CAG QUESTION AND RESPONSE SESSION BY EPA'S OFFICE OF RESEARCH & DEVELOPMENT AND NJDEP

Agenda

- Introduction presented by Anne Pavelka, NJDEP Hydrogeologist
- Questions and Answers by:

  Steve Acree, Hydrologist, EPA Office of R&D, National Risk Management Res. Lab. – Ada OK

  Bruce Pivetz, PhD, Hydrogeologist, Shaw Envir. & Infrastructure Inc. – Ada , Ok

  Daniel Pope, PhD, Biologist, Shaw Envir. & Infrastructure Inc. – Ada, Ok

March 2, 2011 CAG Meeting

- Presentation was made by NJDEP to explain the steps that are needed to be completed to conduct the IRM GW Pilot Study
- Brief overview of the GW Pilot Study was given
- EPA offered to have their Scientists from Office of Res. and Dev. and their contractors in Ada, OK, come and answer questions about the pilot study. The CAG agreed with this idea.

April 6, 2011 Public Information Session and CAG Meeting

- EPA Scientists are here to answer questions.
- There is a list of questions which were generated at the March 2, 2011 CAG.
- These issues will be addressed first, followed by any new questions.

Remediation Goal for Off-Site Ground Water:

- To find a remedial technology or technologies that can be successfully implemented to clean-up the ground water contamination that has migrated off the DuPont site to the Ground Water Quality Standards

Steps Necessary to Achieve this Goal

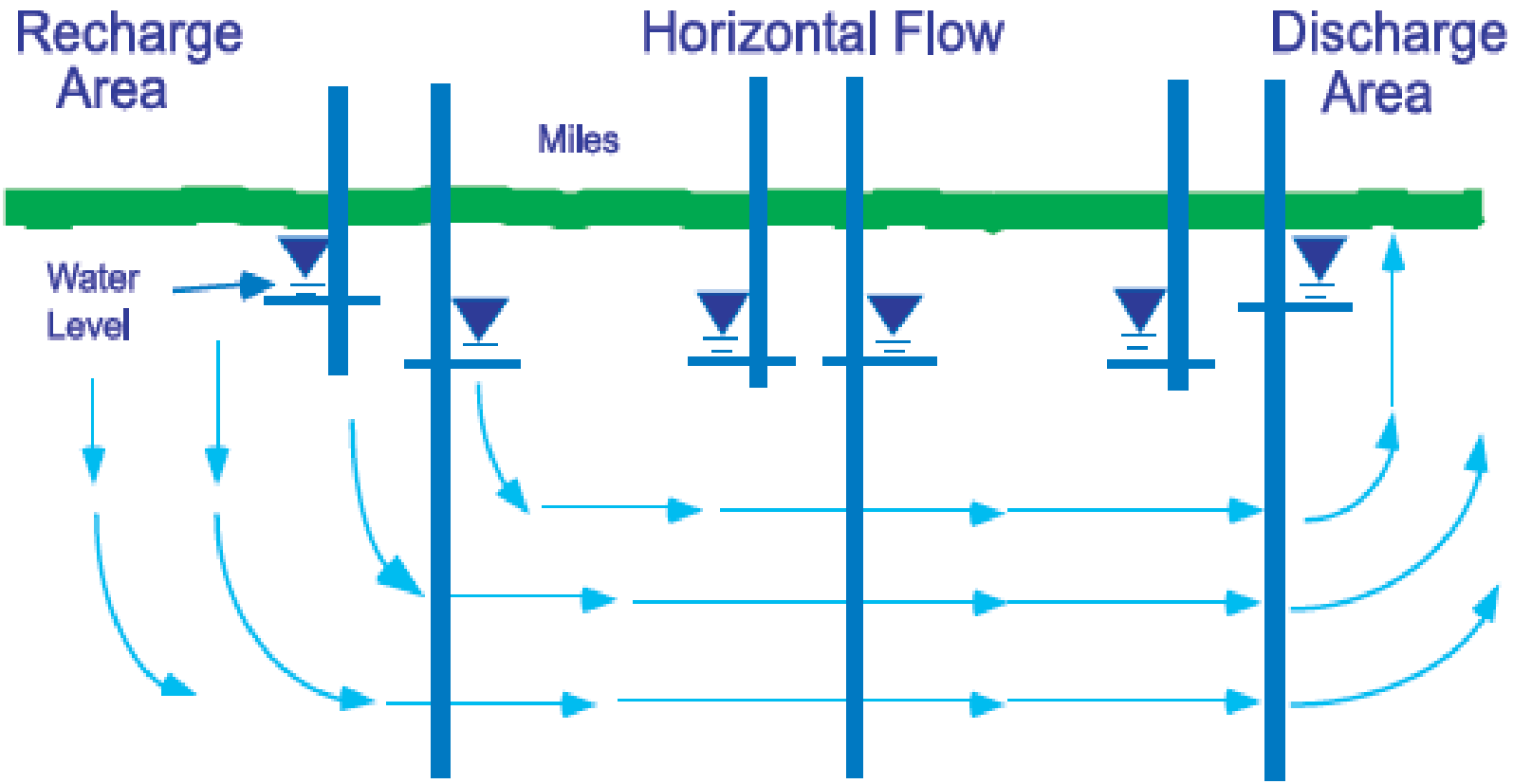
- **Stratigraphic study** – completed and report submitted 10/27/10
- **Ground Water Flow Study** – proposed in 11/9/10 IRM Workplan, work to be conducted in spring and summer
- **Pilot Study Operation Plan** – to be submitted in August, 2011 – This plan will have the detailed description of the pilot study implementation.

