



Department of Navy  
Naval Weapons Industrial Reserve Plant Bethpage  
Restoration Advisory Board Meeting

Operable Unit 2 Groundwater Monitoring/  
Modeling Results

Presented by:  
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Tetra Tech  
16 Nov 2022

# Operable Unit 2 Groundwater Monitoring, Treatment, and Interim Action Update Outline

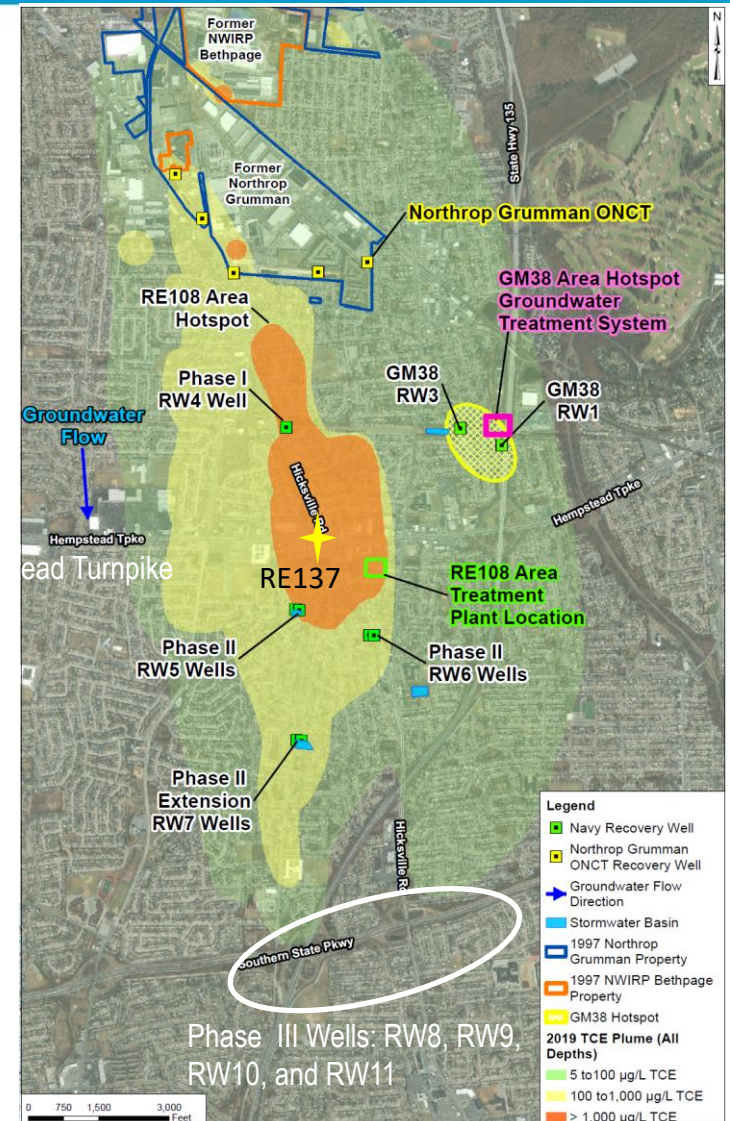


- Overview of the OU2 Remedial Activities
- OU2 Groundwater Monitoring Activities
- OU2 Groundwater Fate and Transport Modeling

# OU2 Groundwater Remediation Overview



- Northrop Grumman Onsite Containment System – 1998
- Navy GM38 Area Hotspot Treatment System – 2009
- Navy GM38 Advanced Oxidation Process (AOP) – May 2021
- Navy Phase I Recovery Well RW4 – April 2021
- Navy RE137 Interim Treatment System – March 2022
- Navy Phase II Recovery Wells – 4 of 6 complete
- Navy Phase II Treatment System – under construction
- Navy Phase III Recovery Wells – 2 of 4 completed

