



**SRP Technical Guidance Training:
Off-Site Source Ground Water
Investigation**

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WELCOME

- *In-Person Attendees*
- *Webinar Attendees*

Milestone:
1st time DEP is able to award CECs to
Webinar Participants for a
Technical Guidance Training Session!



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Continuing Education Credits


Applied to the *SRP Professional Licensing Board* to receive **2 Regulatory CECs**

Attendance Requirements:

- Must sign-in / sign-out: May not miss more than 45 minutes of the training
- Webinar participants must be logged-in and answer 3 out of 4 test questions (randomly inserted in the presentation)




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Attendance Certificates (Issued by the LSRPA)

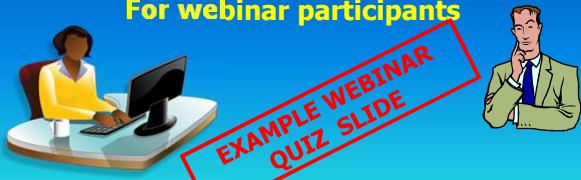
After todays training, DEP will compile a list of "in-person" and "webinar" participants eligible for CECs

- DEP will send an email to those who registered and checked the box to receive a "Training Certificate"
- Email will contain a "Link" to a LSRPA webpage, which will have instructions on how to access certificates *(LSRPA - \$25 processing fee)*



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Test Your Knowledge ! For webinar participants




**EXAMPLE WEBINAR
QUIZ SLIDE**

Water skiing can be a drag

True
 False


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New Jersey DEP Site Remediation Program

Technical Guidance Update

George Nicholas
Lead - DEP/SRP Technical Guidance Development




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Technical Guidance Committees

- 5 DEP Staff / 7 Stakeholders
- Topics:
 - Selected during meetings w/ DEP & Stakeholders (Fall 2010 / Summer 2012)
 - Or requested by Stakeholders/DEP
- Review: Internal/External review of Final Draft
- Final documents: posted on SRP Website at <http://www.nj.gov/dep/srp/guidance/>
 - Currently 24 Technical Guidance documents have been developed/posted






Round-1 15 Tech Guidance Committees

Kicked off work Summer 2010

1. Vapor Intrusion	9. Historic Fill
2. LNAPL	10. Technical Impracticability
3. Receptor Evaluation	11. MNA (Monitored Nat. Atten)
4. Presumptive Remedies	12. Conceptual Site Model
5. IEC (Immed. Env. Concern)	13. Analytical Methods
6. Clean/Alternative Fill	14. Eco Investigation
7. Ground Water SI/RI/RA	15. Attainment
8. Soil (4 docs; PA, SI/RI/RA, UST & Landfill)	16. Linear Construction





Round-2 8 Tech Guidance Committees

(Round 2 - Kicked off Work September 2012)

1. **Off-Site Source** *(posted April 2015)*
2. Commingled Plumes
3. Historically Applied Pesticides *(Draft completed/final is pending)*
4. **Capping** *(posted July 2014)*
5. Performance Monitoring of In-situ GW Remedial Actions
6. Evaluation of GW discharges to SW
7. Child Care Centers *(added spring 2013)*
8. Catastrophic Events: Planning & Response at SRP sites *(added January 2014)*





LSRPA Update
Dan Toder, Board Member - LSRPA

**TECHNICAL GUIDANCE TRAINING
OFF-SITE SOURCE GROUND WATER INVESTIGATION
JUNE 2, 2015**

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LSRP Continuing Education Requirements



36 Continuing Education Credits (CECs) over 3 year LSRP license renewal period:

Minimum no. of CECs must be satisfied in these categories:

- 3 CECs Ethics
- 10 CECs Regulatory
- 14 CECs Technical
- 9 CECs Discretionary

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Continuing Ed Programs vs. Activities



Proposed Rules LSRP Continuing Ed. NJAC 7:26I Subchapter 4

- Continuing Education "PROGRAMS":
 - 1 CEC for 1 hour of instruction at universities, colleges, DEP, LSRPA and other organizations
 - Includes "Alternative Verifiable Learning Formats" (AVLF)
 - Webinars* - Exam required
 - No more than 18 CECs allowed for AVLFs / 3-year cycle
 - Continuing Education "ACTIVITIES": Applications for each activity
 - Teaching a course*
 - Preparing and giving presentations*
 - Presenting a paper*
- "Activities" limited to 18 CECs / 3 year renewal cycle