Stratigraphic Study

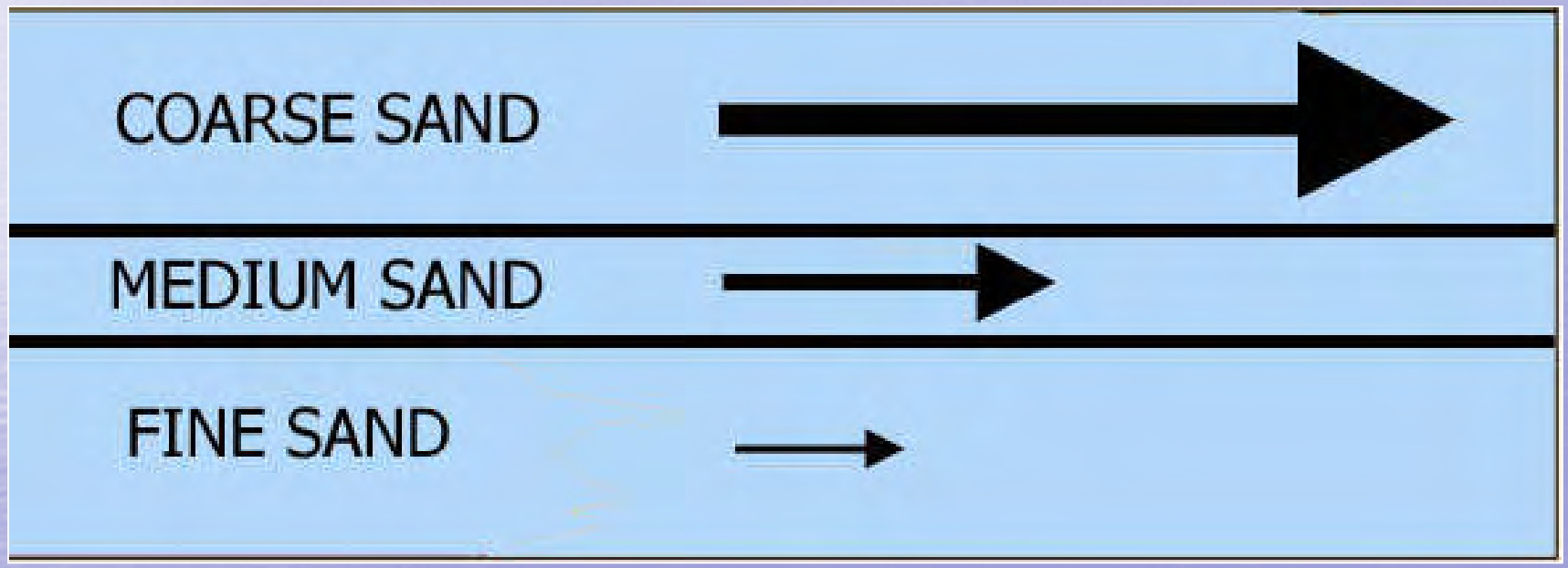
- Depth and thickness of each aquifer zone
- Detailed stratigraphy of each zone
- Approximate concentrations of volatile organic compounds (VOCs) with depth – The VOC data on the next slide is from the October, 2010 Stratigraphic Study.

Aquifer	Depth	Stratigraphy	VOC con.
Shallow Aquifer Zone	7-38 feet below ground surface (bgs.)	Coarse – medium grained sand, some gravel	VOCs < 50 ppb
Intermed. Aquifer Zone	38-78 feet bgs.	Fine-medium grained sand	VOCs 100 - > 1000 ppb
Deep Aquifer Zone	> 78 feet bgs.	Fine sand, silt	VOCs <2 ppb

Basic Groundwater Flow



Relative Rates of Groundwater Movement



Geology is a primary control on groundwater movement.

