# Camp Edwards
# Training Impacts Presentation

Environmental Programs

Presented to NGB 4/19/00 in Washington, DC
(IAGWSPO Contact Ben Gregson, 508-968-5821).

# Today's Presentation

- Introduction
- Soil Results
- Groundwater Results
- Preliminary Findings / Recommendations

# Purpose

**Has training with artillery and mortar weapon systems had an impact on groundwater at Camp Edwards past, present, future**

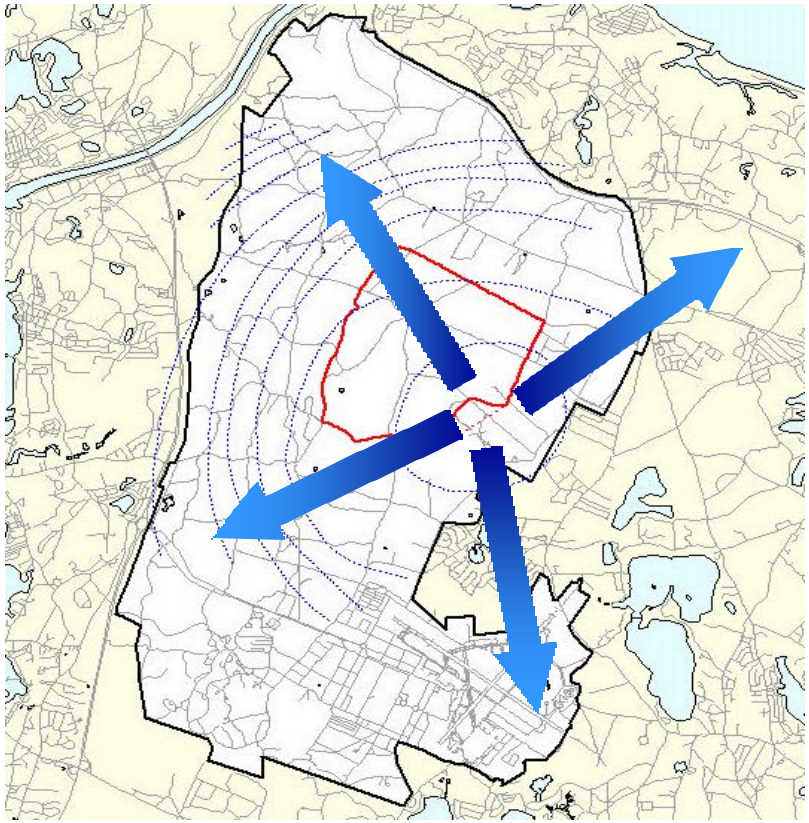
# Site Location

**Massachusetts Military Reservation**

# Camp Edwards History

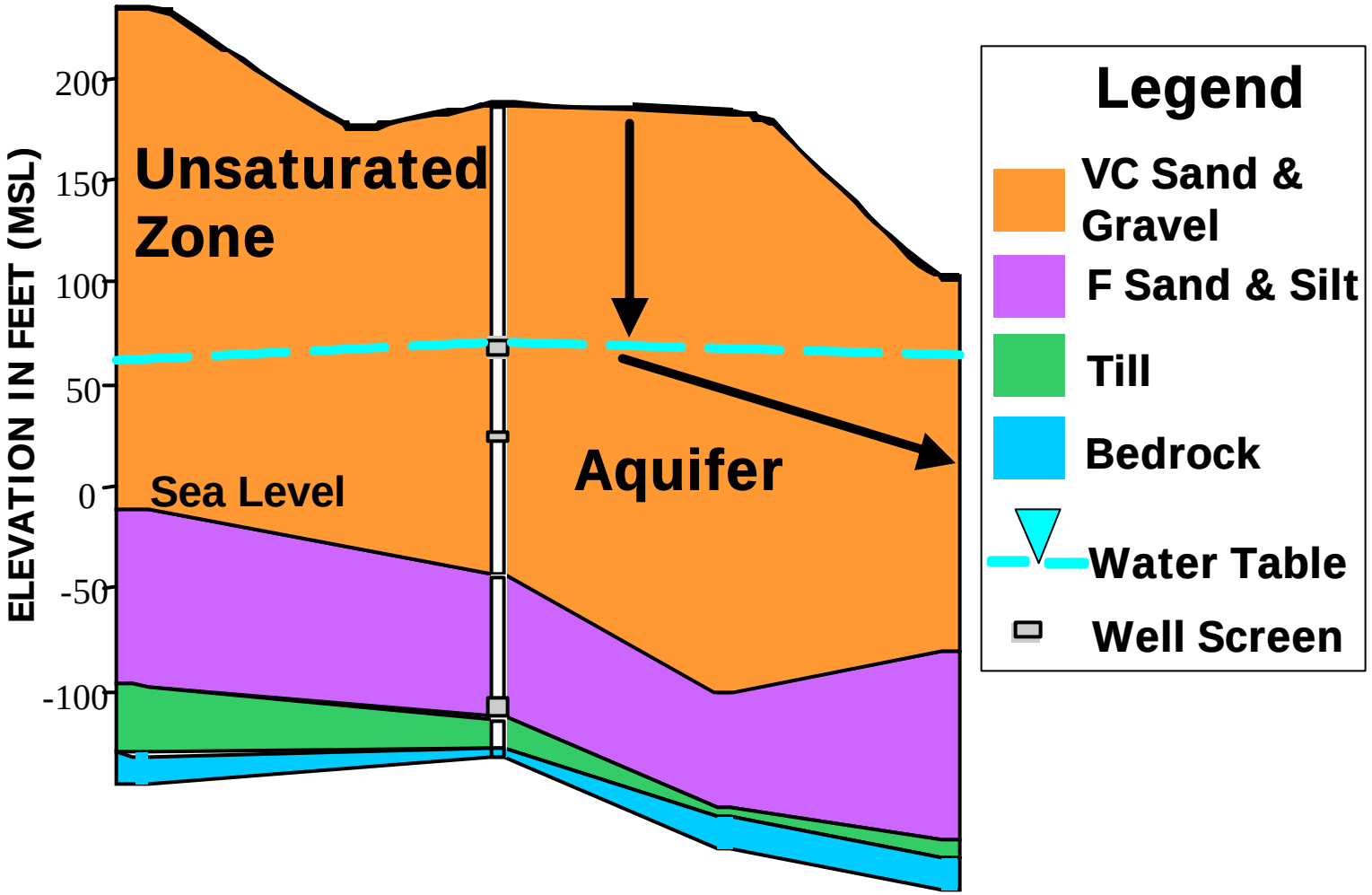
- Training and Impact Areas used since 1911
- Designed to house 30,000 troops during WWII
- Records for 1989 indicate 6456 mortar practice and HE rounds and 1799 artillery practice rounds fired into the Impact Area
  - munitions usage could have been 200 times higher during mobilization

