

AREA B GROUNDWATER INVESTIGATION

Progress Report to the RAB
September 21 2011

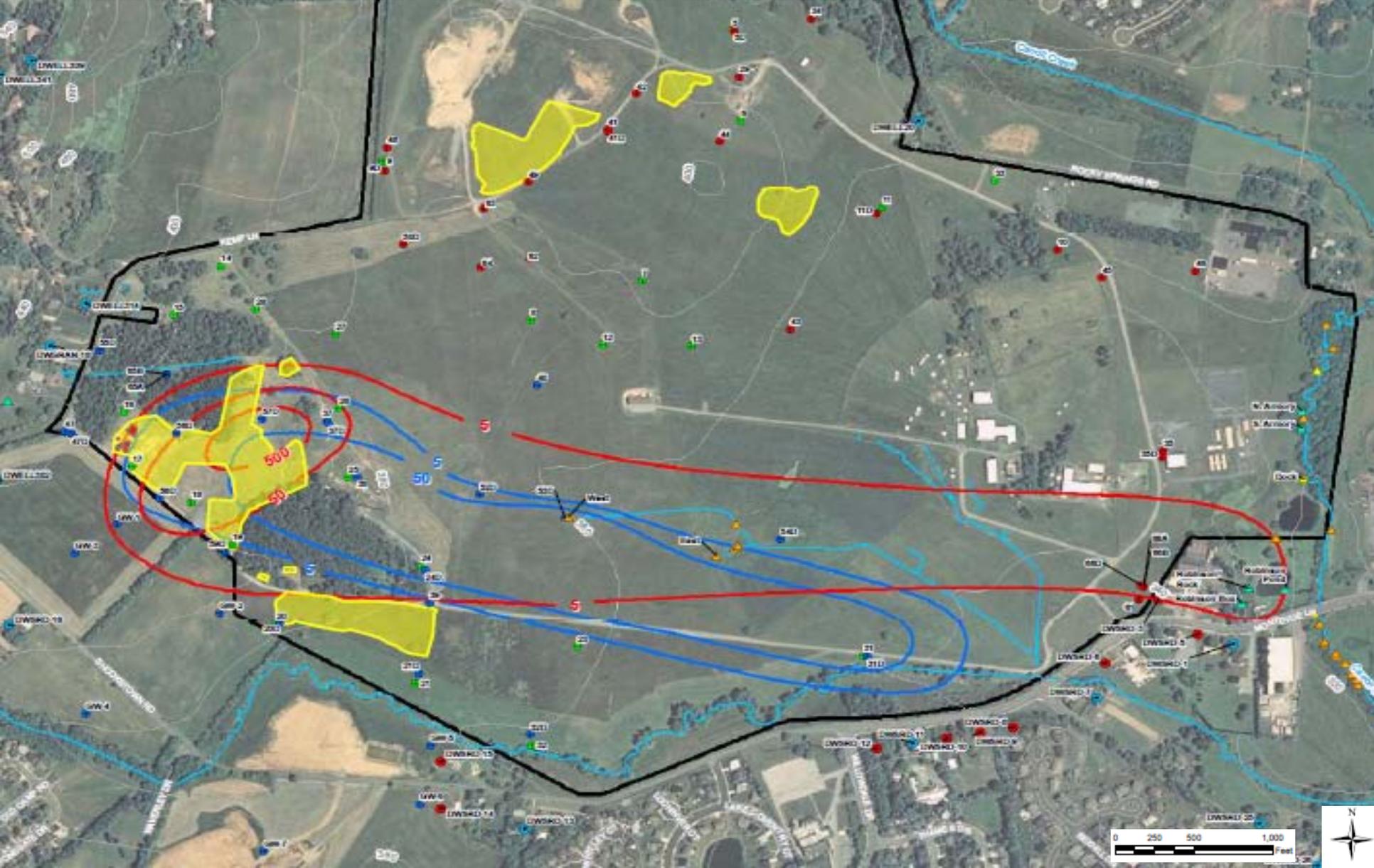


Overview of Topics

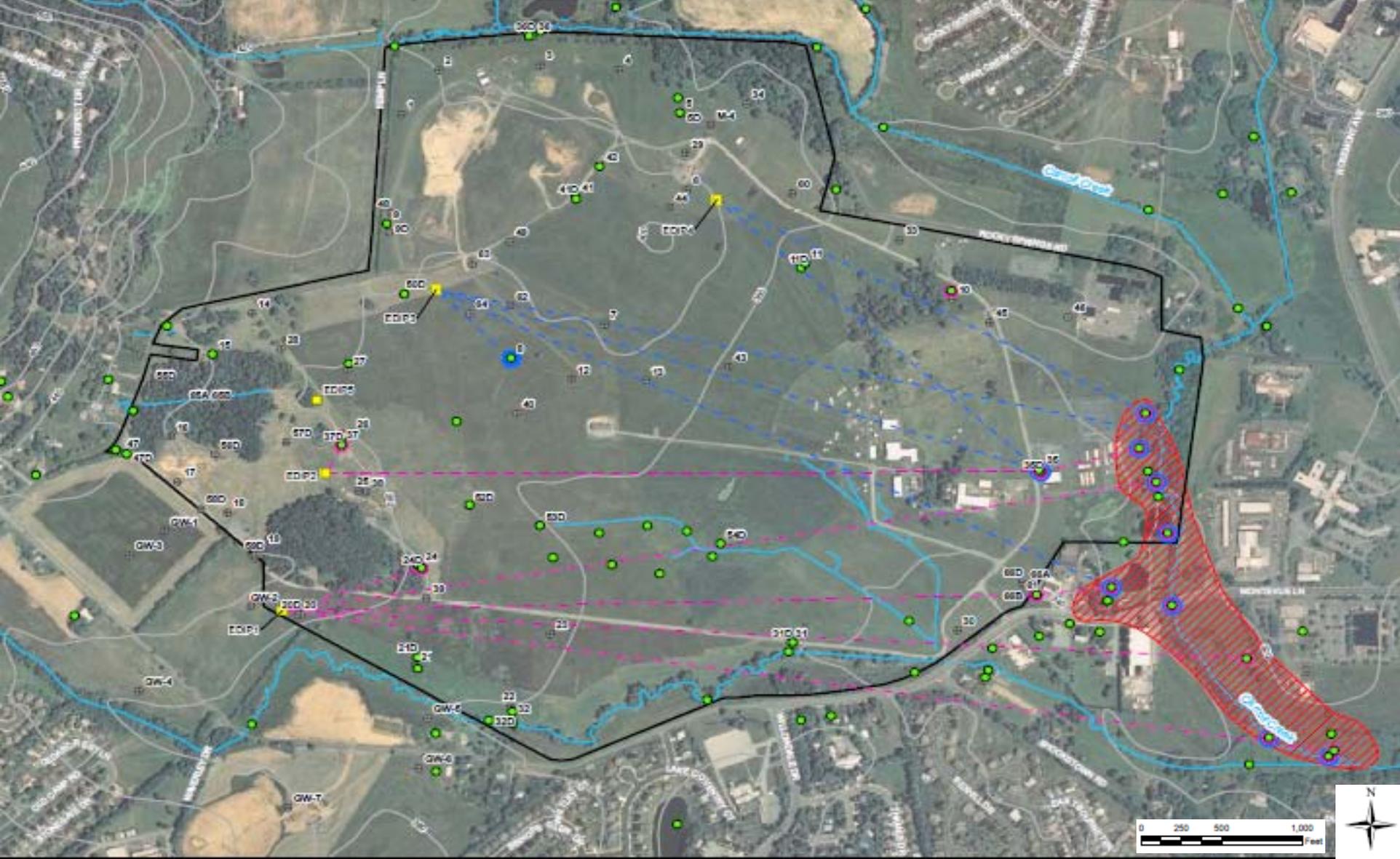
- ❑ Background/objectives of the current phase of work
- ❑ Status of field activities
- ❑ Schedule review and anticipated path forward

Background/ Study Objectives

General Known Distribution of Solvents in Groundwater (from 2010 Workplan)



General Known Groundwater Discharge Areas (from 2010 Workplan)



Objectives of Current Study

1. Further assess the depth and extent of the known contamination
2. Further assess the full range of possible chemical compounds
3. Further assess groundwater flow directions including potential deep groundwater flow under Carroll Creek
4. Further assess the potential for vapor intrusion into on and off site buildings

Planned Work

- ▶ Existing well assessment and repair Feb 2011 to Apr 2011
- ▶ New well installation April 2011 to Nov 2011
- ▶ Dye trace study Pending ROEs
- ▶ Spring and Seep Surveys Pending ROEs
- ▶ Direct Push Investigation Pending ROEs
- ▶ Vapor Intrusion Sampling Pending ROEs
- ▶ Groundwater/Surface Water Sampling 2011/2012

WELL DRILLING

Progress to date

- Two drill rigs/crews operating simultaneously
- 10 day on/ 4 day off work schedule
- Currently in 11th 10-day drilling shift