Purpose of Ground Water Flow Study

- The Ground Water Flow Study is a proposal to determine ground water flow rates and the distribution of hydraulic conductivity (ability of the aquifer to transmit water) in the area of the pilot study near well 128I.

Results from Stratigraphic Study and Ground Water Flow Study and Analysis

Based on the Contaminant Distribution:

- The pilot study will be in the 40 foot thick intermediate zone.
- Being protective by conducting the pilot test in the intermediate aquifer zone. No vapors will be generated from the pilot study, since there is about 30 feet of water above the zone where the pilot study will be conducted.

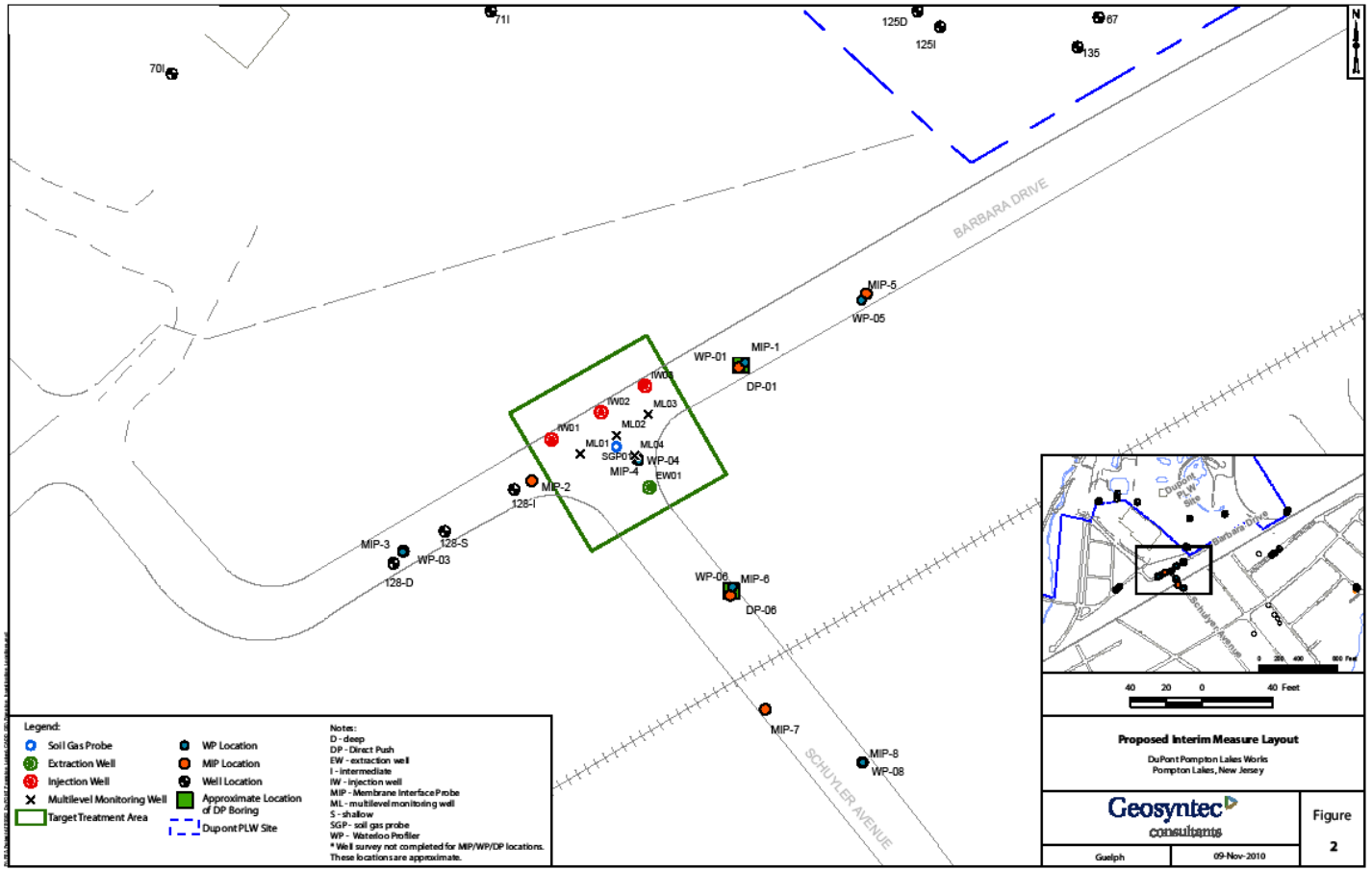
Results from Stratigraphic Study and Ground Water Flow Study and Analysis

- Result is ground water model for the pilot study area.
- Determine the optimum locations for the monitoring wells and the soil gas probe to monitor the progress of the chemical reaction during the pilot test.
- Determine the operational parameters for the pilot test including:
  - Injection rates, extraction rates, timing of injection and extraction periods, concentration of the amendments to be added to the system