Dates/Events to Remember



- **Upcoming Courses/Events**
 - June 4th – Member Breakfast, Ponzio's Diner, Cherry Hill
2 CECs
 - June 23rd – Environmental Forensics, Burlington Co. Enterprise Center
 - October 14th – Due Diligence in New Jersey
- **Significant Dates**
 - LSRPs w/ licenses expiring October 22nd
 - Renewal Applications to be submitted 6/24 - 7/24
 - Steering Committee Meetings - 4/16, 8/20, 12/17
 - Attendance open to all members of LSRPA

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Thank You

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Off-Site Source Ground Water Investigation Training

- Document Overview
- Regulatory Basis

George Nicholas
Bureau of Ground Water Pollution Abatement



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Committee Members

STAKEHOLDERS

Michelle Barbaro
LUKOIL

Kari Brookhouse, LSRP
AECOM

Ed Henke
Shell Oil Products US

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GES, Inc.

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Christina Page, Co-Chair
Bureau of Inspection and Review

Ray Pinkstone
Bureau of Enforcement and Investigations

Ron Poustchi
Bureau of Env. Evaluation and Risk Assessment





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Technical Guidance: Overview

- Focus:
 - How to conduct an off-site source GW invest.
- Covers:
 - Regulatory basis
 - Administration procedures (issuance of RAO)
 - Technical approach for Off-site Source Inv.
- Case Studies







Off-site Source Definition

- An off-site source of ground water contamination exists when one or more contaminants migrate onto a site from an off-site property.


Note: An "off-site source" pertains to the ground water contamination migrating onto the subject site, not the actual source of contamination.

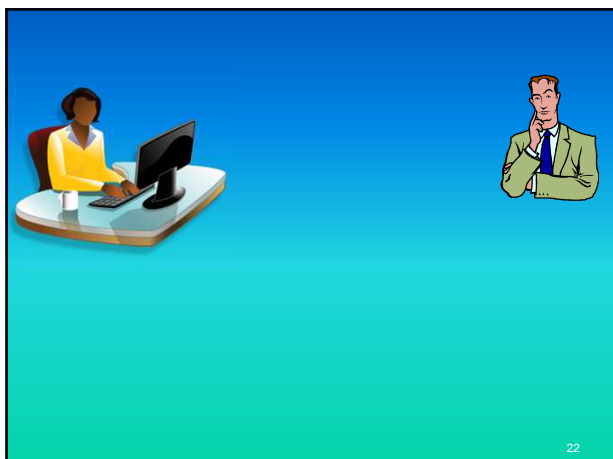





Regulatory Basis: N.J.A.C. 7:26E-3.9


- **N.J.A.C. 7:26E-3.9(a)** allows PRCR to investigate the extent of contamination due to an off-site source.
- **N.J.A.C. 7:26E-3.9(a)1** requires the collection of a sufficient number of samples to adequately determine there is an off-site source of contamination. Samples must be collected at the property boundary (or further upgradient if necessary) in order to be upgradient of, and beyond the influence of, any on-site area of concern (AOC).







 **Regulatory Basis:**
N.J.A.C. 7:26E-3.9 *(cont'd)*


- **N.J.A.C. 7:26E-3.9(a)2** requires sufficient samples to demonstrate a migration pathway between off-site source and on-site AOC.
- **N.J.A.C. 7:26E-3.9(a)3** requires a PA to be conducted and, if necessary, a site investigation to determine if a on-site source exists.



 **Regulatory Basis:**
N.J.A.C. 7:26E-3.9 *(cont'd)*

- **N.J.A.C. 7:26E-3.9(b)**
Person Responsible for Conducting the Remediation (PRCR) is not required to conduct further remediation of the contamination migrating onto the site.







