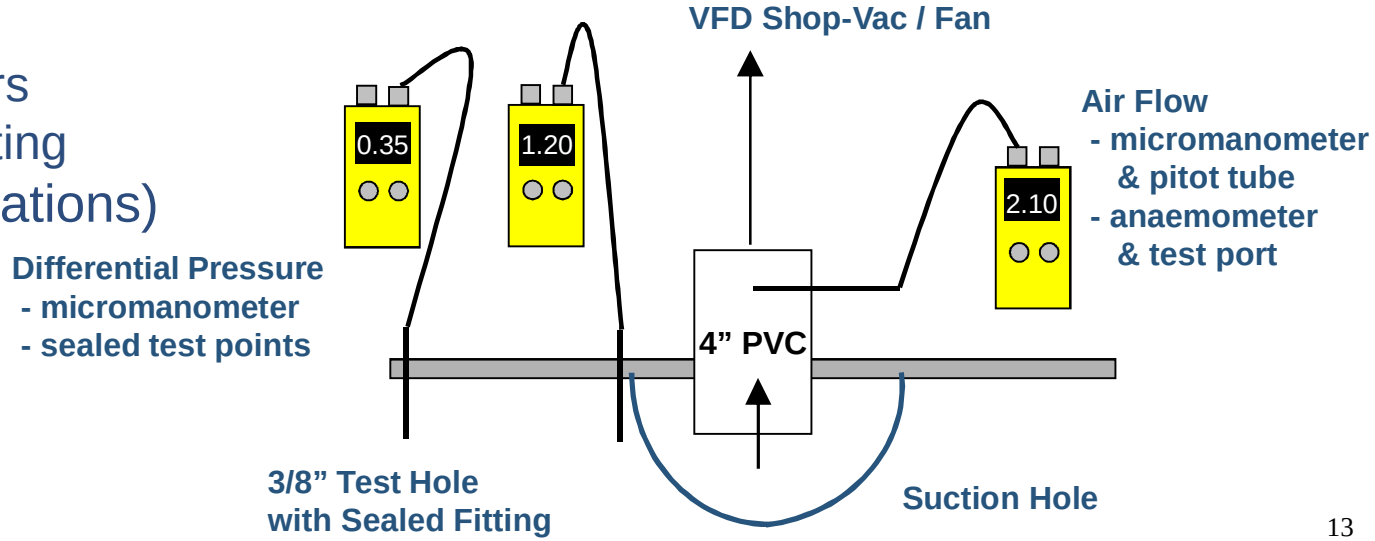
Has the building been renovated from the original construction? yes

Does the building have any additions? If yes how many? Describe. Yes, large addition off back of house w/ full basement, longer than orig house + own separate slab.

1 of 4

PILOT/DIAGNOSTIC TESTING

- Evaluate sub-slab flow characteristics
  - Suction field & radius of influence (ROI)
  - Soil permeability
  - Sub-slab obstructions
  - Short-circuiting issues
- Apply variable flowrates and suctions
- Standardized forms and equipment
  - Manometers
  - Smoke testing
- Iterative (# locations)