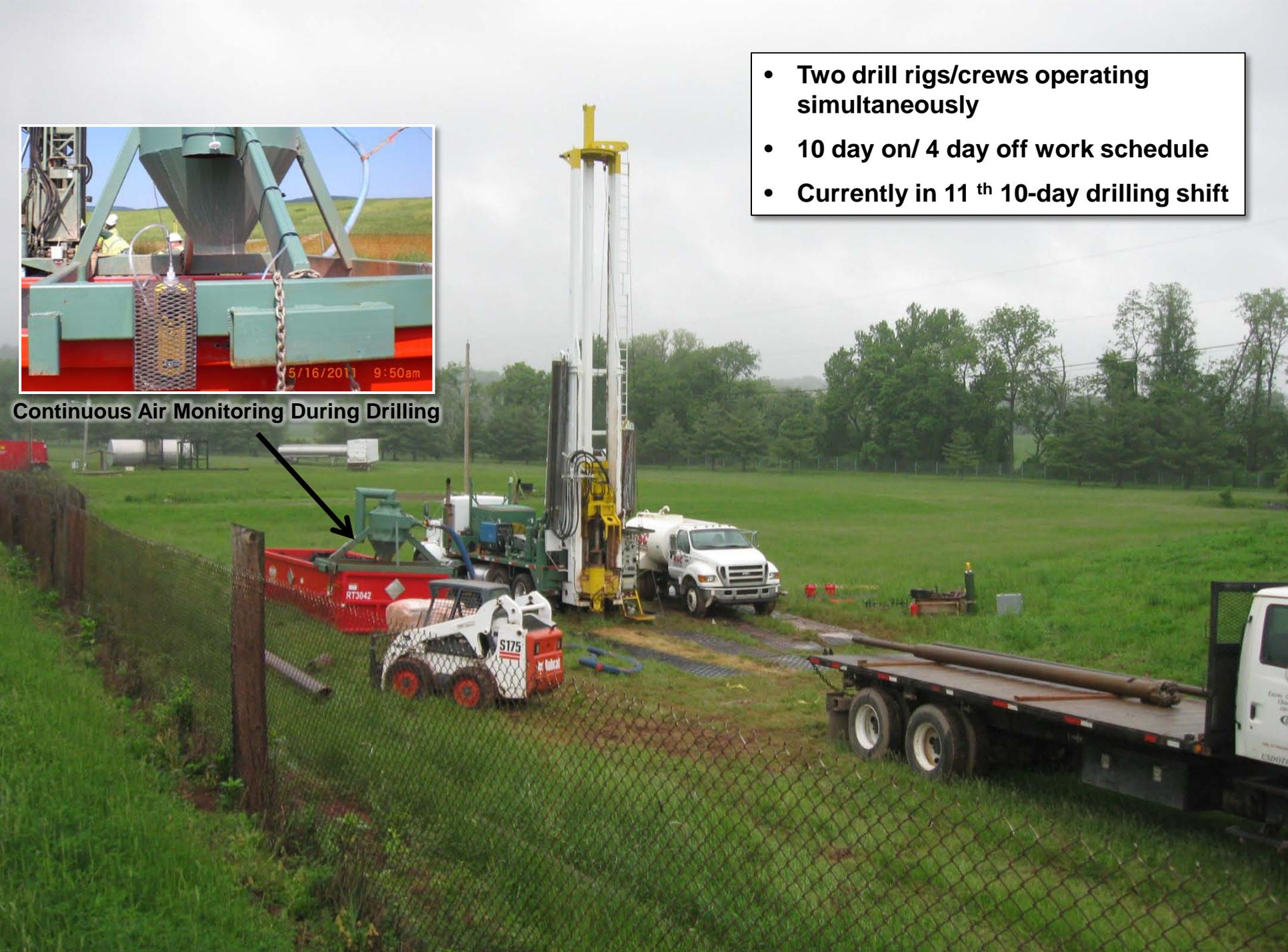


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- Two drill rigs/crews operating simultaneously
- 10 day on/ 4 day off work schedule
- Currently in 11th 10-day drilling shift



Continuous Air Monitoring During Drilling



- Geophysical logging between each drilling interval.



Multiple tools used to collect data at each boring.

5/20/2011 1:02pm

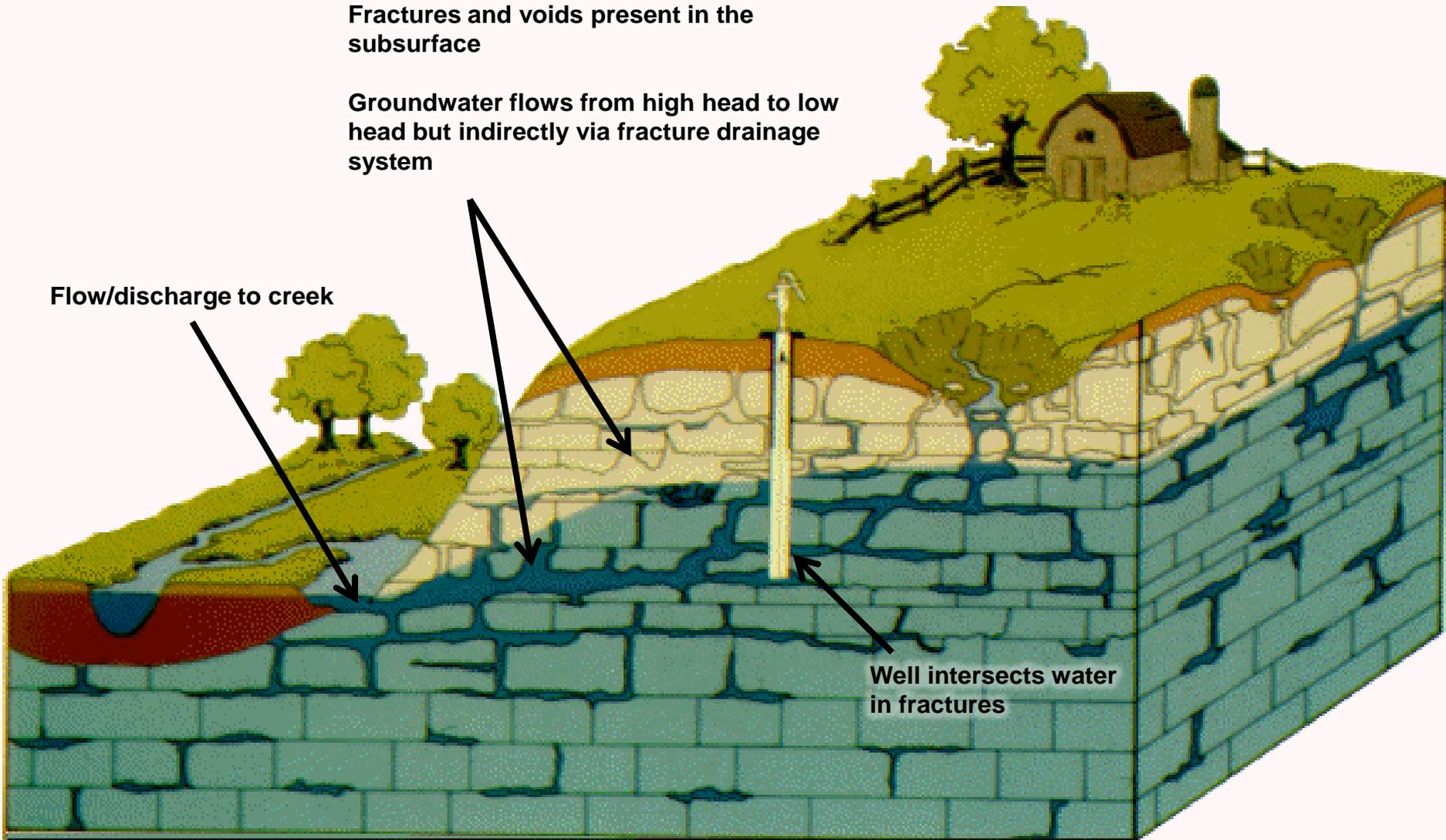
General Groundwater Flow in Limestone/Karst

