

# Air Force Civil Engineer Center

---



## Pease RAB Meeting

24 October 2017



# Agenda

---

- **Welcome and Introduction**
- **RAB Member Administrative Items**
  - July 26 2017 minutes approval
- **Current Restoration Activities**
- **Pease Tradeport Groundwater Mitigation Activities**
- **Related Activities**
- **Committee Membership**
- **Public Comments**
- **Meeting recap and Next Steps, Upcoming Meeting Dates**
- **Adjourn**



# RAB Member Administrative Items

---

- **Approve Summary From 26 July 2017  
RAB Meeting**



# Site 73 Restoration



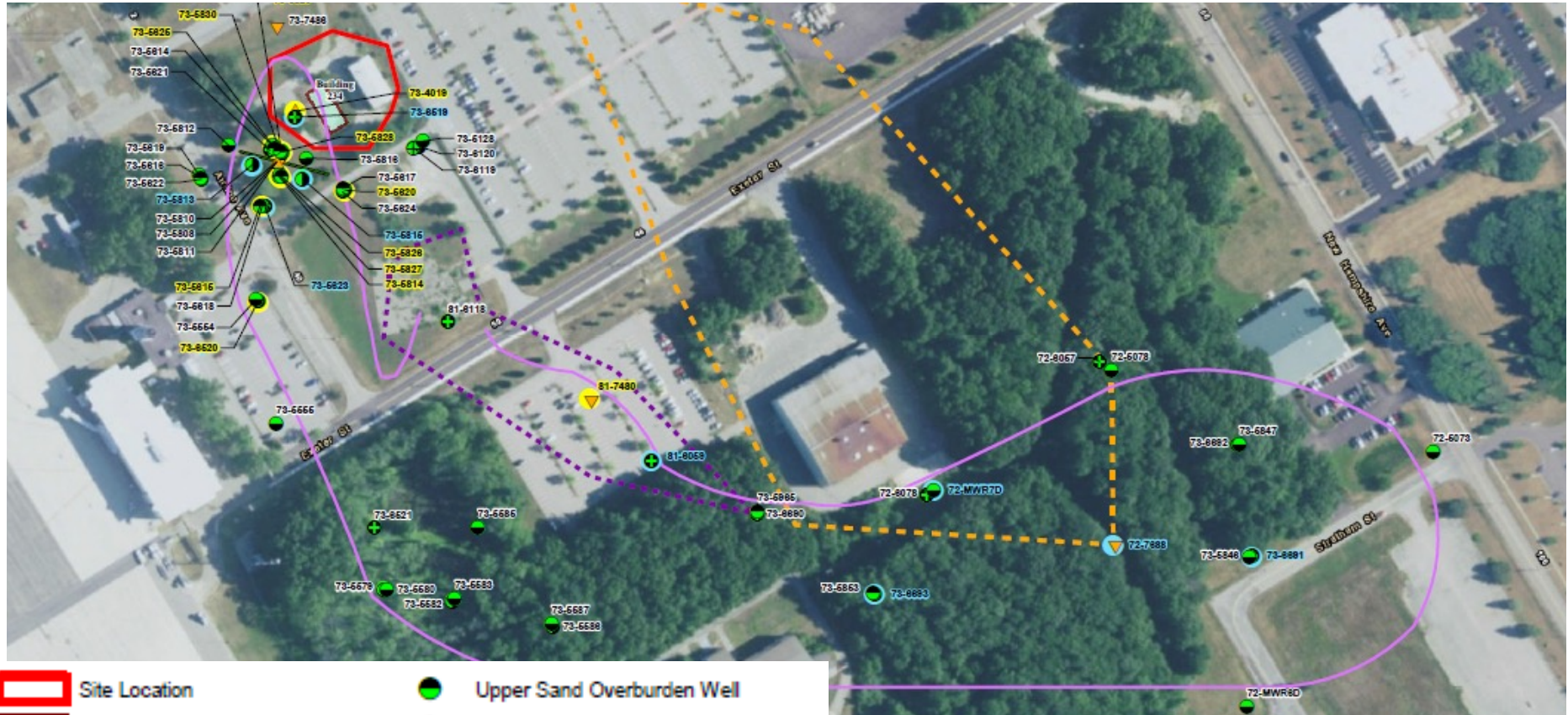
- Former Building 234
- Used as a liquid oxygen plant 1959 to 1978 (CVOC release period)
- After 1978, used as a water demineralization plant














