Vapor Intrusion Pathway: Immediate Environmental Concern

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Vapor Intrusion (VI) Pathway

Commercial/Industrial Worker — Working over Plume

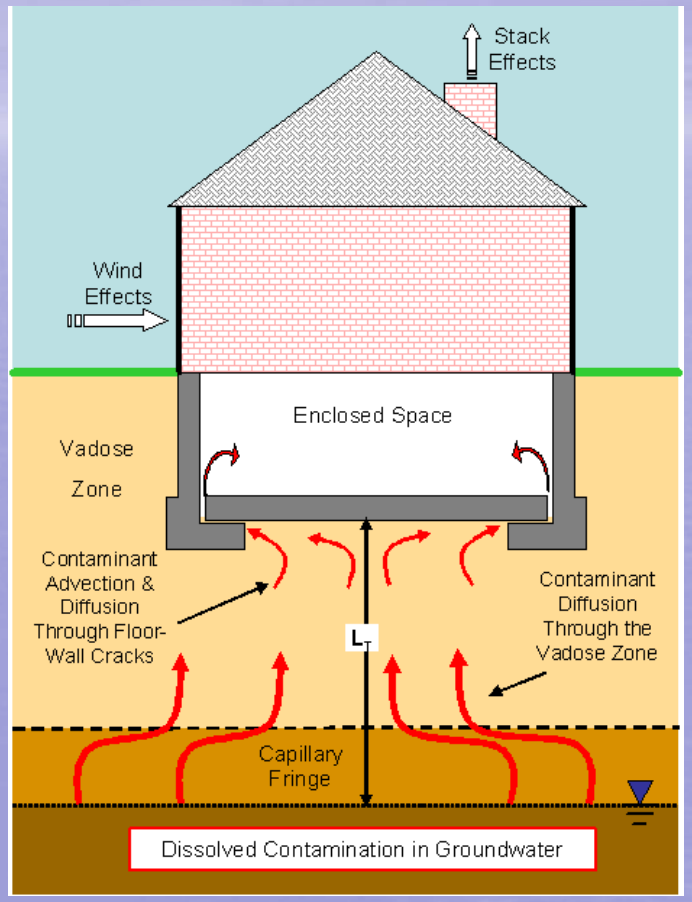
Resident Living over Plume — Basement or Crawl Space; Without Basement

Migration of subsurface vapors to indoor air

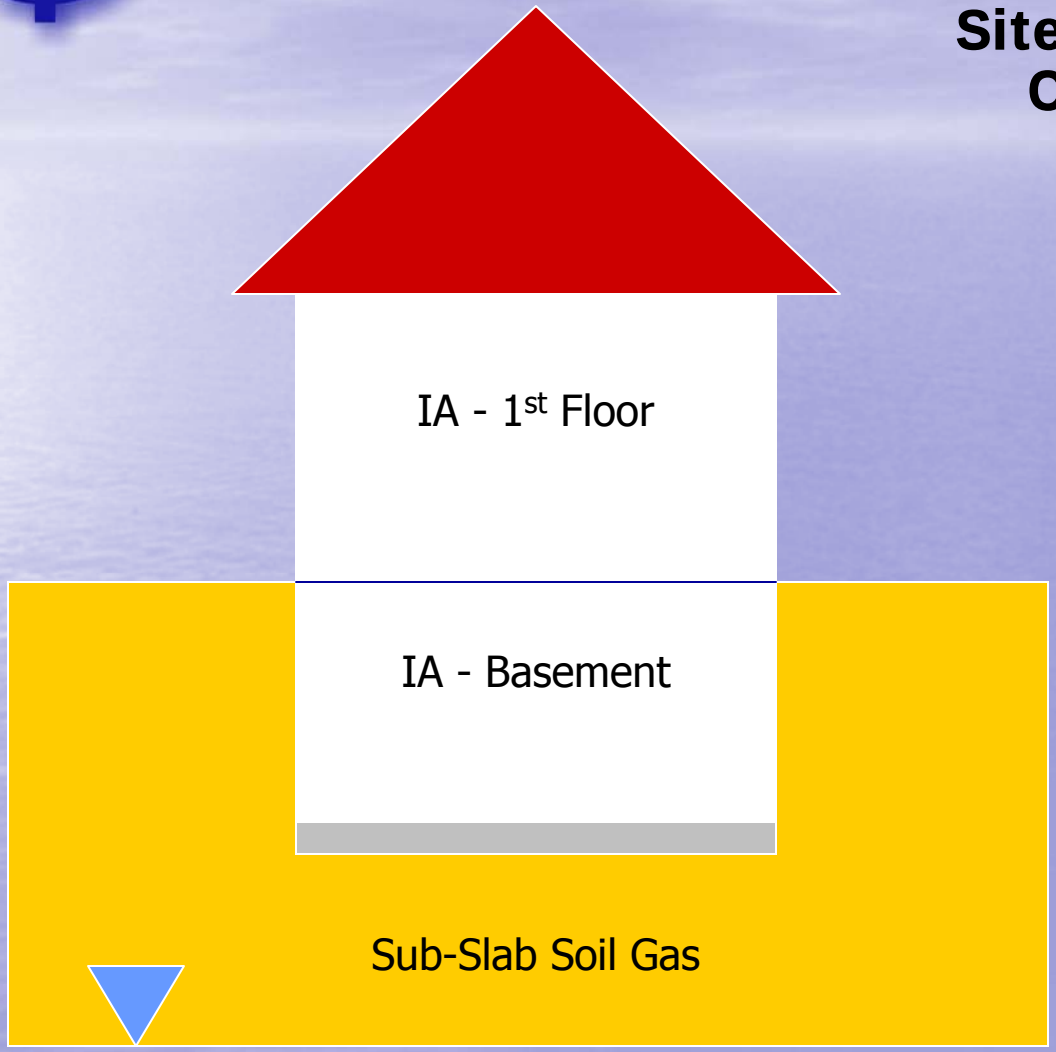
Courtesy: ITRC

When is the VI Pathway Complete?

1) There is an identified source related to a discharge;
2) There is a migration pathway; and,
3) A receptor (current or future) is adversely impacted by a subsurface vapor contaminant migrating into a structure.



Vapor Intrusion IEC Scenarios



Site-related Contaminants of Concern (COC)

- Tetrachloroethene (PCE)
  - GWSL – 1 µg/L
  - SGSL – 34 µg/m^3
  - IASL – 3 µg/m^3
  - RAL – 30 µg/m3
- Trichloroethene (TCE)
  - GWSL – 1 µg/L
  - SGSL – 27 µg/m^3
  - IASL – 3 µg/m^3
  - RAL – 20 µg/m3

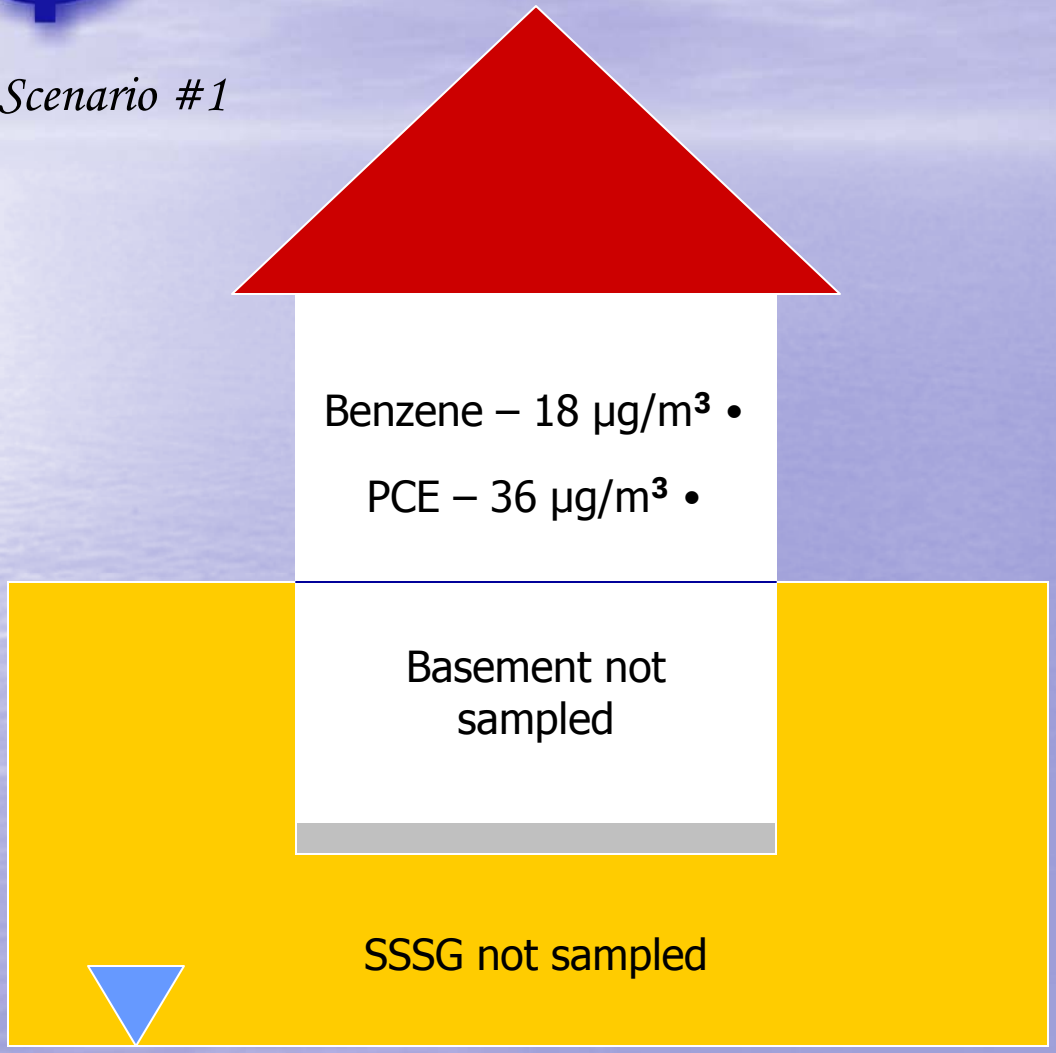
Non-COC

- Benzene
  - GWSL – 15 µg/L
  - SGSL – 16 µg/m^3
  - IASL – 2 µg/m^3
  - RAL – 14 µg/m3

"•" – exceeds VI Screening Level

Is this a Vapor Intrusion IEC?