Fractures and voids present in the subsurface

Groundwater flows from high head to low head but indirectly via fracture drainage system

Flow/discharge to creek

Well intersects water in fractures



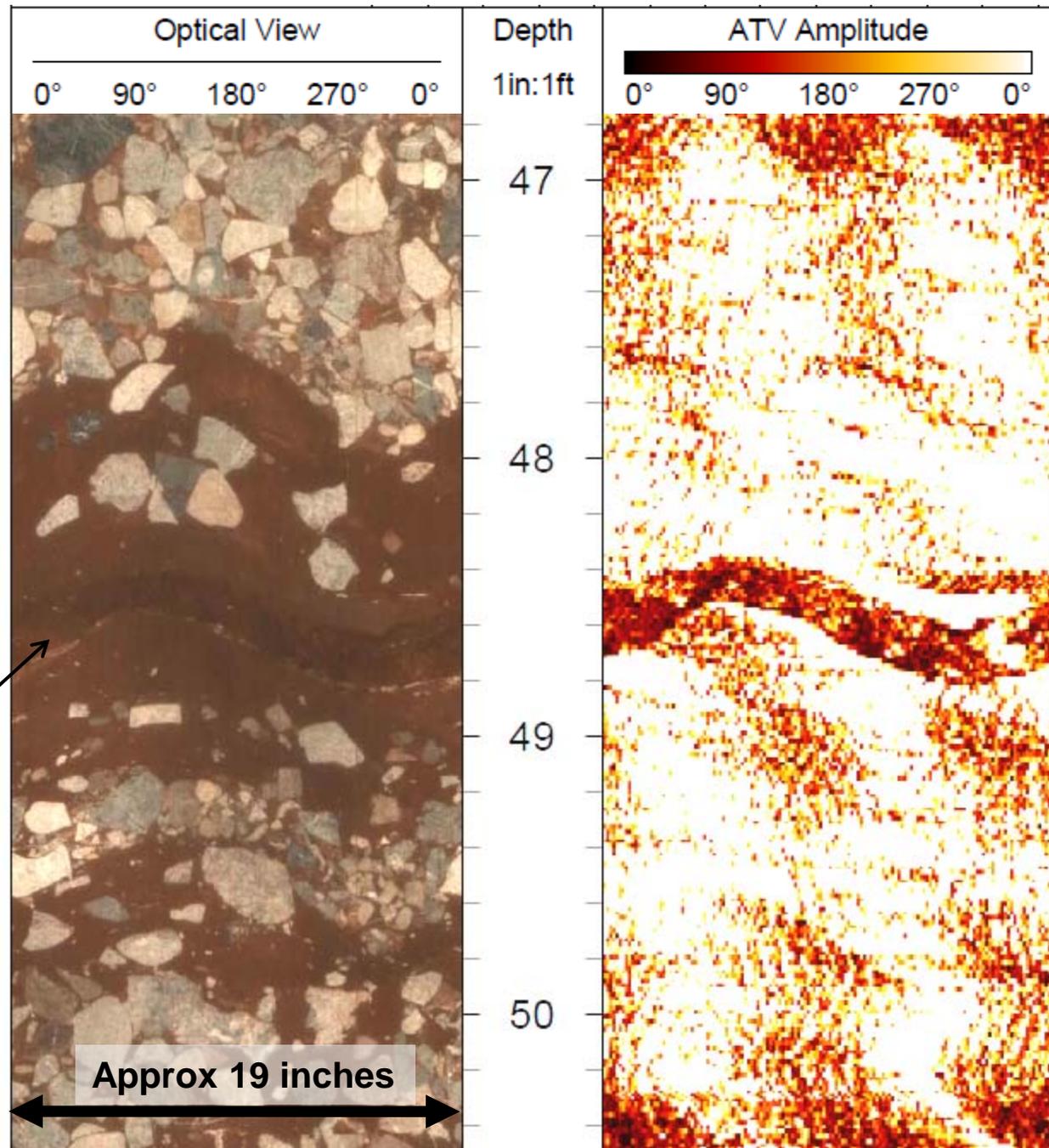
Geophysical Logging

Multiple tools used to help characterize the subsurface:

