Optimization of Northwest Plume Pump and Treat System

Draft **REC 10-01**

Groundwater/ Surface Water/ Soils Committee

Maggie Morgan

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Project Background

- Northwest Plume Interim Remedial Action (NWP IRA) Record of Decision (ROD) signed July 1993
- Routine pump-and-treat operations started August 28, 1995
- System consists of:
  - North wellfield (EW228, EW229)
  - South wellfield (EW230, EW231)
  - C-612 treatment system (220 gallons per minute (GPM))
    - Air-stripping of trichloroethene (TCE)
    - Ion-exchange for technetium-99 (^{99}Tc)

Project Basis

- 2003 CERCLA Five-Year Review (2003)
  - Recommended evaluation for possible optimization
- Site Wide Remedy Review (2006)
  - Recommended extraction well optimization
- Remedial Technology Review (2006)
  - Increase extraction at south wellfield
  - Add extraction wells near south wellfield
- 2008 CERCLA Five-Year Review (2009)
  - Modify NWP system as recommended previously
- Site Management Plan (draft 2009)
  - Discontinue extraction at the north wellfield
  - Optimize extraction at the south wellfield by installing additional wells

Project Engagement

Regulatory Engagement

- CERCLA five-year reviews
- Site Management Plan
- FFA Managers Meeting – September 2009
  - Identified streamlined approach for design, reviews, concurrence, documentation and construction
- Web-based presentations
  - December 2, 2009 – Review of initial modeling results and concurrence on pilot boring locations
  - December 11. 2009 – Discussed streamlined documentation approach
  - December 18, 2009 - Reviewed refined evaluation of EW locations and pumping rates and impacts
- FFA Managers Meeting – January 2010
  - FFA Manager concurrence on wellfield design (well locations and target rate for extraction)