Scenario #1



ISSUES:

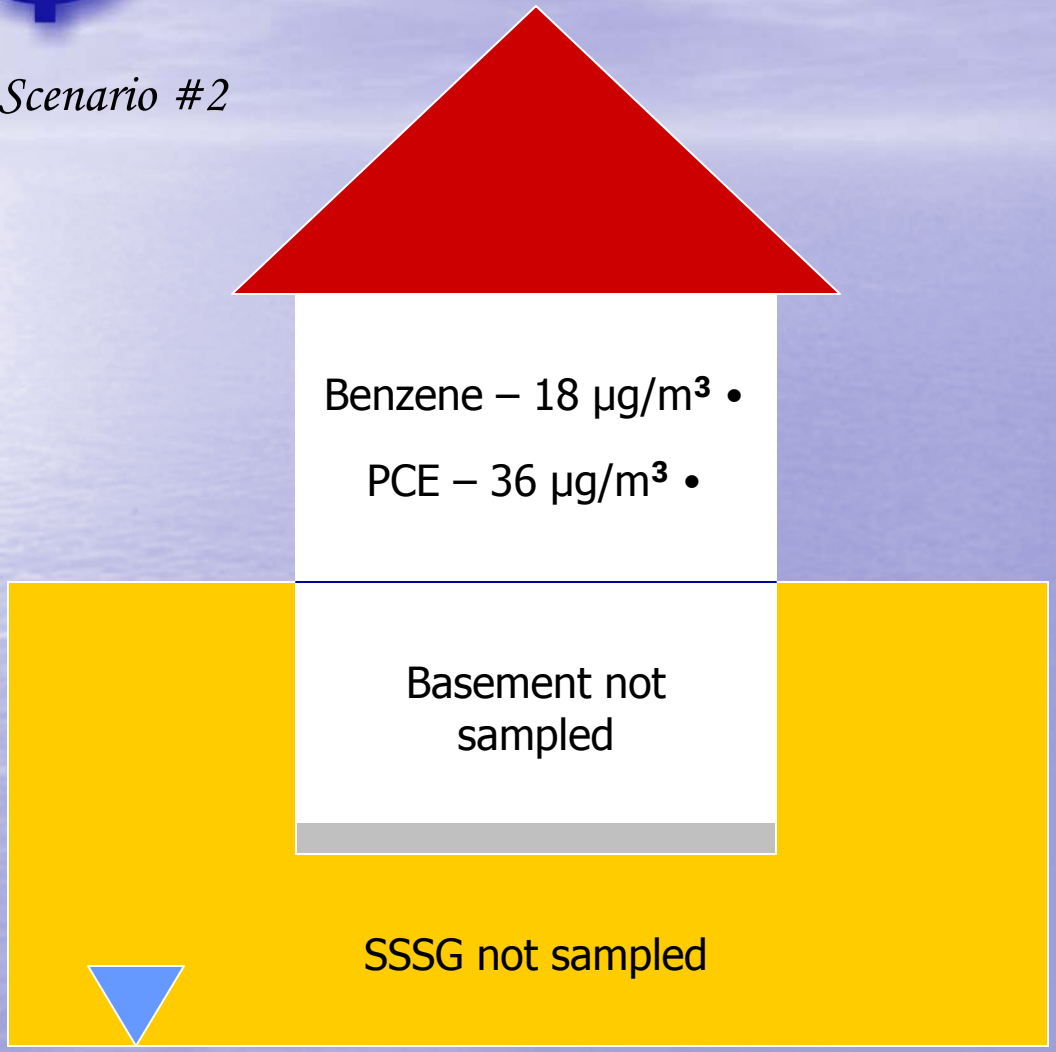
- IA COC > RAL
- IA non-COC > RAL
- SG & GW not sampled
- Status of VI Pathway unknown
- Additional VI investigation warranted to assess IEC

ANSWER:

NO

Is this a Vapor Intrusion IEC?

Scenario #2



ISSUES:

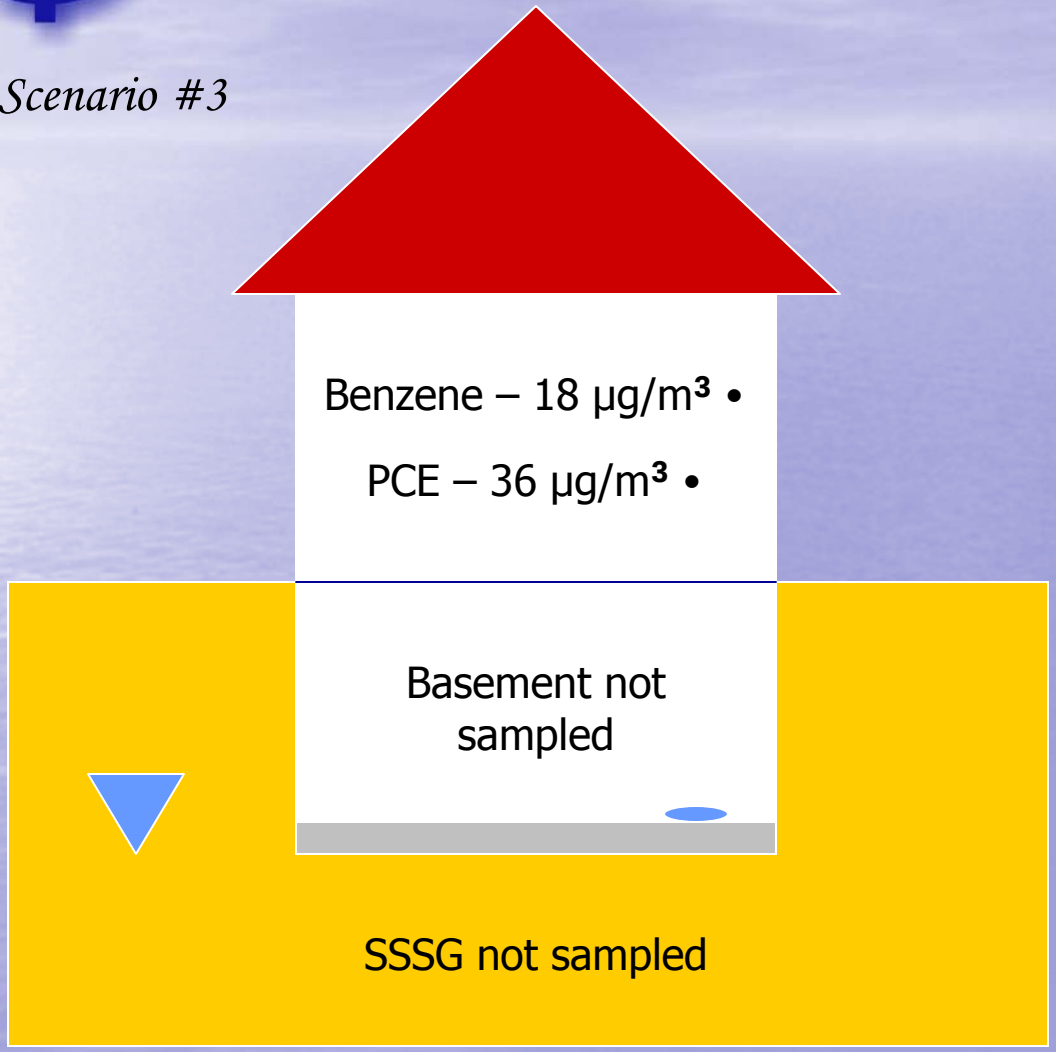
- IA COC > RAL
- IA non-COC > RAL
- GW COC > GWSL
- Status of VI Pathway still unknown
- Additional VI investigation warranted to assess IEC

ANSWER:

NO

Is this a Vapor Intrusion IEC?

Scenario #3



ISSUES:

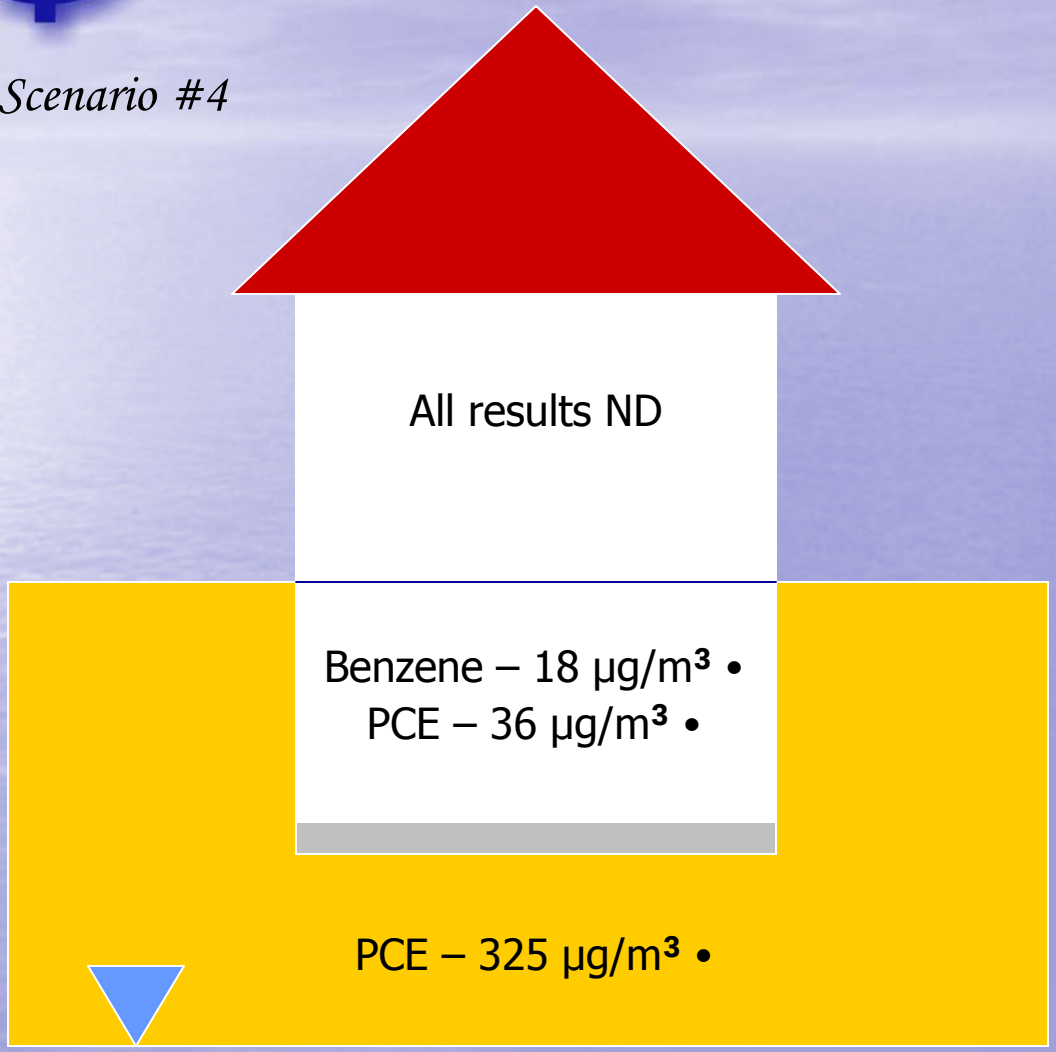
- IA COC > RAL
- IA non-COC > RAL
- GW COC > GWSL
- High GWT
- Status of VI Pathway unknown
- Use Multiple Lines of Evidence (MLE)
- Additional VI investigation may be warranted