Off-Site Source Ground Water Investigation Training

Administrative Procedures

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NJDEP-Bureau of Inspection and Review




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Off-Site Source Administrative Procedures

1st Notification:
When contamination is detected on-site but suspected to be from an off-site source:

- Call the DEP Hotline (1-877-WARNDEP) to report detection of the contaminant
- Provide site information and receive Incident Number
- Within 14 days after discharge is reported submit a Confirmed Discharge Notification (CDN) Form to the Department




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Off-Site Source: Investigation

Conduct a ground water investigation pursuant to **N.J.A.C. 7:26E-3.9(a)**

1. Collect sufficient number of samples to determine off-site source at the property boundary
2. Demonstrate that a contaminant migration pathway exists
3. Conduct a PA to determine if a source of the contaminant exists on-site




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Off-Site Source: Administrative Procedures (cont'd)

2nd Notification:
When Contaminant is **verified** to be from an Off-Site Source

- Call to the DEP Hotline (1-877-WARNDEP)
- Say... "I am reporting a discharge to GW not related to my site. The contamination is verified to be from an off-site source."
- Provide all site related information
- Obtain new incident number for verified unknown off-site source of contamination






Off-Site Source Administrative Procedures (cont'd)

Issue an Area of Concern RAO (RAO-A) to address Off-Site Source
(can also address in RAO-E for entire site)

- Insert Communication Center Number from **1st Notification** (reporting initial detection of contamination) in reference section (Re.) of the RAO header. If the initial call was never made to the DEP Hotline, leave this blank.
- Insert Communication Center Number from **2nd Notification** (reporting **verified** unknown off-site source") in the RAO notice titled "Contamination Remains On-Site due to Off-Site Contamination."



EXAMPLE RAO

PRCR [INSERT DATE]
Address
City, Municipality, Zip

Re: Response Action Outcome

Remedial Action Type: Unrestricted Use
Scope of Remediation: Area(s) of Concern: PCE in ground water and no other areas
Case Name: Service Station
Address: 100 Milky Way
Municipality: Neptune
County: Monmouth
Block: 15 Lot: 3
Preferred ID: 000000
Communication Center # 12-12-1212-12

"1st Notification"
Communications
Center Number
goes here

Dear Person Responsible for Conducting the Remediation:

As a Licensed Site Remediation Professional authorized pursuant to N.J.S.A. 58:10C to conduct business in New Jersey, I hereby issue this Response Action Outcome for the remediation of the *area(s) of concern* specifically referenced above. I directly oversaw and supervised all of the referenced remediation and personally reviewed and accepted all of the referenced remediation and based upon this work, it is my professional opinion that this remediation has been completed in compliance with the Administrative Requirements for the Remediation of Contaminated Sites (N.J.A.C. 7:26C), that is protective of public health, safety and the environment. Also, full payment has been made for all Department fees and oversight costs pursuant to N.J.A.C. 7:26C-4.

Example Notice

NOTICES


2nd Notification Communications Center Number goes here

Contamination Remains On-Site due to Off-Site Contamination


Please be advised that contamination in the ground water at this site exists above the Ground Water Quality Standards (N.J.A.C. 7:9C-1.7) which may limit ground water use at this site. Based on completion of a preliminary assessment and site investigation (as applicable), pursuant to N.J.A.C. 7:26E-3, and completion of a background investigation pursuant to N.J.A.C. 7:26E-3.9, there is no onsite contribution to this contamination and I have confirmed the source of this contamination is from offsite. This aspect of the site was reported to the Department and assigned the Department's Hotline incident number 13-13-1313-13. Any redevelopment on this site should take into consideration the potential for vapor intrusion from the ground water contamination.


In concluding that this remediation has been completed, I am offering no opinions concerning whether either primary restoration (restoring natural resources to their pre-discharge condition) or compensatory restoration (compensating the citizens of New Jersey for the lost interim value of the natural resources) has been completed.

Pursuant to N.J.S.A. 58:10C-25, the Department may audit this Response Action Outcome and associated documentation up to three years following issuance. Based on a finding by the Department that a Response Action Outcome is not protective of public health, safety and the environment, the Department can invalidate the Response Action Outcome. Other justifications for the Department's invalidation of this Response Action Outcome are listed in the



Questions?







Off-Site Source Ground Water Investigation Training

Ground Water Investigation

George Nicholas
NJDEP-Bureau of Ground Water Pollution Abatement




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Conceptual Site Model (CSM)

CSM is a written and/or illustrative representation of the physical, chemical and biological processes that control the migration and actual/potential impacts to receptors.