- Building demolished in 2007
- PCE and TCE used at building

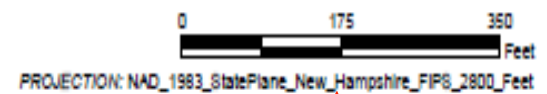




# Site 73 Restoration (continued)



-  Site Location
-  Former Building Location
-  Permeable Reactive Barrier
-  Site 72 GMZ Boundary
-  Site 81 GMZ Boundary
-  Approximate Boundary of Historical Chlorinated VOC Plume
-  Upper Sand Overburden Well
-  Lower Sand Overburden Well
-  Hybrid Well
-  Bedrock Well
-  Fractured Bedrock Well
-  Upper Sand Overburden Piezometer
-  Lower Sand Overburden Piezometer



  
0 to 350 feet



# Site 73 Restoration (continued)

---

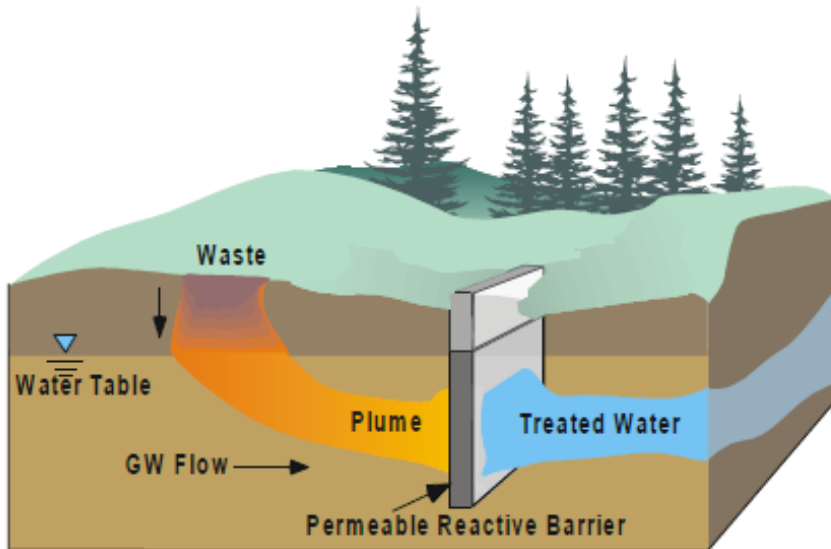
- **Remediation History**

- **1989 to 1991: Tank removal with soil excavation (150 tons of soil removed)**
- **1999: Permeable Reactive Barrier (PRB) installed**
  - zerovalent iron ( $\text{Fe}^0$ )
- **2012: In Situ Enhanced Bioremediation (ISEB) Treatment**
  - Emulsified vegetable oil (EVO) with anaerobic microbes (SDC-9)



# Site 73 Restoration (continued)

## Permeable Reactive Barrier (PRB)



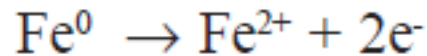
Source: ITRC 2011

A PRB is a wall created below ground that is “permeable” and “reactive”. As contaminated groundwater passes through the PRB, it reacts with the wall and remediates the groundwater. At Site 73, the PRB was constructed using zerovalent iron ( $\text{Fe}^0$ ).