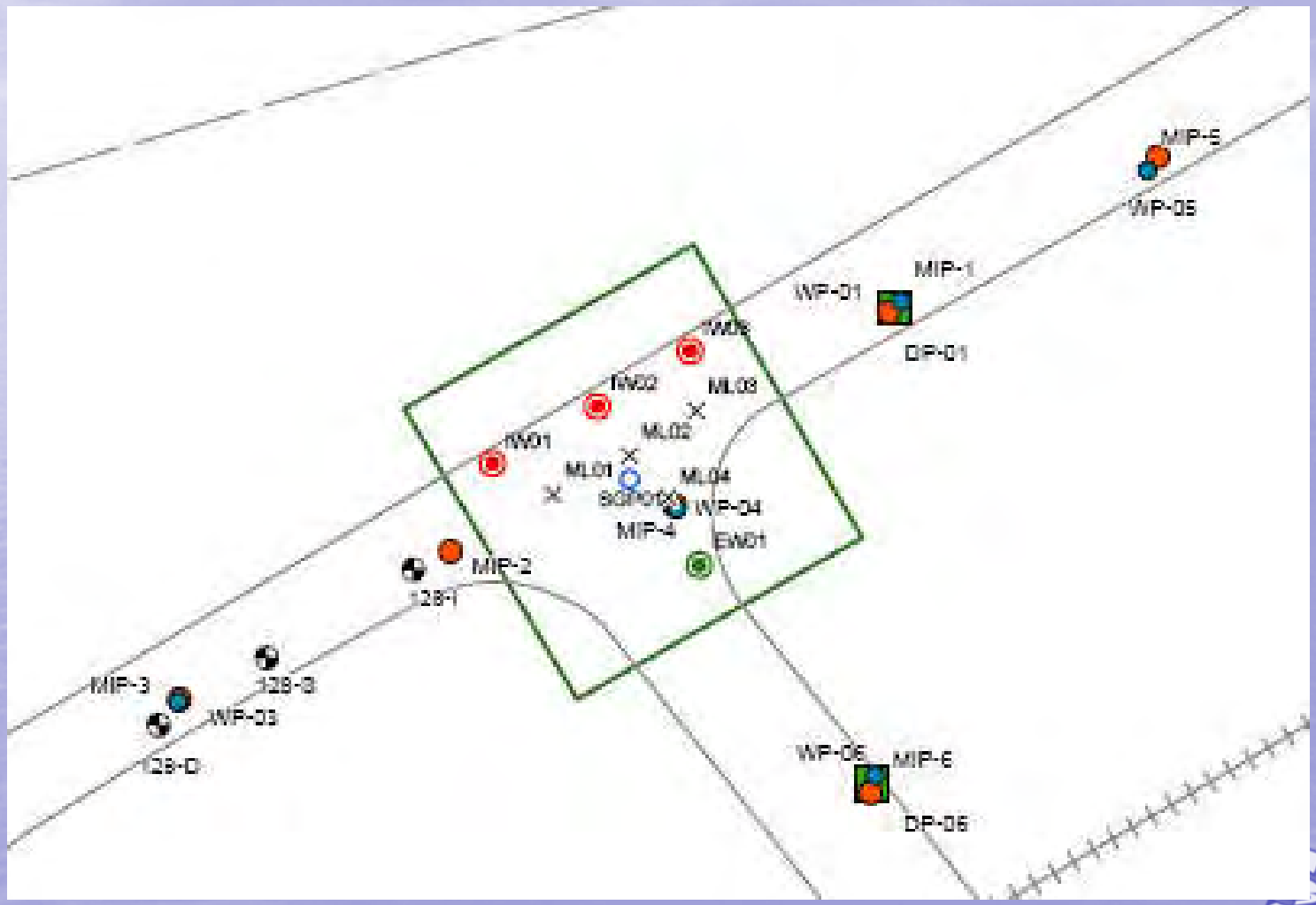
Target Treatment Area (TTA)

- The TTA is a recirculation cell which will be built at the intersection of Barbara and Schuyler Avenues.
- The cell will have:
  - 3 injection wells with 2 screened intervals
  - 1 extraction well with 2 screened intervals
  - 4 monitoring wells with 7 screened intervals
  - 1 soil gas probe