SOURCE → PATHWAY → RECEPTOR







Ground Water Investigation Data Objectives

- Document contamination is migrating/has migrated onto the site from an off-site source
- Demonstrate a migration pathway
- Rule out on-site AOCs as contributing sources (conduct PA)





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Ground Water Investigation

Document that contamination is migrating onto site

- Determine GW flow direction and establish upgradient/downgradient flow relationships
- Sample all relevant water bearing zones
- Sample at the property boundary or further upgradient if necessary, to be beyond the influence of any on-site AOCs

DEP Technical Guidance on *Ground Water SI/RI/RA* for more info
[\(http://www.nj.gov/dep/srp/guidance/\)](http://www.nj.gov/dep/srp/guidance/)





Ground Water Investigation


Demonstrate a Migration Pathway Between Property Boundary and AOC


Develop Lines of Evidence (LOE)

- Current GW flow direction
- Consider effects of changing conditions (pumping)
- Preferential flow paths (utility corridors, excavations)


May need additional lines of evidence

- More GW samples
- Fate and transport modeling
- More info on subsurface conditions (lithology)







Off-Site Source Ground Water Investigation



A simple concentration gradient may not exist

Truncated plumes or periodic /historical discharges may result in lower concentrations at upgradient sampling locations *(Table 1 - Data Gathering Tools)*







Ground Water Investigation Conduct a Preliminary Assessment

Rule Out On-Site AOCs as Contributing Sources

- If necessary, conduct a Site Investigation (SI)
- Base sampling locations on CSM
 - Flow direction, contaminant degradation, pathways, fate and transport modeling







Ground Water Investigation Preliminary Assessment (cont'd)

- Account for degradation of parent compounds when assessing current/former AOCs

PCE → TCE → DCE → VC
- Only AOCs related to off-site source investigation need to be included in Case Inventory Document, PA and PA form



See the Department's Technical Guidance on **Preliminary Assessment** and **Ground Water SI/RI/RA** for more info
[\(http://www.nj.gov/dep/srp/guidance/\)](http://www.nj.gov/dep/srp/guidance/)







Preliminary Assessment - Important Point -


If on-site sources/discharges are identified, but are not contributing to the off-site plume migrating onto the site (i.e., distinct and separate plumes), the investigator can still use this guidance and issue an RAO for the off-site source/plume.





Questions?






Off-Site Source Ground Water Investigation Training


Case Studies

Service Station Case Study

Christina Page
NJDEP-Bureau of Inspection and Review





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Service Station Case Study


- Operating gas service station with convenience store
 - Former USTs:
 - 550 gal waste oil
 - 4,000 gal gasoline
 - Current USTs:
 - 2-10,000 gal unleaded gasoline
 - 1-8,000 gal diesel






Excavation of Former USTs


- Post Ex Soil Samples
 - 4,000 gal gasoline: benzene >SCC
 - 550 gal waste oil: ND for all compounds
- The detection of benzene in soil triggered a call to the DEP Hotline

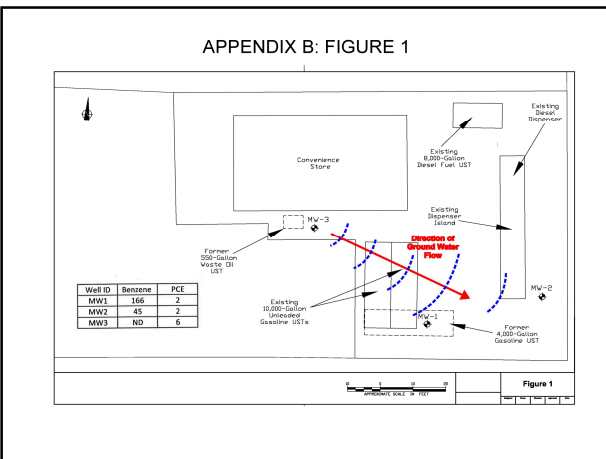





Ground Water Sampling

- 3 monitoring wells installed
- Benzene and PCE detected in ground water
- Detection of benzene in soil triggered a call to the DEP Hotline
- Detection of PCE in GW triggered another call to the DEP Hotline (= "**1st notification**" of suspected unknown off-site source)