- Identify water-bearing zones,
- Select intervals for sampling, and
- Determine zones for screening permanent wells.

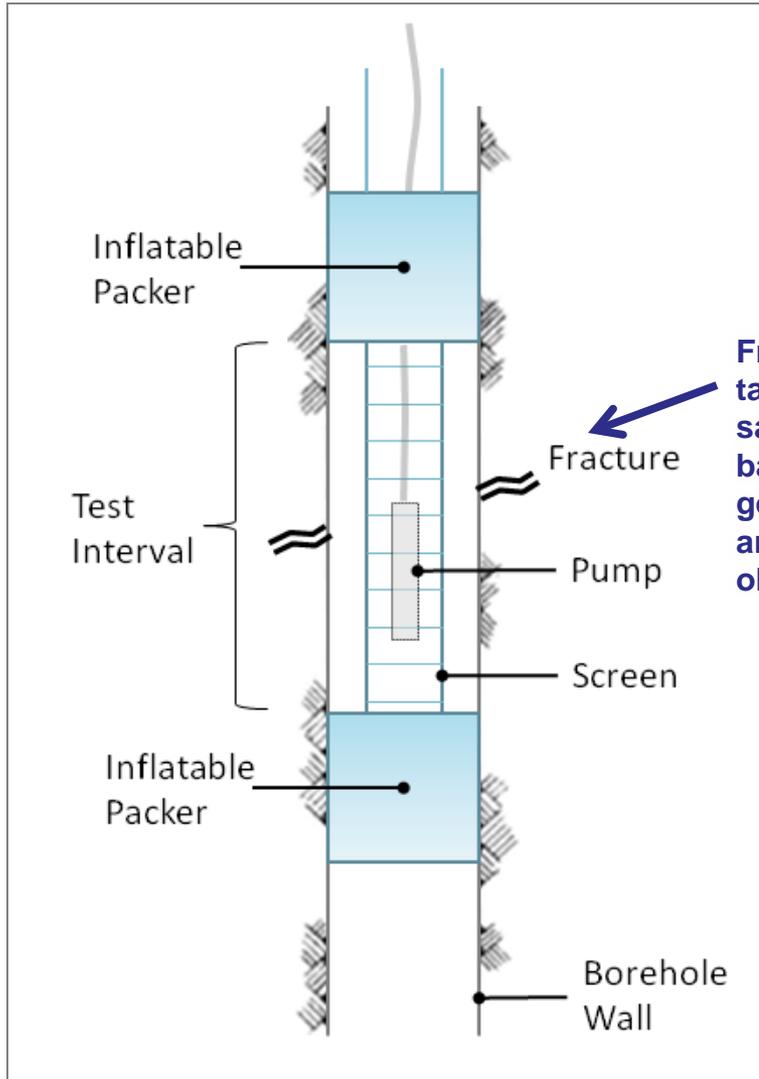
Fracture clearly visible on the Optical and Acoustical Televiwer Logs

Boring ID: BMW-72



Packer Testing

(Groundwater Sampling at Targeted Zones)



Fracture targeted for sampling based on geophysics and other observations.

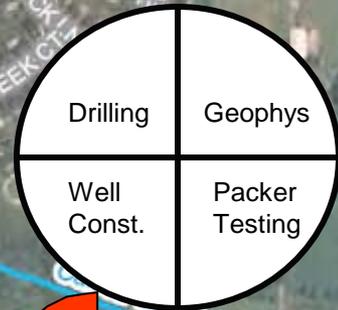


Status of Drilling Program

- ▶ 18 of 20 planned borings in progress
- ▶ 8 of 29 new monitoring wells installed (105 total + 7 option)
- ▶ 2,146 of 3,640 linear feet of drilling completed
- ▶ 1,970 of 2,720 linear feet of geophysical logging completed
- ▶ 24 of 50 packer test intervals completed
- ▶ 19 groundwater samples collected for VOCs
- ▶ Continuous air monitoring for VOCs at all borings