ANSWER:

MAYBE

Is this a Vapor Intrusion IEC?

Scenario #4



ISSUES:

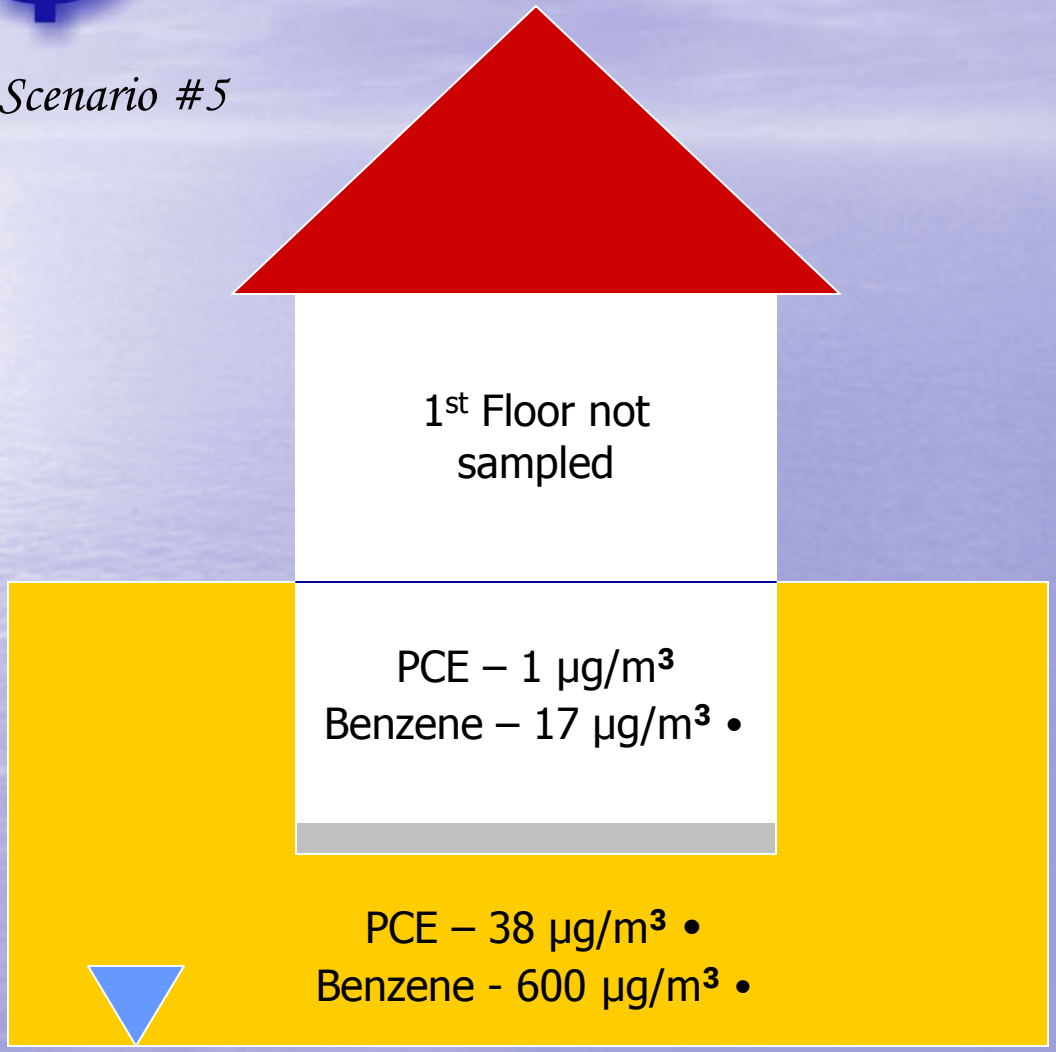
- IA COC > RAL
- IA non-COC > RAL
- 1st Floor IA results ND
- SSSG COC > SGSL
- GW COC > GWSL
- VI Pathway complete

ANSWER:

YES

Is this a Vapor Intrusion IEC?

Scenario #5



ISSUES:

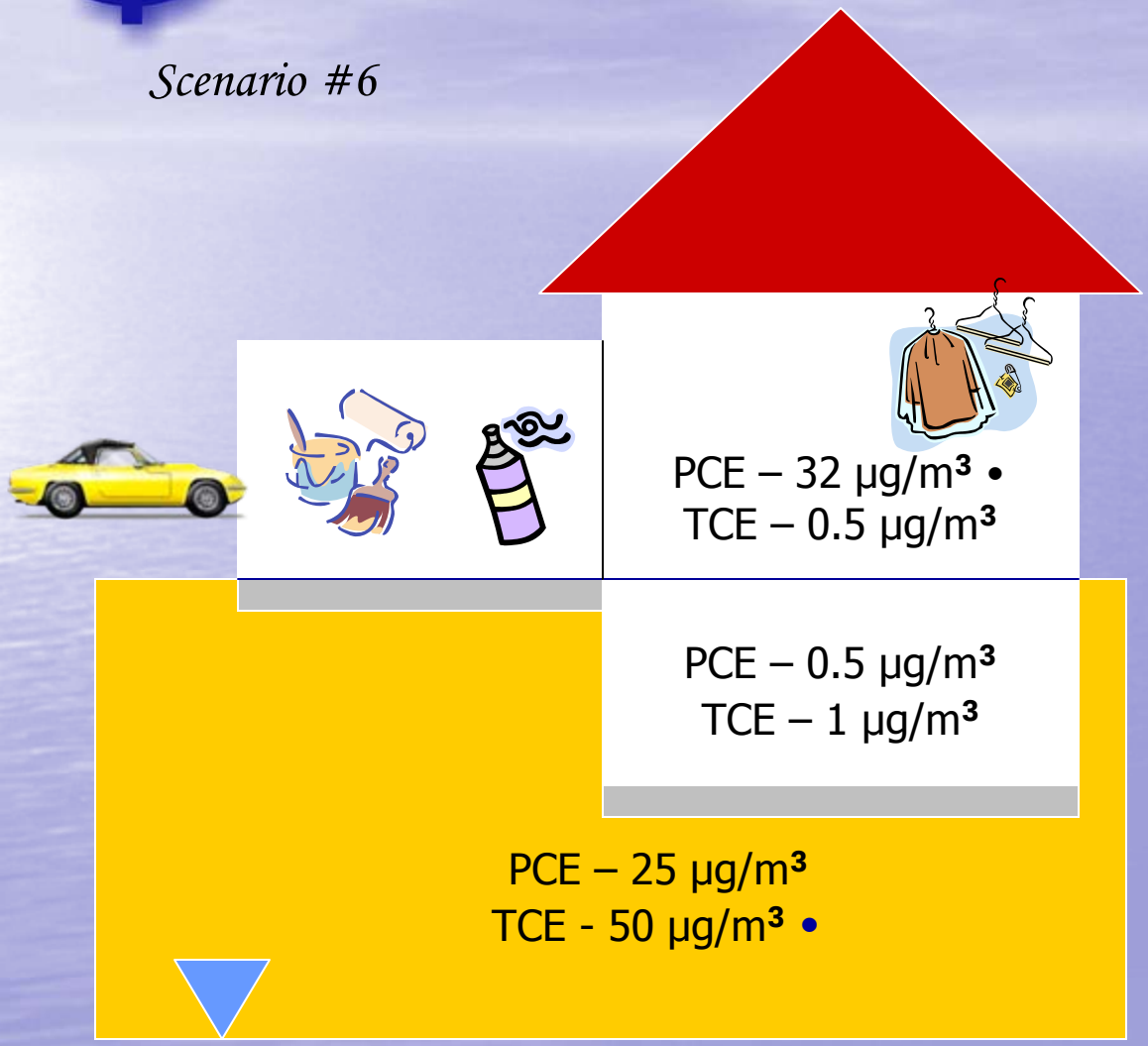
- IA COC < RAL
- IA non-COC > RAL
- SSSG (both) > SGSL
- GW (both) > GWSL
- COCs well documented
- VI Pathway complete

ANSWER:

YES, but . . .

Is this a Vapor Intrusion IEC?