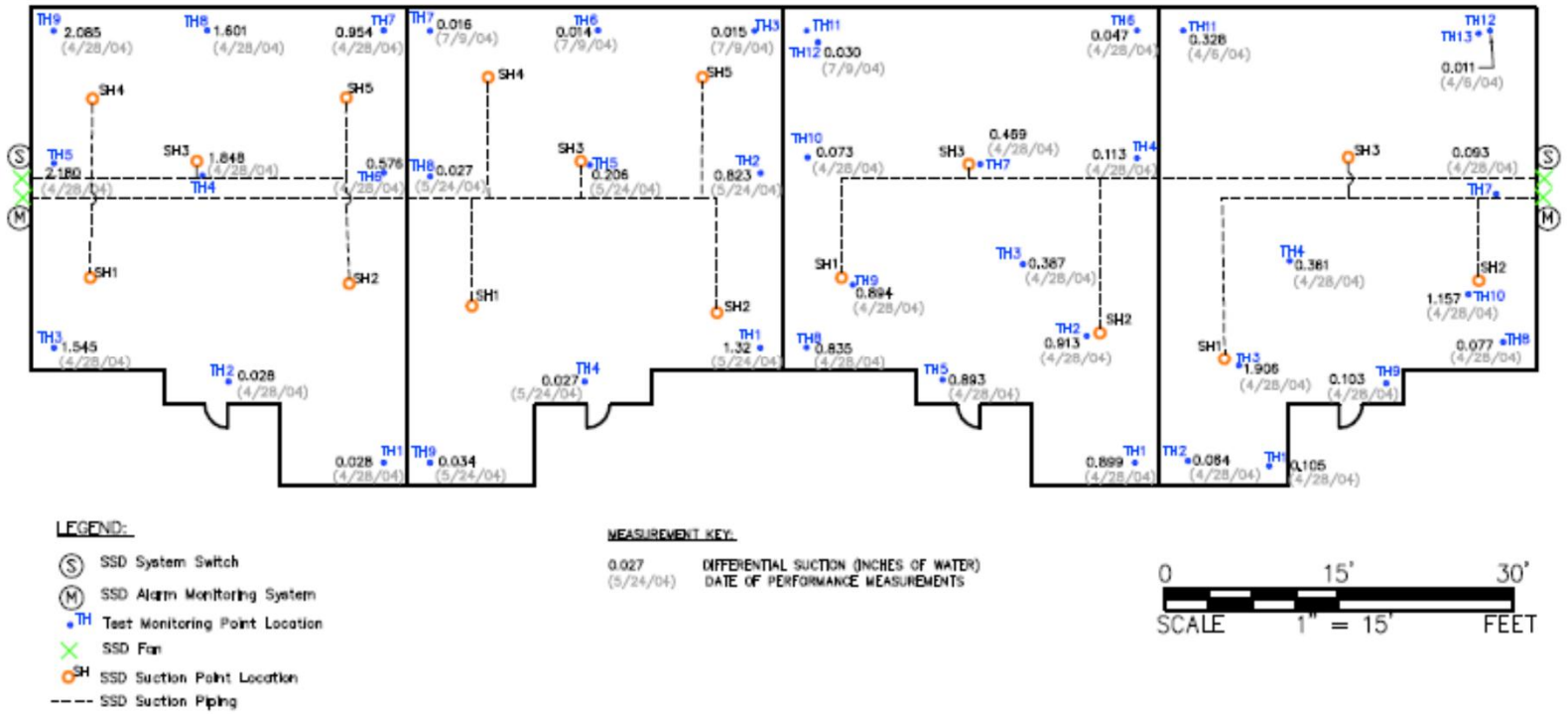


DESIGN

- Low pressure/high flow vs high pressure/low flow
- Coverage of all slabs
- Sizing of system components
  - Fans
  - Piping
- System layout
  - Number & layout of suction points
  - Number & location of fans
    - Exterior
    - Attic
  - Piping layout
  - Location of monitoring systems
  - Electrical service

Performance Testing and Metrics

- Confirm minimum negative differential pressures throughout sub-slab area(s)
- Vapor discharge
- Document system performance



Operations & Maintenance

- Monitor vacuum
- Alarms to trigger low suction
- Telemetry
- Replace fans/blowers
- Condensate removal
- Ice buildup
- Backup battery at critical sites
- Vapor treatment?
- Capture elements in a plan