# Hydrogeologic Model



**Groundwater flow is radial with the mound to the southeast of the Impact Area in the J Range Area**

# Camp Edwards Lithology



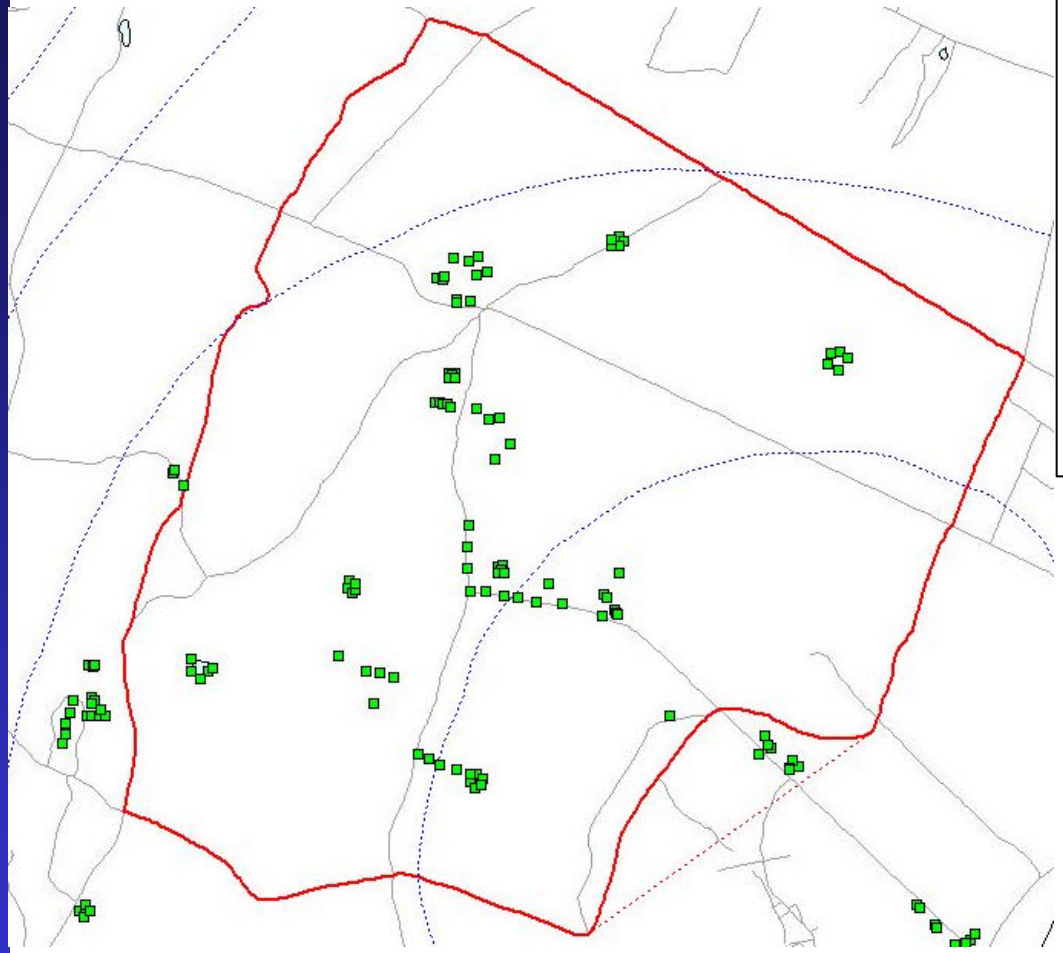
# MMR Explosive Fate-and-Transport Conceptual Model

- Deposition of particulates to ground surface
- Slow dissolution of particulates
- Rapid movement of dissolved explosives through unsaturated zone, leaving little residual contamination (RDX and HMX)
- Introduction to groundwater results in rapid transport away from source
- Based on review of over 200 papers, reports, etc. on the F&T of explosives