Scenario #6



ISSUES:

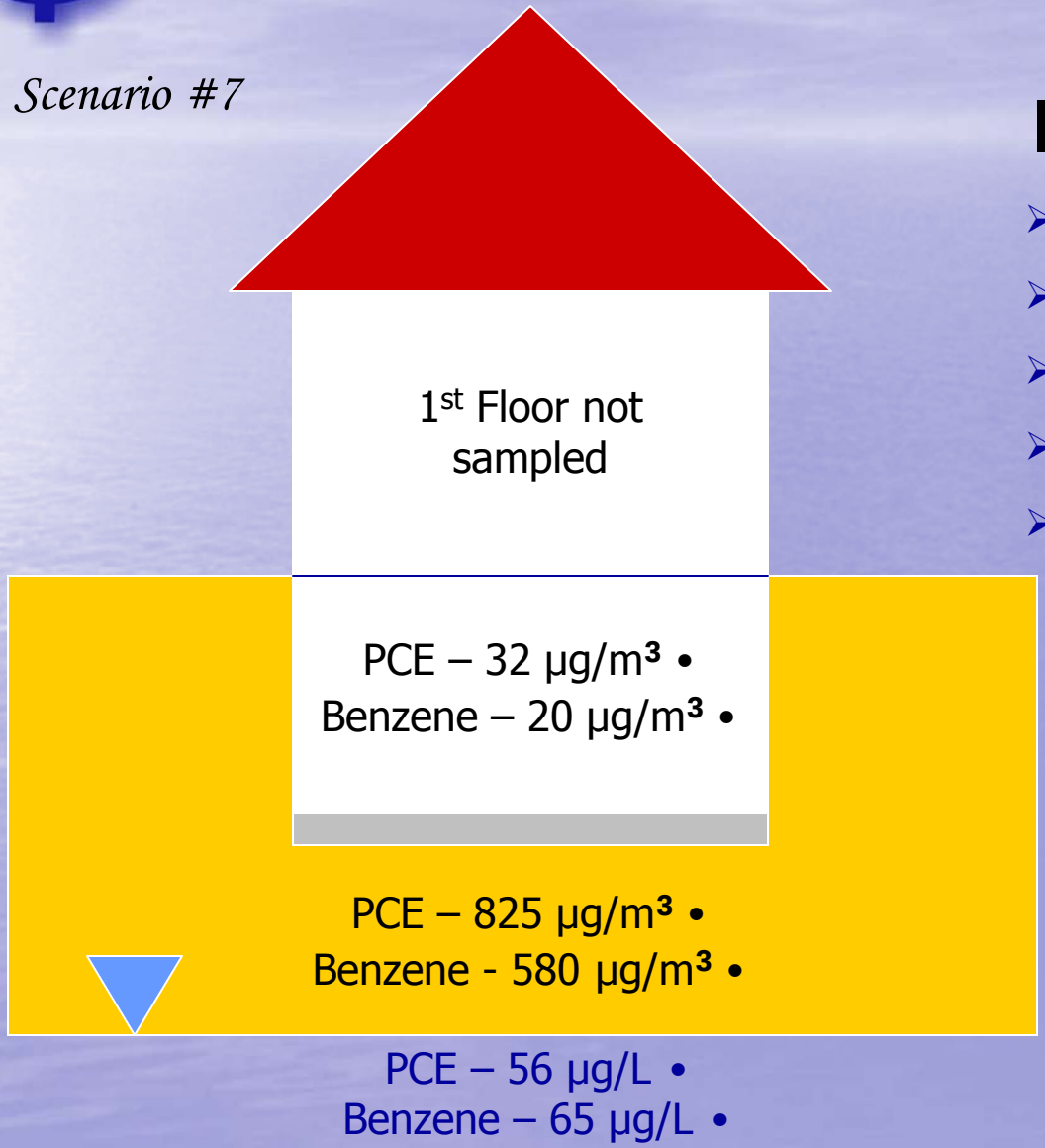
- 1st Floor IA COC > RAL
- SSSG COC > SGSL
- GW COC > GWSL
- VI Pathway complete??
- Background sources
- Multiple lines of evidence
- Additional VI investigation may be warranted

ANSWER:

NO

Is this a Vapor Intrusion IEC?

Scenario #7



ISSUES:

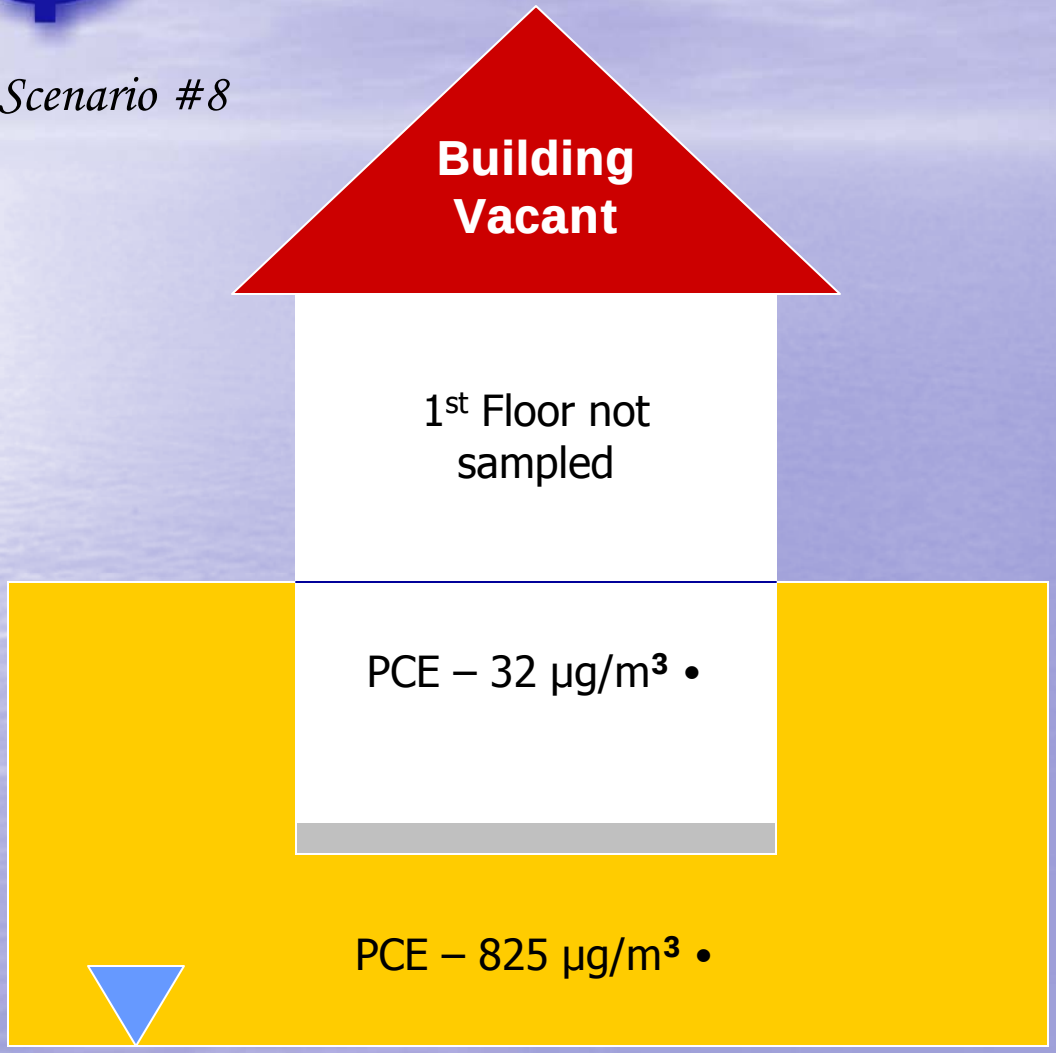
- IA COC > RAL
- IA non-COC > RAL
- SSSG & GW COC > SLs
- SSSG & GW Non-COC > SLs
- VI Pathway complete

ANSWER:

YES

Is this a Vapor Intrusion IEC?

Scenario #8



ISSUES:

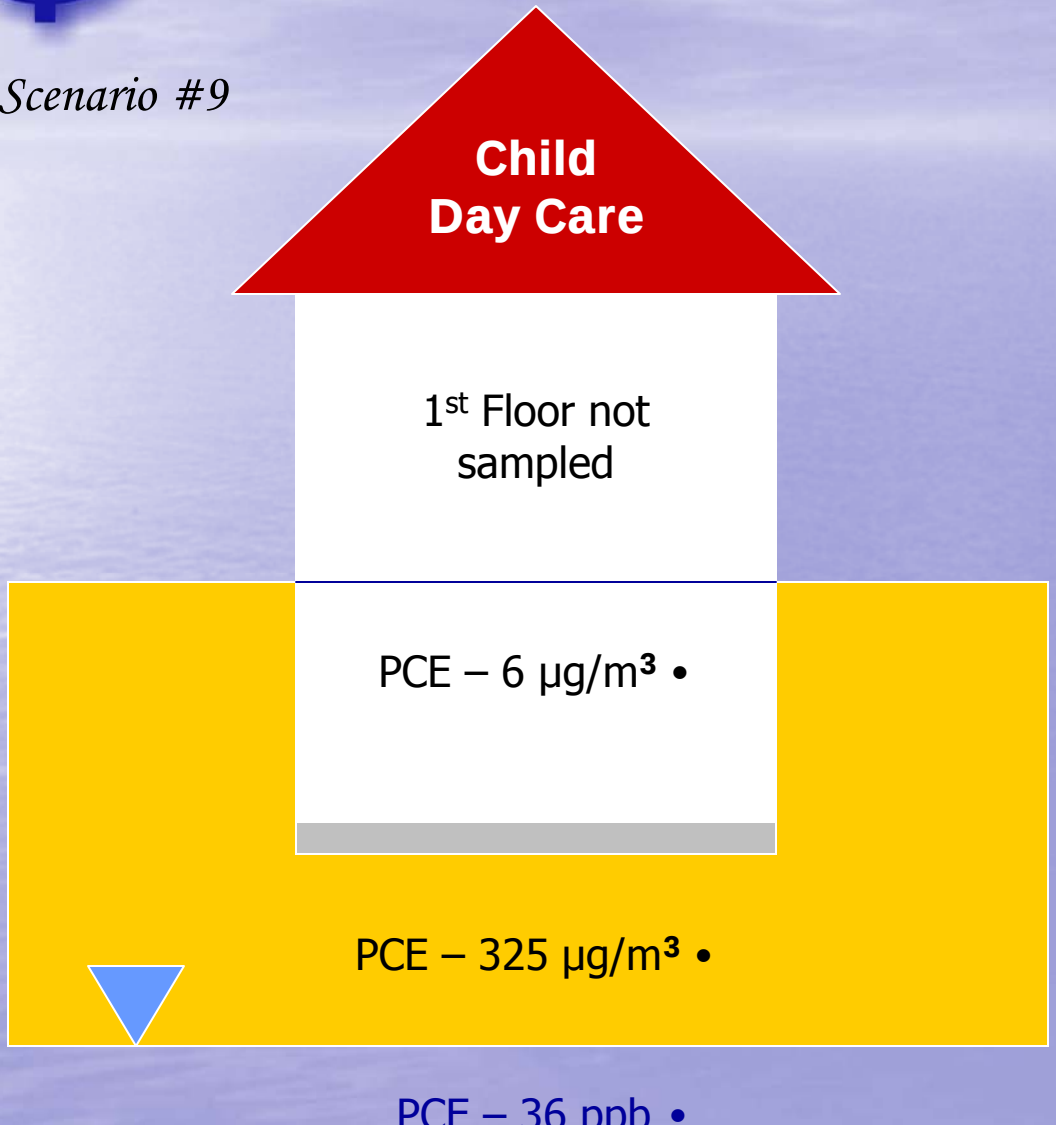
- IA COC > RAL
- SSSG & GW COC > SLs
- Building vacant
- VI Pathway complete
- How to monitor future use?
- Off-site vs. onsite
- Mitigation warranted in the future if occupied

ANSWER:

YES

Is this a Vapor Intrusion IEC?