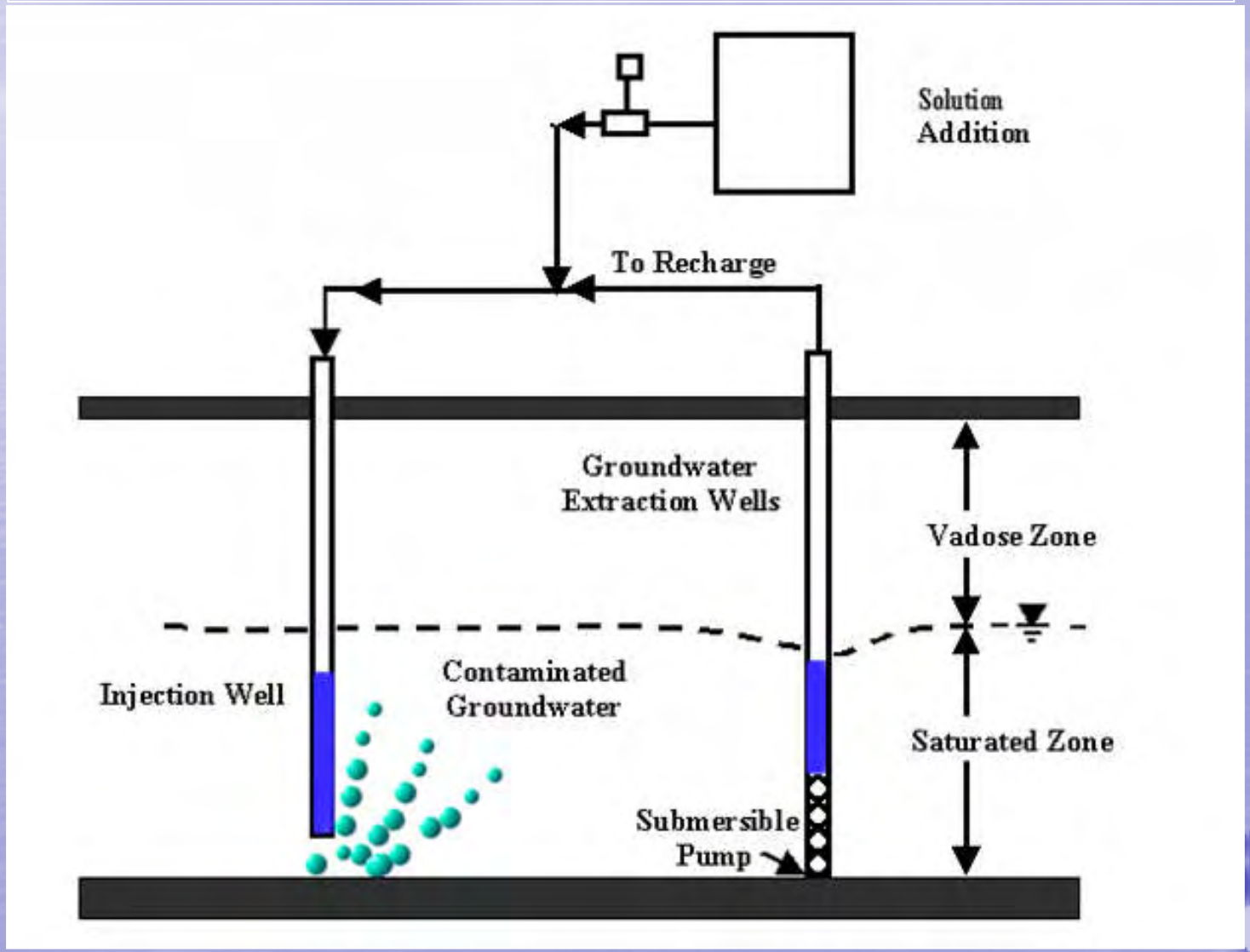
Target Treatment Cell



Pilot Study Area



Generic Bioremediation System



Goal of the Pilot Study

- To show through implementation of the pilot study, that Enhanced Anaerobic Bioremediation is capable of reducing the contaminant concentrations in ground water to the Ground Water Quality Standards

Chemical Reaction

- Tetrachloroethene → Trichloroethene> Cis- 1,2 Dichloroethene → Vinyl Chloride → ethene → ethane

- Naturally occurring bacteria control the reaction. An electron donor is added to feed the bacteria.

Enhanced Anaerobic Bioremediation Amendments

- Electron Donor
  - Lactate – fast acting
  - Emulsified Vegetable Oil – slow acting
- Bacteria
  - KB-1, which is a consortium of naturally occurring bacteria. This will insure that the reaction goes to completion.

Conceptual Pilot Study

- The timing and rate of amendment addition will be based on the results of the stratigraphic characterization done in 2010, the ground water flow study and ground water modeling to be performed.

Question and Answer Period by EPA Scientists from Ada, OK

- Discuss questions from March 2, 2011 CAG Meeting
- Additional Questions

General Questions

- What is anticipated to occur during the pilot?
- What is the impact on neighboring homes?
- How will unknowns be answered before any injection is conducted?
- How will monitoring assure there is no harmful impact to the surrounding homes and aquifer?
- Examples of how this has been successfully conducted at other locations.