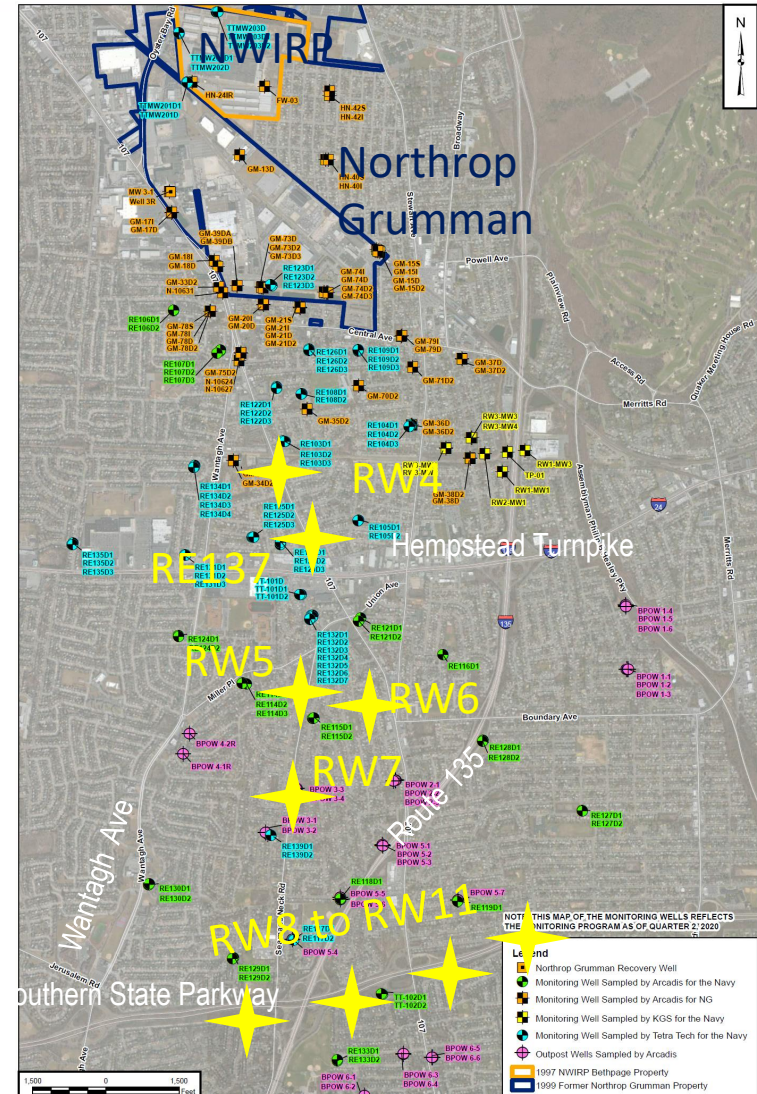




# OU2 Groundwater Monitoring Program



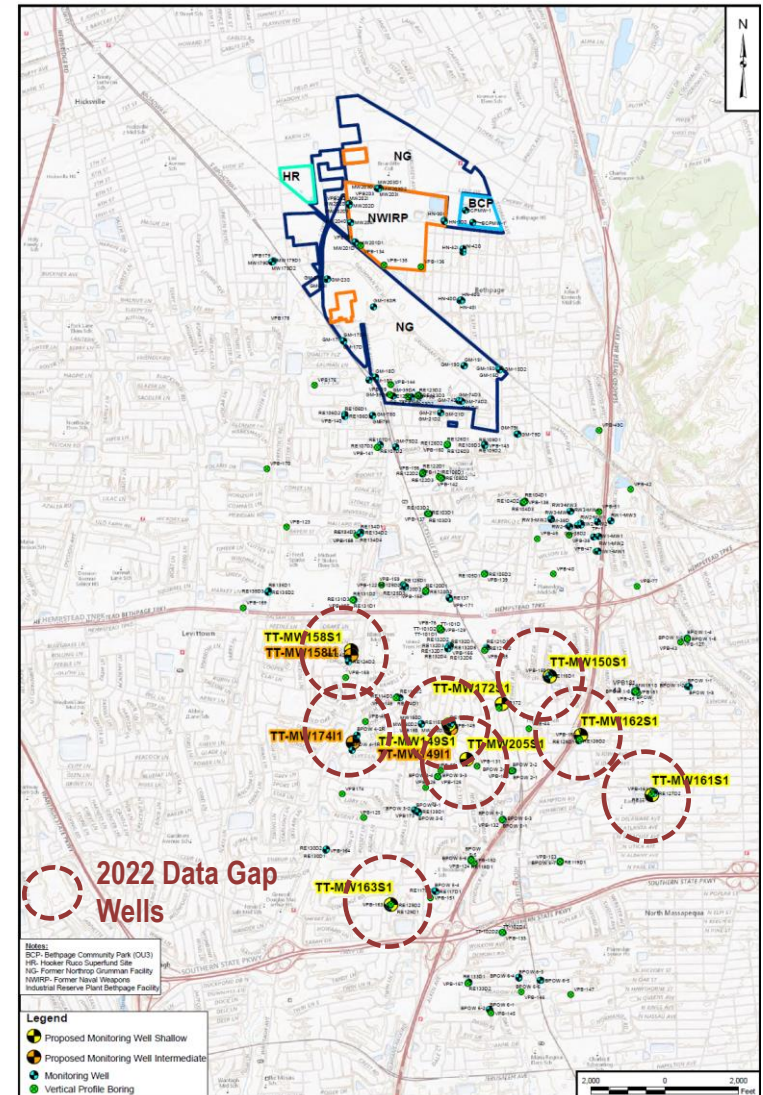
- Monitoring – OU2 plume migration, attenuation, and cleanup
- Groundwater samples – 180 wells on a quarterly, semi-annual, or annual basis, and analyzed for Volatile Organic Compounds (VOC) and 1,4-dioxane
- Recovery Wells RW4 and RE137 are installed and operating
- Recovery Wells RW6A/B, RW7A/B, RW8 and RW9 are installed
- Recovery Well RW5 in progress
- Recovery Wells RW10 and RW11, preliminary borings to start in late 2022



# OU2 Groundwater Monitoring Program



- New monitoring wells continue to be added as needed:
  - Shallow and intermediate-depth groundwater data gap wells (200 to 350 feet below ground surface): completed in August 2022
- **Monitoring well program has shifted from plume delineation to support of plume cleanup**

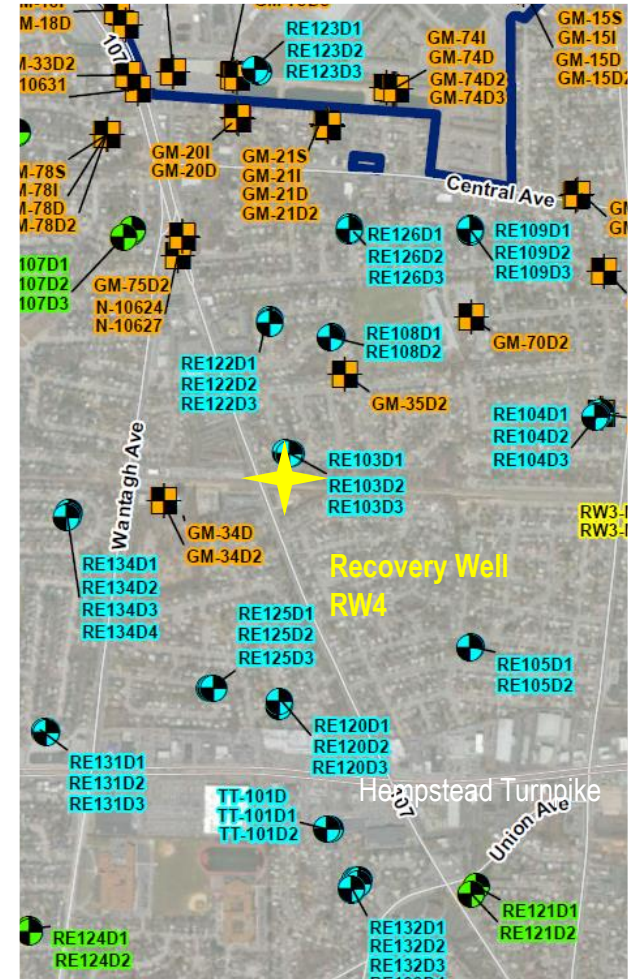
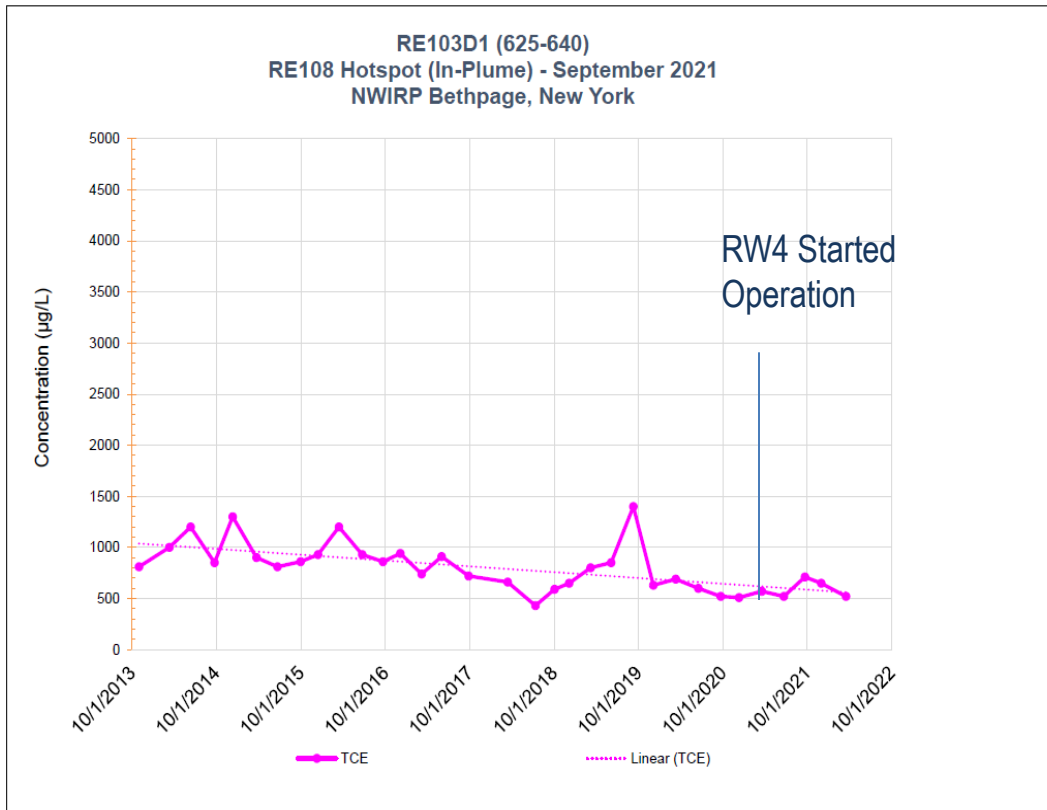