Scenario #9



ISSUES:

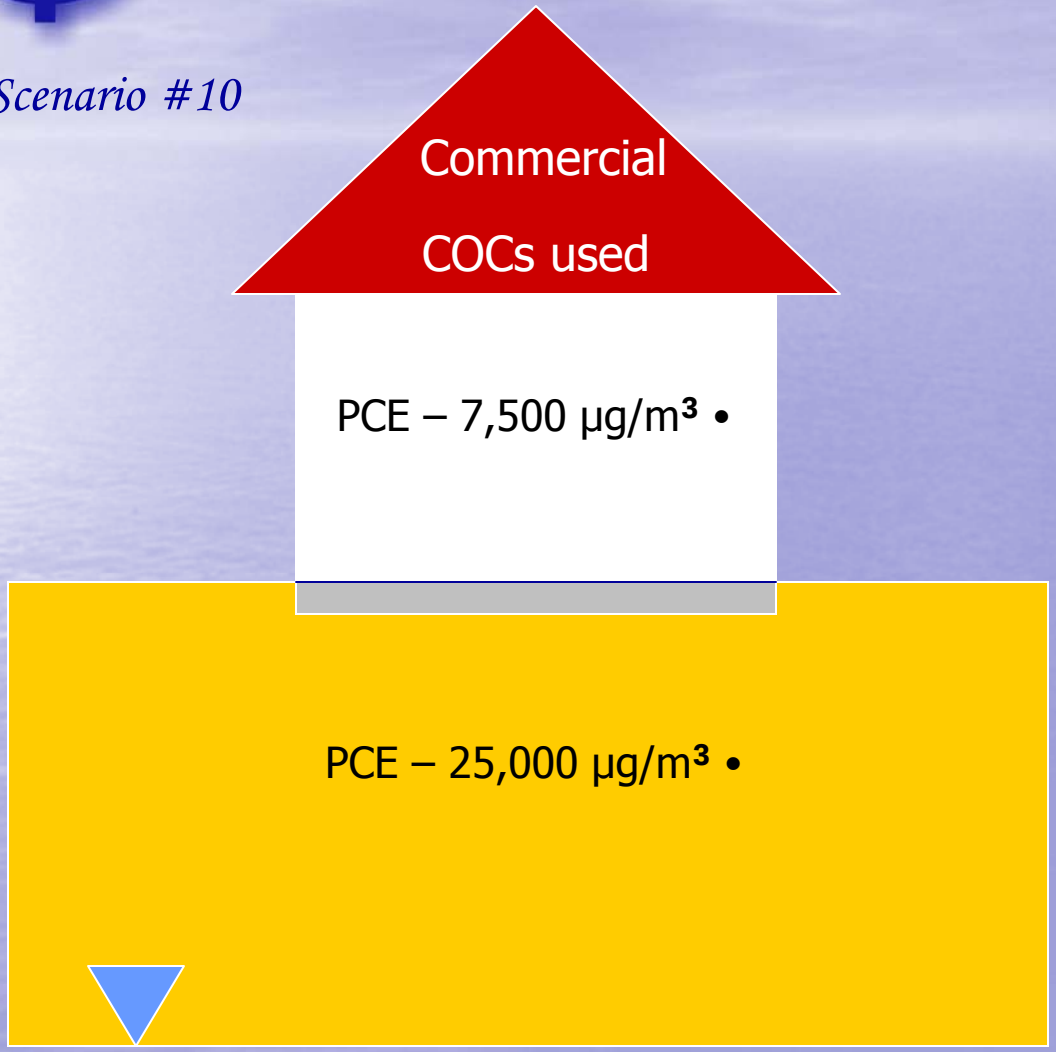
- IA COC > IASL
- SSSG & GW COC > SLs
- Child Day Care Facility
- VI Pathway complete
- VC condition, not IEC
- Mitigation warranted using different timeline

ANSWER:

NO

Is this a Vapor Intrusion IEC?

Scenario #10



ISSUES:

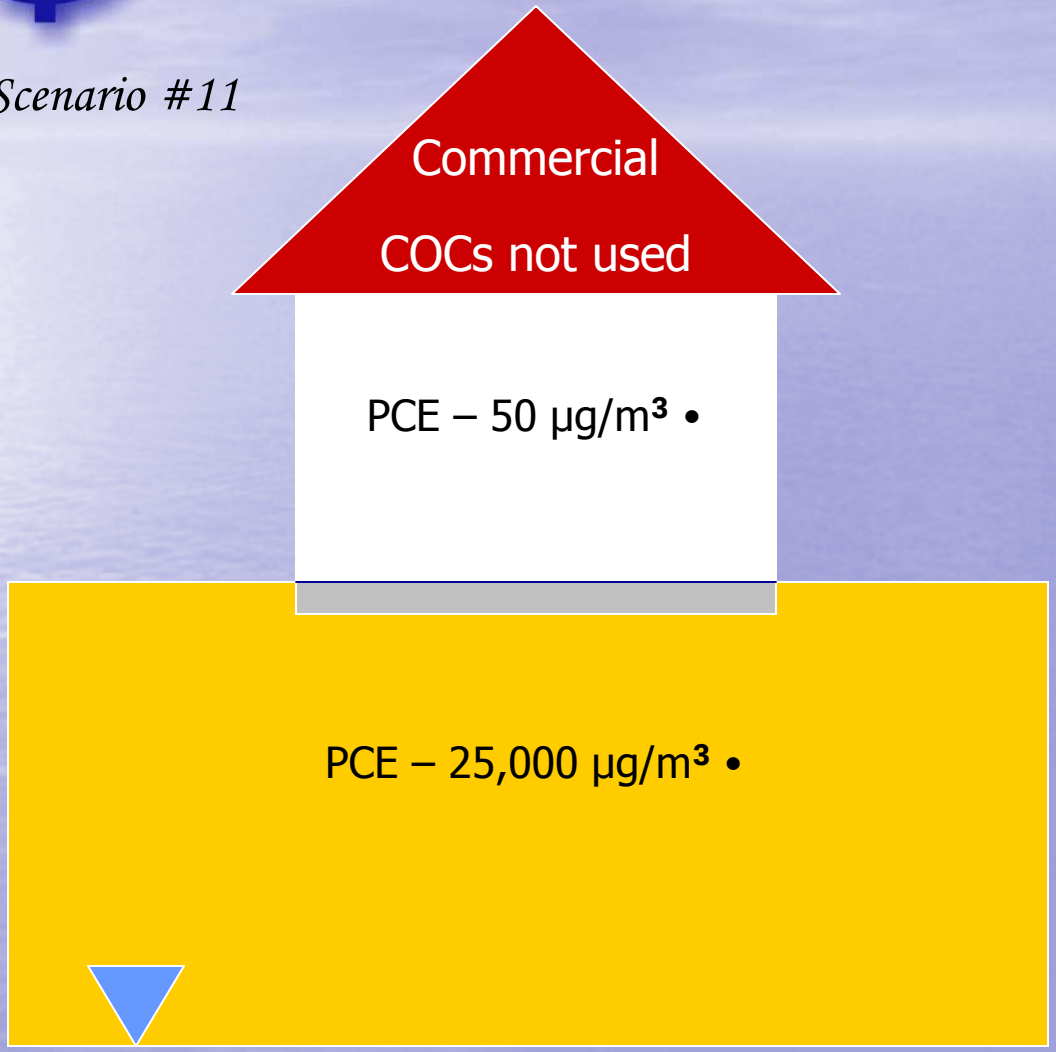
- IA COC > RAL
- Commercial Building
- Status of VI Pathway unknown
- Utilize COC in current operations
- Future use?
- Additional VI investigation warranted if use or chemicals change

ANSWER:

NO

Is this a Vapor Intrusion IEC?