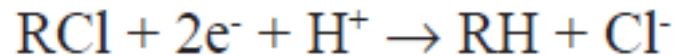


# Site 73 Restoration (continued)

## Zerovalent Iron ( $\text{Fe}^0$ ) Reduction (Sequential hydrogenolysis)



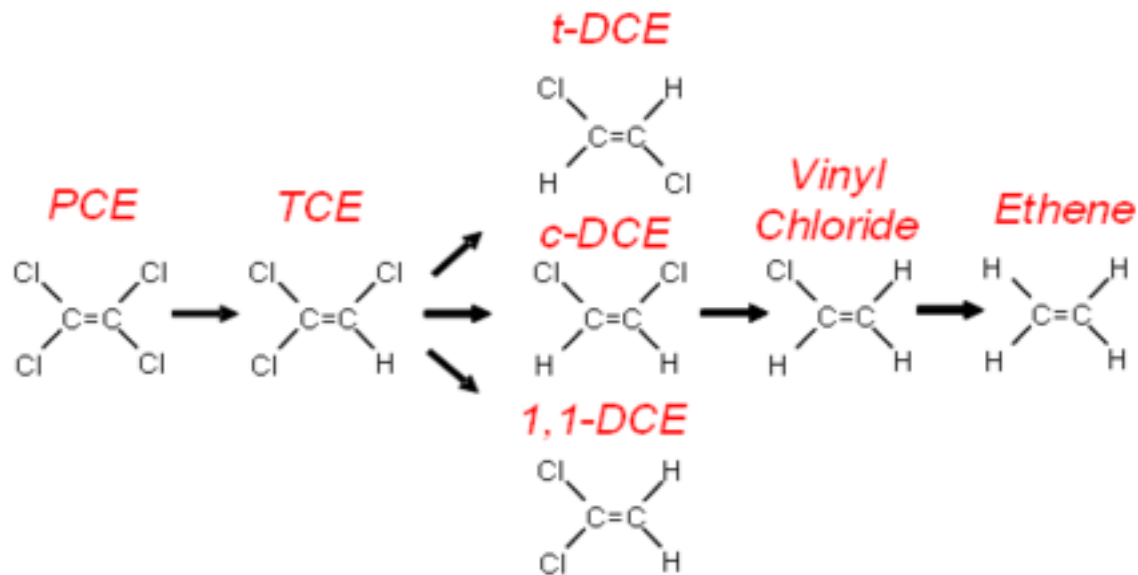
Anodic Reaction



Cathodic Reaction



Net Reaction







# Site 73 Restoration (continued)

---

- **Site 73 PRB Details**
  - Installed approximately 125 feet downgradient of the known chlorinated solvent source area (Building 234)
  - 150 feet long, 2.5 feet wide
  - Total depth is approximately 34 feet below ground surface to top of bedrock
  - Post-construction evaluation has determined that PRB has been successful in capturing and treating contaminated groundwater



# Site 73 Restoration (continued)

## PRB Mass Reduction in Highest Concentration Source Area Wells: 1999 to 2010

### Deep Overburden Wells

1999 → 2010

TCE: 777 µg/L → 9 µg/L

DCE: 2,020 µg/L → 29 µg/L

VC: ND → 9 µg/L

### Shallow Bedrock/Hybrid Wells

1999 → 2010

TCE: 193 µg/L → 28 µg/L

DCE: 324 µg/L → 100 µg/L

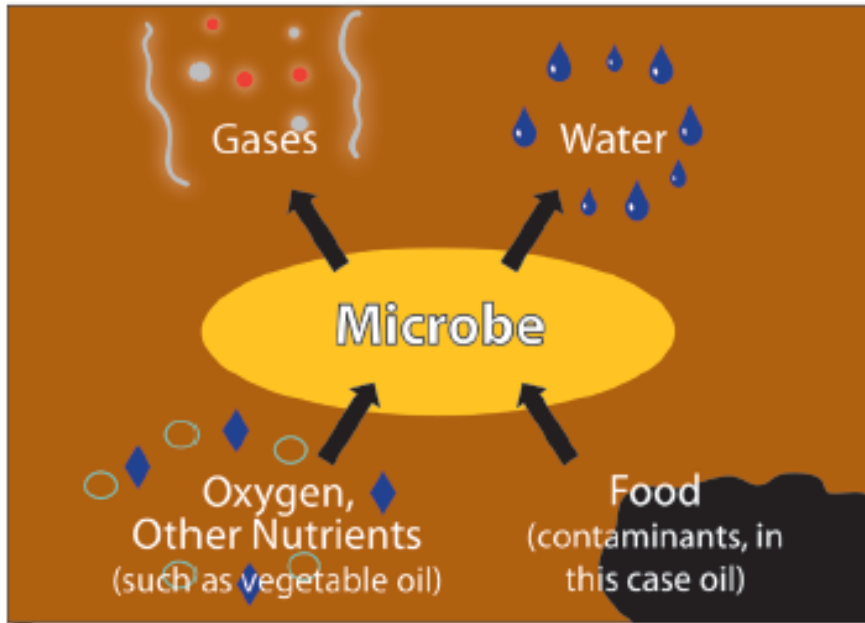
VC: 7 µg/L → 11 µg/L

- The PRB has done a good job of reducing mass at Site 73 even though some residual mass has persisted in the source area.
- Leading edge of plume has reduced in length from approximately 2,200 feet long to approximately 150 feet long.