# OU2 Groundwater Monitoring – Recovery Well RW4 (Phase I)

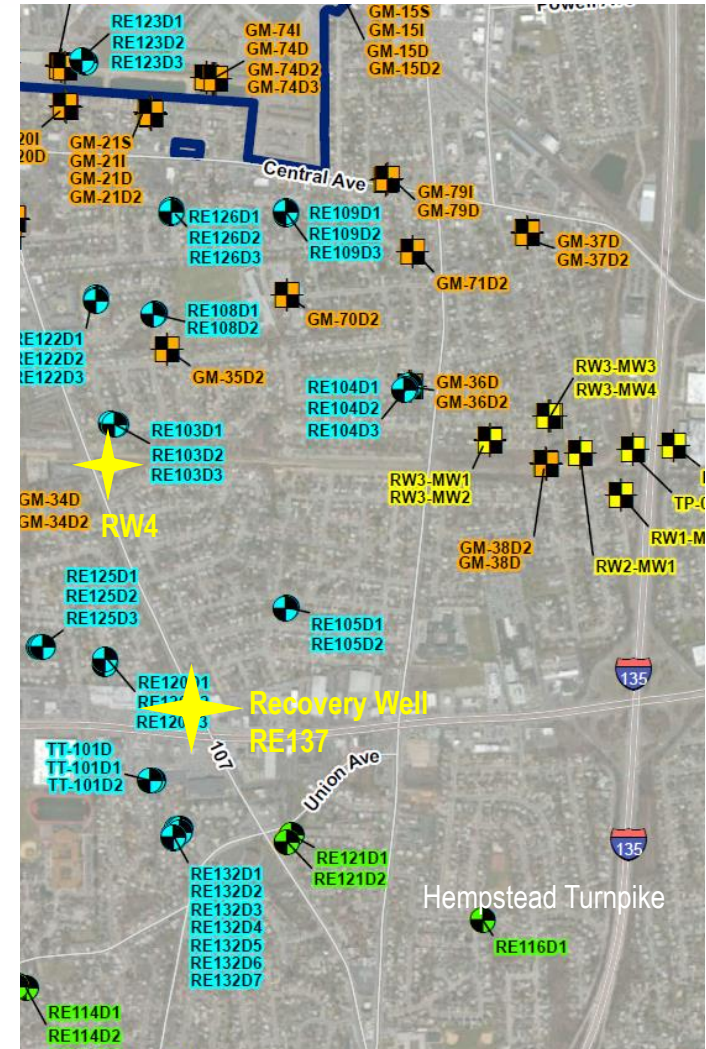
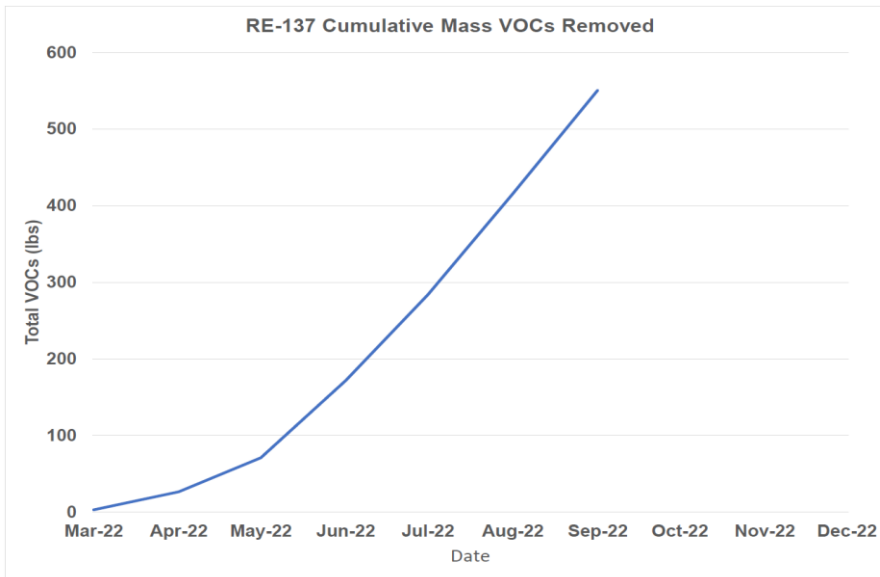
- Changes in water level and VOC concentrations in nearby monitoring wells are used to evaluate effectiveness of recovery wells
- Water level data is processed with computer modeling





# OU2 Groundwater Monitoring – Recovery Well RE137

- Well started operation in March 2022
- Trichloroethene (TCE) mass removal increasing with higher pumping rates and concentrations
- Groundwater is treated locally using Advanced Oxidation Process (AOP) system and Granular Activated Carbon (GAC)
- 135 Pounds of VOCs were removed in Sept 2022

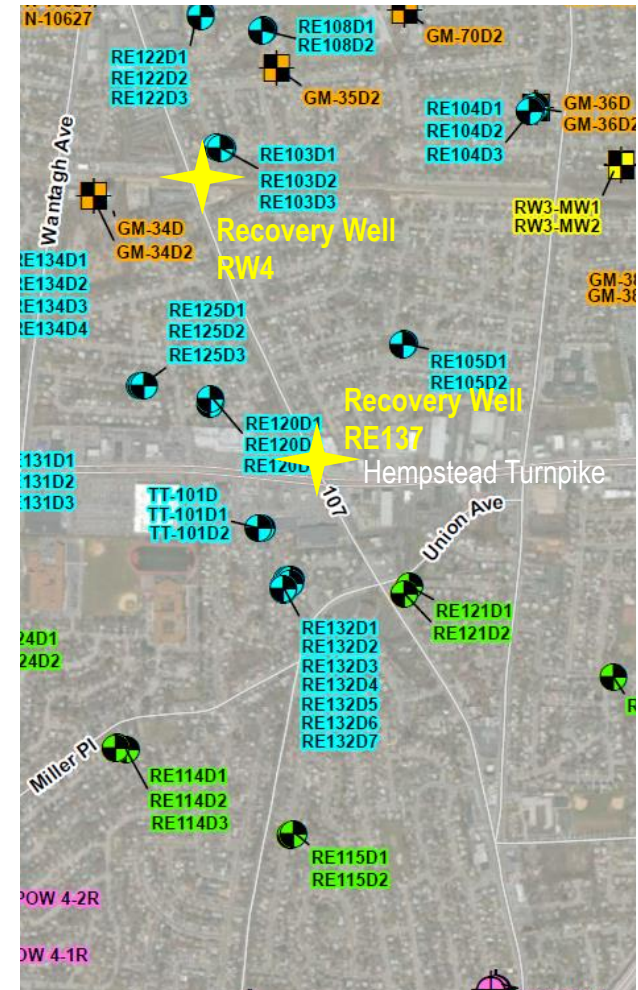
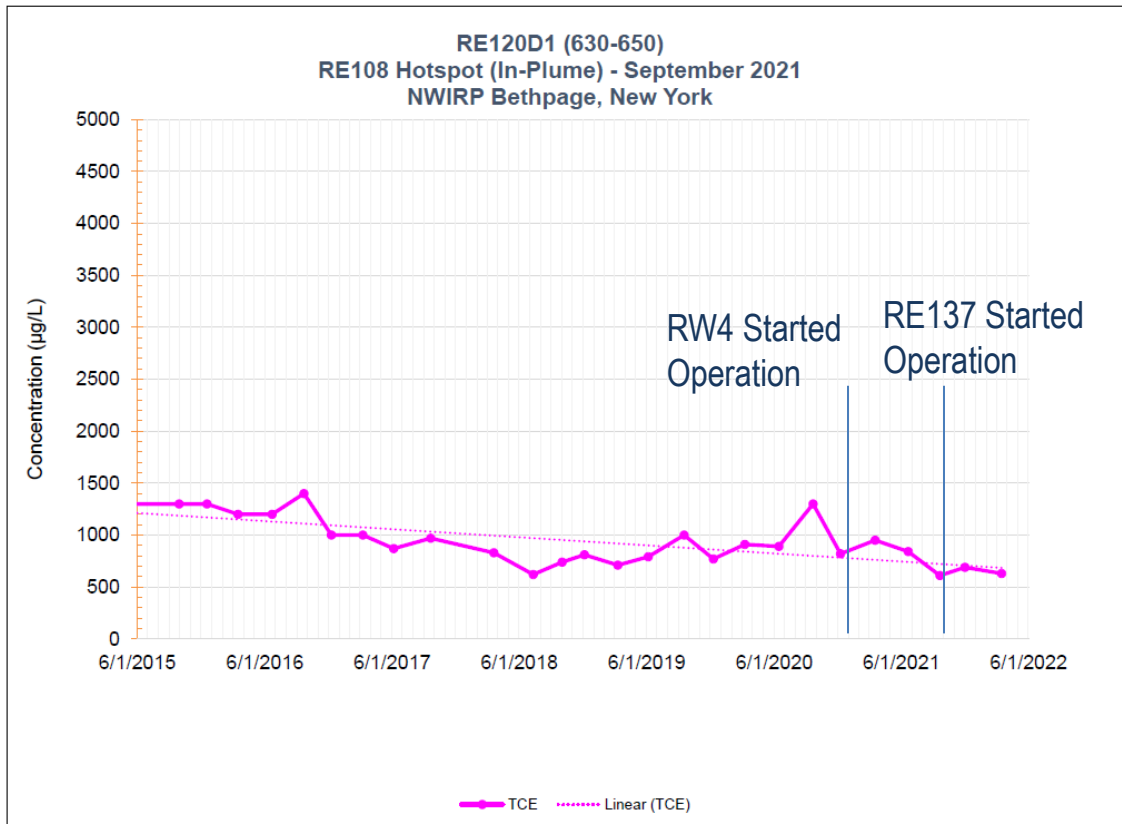