Scenario #11



ISSUES:

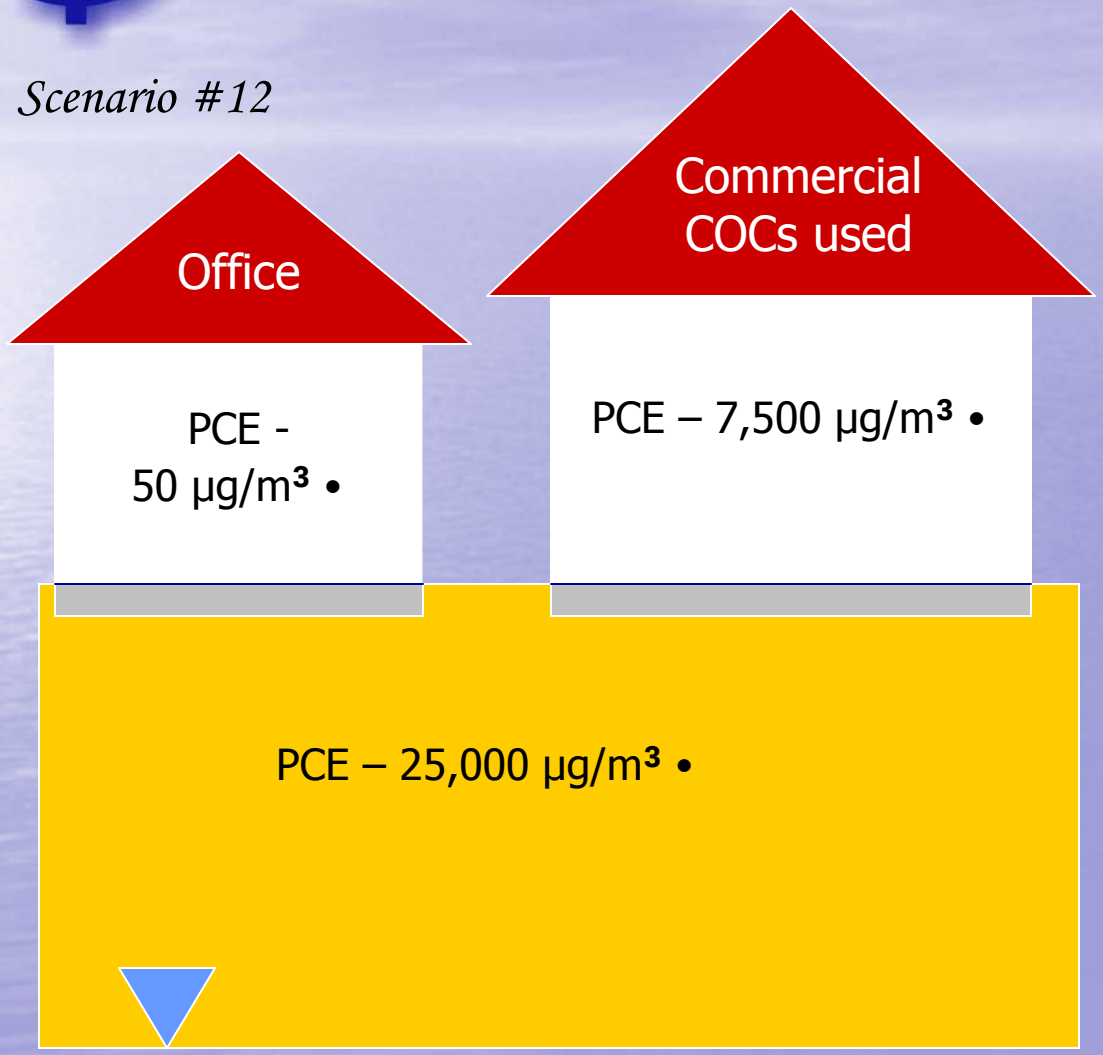
- IA COC > RAL
- Commercial Building
- Don't utilize COC in current operations
- VI Pathway complete

ANSWER:

YES

Is this a Vapor Intrusion IEC?

Scenario #12



ISSUES:

- IA COC > RAL
- Commercial & Office Buildings on site
- Utilize COC in current factory operations
- Don't utilize COC in office
- VI Pathway complete?
- Future use?
- Additional VI investigation warranted if use changes

ANSWER:

YES & NO

IEC CASE STUDY

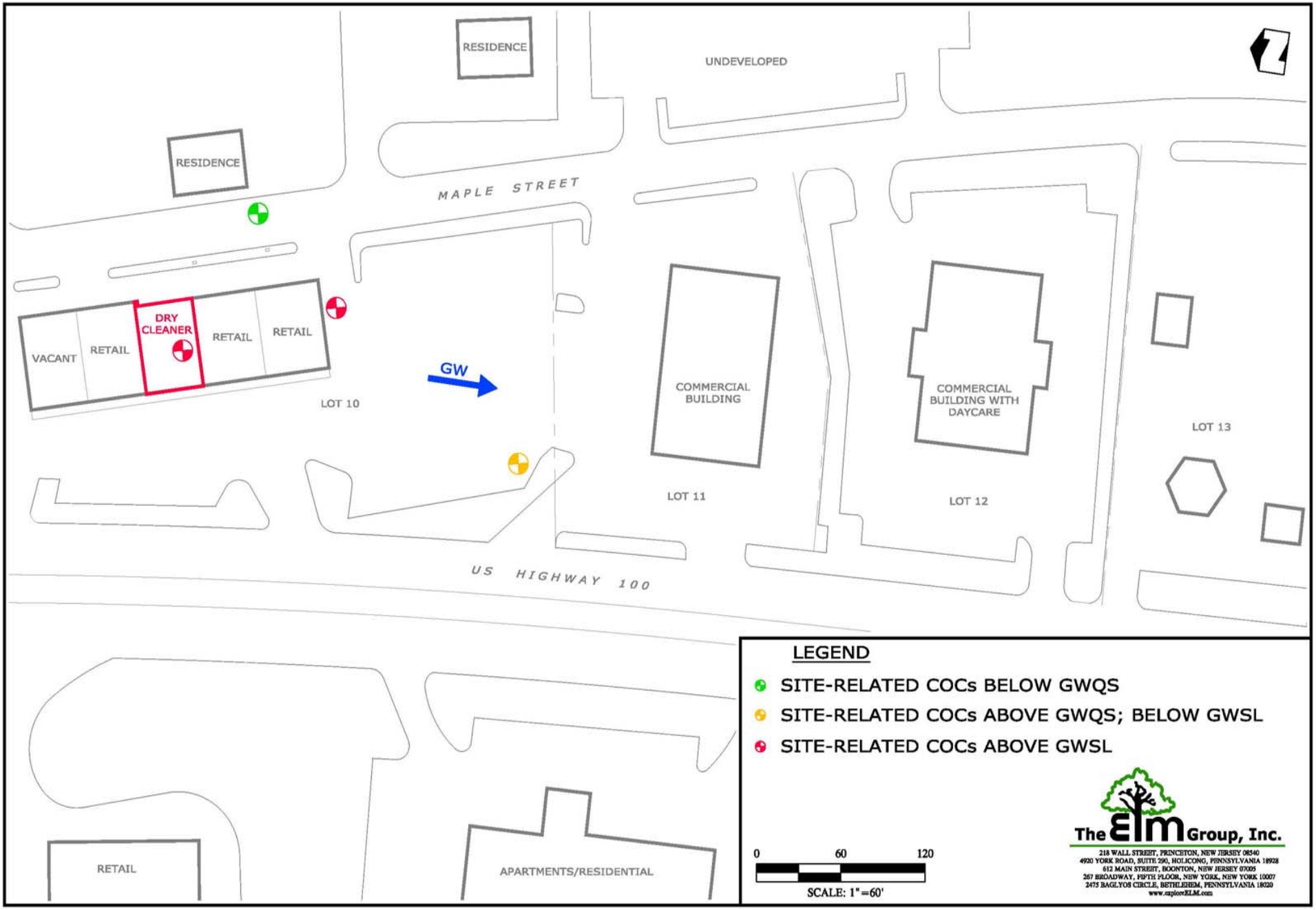
PRESENTED BY:

Mark D. Fisher, CHMM, LSRP
Principal – The ELM Group, Inc.

THE ELM GROUP

Site Background

- Operating dry cleaner in strip mall
- Confirmed release with soil and ground water impacts
- Site related contaminants of concern (COCS) – PCE and degradation compounds
- Remedial investigation initiated, but not completed
- Initial Receptor Evaluation completed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SCALE: 1"=60'
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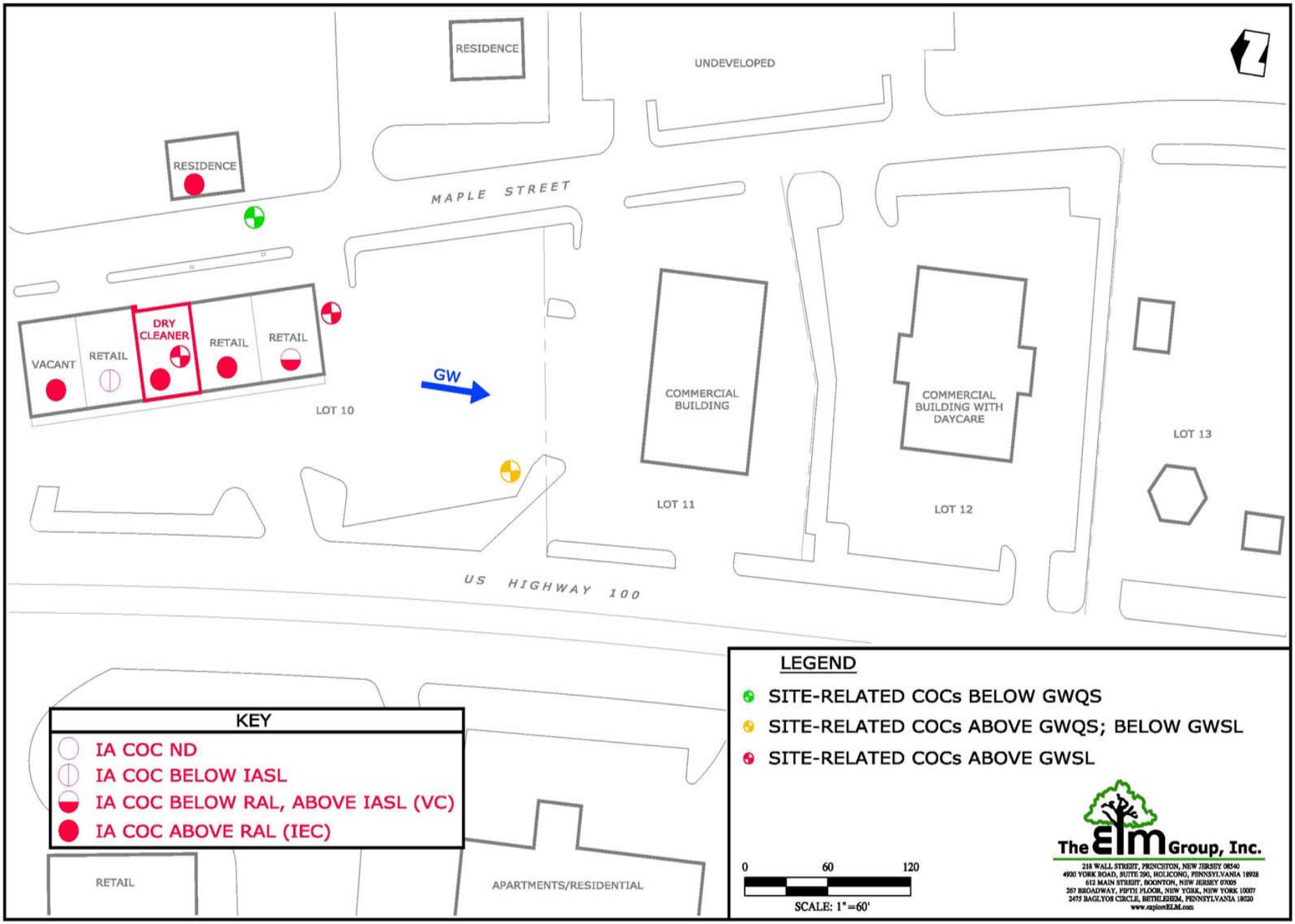
Initial Phase of VI Investigation