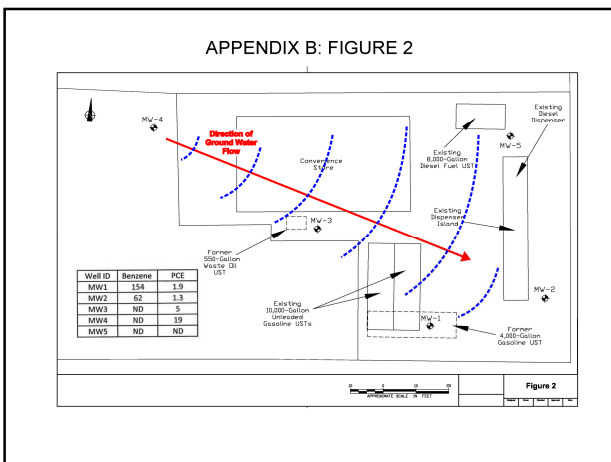





Ground Water Investigation

- 2 additional monitoring wells installed for upgradient and downgradient delineation
- PA conducted: **NO** on-site contribution identified
- Highest concentrations of PCE detected in the off-site upgradient well (= "2nd notification" of verified unknown off-site source)
- GW contamination triggered a VI investigation










What questions should you be asking?


- **Source(s)**
- **Pathway**
 - What are the exposure and migration routes?
- **Receptors**
 - Are there any?
 - What type of receptor and proximity?







Vapor Intrusion Investigation


- Benzene concentrations in MWs 1 and 2 triggered VI investigation although >30 feet from the convenience store
- 30-foot VI trigger distance for PHCs is based on limit of GW contamination not well location
- LSRP extrapolated GW contamination extent to be within the 30-foot trigger distance







Vapor Intrusion Investigation

- The LSRP conducted sub-slab soil gas survey at convenience store
- Results did not exceed Soil Gas Screening Levels.
- Receptor pathway did not exist and the VI investigation was terminated






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Questions?






Off-Site Source Ground Water Investigation Training

Case Studies

Multi-Scenario Case Study


Steve Posten LSRP
AMEC Foster Wheeler Environment & Infrastructure, Inc.






Common Site Features


- Small site (1/3 ac) in central city
- Bank building and parking lot
- 15 years ago, heating oil UST removed
 - TPH contamination in soil
 - 63 tons contaminated soil removed
 - No CVOC contamination in soil
 - 3 MWs installed
 - No fuel-related constituents detected
 - CVOCs (primarily TCE) detected
 - 2001 (>190-250 ppb detected in all wells)
 - 2013: 3-10 ppb in cross-/down-gradient wells)






Common Site Features


- Hydraulic gradient (on-site wells)
 - Oriented south/southwest
- Land Use:
 - Primarily residential
 - Industrial properties to north
 - Commercial properties to west
 - Auto body, auto repair, dry cleaning
- Vapor Intrusion
 - Sub-slab and IA performed at on-site bldg
 - Results negative






Common Site Features


- Off-Site source suspected due to:
 - On-site soil sampling results (negative for CVOCs)
 - Surrounding land uses
 - Hydraulic gradient
 - Initial pattern of TCE contamination in on-site wells