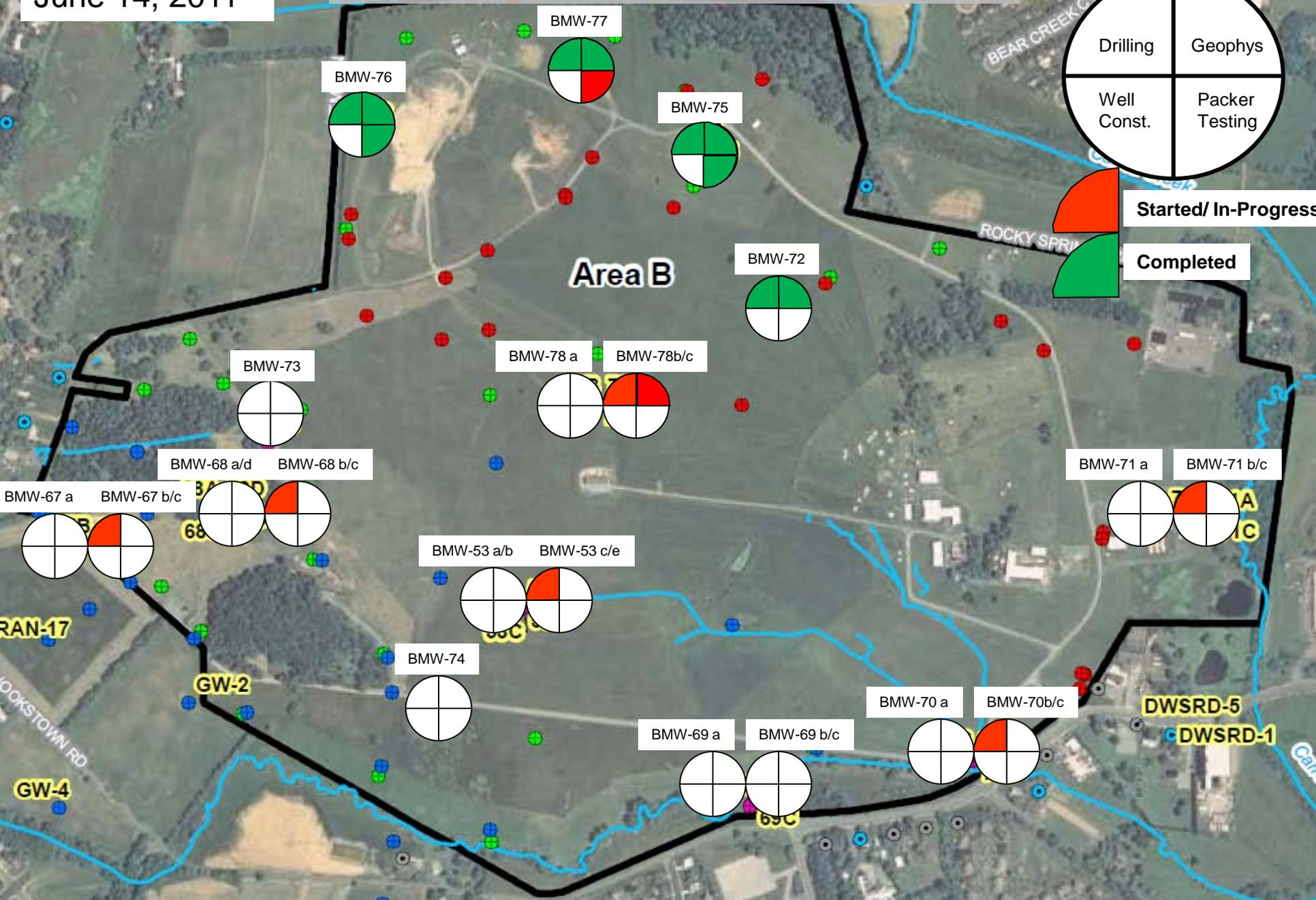
New Well Installations

June 14, 2011

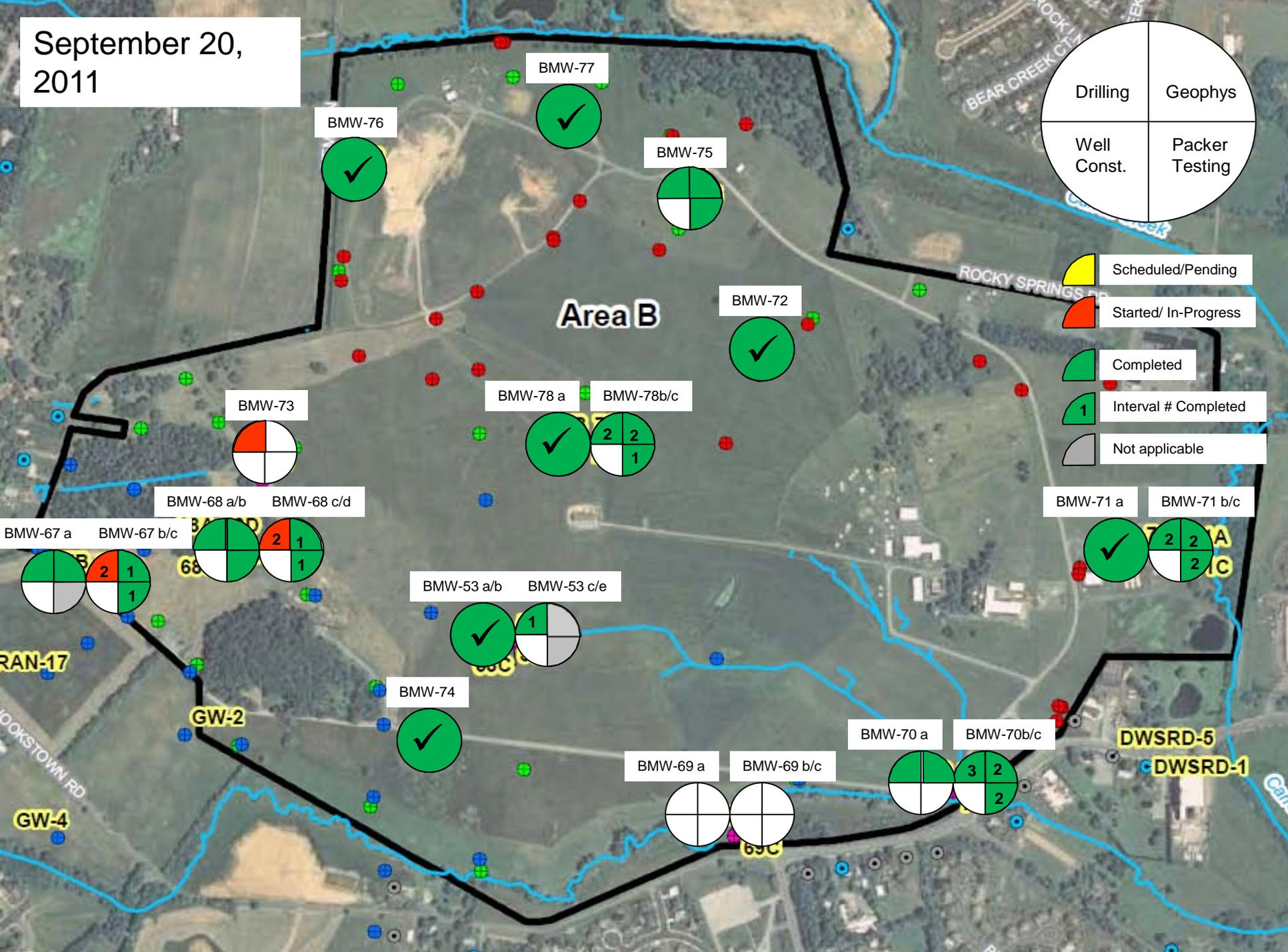
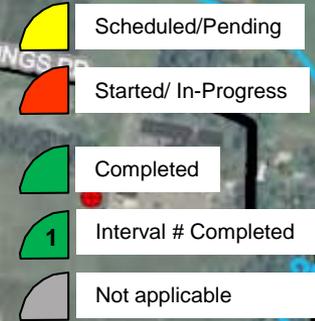
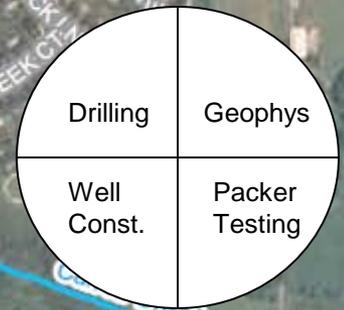


Started/ In-Progress

Completed



September 20,
2011



Area B

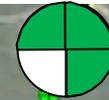
BMW-77



BMW-76



BMW-75



BMW-72



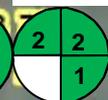
BMW-73



BMW-78 a



BMW-78b/c



BMW-68 a/b



BMW-68 c/d



BMW-67 a



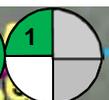
BMW-67 b/c



BMW-53 a/b



BMW-53 c/e



BMW-74



BMW-71 a



BMW-71 b/c



BMW-70 a



BMW-70b/c



BMW-69 a



BMW-69 b/c



DWSRD-5

DWSRD-1

GW-2

GW-4

RAN-17

ROCKSTOWN RD

BEAR CREEK CTZ
ROCKY SPRINGS DR

Key Findings to Date

TCE and PCE above the standard of 5 ppb in fractures tested

WELL ID	DEPTH (ft)	TCE (ppb)	PCE (ppb)	Sept 2010 Results (nearby)
BMW 68	38	1,800	35	1,400 ppb TCE / 110 ppb PCE at 120 to 122 ft
	50 - 63	1,800	39	
BMW 73	29	24	8.7	New location
BMW 74	12	120	12	17 ppb TCE / 740 ppb PCE at 170 ft
BMW 77	56 - 71	<5	8.9	0.53 ppb PCE at 35 ft
BMW 78	49	11	<5	23 TCE ppb / 2.5 ppb PCE at 58 ft

Key Findings to Date

- ▶ Flow in tested fractures ranges from less than 0.5 gpm to 21.5 gpm
- ▶ Average flow is approximately 4.4 gpm
- ▶ Total water pumped to date 6,000 gals
- ▶ Packer testing is successfully identifying key flow paths within the installed boreholes