- Receptor Evaluation information
- Soil and ground water data
- Determination of structures to be included in VI sampling
- VI sampling – subslab (SS) with contingent indoor air (IA)

G:\MARK FISHER PRESENTATION\PRESENTATION SCENARIOS-2.dwg, SITE MAP, 8/29/2011 3:15:51 PM, Pinnacle

IEC Confirmed

- PCE above Rapid Action Levels (RALs) in several retail and at residence
- Operational considerations for active dry cleaner leasehold
- IEC regulatory/mandatory time frame (RTF/MTF) clock starts at confirmation of VI IEC
- Immediate notification to DEP Hotline and Case Manager (if any) – (IEC RTF)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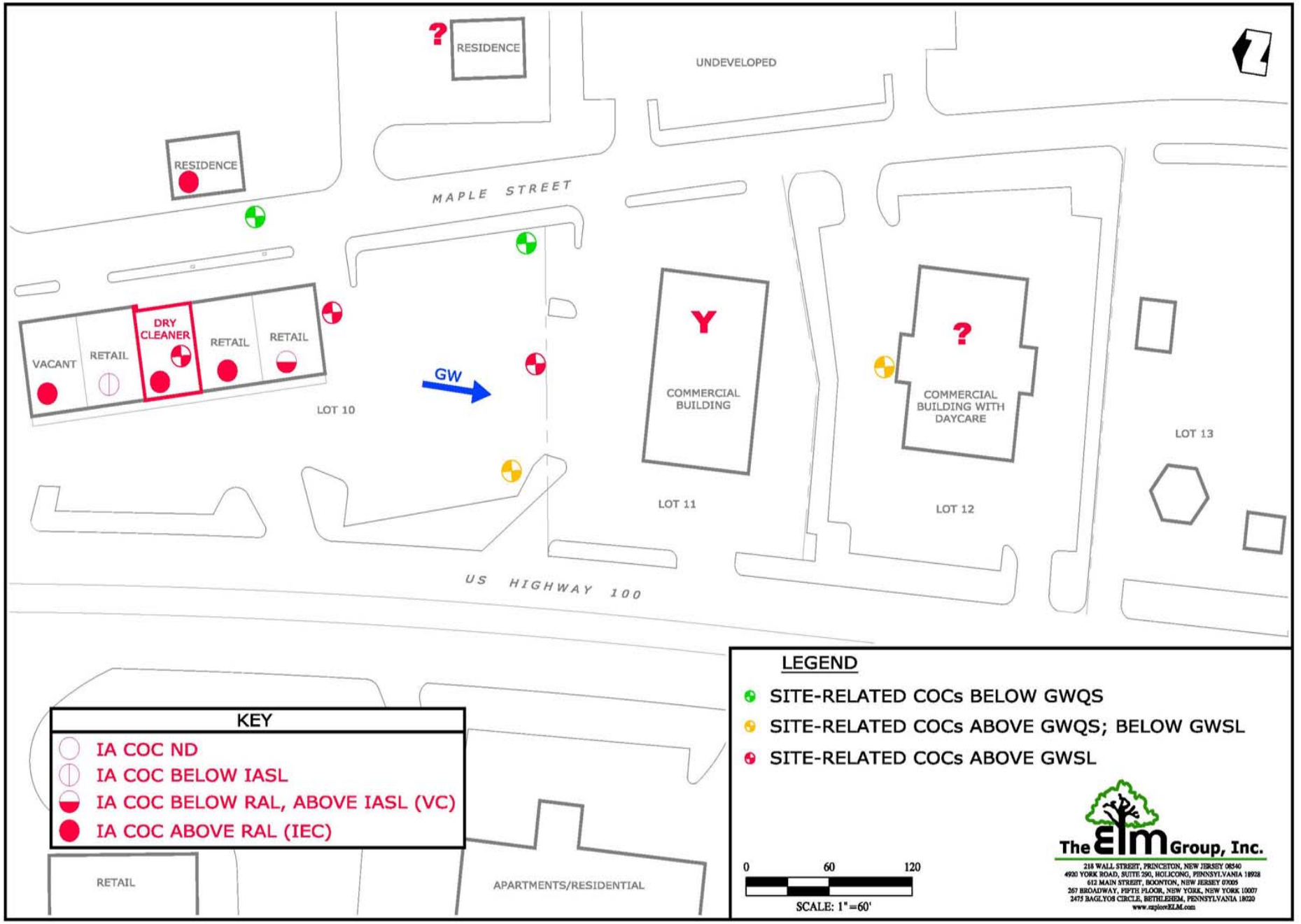
Interim Response Actions – 14 Days

- Evaluate interim response actions – dry cleaner, retail leaseholds, residence
- Options – air purifier, seal cracks/obvious subsurface pathways, ventilation/HVAC mod.
- Implement interim response actions
- Submit IEC form, info & notifications within 14 days of VI IEC confirmation (IEC RTF)

Interim Response Actions – 14 Days

- Communicate with DEP IEC Case Manager
- Begin planning of engineered system response action (next IEC RTF)
- Begin planning of additional receptor/site characterization
- Protection of receptors is the primary concern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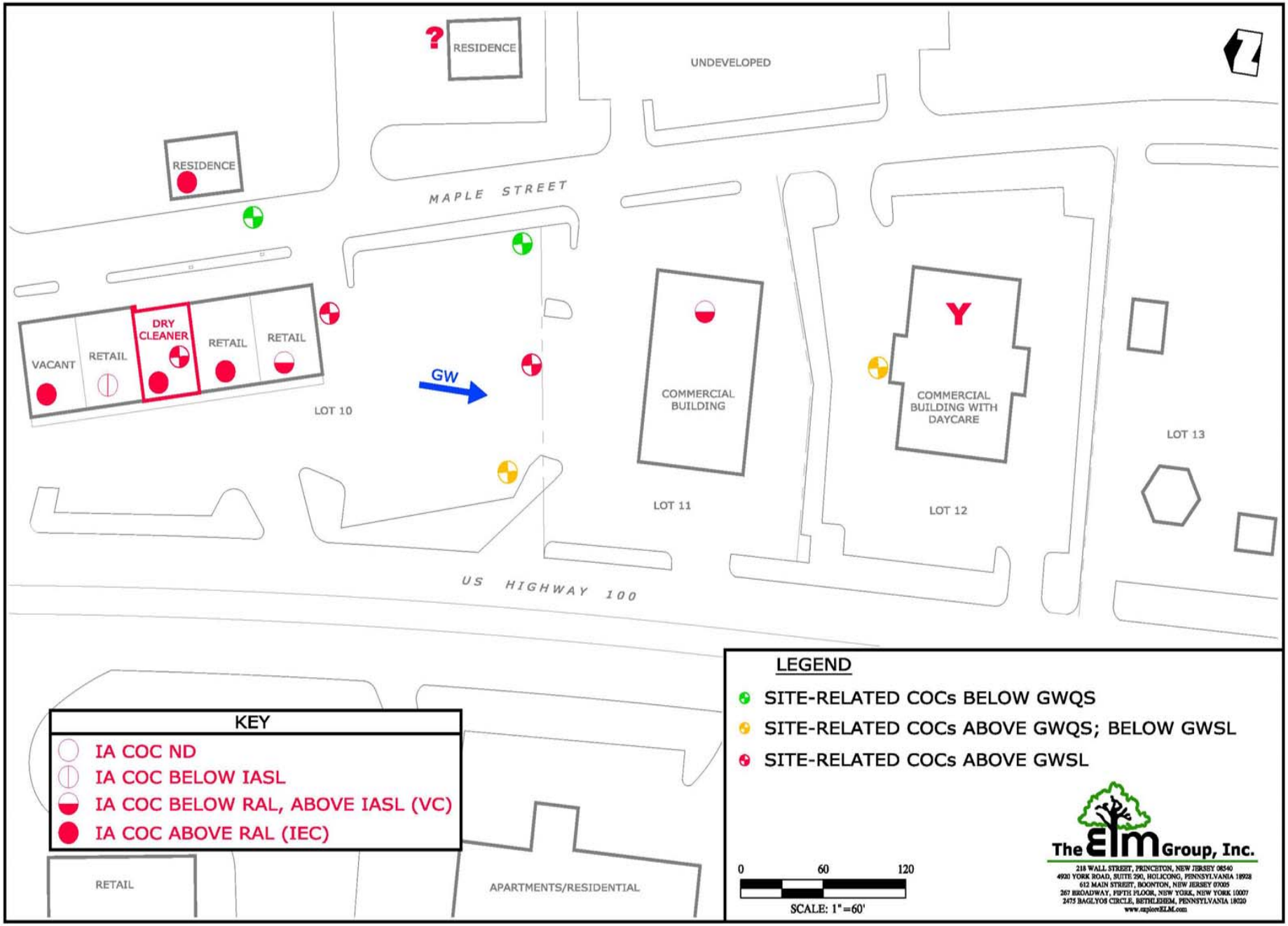
Subsequent Phase of VI Investigation – 60 Days