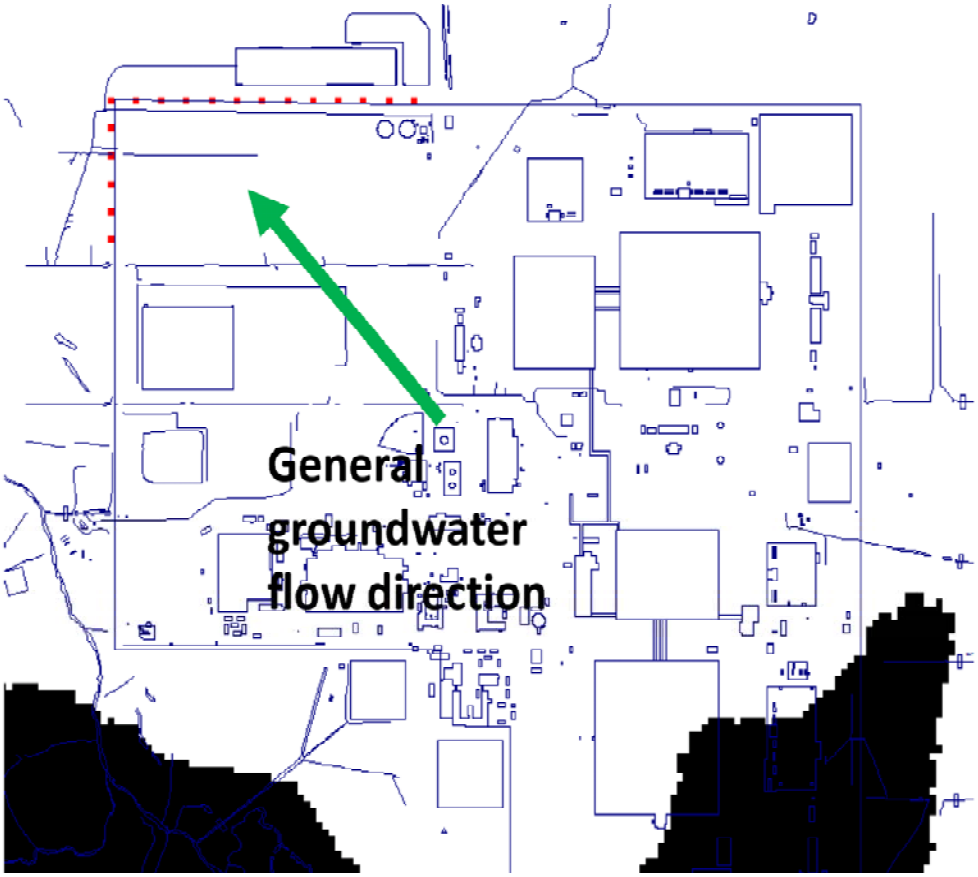
CAB Groundwater Committee Engagement

- January 2010 Briefing
- February 2010 Briefing

Wellfield Modeling

- Objectives
  - Select and evaluate extraction well configurations to improve capture of dissolved mass migrating from the northwest portion of the PGDP at the north fenceline
  - Consider potential changes in groundwater flow field due to PGDP shutdown
- Approach
  - Used 2008 updated Sitewide flow model
  - Evaluated 18 potential extraction well locations
  - Tested flow rates from 220 – 250 gallons per minute (gpm)
  - Assumed plume mass based on 2007 plume map
  - Assumed no change to C-612 treatment process capability or flow capacity as agreed with EPA and KY
  - Tested 1-, 2-, 3-, and 4-well scenarios
- Results
  - Predicted mass capture rates all exceeded 99% of the assumed mass
  - A 2-well scenario was selected for further evaluation under current and potential future flow conditions at 220 gpm
  - Predicted mass capture rates were 99.87% (current flow field) and 99.97% (potential future flow field)