# OU2 Groundwater Monitoring – Recovery Well RE137



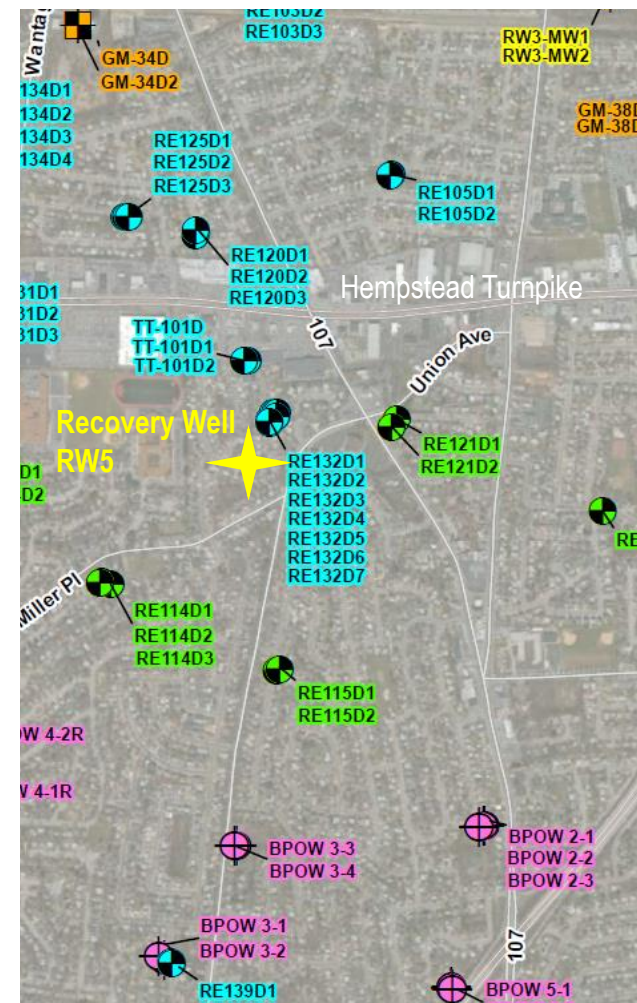
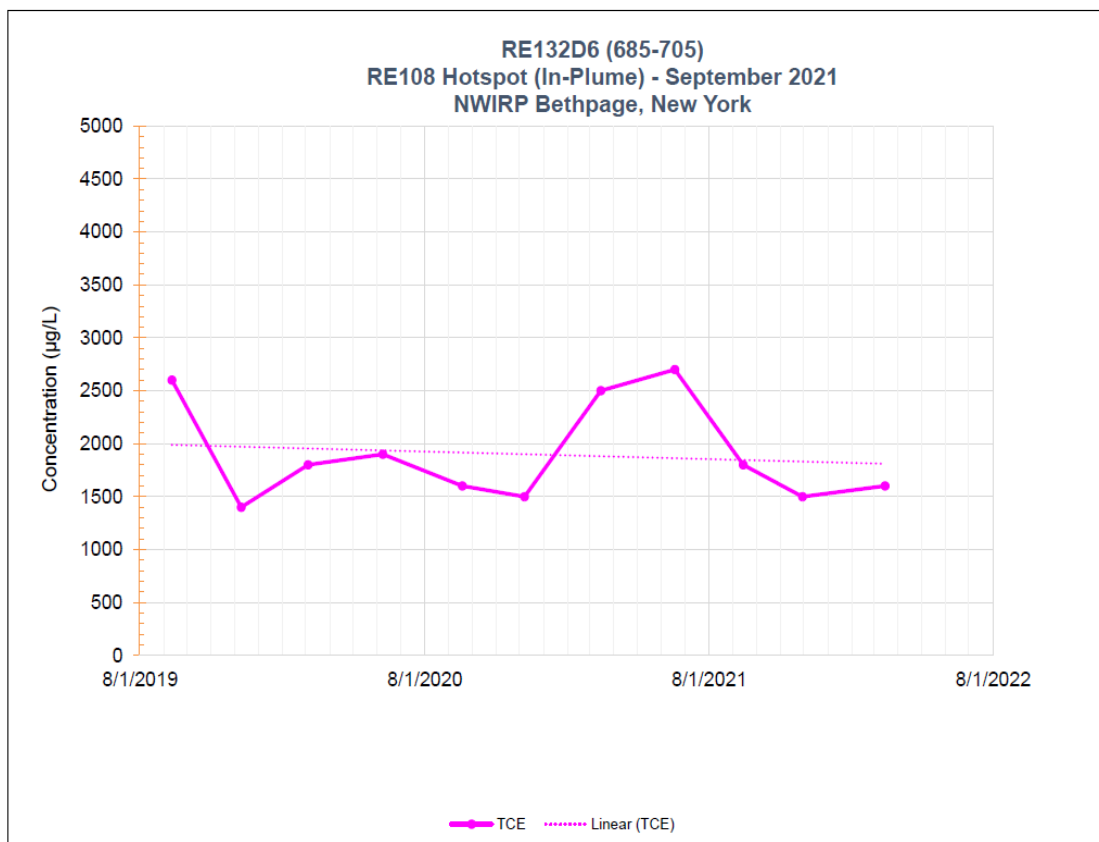
- Pilot testing – Startup in March 2022
- Planned operation through December 2023



# OU2 Groundwater Monitoring – Recovery Well RW5 (Phase II)



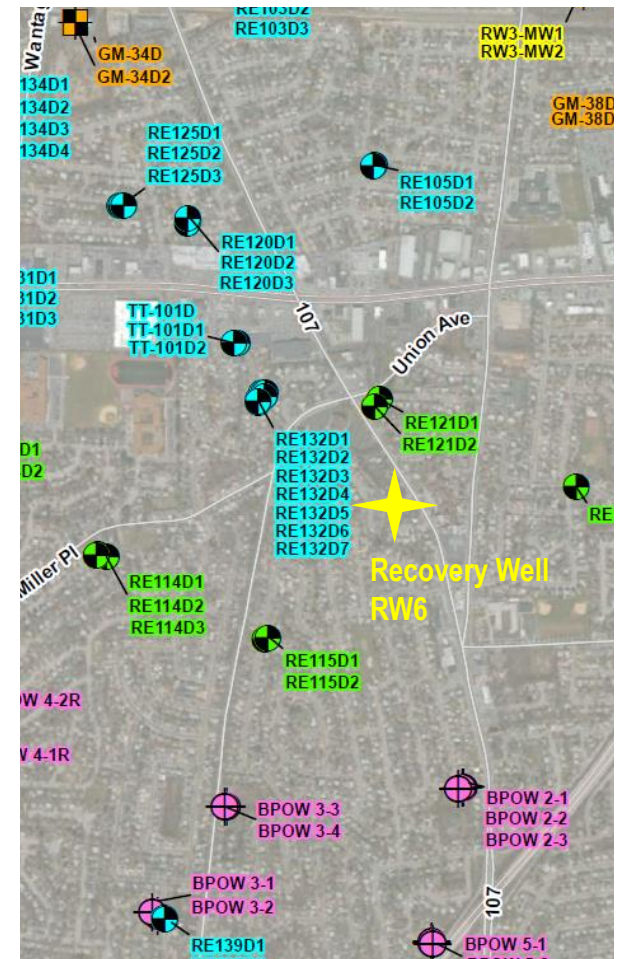
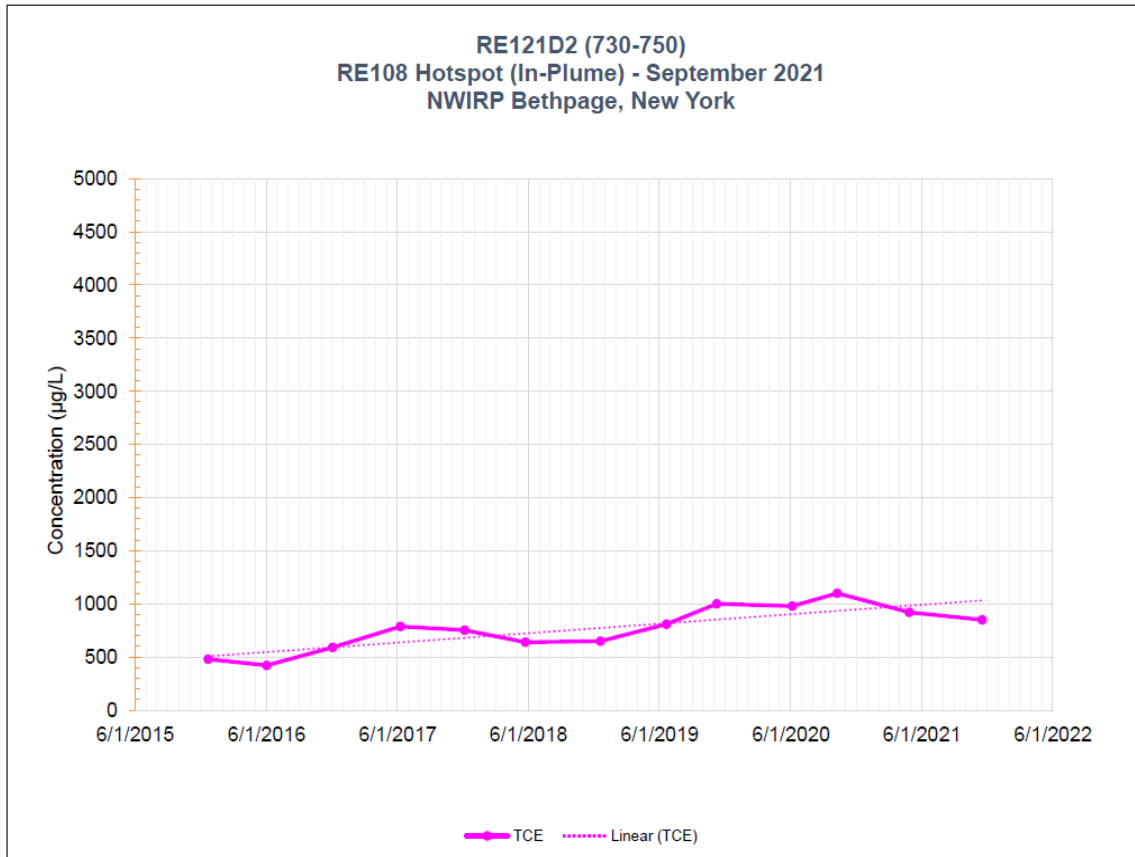
- RW5 installation (late 2022) and operation in 2023