# Today's Presentation

- Introduction
- Soil Results

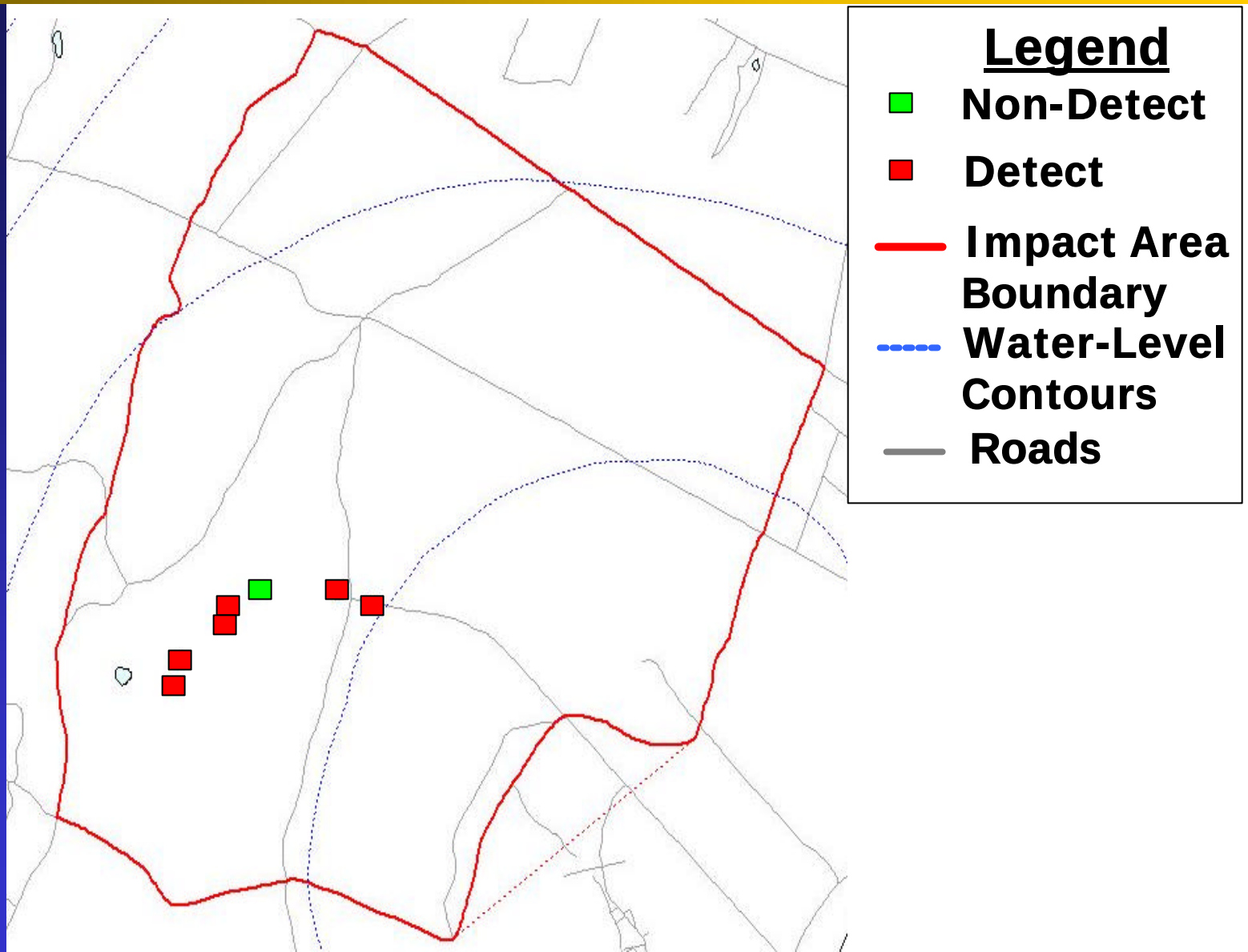
# Phase I Soil Results



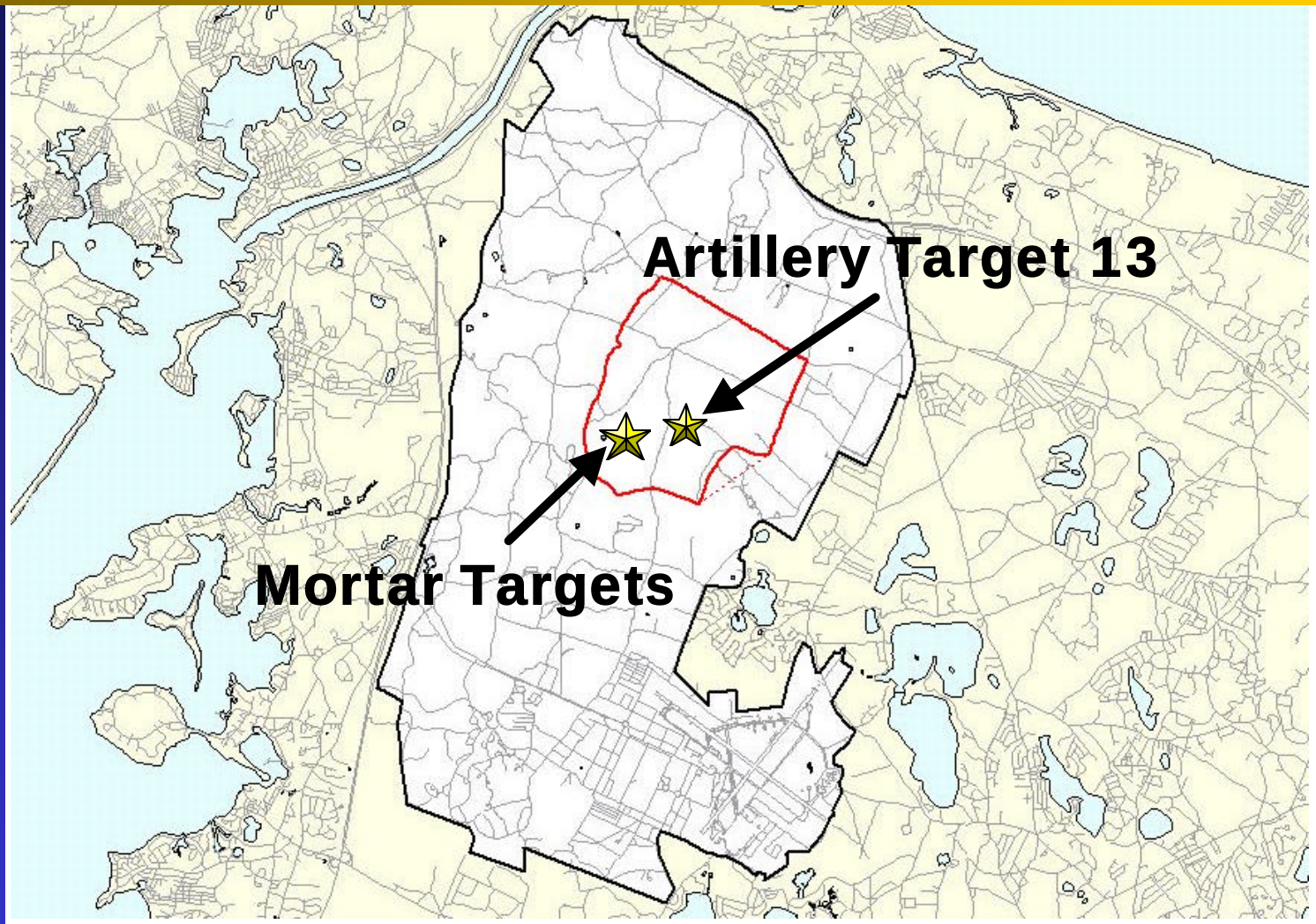
**Legend**

- Non-Detect
- Impact Area Boundary
- Water-Level Contours
- Roads

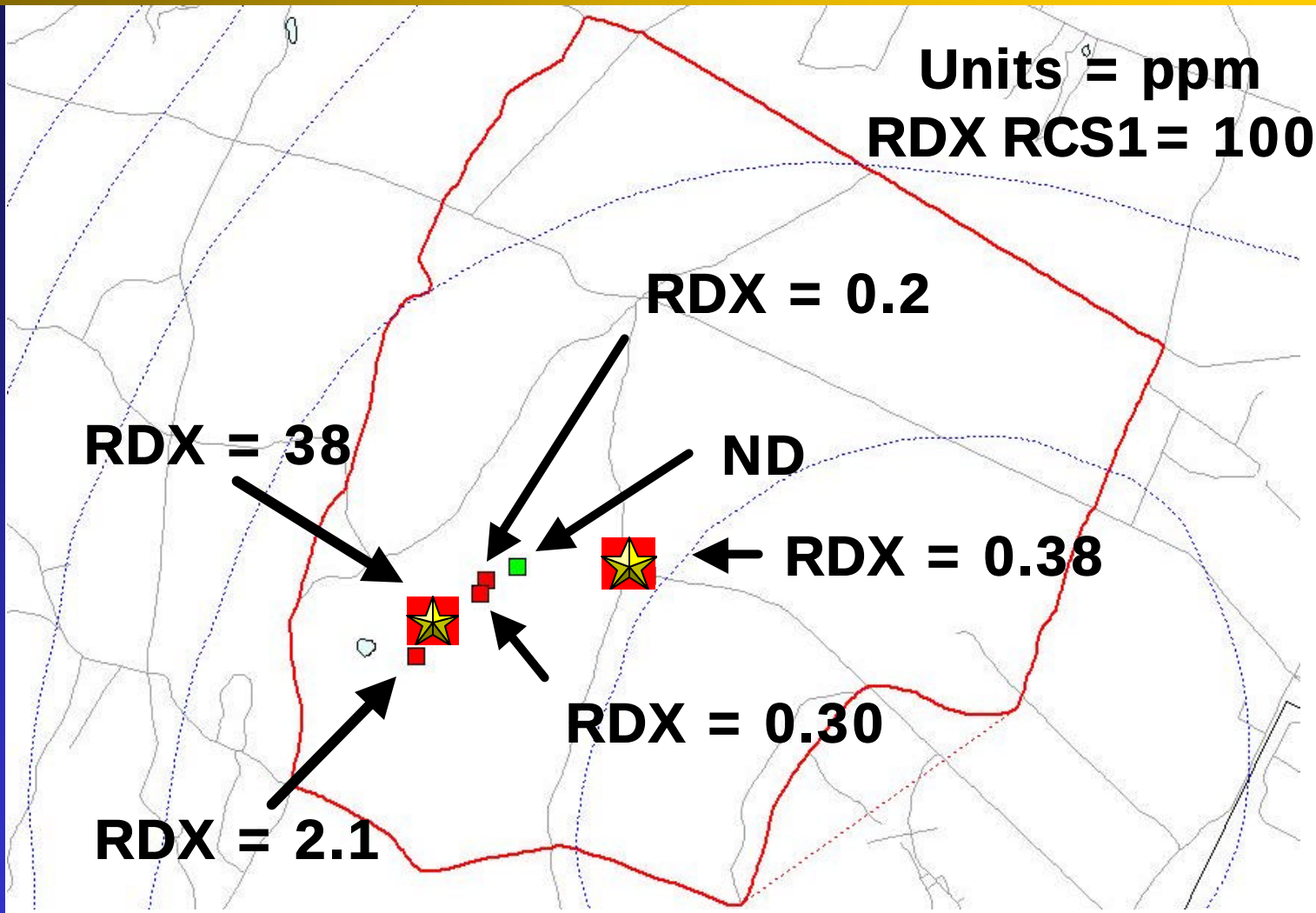
# Phase II Soil Results



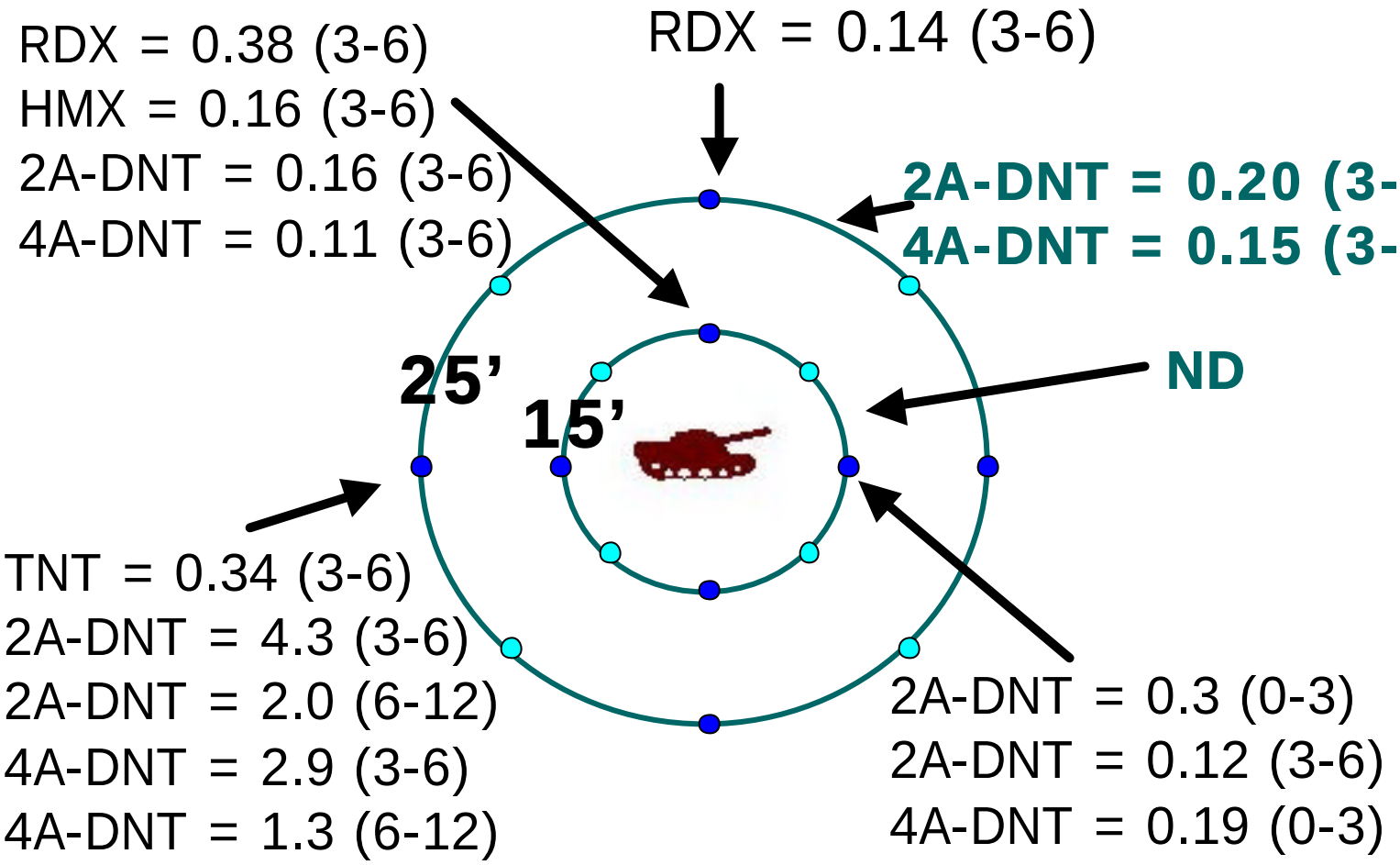
# Selected Artillery and Mortar Target Soil Sample Locations



# Phase II Target Soil Sample RDX Results



# Phase II Soil Results at Artillery Target 13




- Composite Only (ppm)
- Discrete & Composite (ppm)