- Additional step out sampling based upon existing data (SS, IA, GW) within 60 days
  (IEC/Receptor Evaluation RTF)
- Continue with iterative process as needed based upon data & professional judgment
- Goal is to complete VI investigation & relevant components of remedial investigation ASAP

Subsequent Phase of VI Investigation – 60 Days

- Communicate with DEP IEC Case Manager to eliminate potential non-compliance situation
- Evaluate need for extension requests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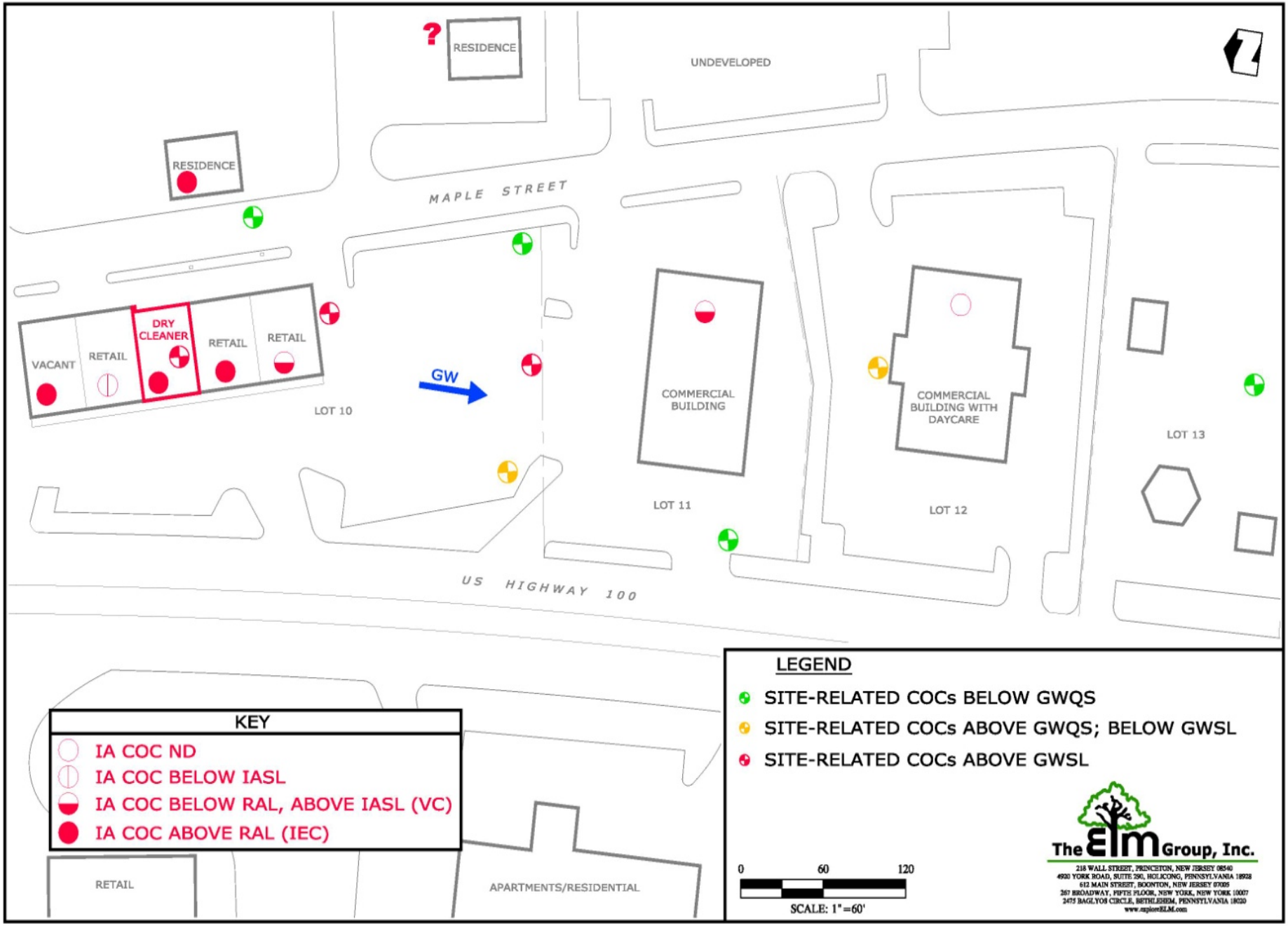
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Engineered System Response Action – 60 Days

- Engineered System Response Action needs to be initiated and form submitted within 60 days of VI IEC confirmation (IEC RTF)
- Multiple IECs and/or VCs will have separate clocks/time frames
- Typically requires prioritization of actions based upon sensitivity of receptors – work with DEP IEC Case Manager to establish extensions to time frames

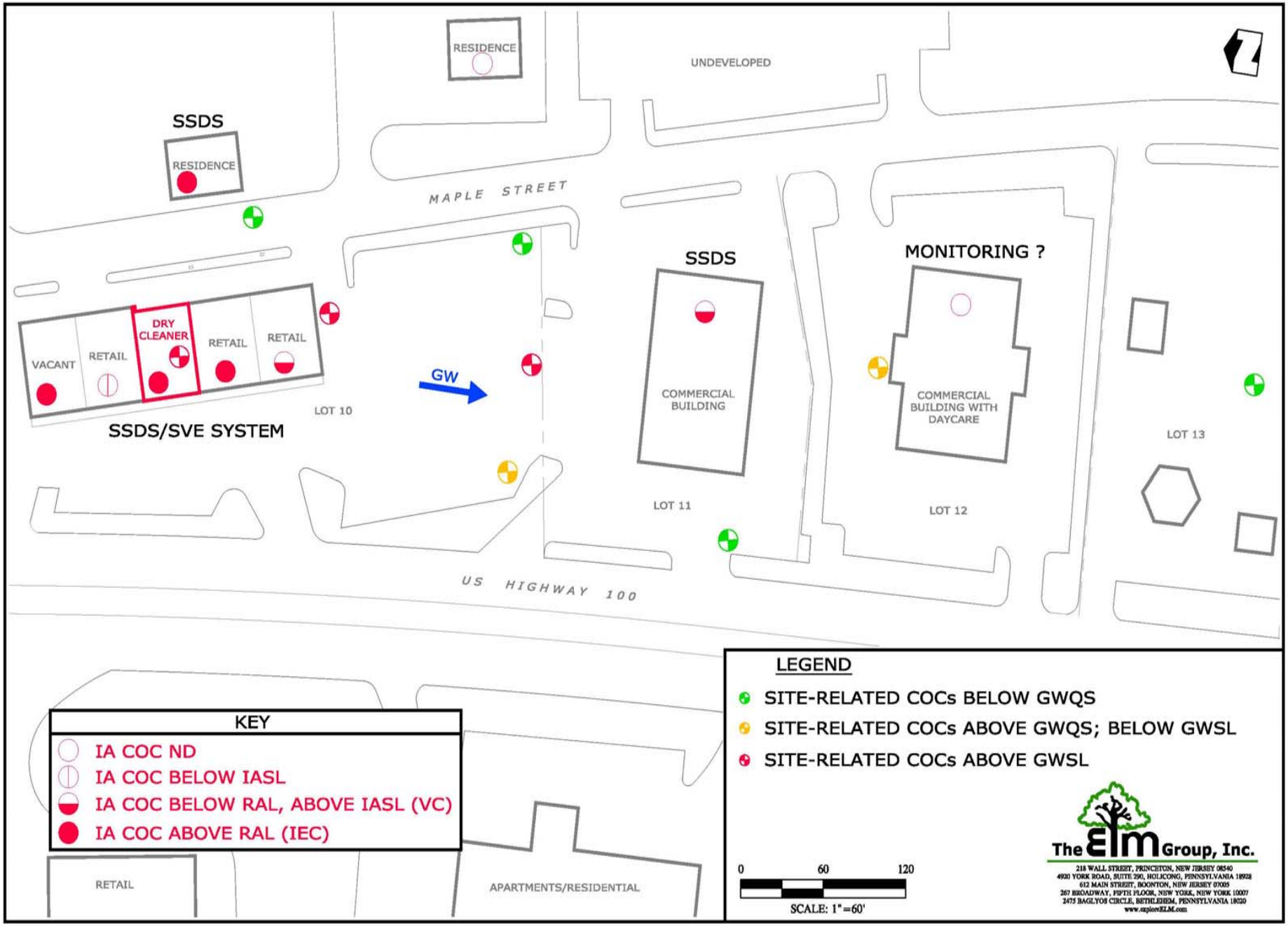
Engineered System Response Action Report – 120 days

- Updated report, forms, tables and maps must be submitted within 120 days of VI IEC confirmation (IEC RTF)

- If multiple IECs/structures, include all available info/data with initial report, and then provide updates as needed

Engineered System Response Action Report – 120 days

- DEP does not want formal work plans for Engineered System Response Action Reports – **keep it simple**
  - Verbal and email communication
  - Presumption is subsurface depressurization for IEC structures
  - Other "engineered systems" will likely require more detailed DEP IEC Case Manager review/approval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Initiation of IEC Source Control – 1 Year

- Initiate control of the IEC contaminant source and submit report and form within 1year of VI IEC confirmation (IEC RTF with associated mandatory time frame)

- "Source control" not specifically defined
  - Focus/DEP expectation is removal or initiate remediation of gross mass/source material
  - Dissolved phase GW contamination is not part of "source control"
  - Communicate DEP IEC Case Manager to reduce potential for non-compliance

- Establish monitoring and maintenance plan for systems and affected structures

QUESTIONS?

IEC Program Status

Andrew Sites, NJDEP

IEC Program Status

- 72 LSRP IECs & VCs
- 70 Publicly Funded IECs
- 85% of LSRP cases are VI

Problems & Misconceptions

- IECs become VCs when levels decrease
- Reporting IEC or VC with no pathway
- Sampling when COC is used in building
- IEC complete after receptor control
- No information submitted with IEC form
- No Receptor Delineation for IECs

Future Changes

- New Technical Rules for May 2012
- IEC Guidance will be revised for May 2012
- Revised VIG: Expanded Operation, Maintenance & Monitoring

Questions?