# OU2 Groundwater Monitoring – Recovery Well RW6 (Phase II)



- RW6 is installed and planned for operation in early 2023

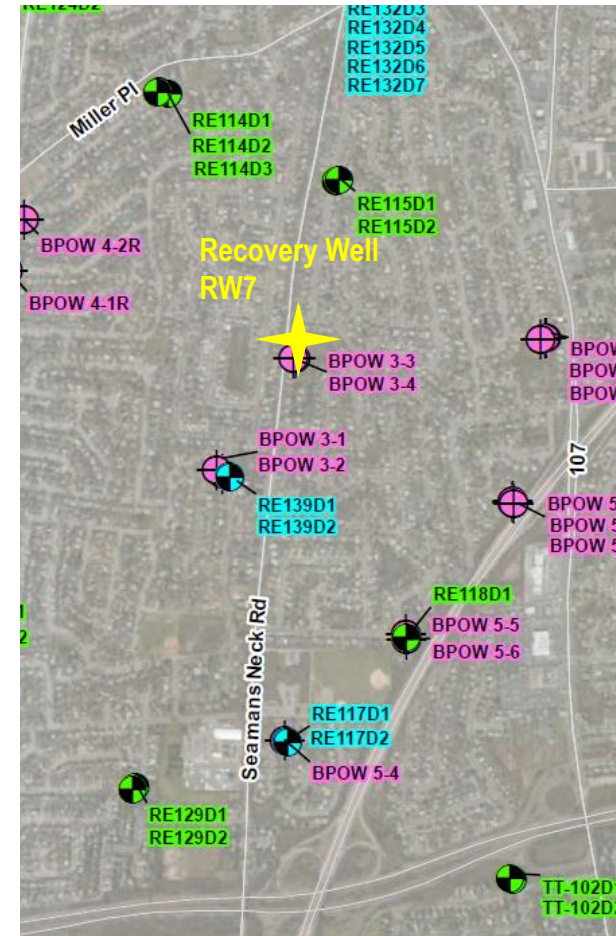
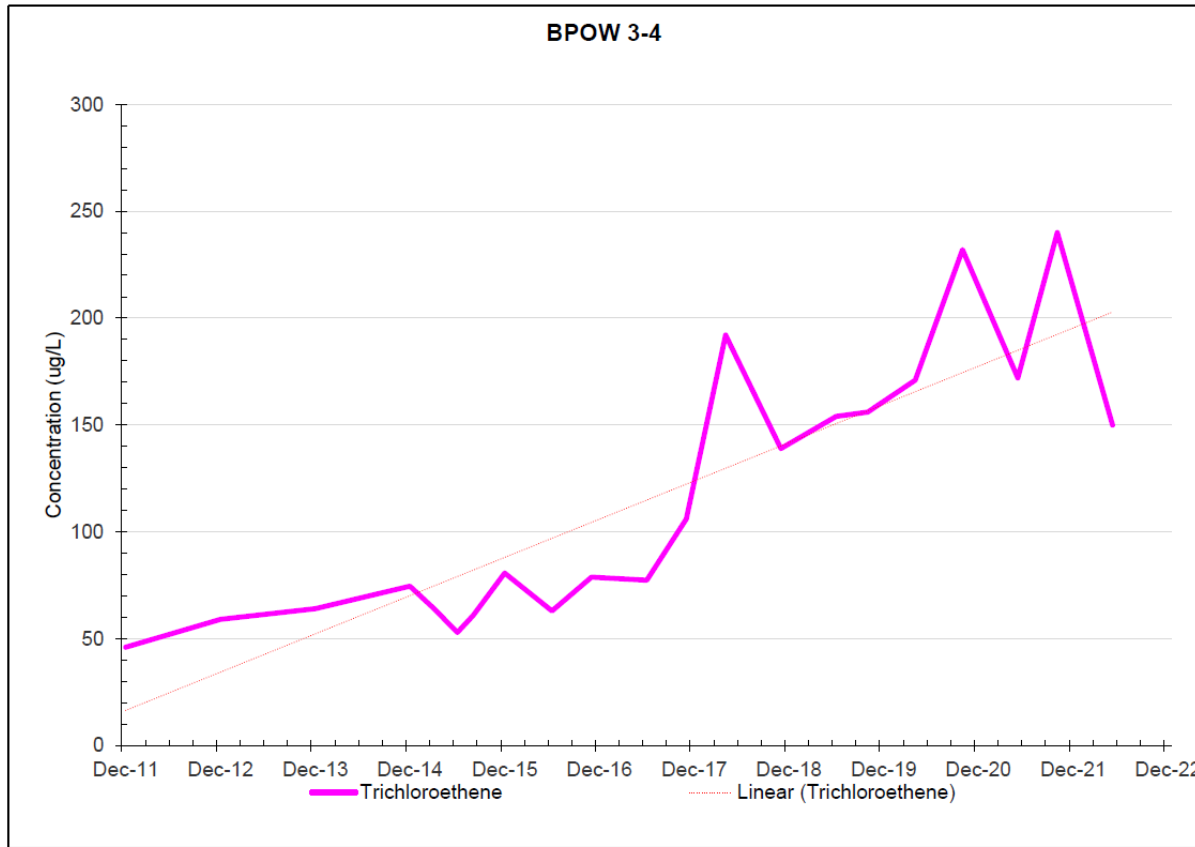