Depth = inches

# Phase I/II Soil Sampling Differences

- **Lack of explosives in Phase I soil samples may be explained by:**
  - **30 x 30 ft grids with 9 pt composite**
  - **samples collected from 0 - 6 and 18 - 24 “**
  - **samples not collected immediately adjacent to targets**
- **Phase II soil samples:**
  - **focused immediately around targets**
  - **utilize 22 x 22 ft grids, with 5 pt composite**
  - **collected from 0 - 3, 3 - 6, and 6 - 12 “**

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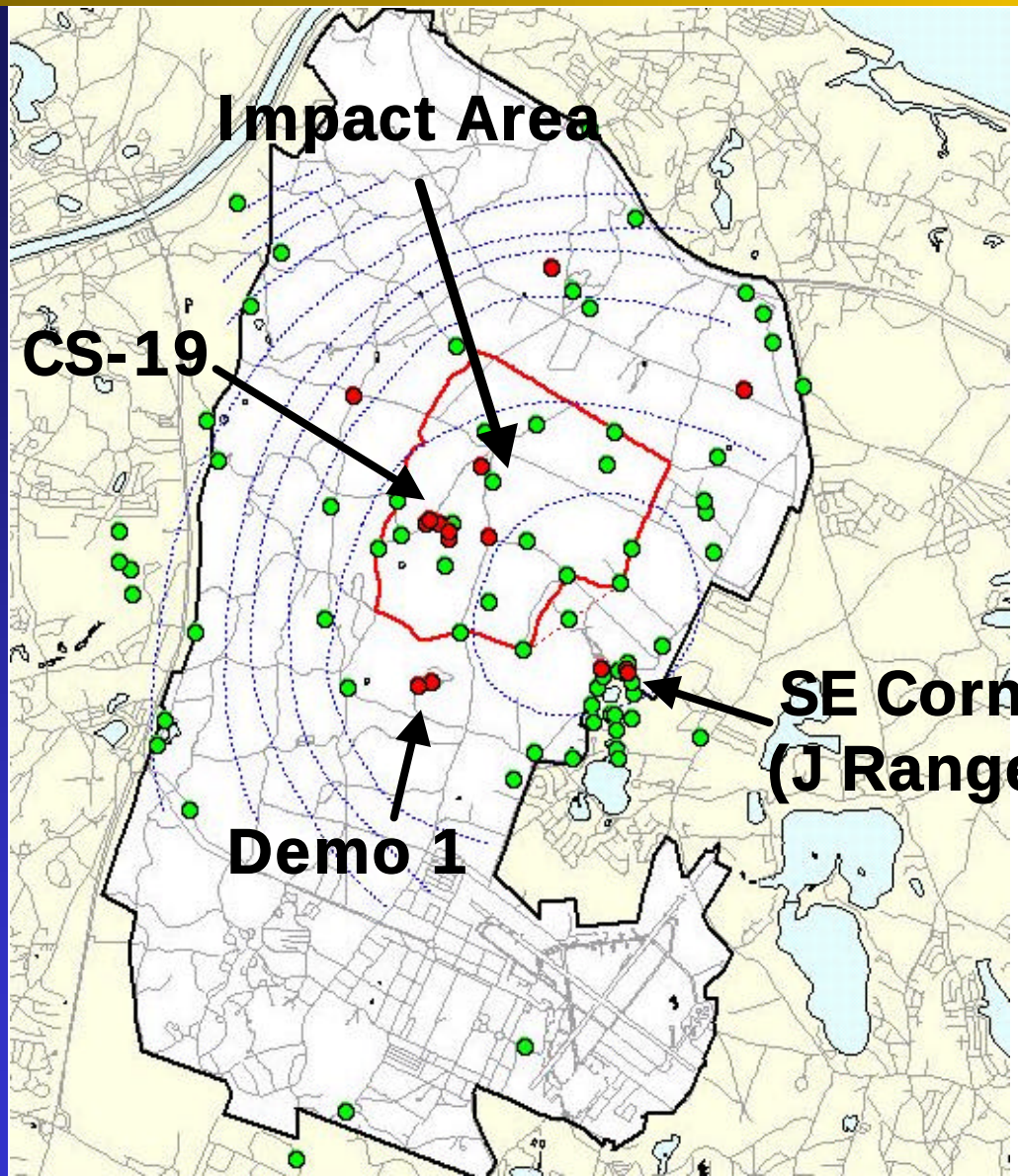
- Groundwater Results