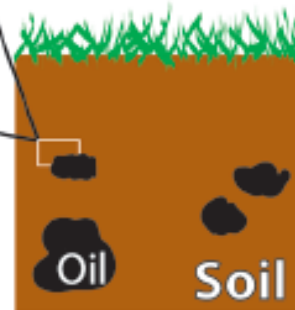


# Site 73 Restoration (continued)

## In Situ Enhanced Bioremediation (ISEB)



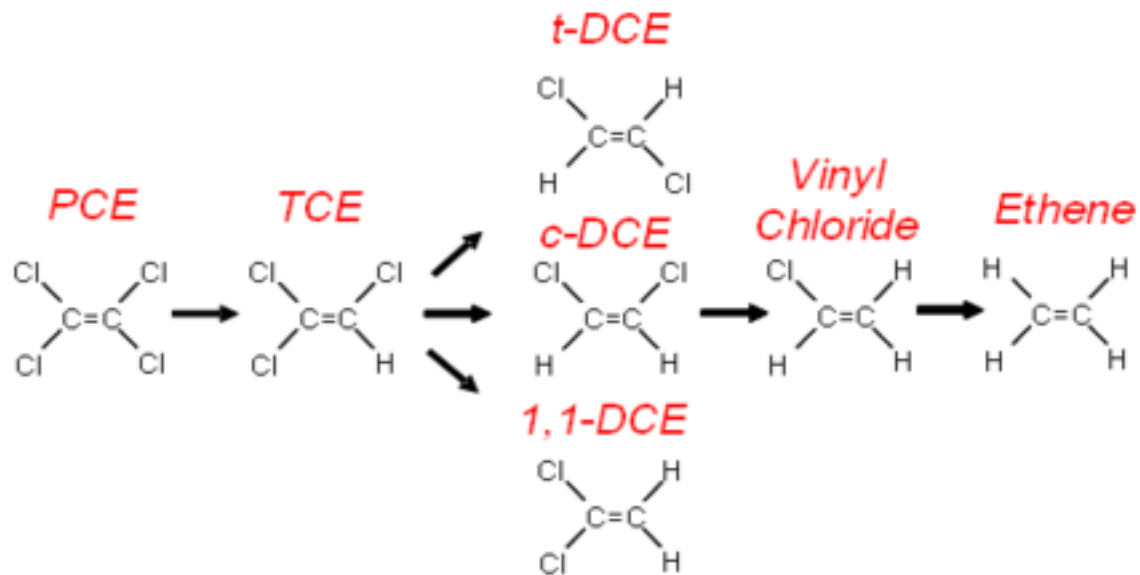
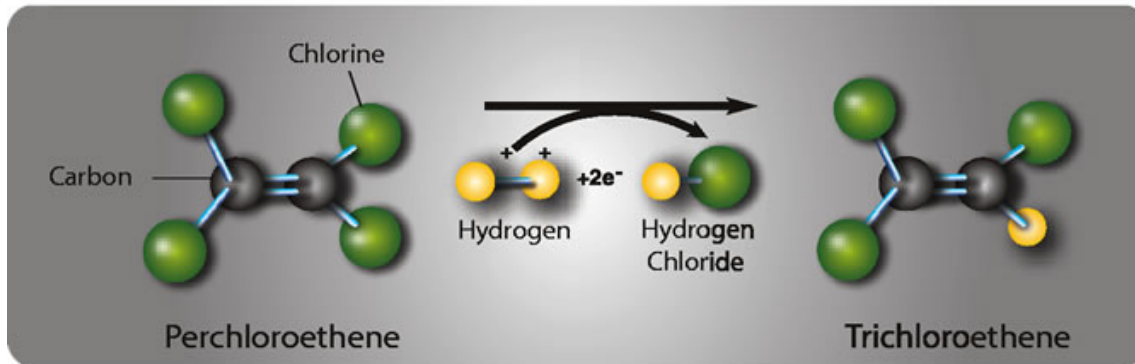
ISEB is the technology that uses both native and introduced microbes to clean up contamination in soil and groundwater. This is accomplished by providing both the correct microbes and electron donor (EVO).