# OU2 Groundwater Monitoring – Recovery Well RW7 (Phase II Extension)



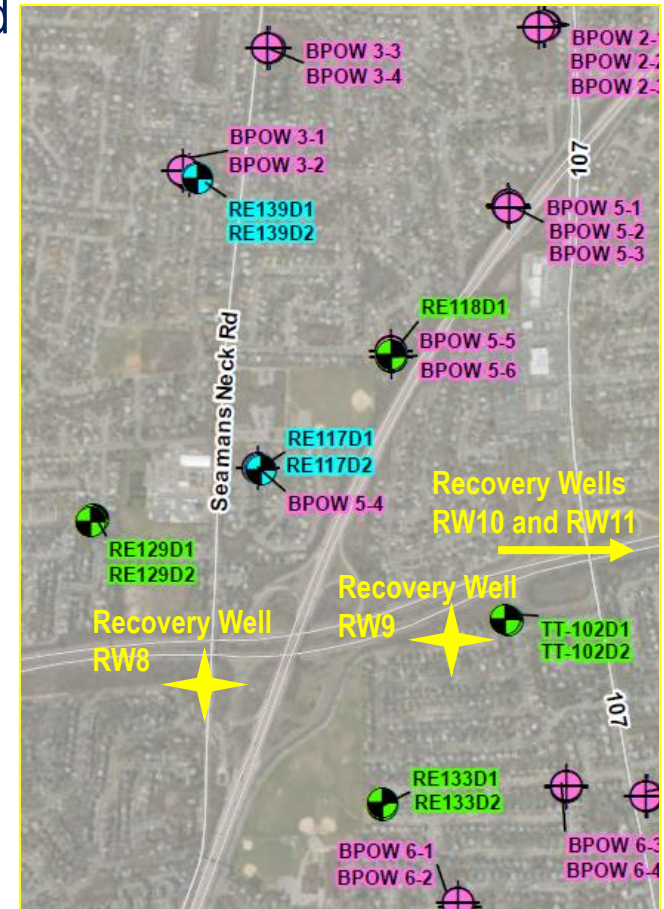
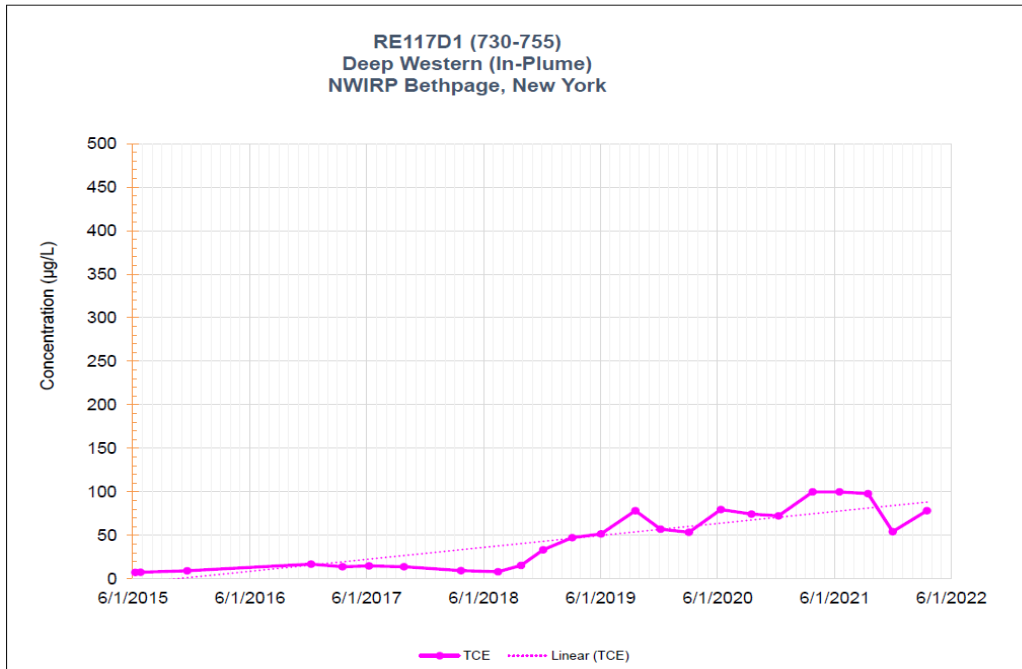
- RW7 is installed and planned for operation in early 2023



# OU2 Groundwater Monitoring – Recovery Well RW8 to RW11 (Phase III)



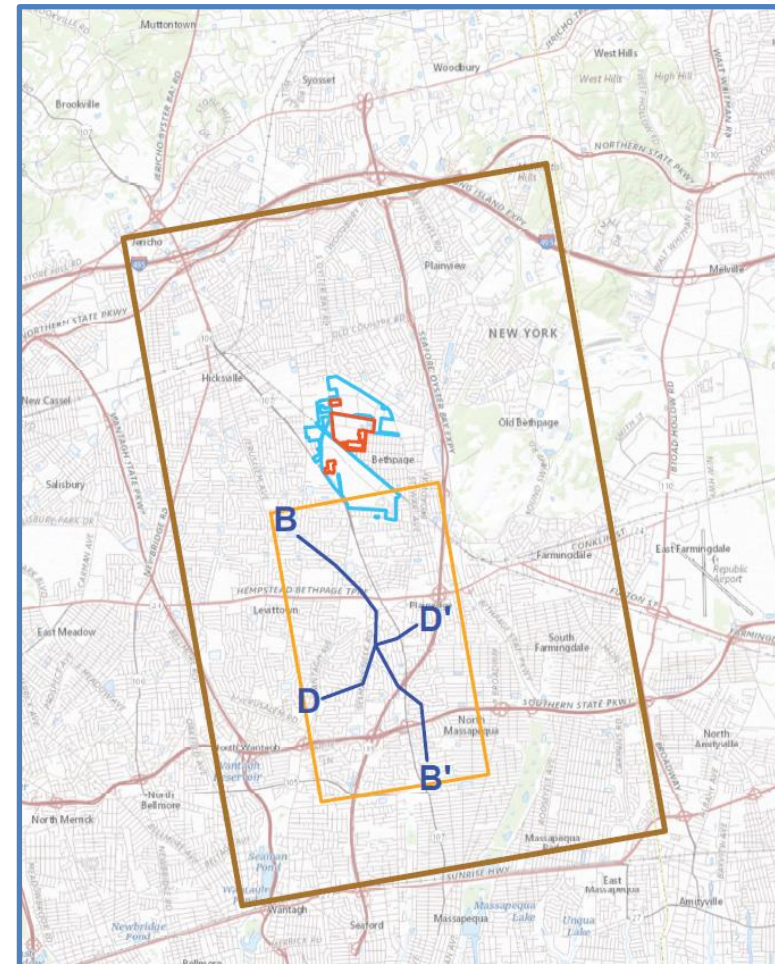
- Recovery Wells RW8 and RW9 target deep groundwater at monitoring well RE117
- RW8 and RW9 are installed, pumping tests in October and December 2022. System to be in operation in 2024
- RW10 and/or RW11 VPBs and monitoring wells to start late 2022



# OU2 Groundwater Fate and Transport Modeling



- Flow model used to evaluate OU2 plume behavior over time
- Model is approximately 42 square miles and 2 million cells
- Design, evaluate, and optimize remedial systems