Specific Questions

- Why is this pilot test not focused on shallower groundwater?
- Can the monitoring well with seven screens provide a vertical pathway that could move contamination between zones?
- Are the flow rates in the three aquifers similar or different?
- What are the risks of the technologies used in this pilot study?

Specific Questions

- If residents in the study area don't have a vapor mitigation system, are they more at risk as a result of the pilot study?
- Is there a potential for a delayed reaction from the pilot study to result in adverse effects?
- Has a similar test has been conducted anywhere in the country?
- Could contamination be spread by the pressure from injection wells?

Specific Questions

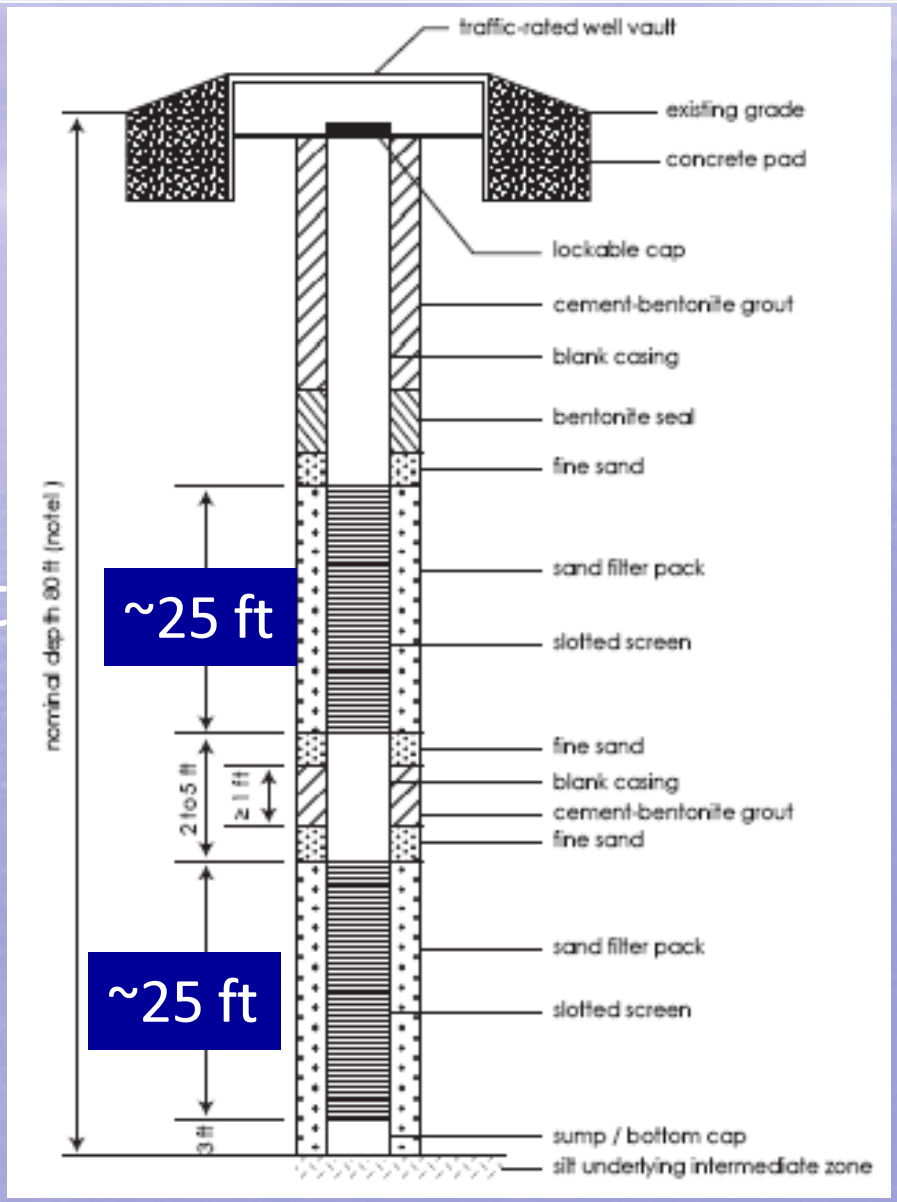
- How does our site compare with the Raritan Arsenal Site and the study that was recently conducted there? Was the Raritan Arsenal study conducted in the shallow aquifer?
- Is ethane, the final degradation product, safe?
- Why is vinyl chloride the last chemical in the chain in site reports?