# Site 73 Restoration (continued)

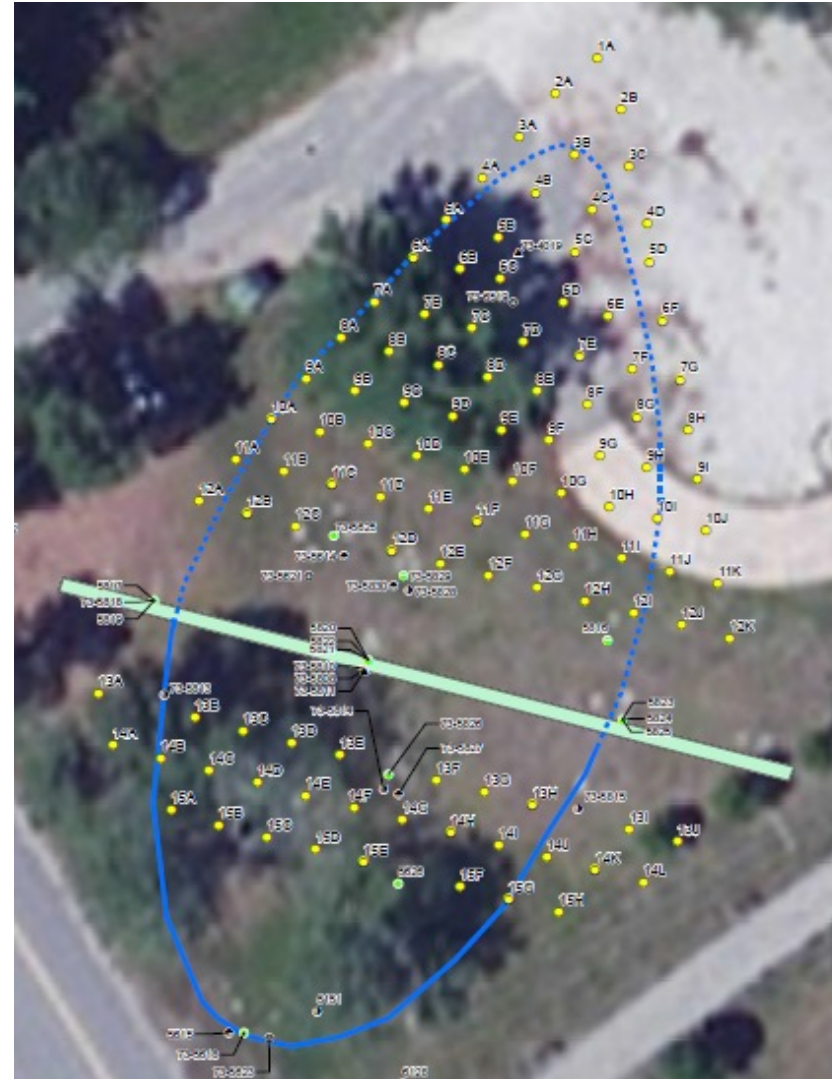
## Reductive Dechlorination





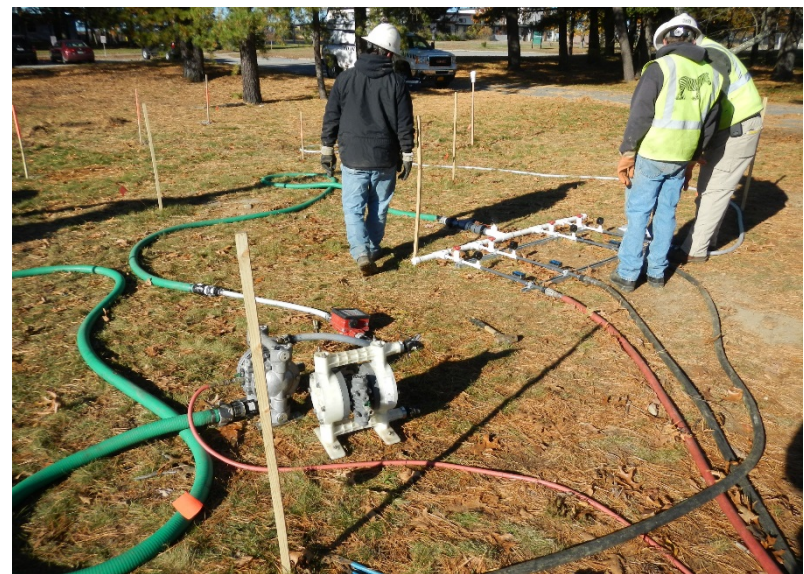
# Site 73 Restoration (continued)