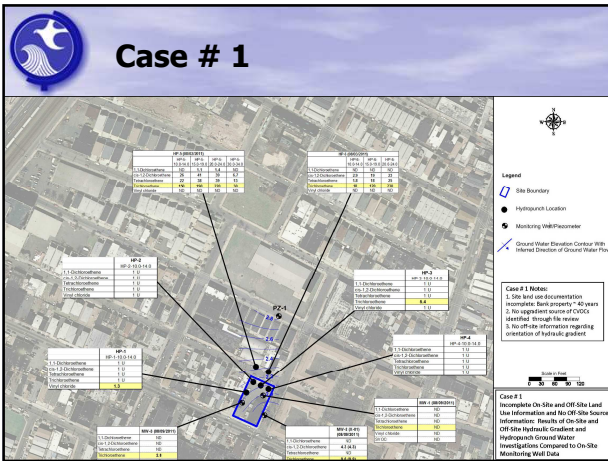




Case # 1 Scenario

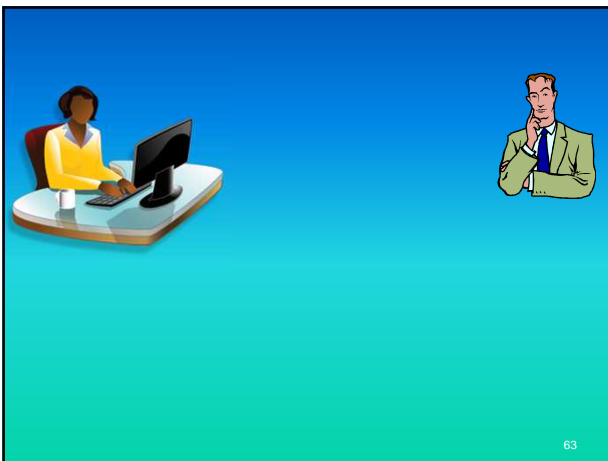
- PA results:
 - Ownership history
 - Bank ownership records extend only to 1960s
 - Aerial Photography/Fire Insurance Maps
 - Incomplete/poor quality prior to 1960s/1950s
- Data Miner/Geoweb/OPRA file review
 - No potential upgradient, off-site sources identified

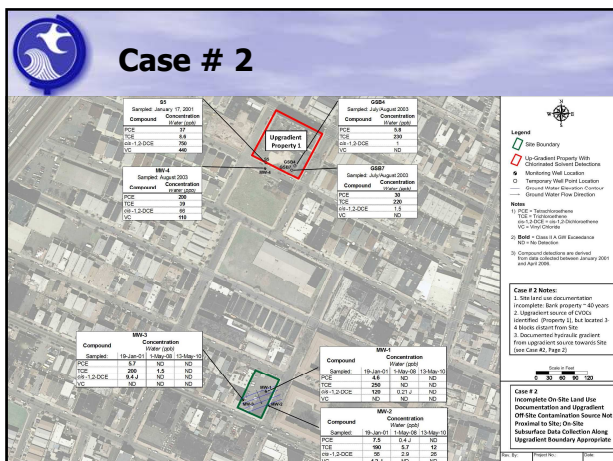


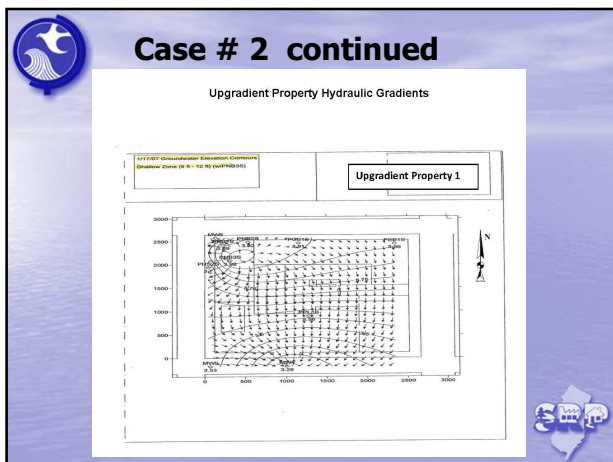


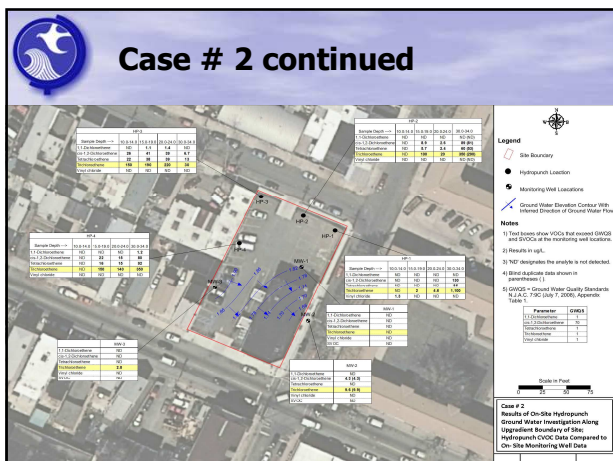
Case # 2 Scenario


- PA results:
 - Ownership history
 - Bank ownership records extend only to 1960s
 - Aerial Photography/Fire Insurance Maps
 - Incomplete/poor quality prior to 1960s/1950s
- Data Miner/Geoweb/OPRA file review
 - Potential upgradient, off-site source identified
 - Several blocks away from subject property
 - CVOC source in soil and GW documented
 - Hydraulic gradient partially documented