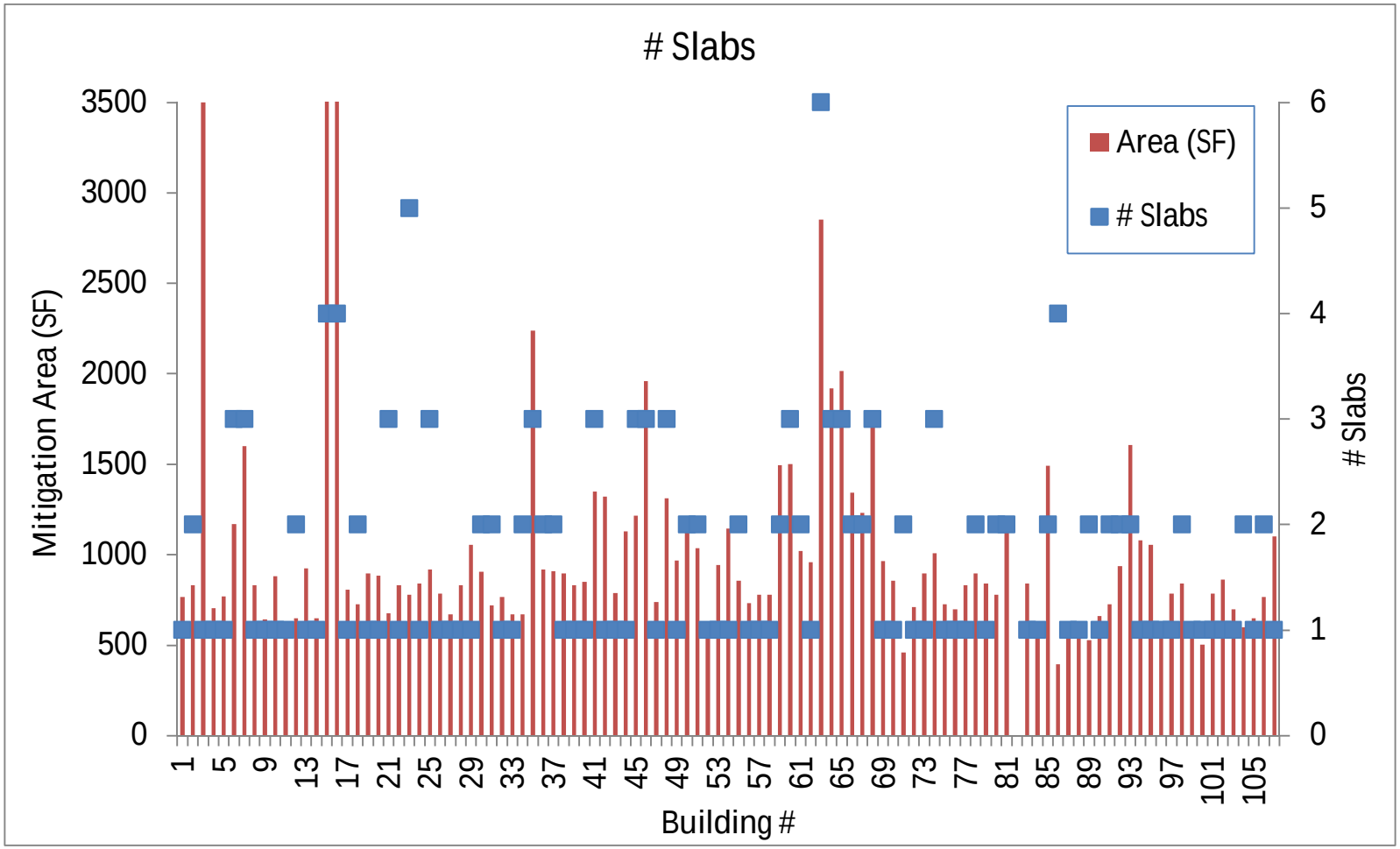
Mitigation System Design Challenges / Considerations

- Commercial buildings
- High water table
- Old buildings
- Explosive concentrations
- Moisture and condensation
- Vapor discharge
- Background VOCs