- 106 Injection Points
- ~1,338 gallons of solution injected per point
- 140,791 total gallons of solution injected
- 2,585 gallons of 60% EVO stock solution
- 23 gallons of SDC-9 dechlorinating consortium ( $1.5 \times 10^{12}$  cells/L)





# Site 73 Restoration (continued)





# Site 73 Restoration (continued)

## ISEB Mass Reduction in Highest Concentration Source Area Wells: 2010 to 2017

### Deep Overburden Wells

2010 → 2017

TCE: 9 µg/L → ND

DCE: 29 µg/L → ND

VC: 9 µg/L → 23.9 µg/L

### Shallow Bedrock/Hybrid Wells

2010 → 2017

TCE: 128 µg/L → ND

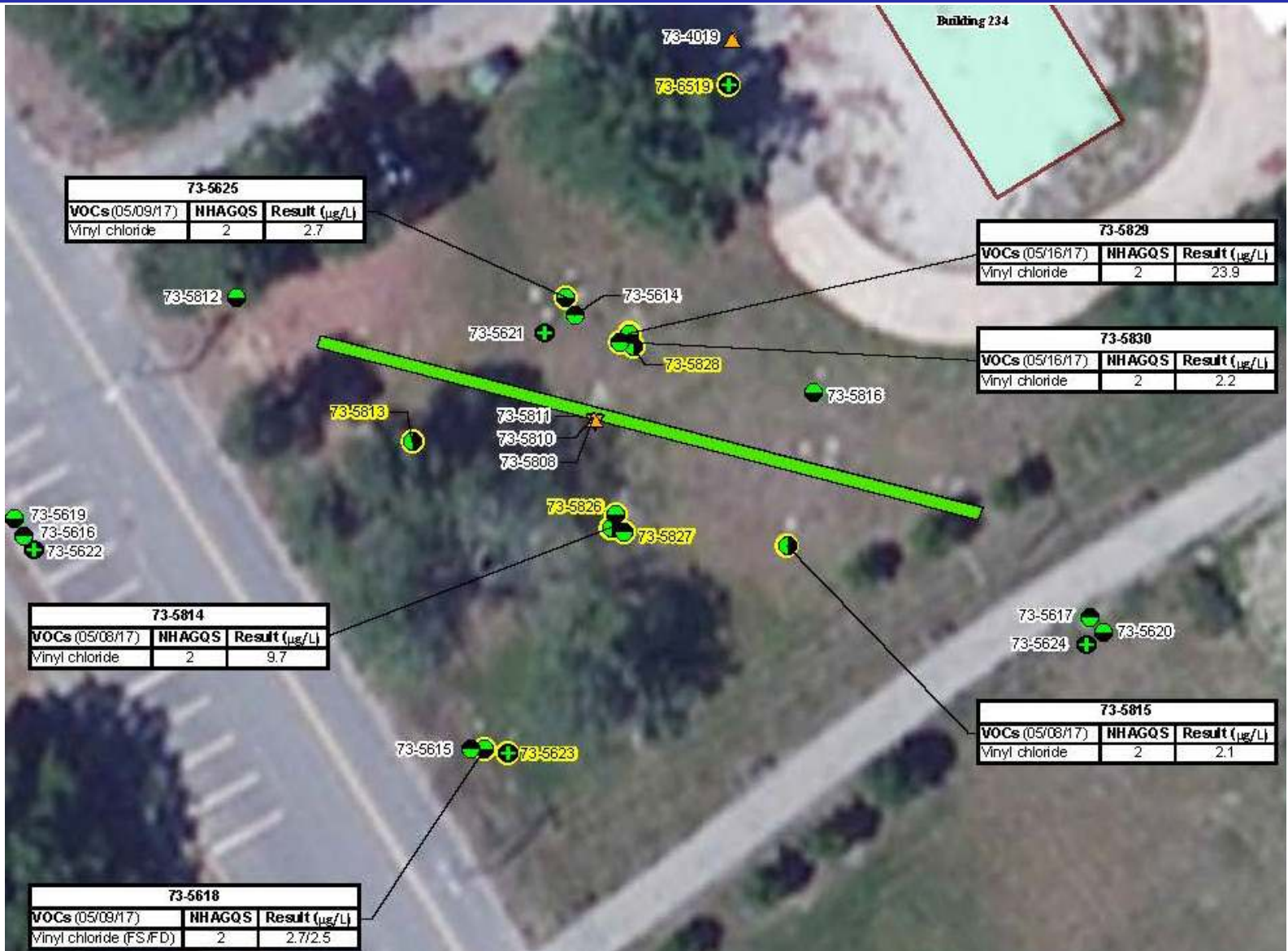
DCE: 100 µg/L → ND

VC: 11 µg/L → 2.1 µg/L

- The ISEB has successfully remediated TCE and DCE with only residual vinyl chloride (VC) remaining.



# Site 73 Restoration (continued)







# Site 73 Restoration (continued)

---

- **Conclusions**

- **The PRB reduced most chlorinated solvents as contamination passed through/near the PRB.**
- **The ISEB process did a good job reducing the remaining chlorinated compounds to below regulatory standards with the exception vinyl chloride, which remains at low concentrations.**
- **Currently evaluating two options to address the slow vinyl chloride degradation rate. Continued monitoring or injecting an aerobic substrate to biologically remediate the remaining vinyl chloride to below regulatory standards.**



# Site 8 Interim Mitigation System Update

---

- **Construction is underway**
- **All extraction wells are installed**
- **Building construction starts this week**
- **Trenching from wells to building continues**



# Site 8 Interim Mitigation System Update



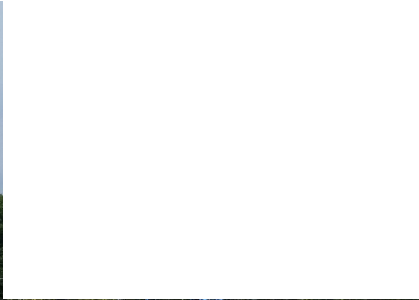


# Site 8 Interim Mitigation System Update





# Site 8 Interim Mitigation System Update





# Airfield Interim Mitigation System Update

- Air Force has awarded the construction contract