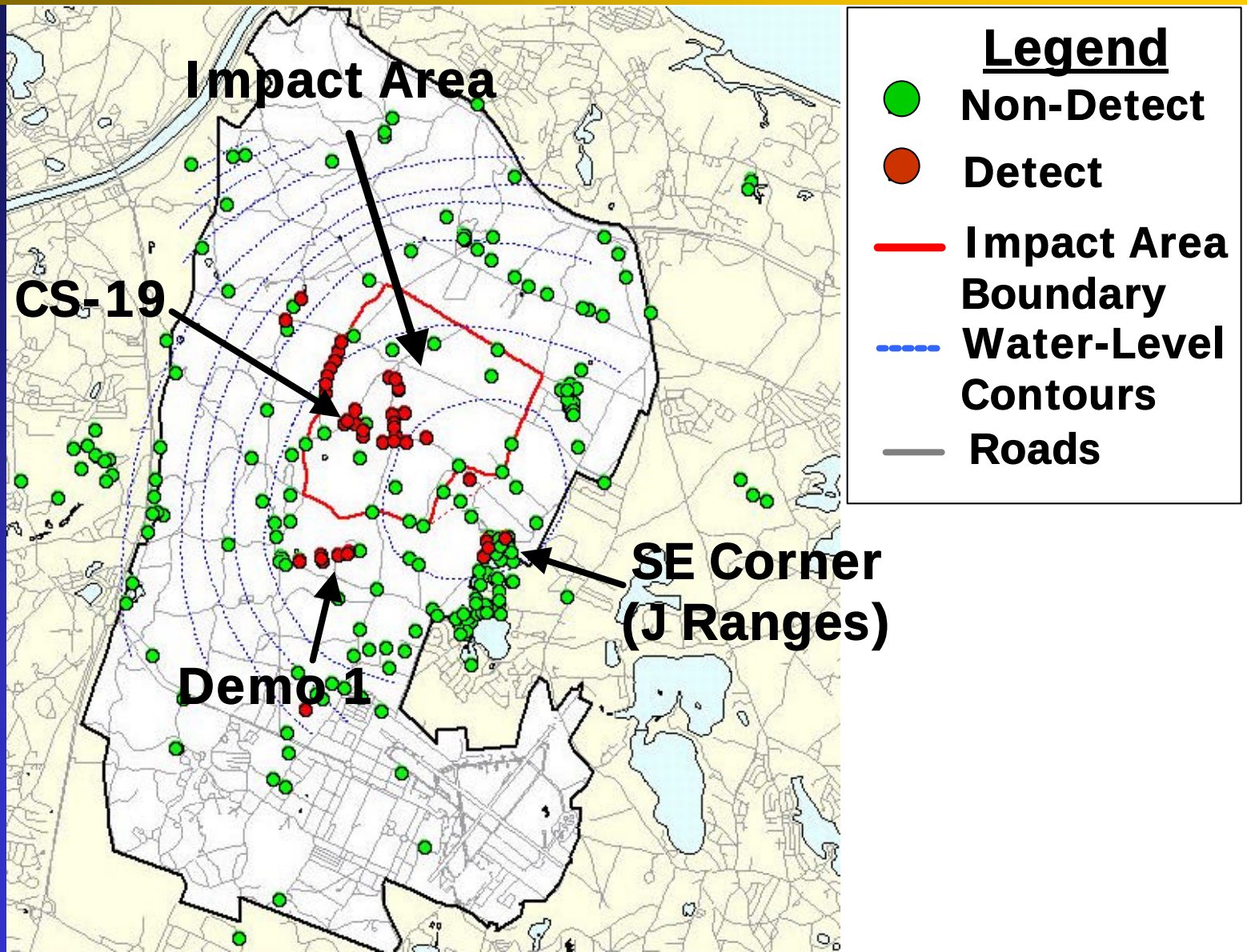
# Phase I Groundwater Results



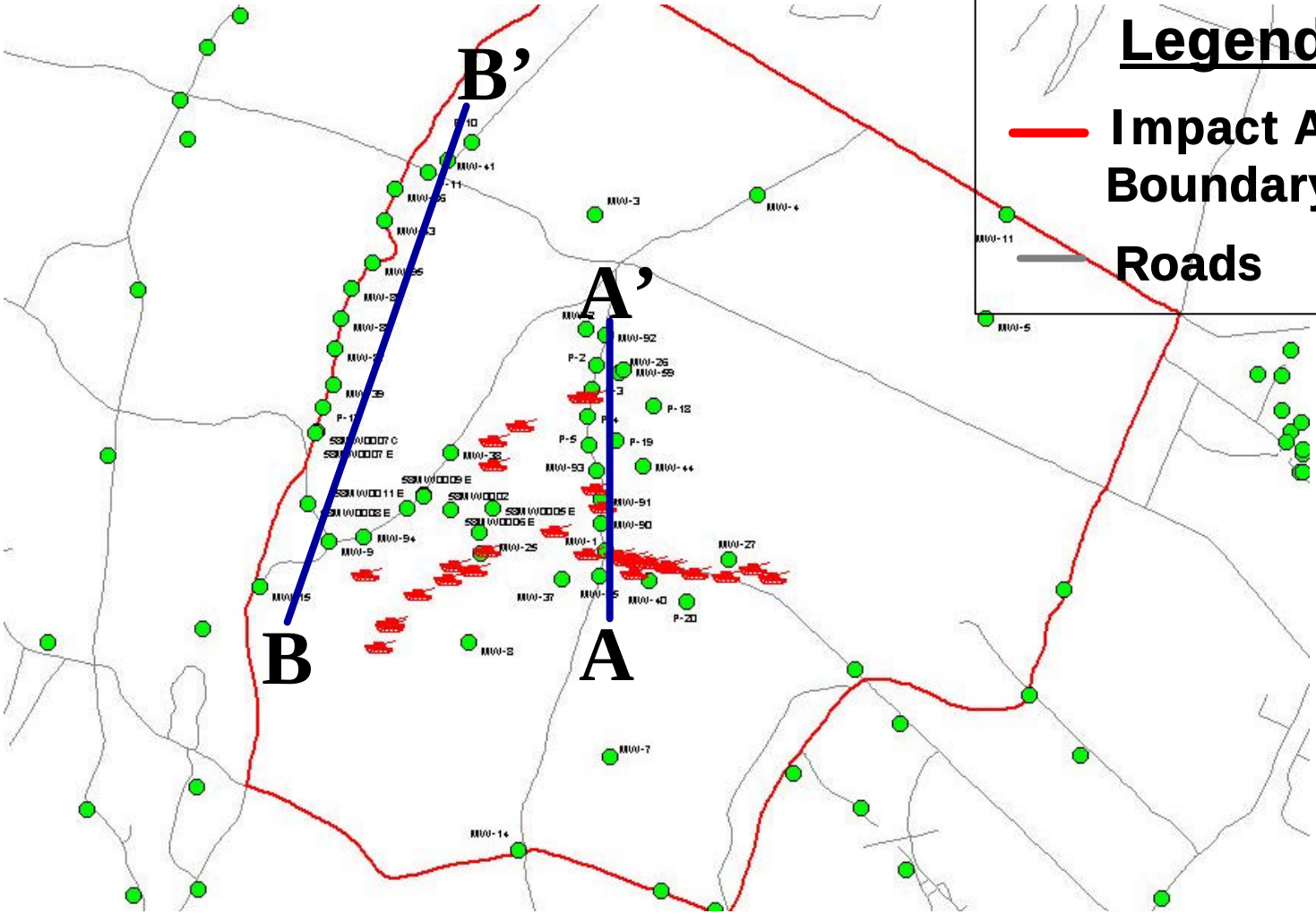

**Legend**

- Non-Detect
- Detect
- Impact Area Boundary
- Water-Level Contours