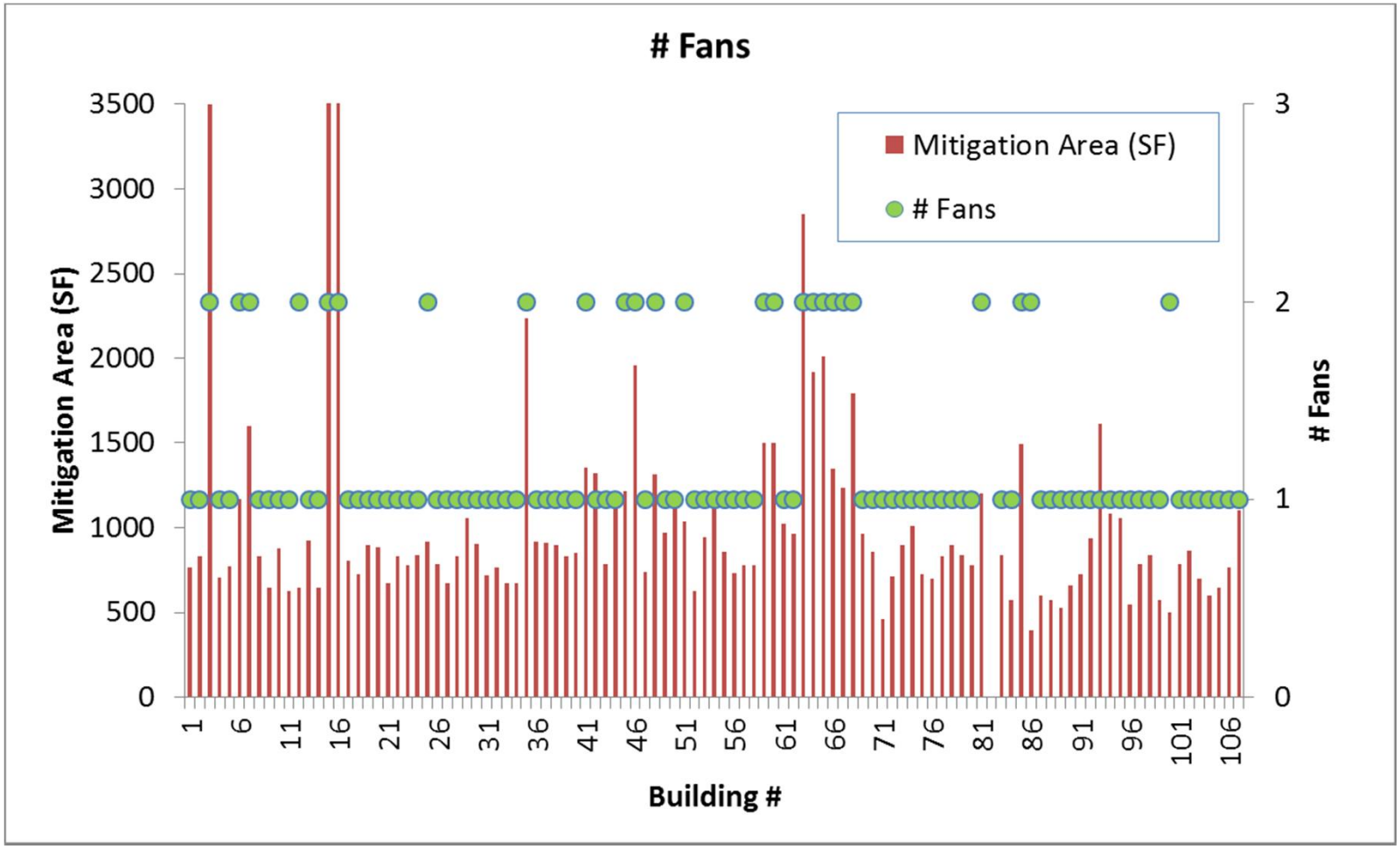
CASE STUDY:
RESIDENTIAL NEIGHBORHOOD

- EPA/CTDEEP response action
  - Down-gradient of former Superfund site
  - Low level TCE & 1,1-DCE
- 103 single-family homes & 3 larger buildings
  - c. Late 1800s – 1960s
  - Single- and multi-story buildings
  - Footprints: ~500 - ~3,000 FT^2
- Features
  - 60 buildings with one slab
  - 105 basements
  - 14 on-grade slabs
  - 33 crawl spaces
  - 3 dirt floors and 21 stone wall foundations