Specific Questions

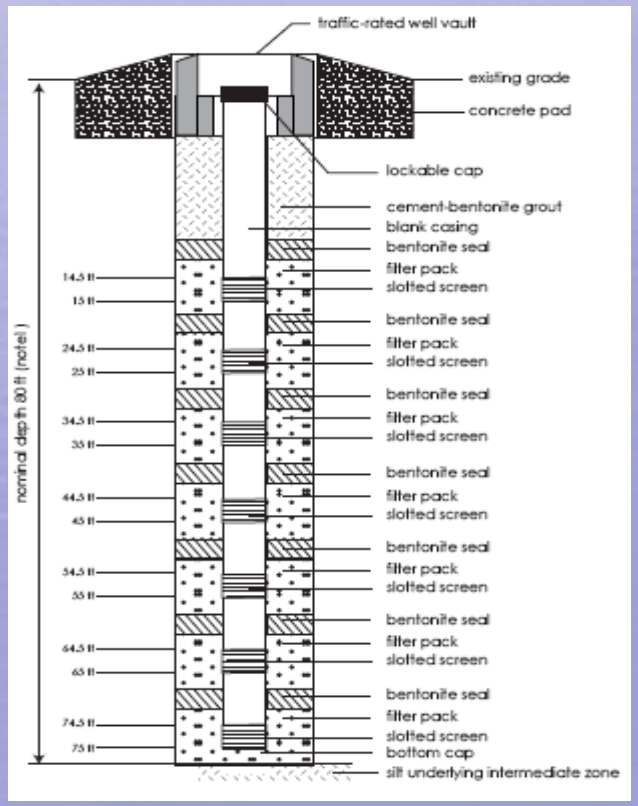
- The existing Pump and Treat system appears to result in a concentration of contaminants in the bend of Barbara Drive, is there is an extraction well there?