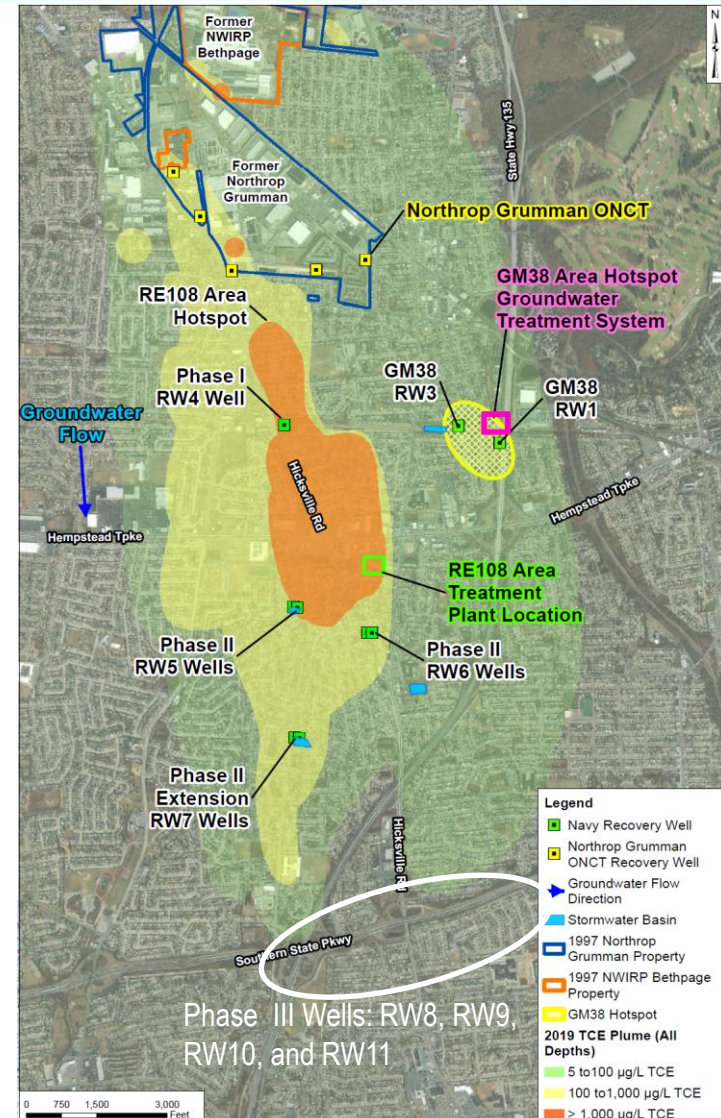




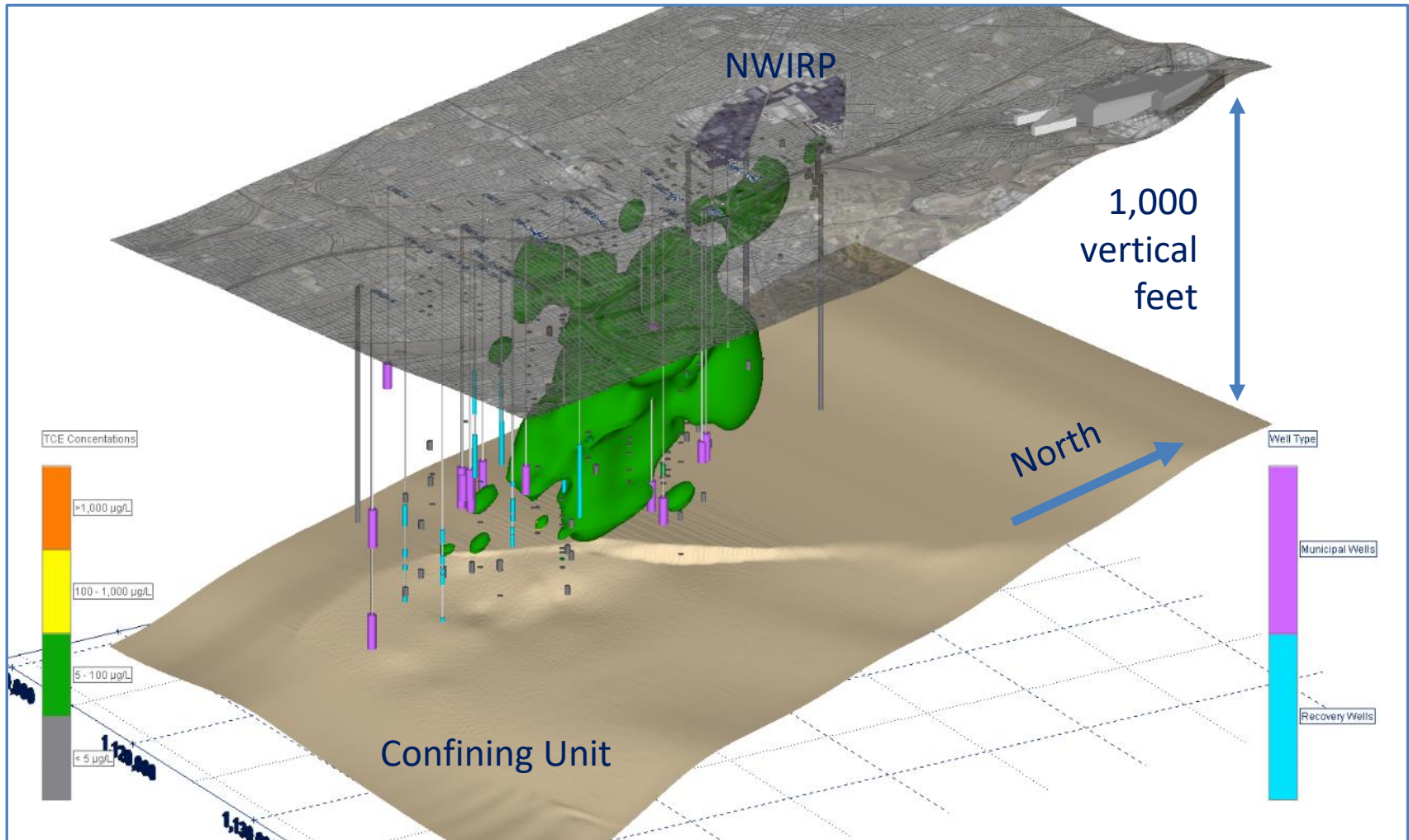
# OU2 Groundwater Fate and Transport Modeling



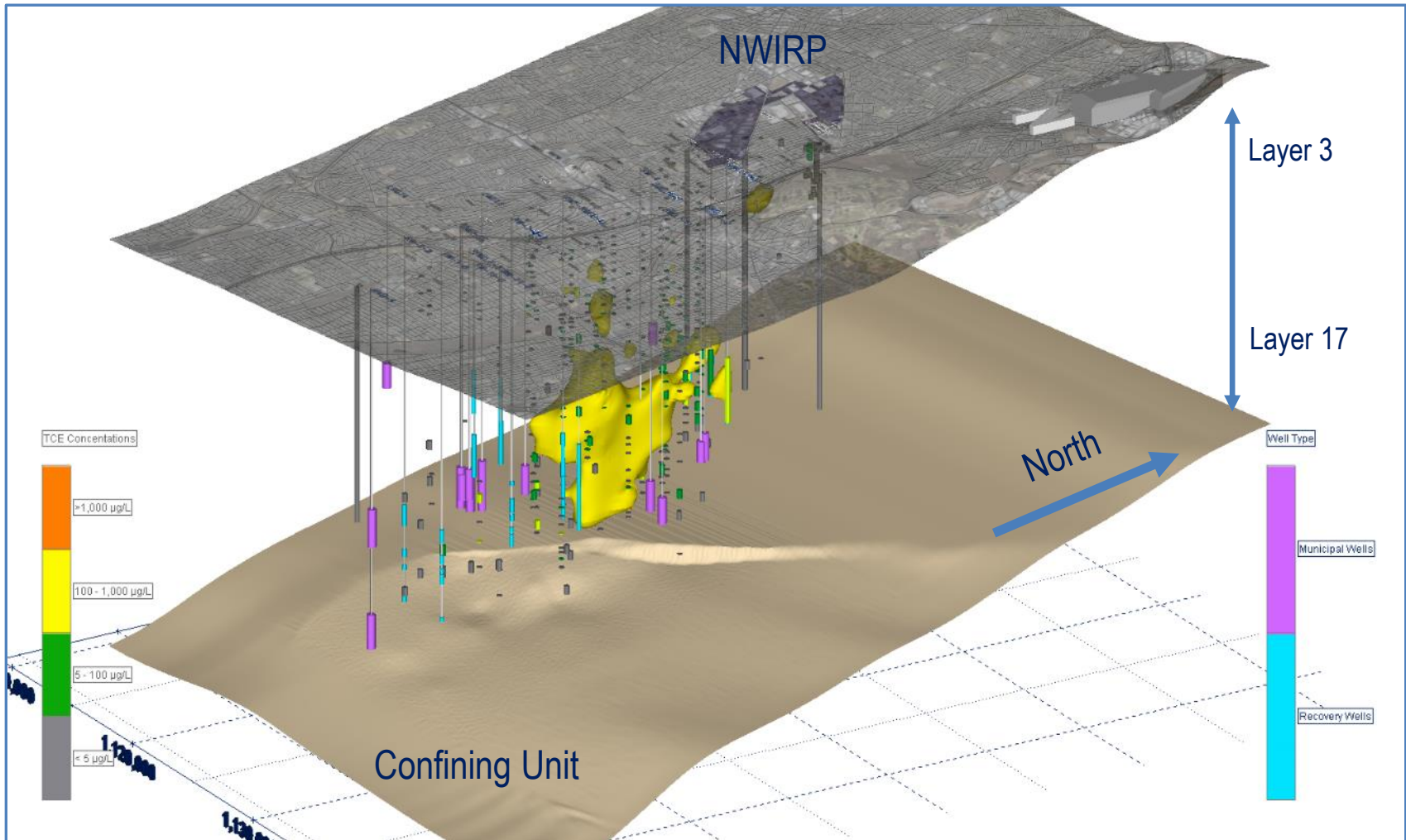
- Plume boundaries are shown using trichloroethene (TCE) as:
  - Green - 5 to 100 micrograms per liter (ug/L)
  - Yellow - 100 to 1,000 ug/L
  - Orange - greater than 1,000 ug/L
- Boundary likely includes non-OU2 contributors