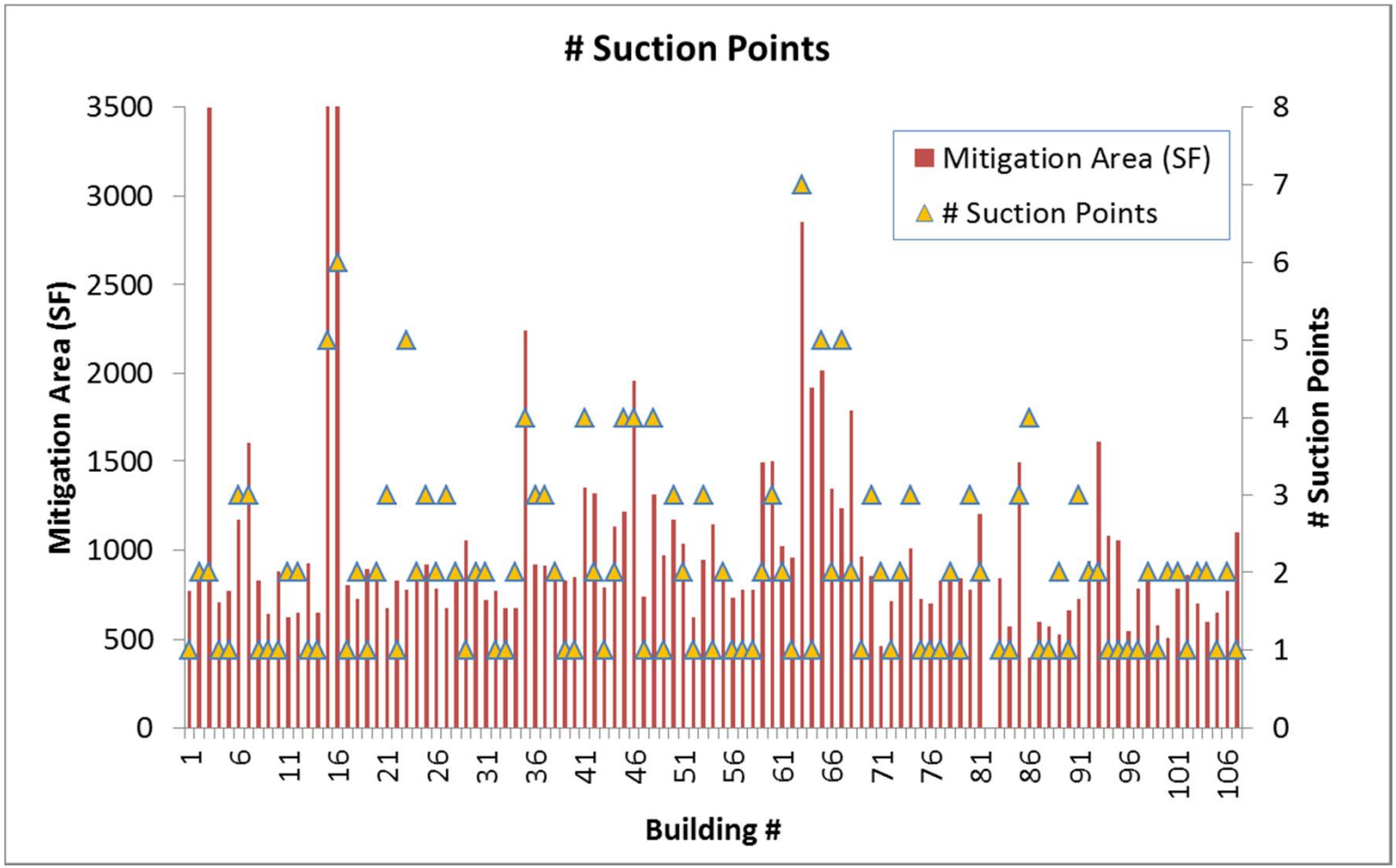
	Mitigation Area (SF)	Slabs
Max	3510	6
Min	396	1
Ave	1022	1.7