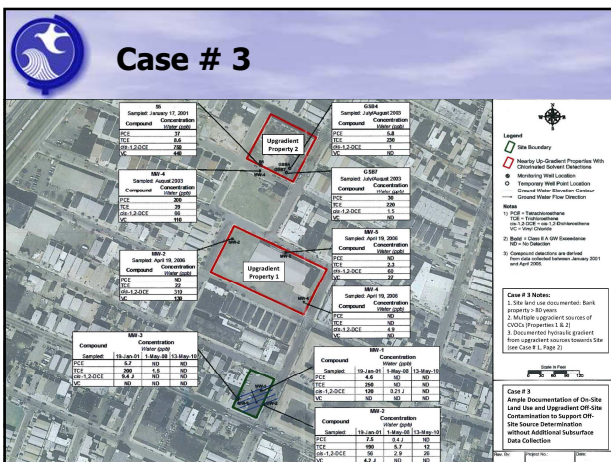


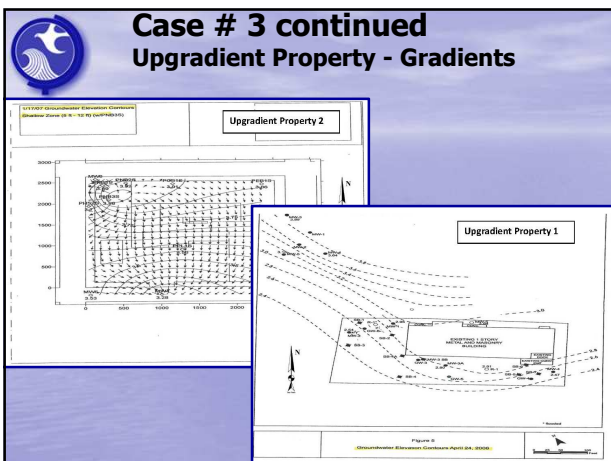



Case # 3 Scenario

- PA results:
 - Ownership history
 - Bank ownership records extend to 1917
 - Aerial Photography/Fire Insurance Maps
 - Extensive aerial photography through 1946
 - Detailed Fire Insurance maps through 1892
- Data Miner/Geoweb/OPRA file review
 - Two upgradient, off-site sources identified
 - Same as Case # 2, plus 2nd source one block away
 - CVOC sources in soil and GW documented
 - Hydraulic gradient fully documented









 **Multi-Scenario Case Study Summary**

Case Study #1

Lines of Evidence:

- On-Site land use history only partially documented
- No potential off-site CVOC sources identified through file review
- No off-site information regarding orientation of hydraulic gradient identified through file review





 **Multi-Scenario Case Study Summary**

Case Study #1 (cont'd)

Appropriate Level of Investigation:

- On-site upgradient perimeter sampling (inconclusive)
- Off-site piez installation to verify hydraulic gradient
- Off-site hydropunch investigation to verify presence of upgradient source of CVOCs in gw





 **Multi-Scenario Case Study Summary**

Case Study #2

Lines of Evidence:

- On-Site land use history only partially documented
- Potential off-site CVOC source identified through file review (3 blocks away from site)
- Information regarding the orientation of the hydraulic gradient identified through file review (3 blocks away)





 **Multi-Scenario Case Study Summary**

Case Study #2 (cont'd)

Appropriate Level of Investigation:

- Comprehensive on-site perimeter sampling to verify presence of upgradient source of CVOCs in GW
 - Vertical profiling
 - Full NE-SW boundary coverage (due to some uncertainty in variability of gradients)



 **Multi-Scenario Case Study Summary**


Case Study #3


Lines of Evidence:

- On-Site land use history fully documented
- Two potential off-site CVOc sources identified through file review (1 and 3 blocks away from site)
- Definitive information regarding the orientation of the hydraulic gradient identified through file review (1 and 3 blocks away from site)

Appropriate Level of Investigation:

- No further investigation necessary



 **Questions?**