Preliminary Extraction/Injection Well Design

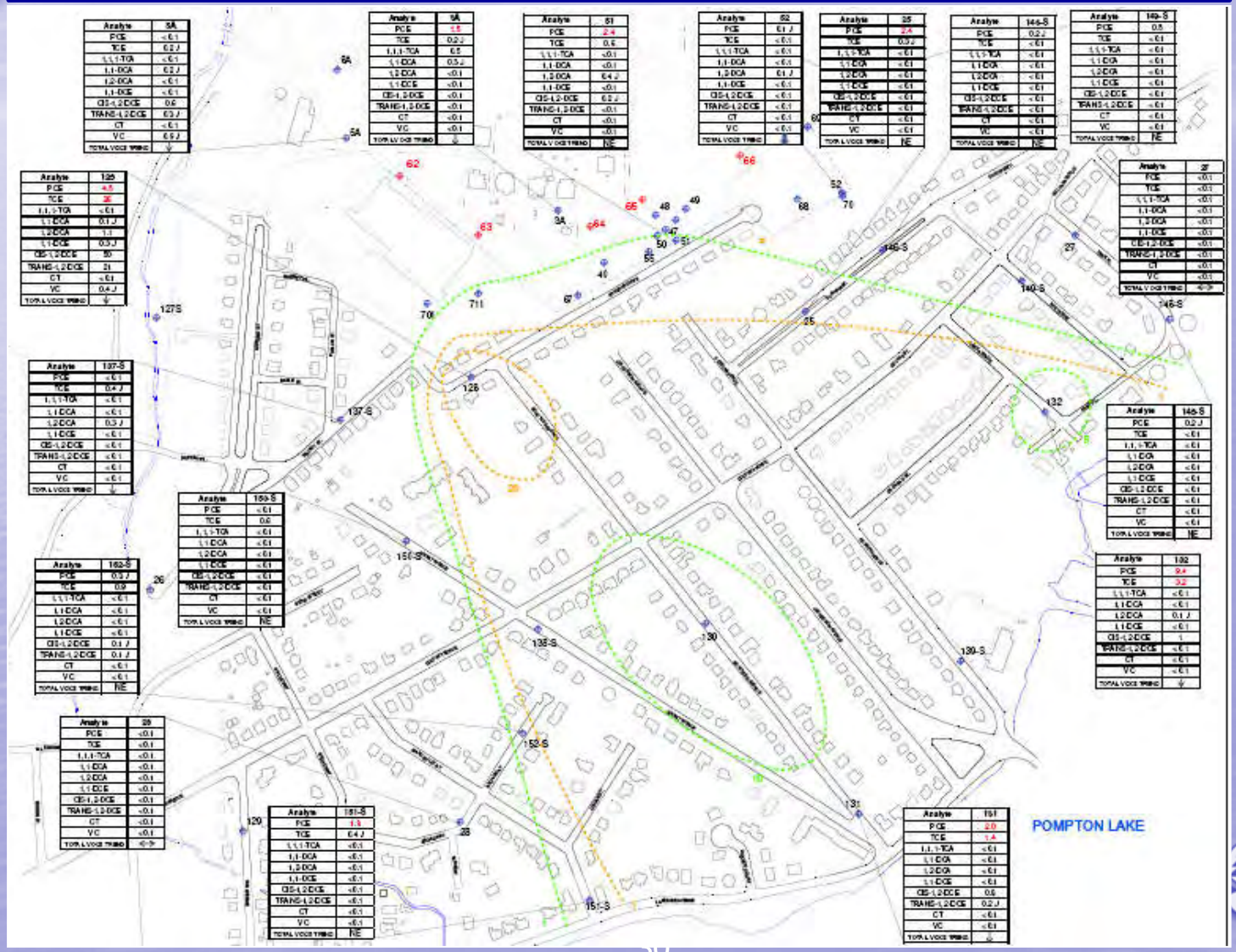
~ 80 ft



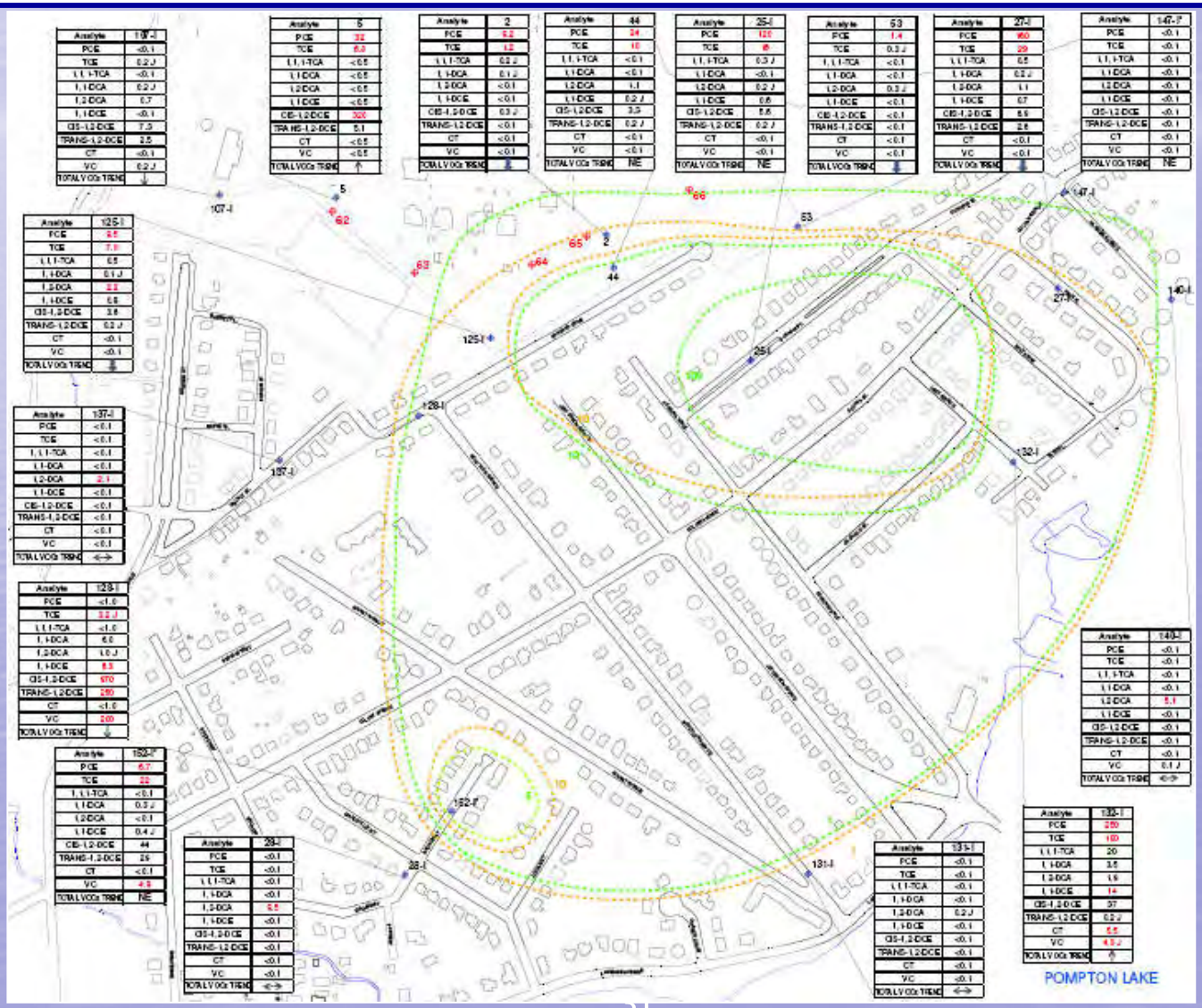
Preliminary Multi-Level Monitoring Well Design



VOC Concentrations in Shallow Zone
November 2010



VOC Concentrations in Intermediate Zone
November 2010



VOC Concentrations in Deep Zone
November 2010