- Treated water reinjection testing is underway through December
- Final design to be developed over the winter
- Construction to begin in spring





# Update on PFCs at Pease

---

- **Air Force has continued to sample the Smith, Harrison, Portsmouth and Collins Wells**
  - 123 sampling events and 830 samples (supply wells, sentry wells, and distribution points)
  - Concentrations are very stable – no changes
  - Data posted to City of Portsmouth website
  - Sentry Monitoring planned for November 2017, 8<sup>th</sup> event since October 2014 (no changes to date)
- **Planned Activities:**
  - Air Force is developing follow-on delineation plans across Pease and in Newington
  - Continue sentry well and private well monitoring
  - Continued to develop a better understanding of PFOS and PFOA distribution at Pease



# Related Activities

---

- **Updates by RAB members on any related activities (e.g. the recent meeting with Newington residents)**





# Committee Membership

---

- **RAB Membership – discuss and approve the process for adding new members and confirming ongoing memberships**



# Public Comment

---

**Goal:** Provide opportunity for members of the public to comment.

**Process:** Public members fill out a comment card indicating they wish to speak. Statements are timed and are limited to 3 minutes for each speaker. The timer will notify the speaker when they have 30 seconds remaining and when they have reached 3 minutes.

**Outcome:** Questions will be answered in writing in Meeting Minutes and individually, if you leave us an email address



# RAB Meeting Recap

---

- **Meeting Recap**
- **Next Steps**
- **Upcoming Meeting Dates**



# Adjournment

---