- Roads

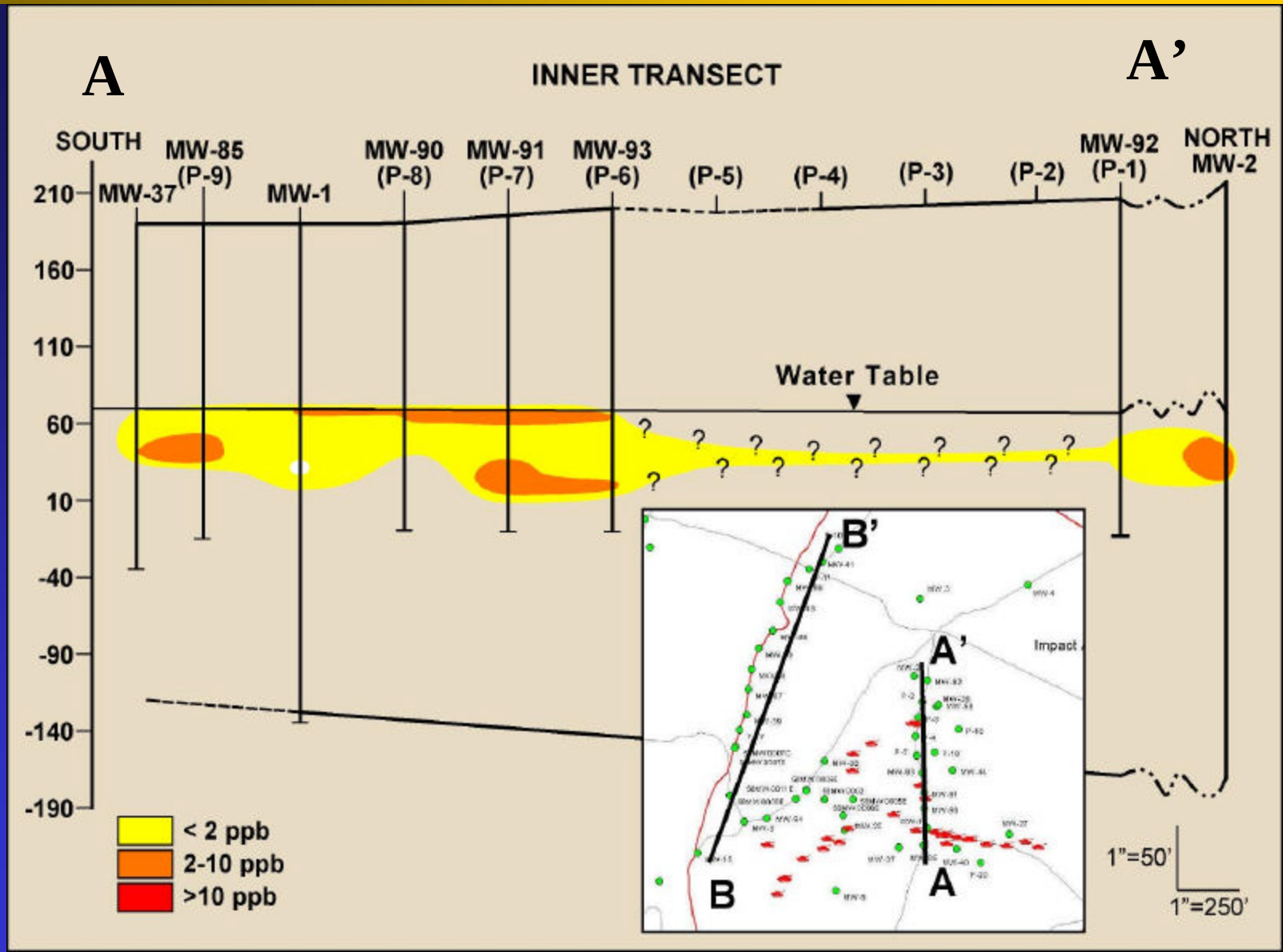
# Phase II Groundwater Results



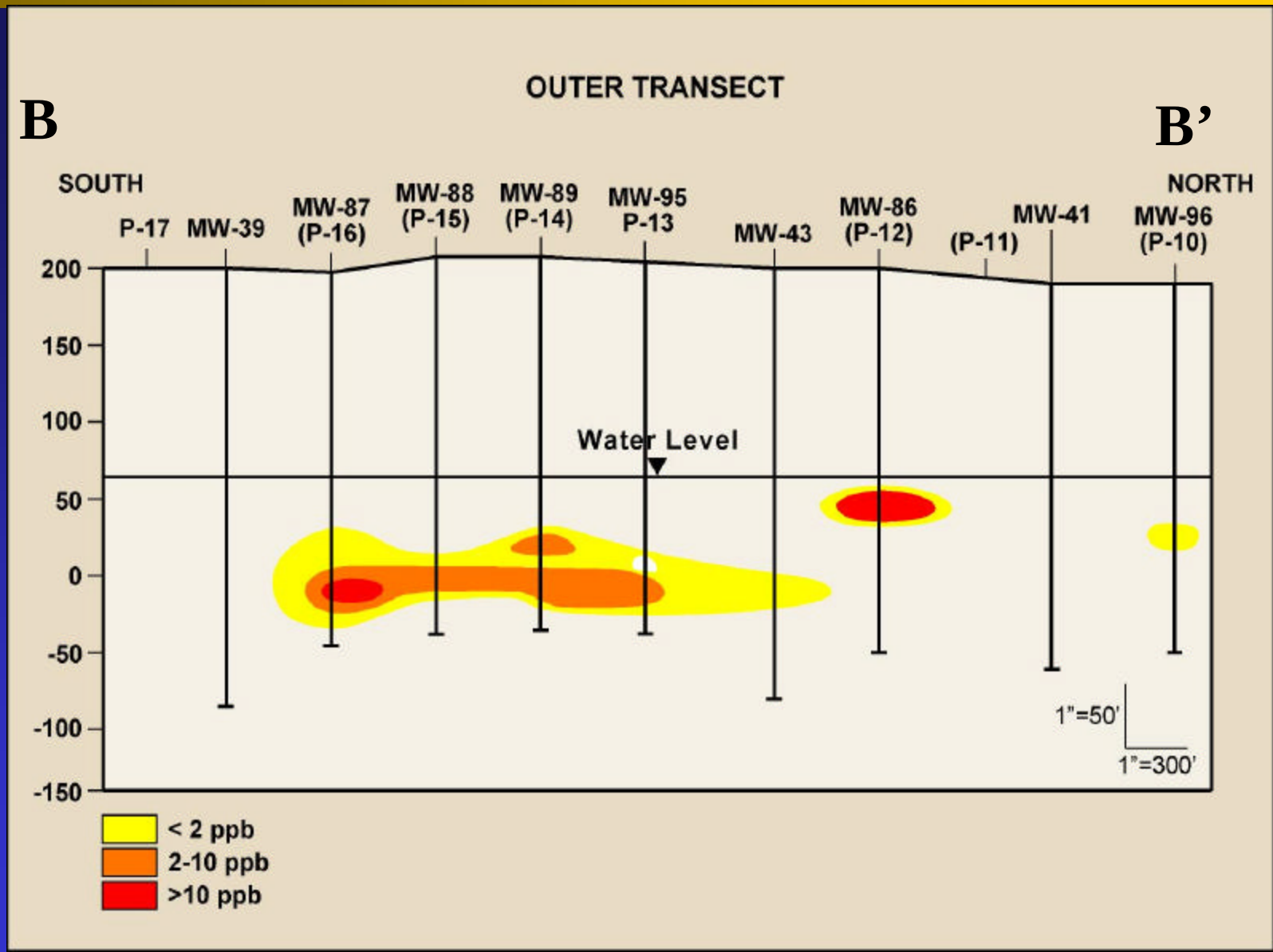
# Location of Groundwater Transects within the Impact Area