# OU2 Groundwater Fate and Transport Modeling – 3D TCE Plume



# OU2 Groundwater Fate and Transport Modeling – 3D TCE Plume

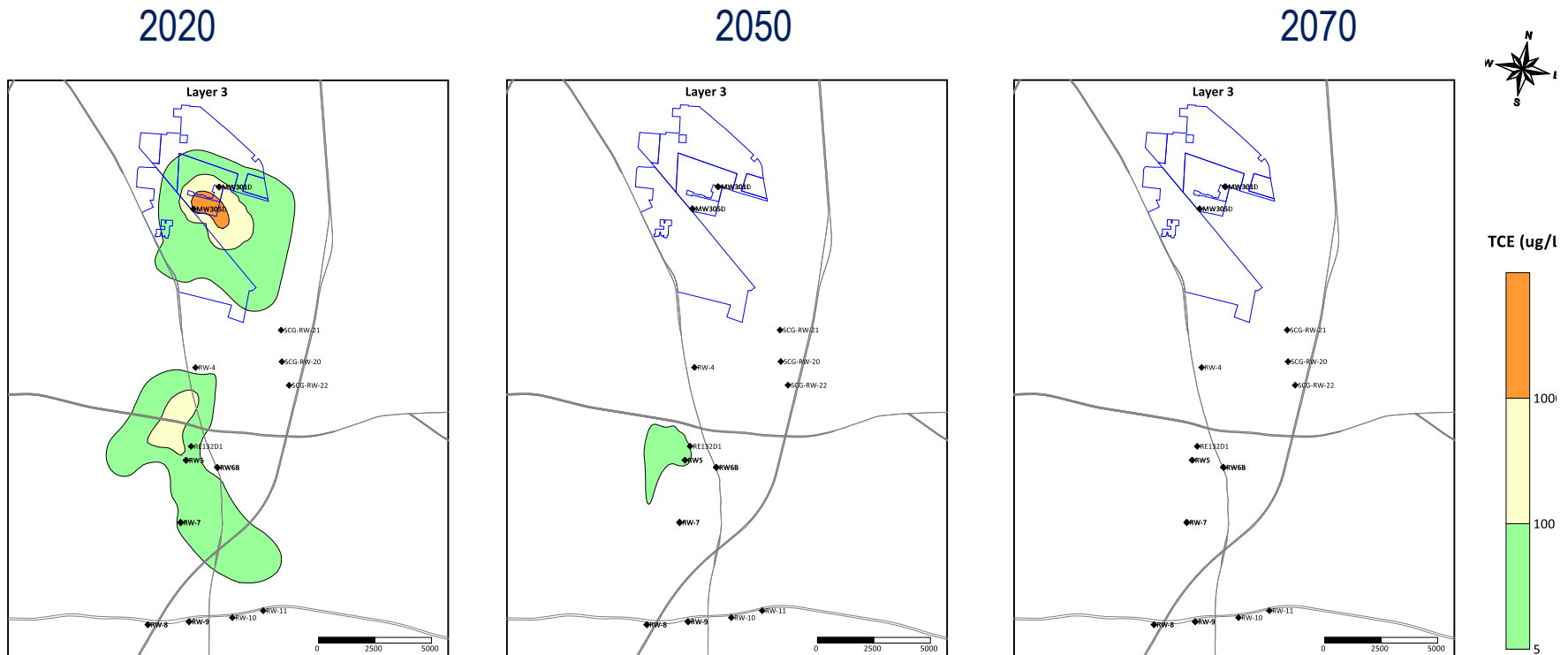




# OU2 Groundwater Fate and Transport Modeling



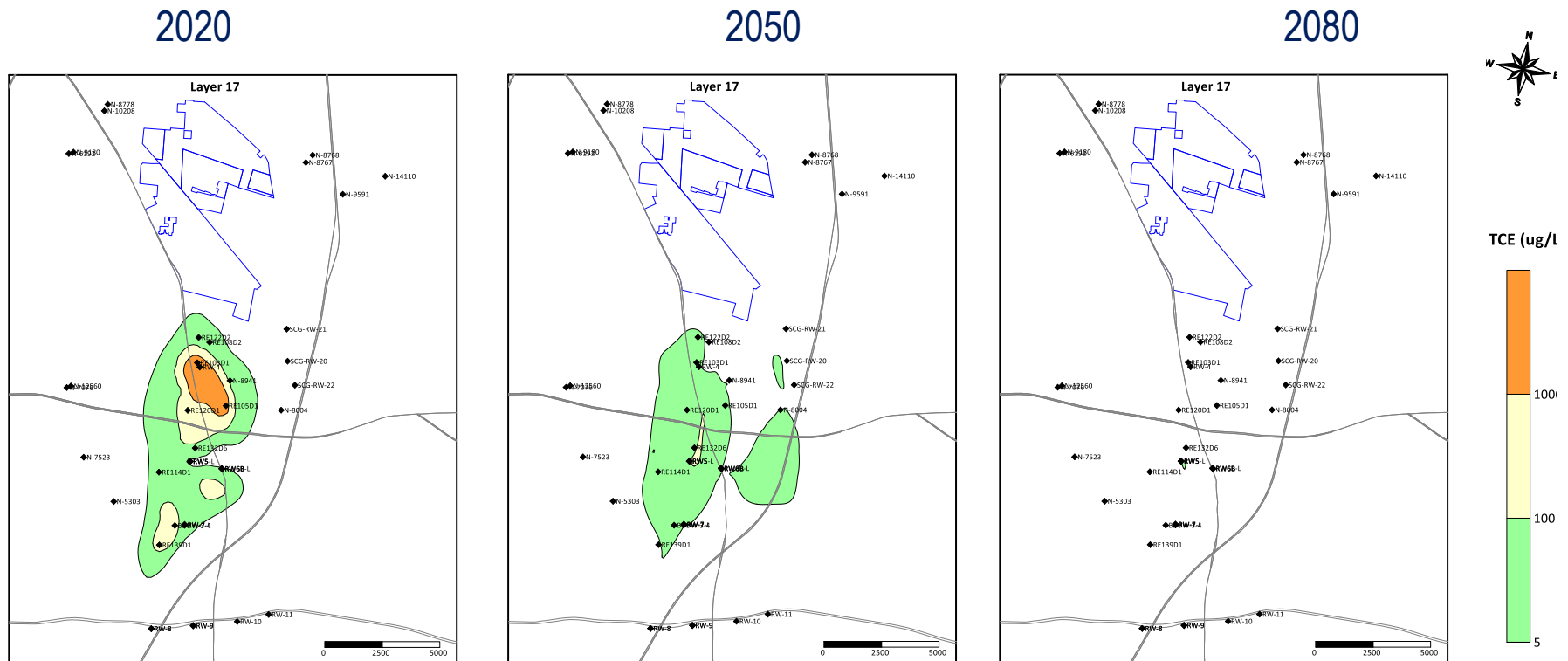
- Layer 3 (Approx. 250 feet below ground surface) plume cleanup estimates (Trichloroethene)
- Different layers and concentrations cleanup at different rates (Shallow layers cleanup faster)



# OU2 Groundwater Fate and Transport Modeling



- Layer 17 (Approx. 700 feet below ground surface) plume cleanup estimates (Trichloroethene)
- Different layers and concentrations cleanup at different rates (Deeper layers take longer)



## OU2 Groundwater Fate and Transport Modeling



- Three-dimensional plume video





## RAB Member Questions