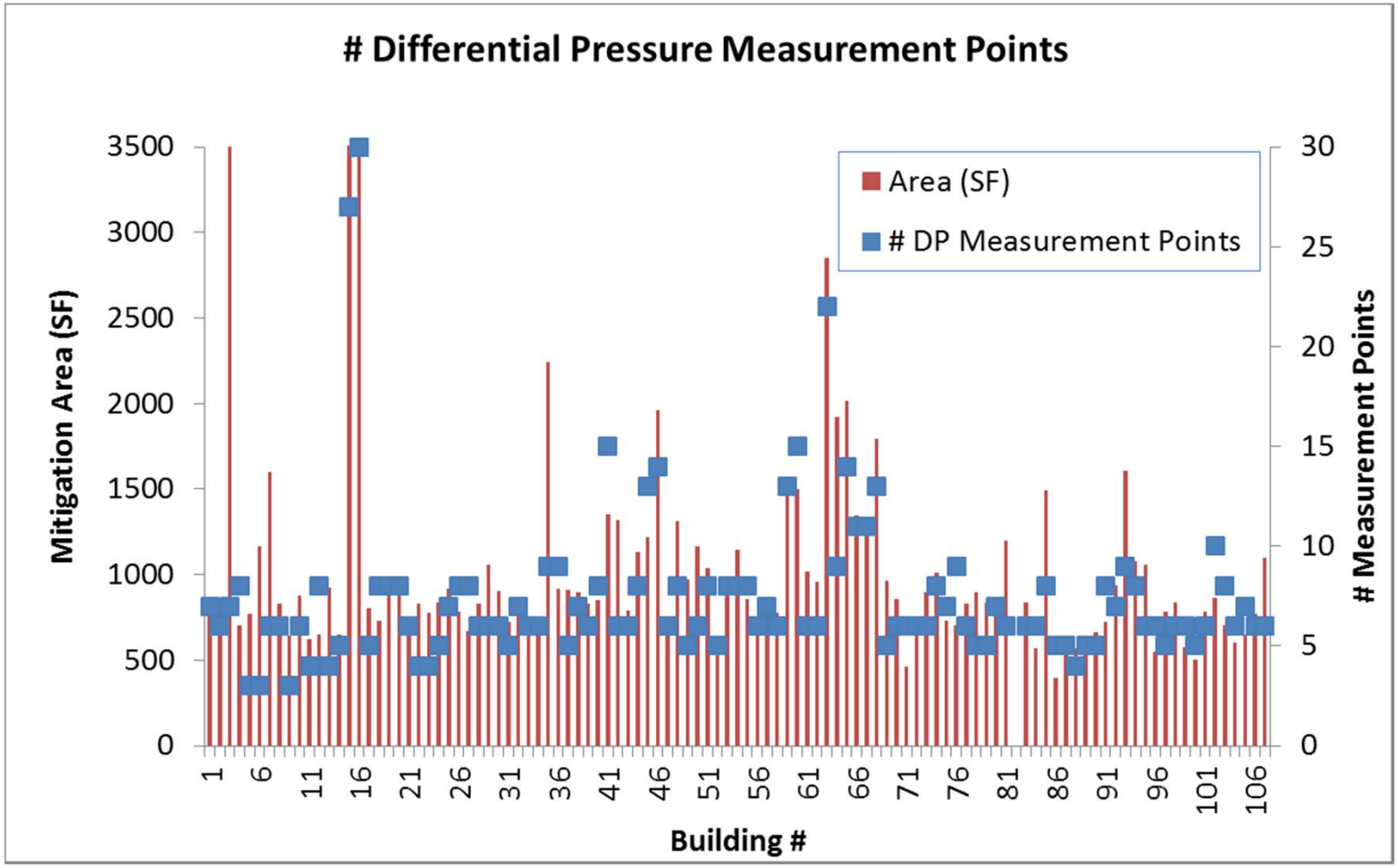
	Fans
Max	2
Min	1
Ave	1.2



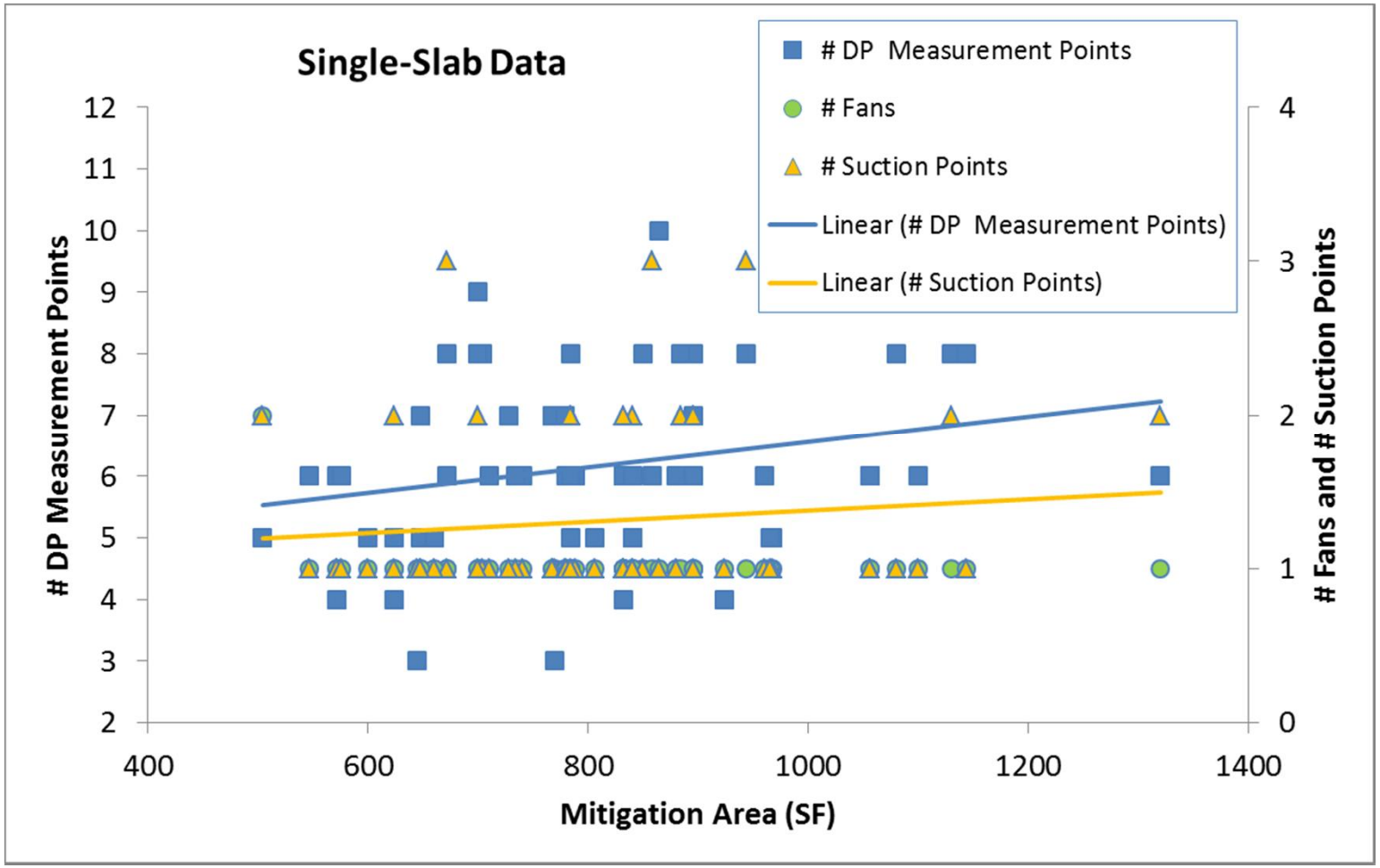
	Suction Points
Max	7
Min	1
Ave	2.0



	DP Measurement Points
Max	10
Min	3
Ave	6.2



	Slab Area (SF)	DP Measurement Points	Fans	Suction Points
Max	1320	10	2	3
Min	504	3	1	1
Ave	809	6.2	1.0	1.3



Case Study Summary

- Challenges
  - Older construction (crawlspaces, additions, stone wall foundations, deteriorated slabs)
  - Unseen subsurface obstructions
- Engineered approach was successful
- Rules of thumb from data evaluation
  - Full program
    - 1 or 2 mitigation fans
    - Average of 2 suction points
    - Average of 6 DP measurement points
  - Single-slab (500 – 1,300 SF)
    - 1 mitigation fan
    - Average of 6 DP measurement points
    - Average of 1.3 suction points

Questions??

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