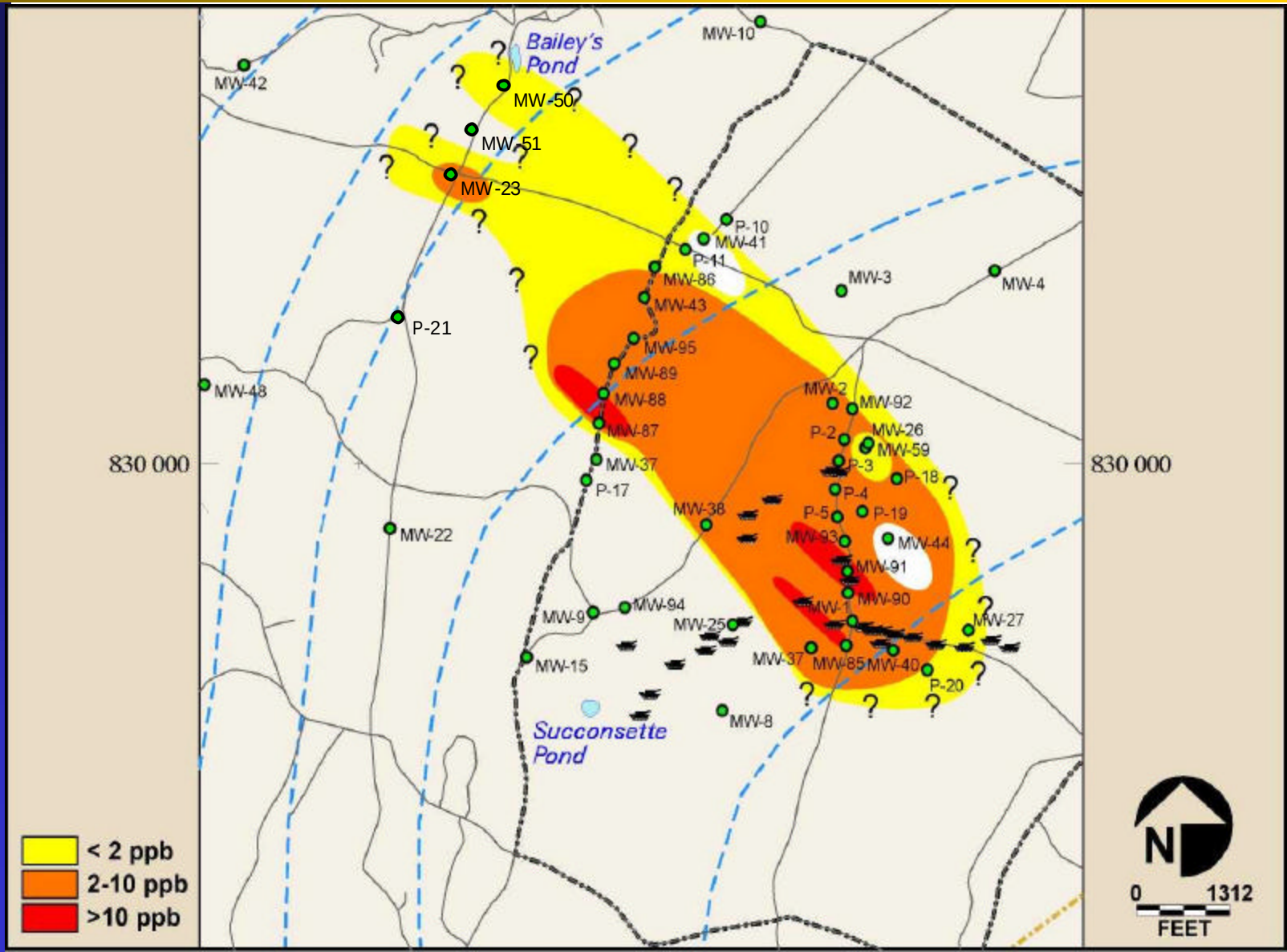
# Inner Groundwater Transect



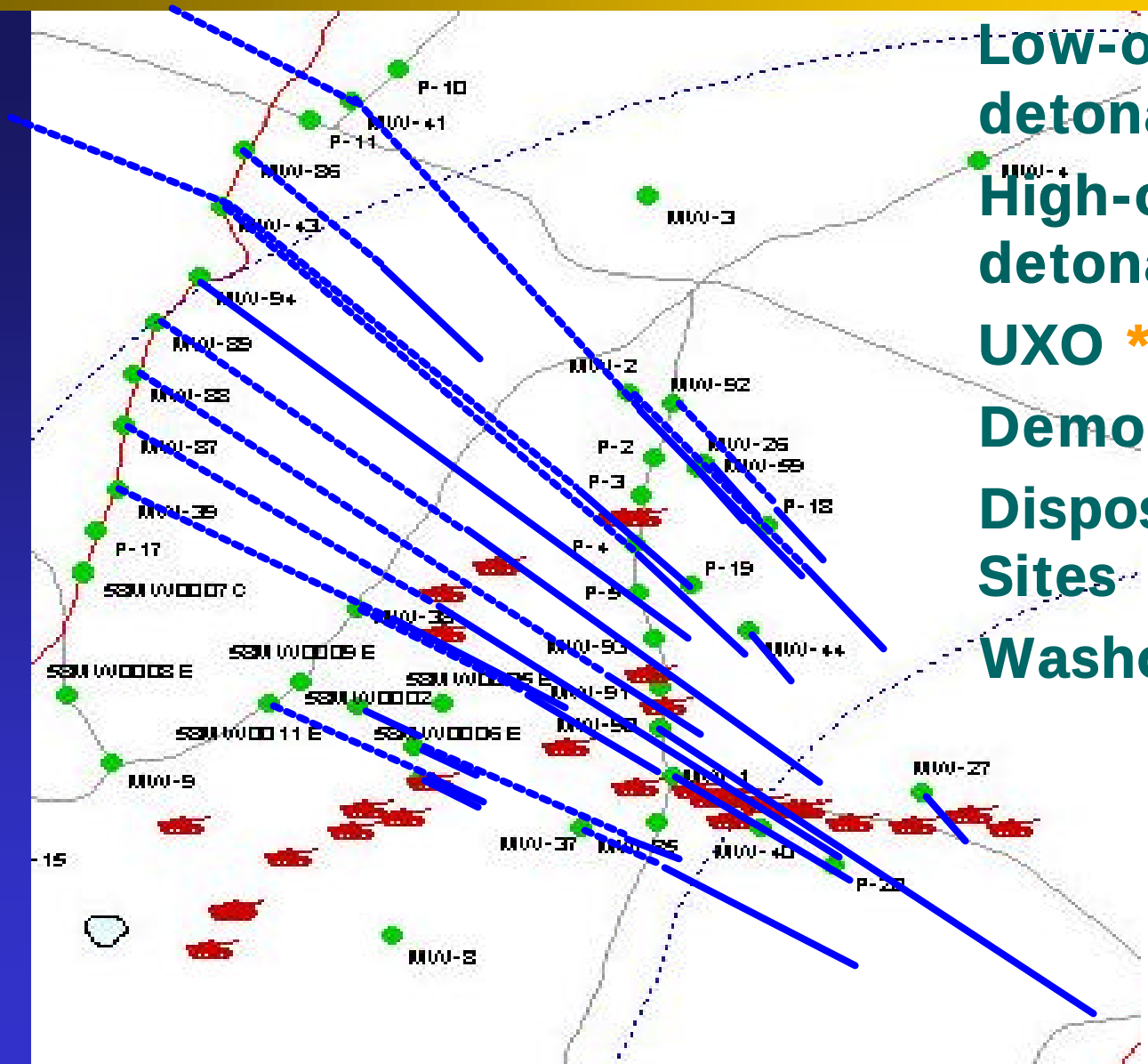
# Outer Groundwater Transect



# Plan View of RDX Detections in the Impact Area

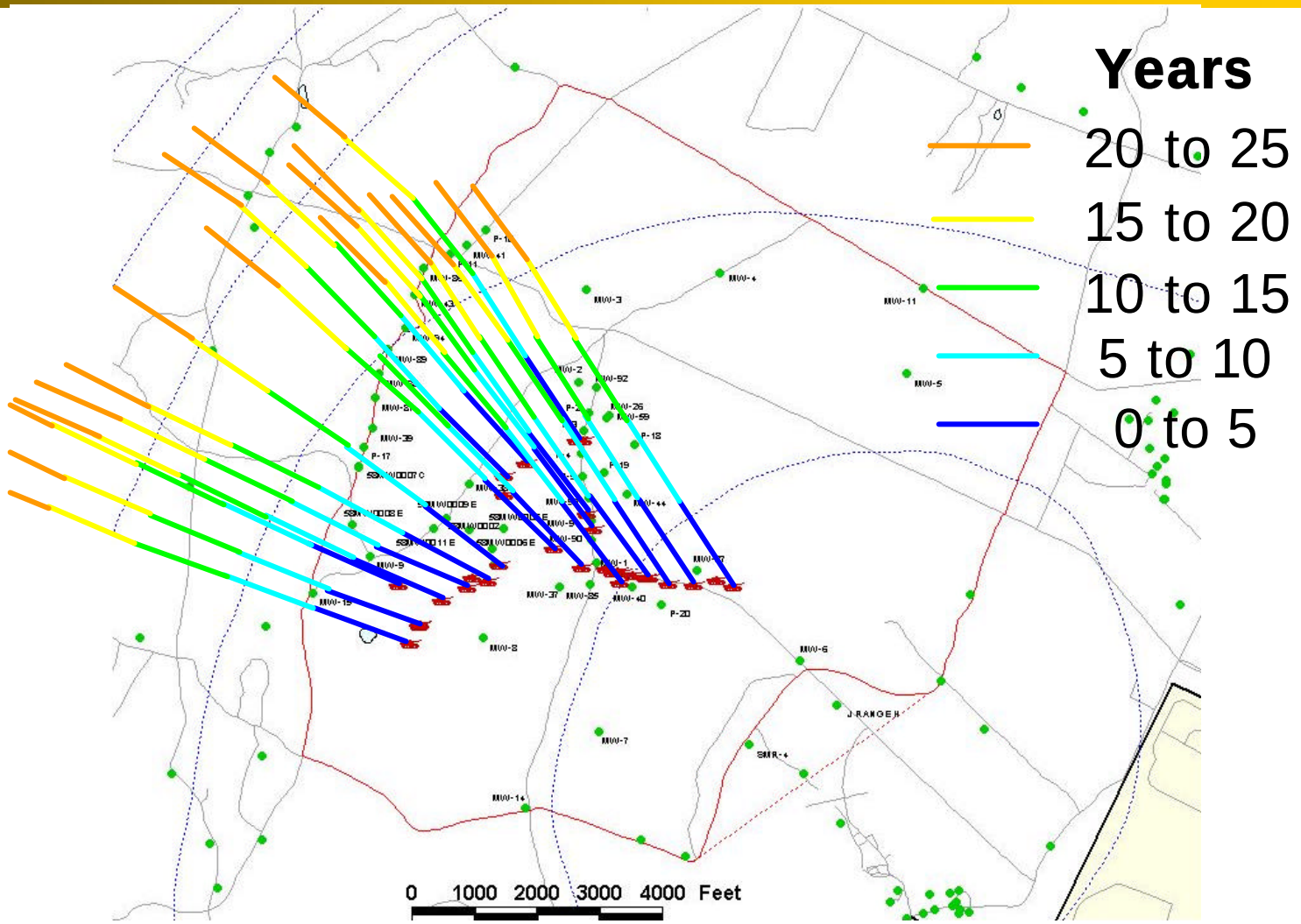


# MMR Possible Source Terms




- Low-order detonations*
- High-order detonations
- UXO *
- Demolition
- Disposal / Burial Sites
- Washout

# Potential Contaminant Migration Over Time



# Differences Between Current and Past Conceptual Model

- **Absence of Phase I surface soil contamination**
  - **suggests training was not the source of RDX in groundwater**
- **Presence of explosives in surface soils at artillery and mortar targets during Phase II**
  - **suggests training may be a contributing source of RDX to groundwater**

# MMR RDX Distribution Hypothesis

- **Shallow surface soil detections reflect presence of solid particulates**
  - **evidence of soil concentrations in excess of RDX solubility limit at MMR**
- **Absence of RDX in deeper soil may be the result of:**
  - **very small spatial footprint**
  - **dissolved RDX only present in wetting front**
  - **amount of RDX residual in solution is inconsequential compared to total volume of soil**
- **RDX present in groundwater at MMR**

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# MMR Preliminary Findings

- RDX and HMX present in surface soil adjacent to artillery and mortar targets
- RDX and HMX present in groundwater downgradient of primary target area (i.e. Tank Alley) within the Impact Area
- TNT which is a component of the munitions appears to be degraded before reaching groundwater

# MMR Preliminary Findings (Continued)

- **Training using HE artillery rounds (UXO, detonation, or both) appears to have resulted in an impact to groundwater at MMR**
- **Training with mortar rounds may have impacted groundwater at MMR**

# Ongoing/Planned Activities

- Conduct laboratory experiments to define Camp Edward specific fate-and-transport parameters (Funded)
- Conduct fate-and-transport modeling (Funded)
- High-Use Target Area investigations (Funded)
- Additional monitoring well installation/sampling (Funded/Planned)
- Additional Soil Sampling (Planned)

# Next Step

- Seek DOD guidance
- Prepare public affairs/community involvement plan for public presentation
- Range maintenance