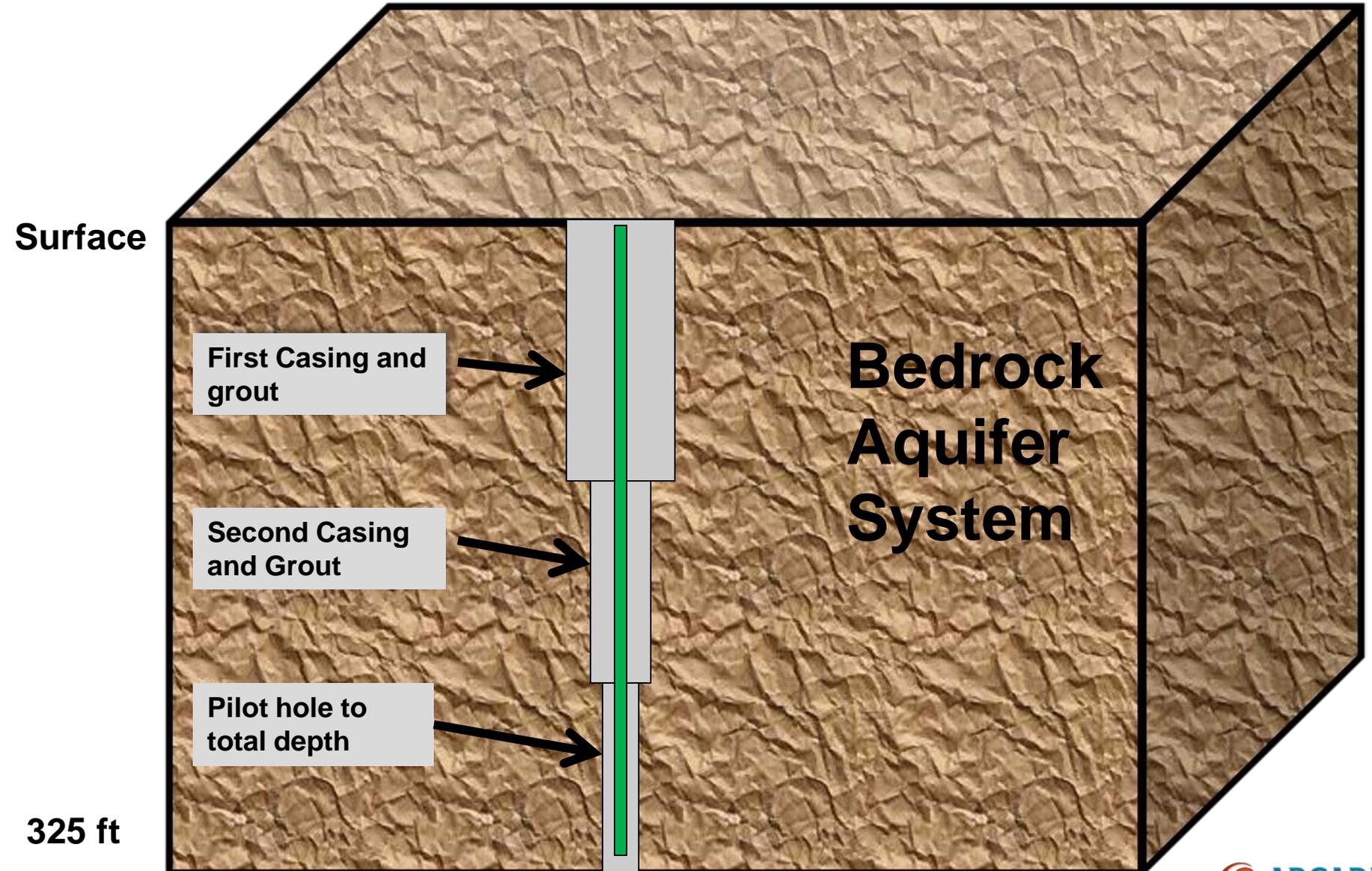


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Comments

- ▶ 9 bi-weekly calls conducted with EPA and MDE
- ▶ Data collected generally consistent with past data
- ▶ Most new data from shallower depths (less than 100')
- ▶ Deeper borings, samples, and wells planned next

Deep Well Installation Method



Imagine the result

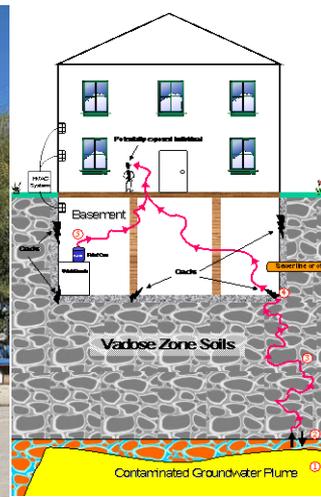
Well Drilling Path Forward

- ▶ Continue to collect subsurface data
- ▶ Continue to work interactively with EPA and MDE to select appropriate intervals of the subsurface to install well screens
- ▶ Drilling will continue into November

Future Work

Future Work

Dye trace study	Evaluate deep groundwater flow and the potential for off-site migration under Carroll Creek.
Spring and Seep Surveys	Identify and sample discharge areas where groundwater flows into surface water.
Direct Push Drilling	59 off-post borings to assess shallow groundwater contamination.
Vapor Intrusion Sampling	Collect sub-slab and indoor air samples at 6 buildings to assess potential impacts from shallow contamination.
Groundwater/Surface Water Sampling	Comprehensive sampling of existing/new wells and surface water for broad suite of chemicals.



Status of Rights of Entry to Off-site Properties

Fort Detrick Public Affairs Office

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