Model Development



- 18 potential well locations
- Fully penetrate the RGA
- 200 ft separation

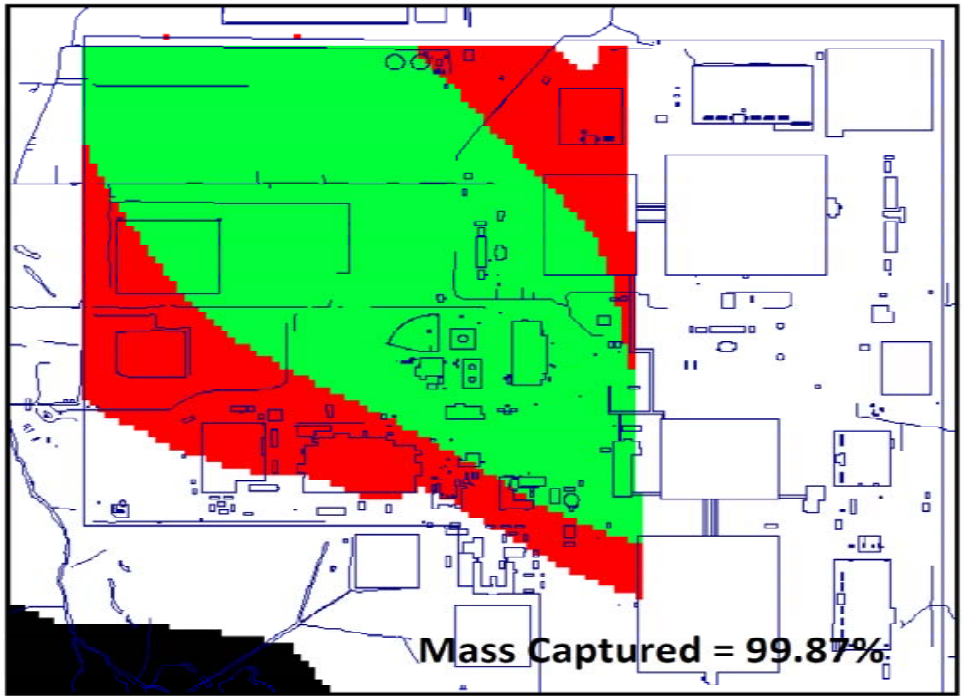
Current System

Current Operating System

Wells 1 and 2

Wells 1 and 2

High Pump Rate Scenario

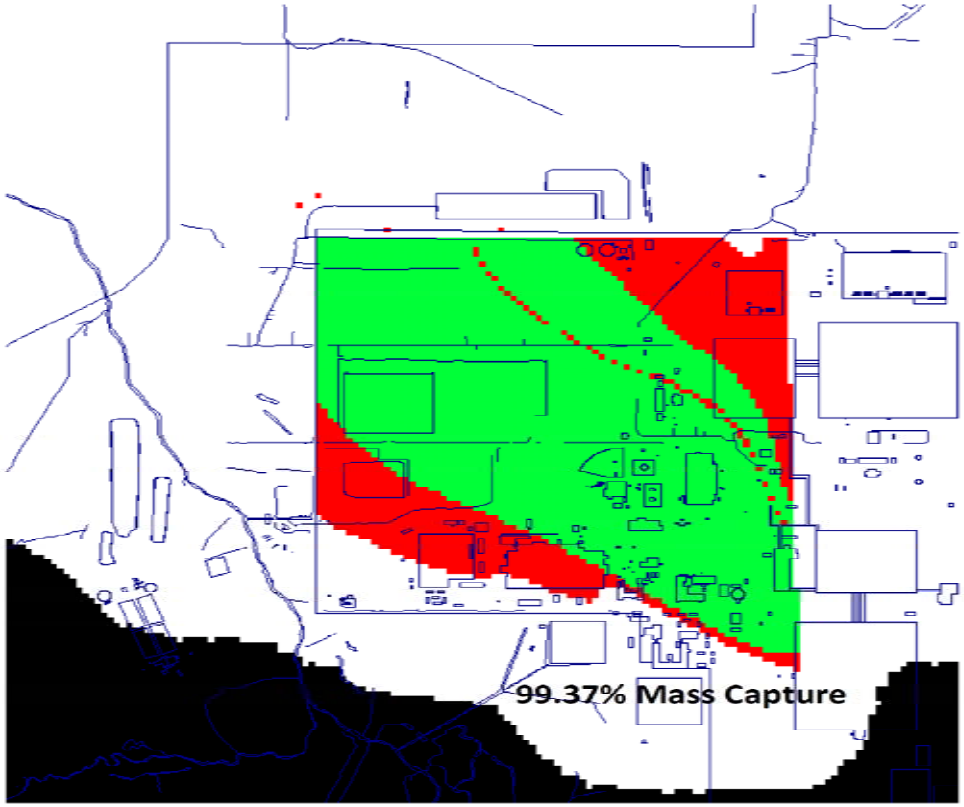


Green = Captured

Red = Not Captured

Two New Wells – 110 gpm/well

Low Pump Rate Scenario



Green = Captured

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Two New and Two Old Wells – 55 gpm/well

System Modifications

System Modification and Implementation

- Existing northern extraction wells will be taken out of operation
- Pumping from the existing southern extraction wells will be stopped
- New pilot borings drilled at model predicted extraction well locations to obtain geologic and hydraulic design data
- Design of new extraction wells, pipeline, vaults, electrical, and communication and control
- Construction packages to include:
  - Drilling and well installation
  - Piping, vaults, electrical, communication and control

Recommendation

The PGDP CAB fully supports the Northwest Plume Interim Remedial Action Optimization project and recommends that DOE continue with the process of expediting time frames and enhanced communication efforts between the Department of Energy, U.S. EPA, and Kentucky Division of Waste Management.

Recommendation (2)

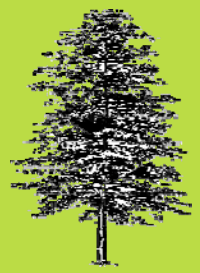
Expediting projects such as this is in the best interest of the public, as it will result in increased removal rates for TCE and 99Tc from the area of the Northwest Plume containing the highest concentrations of these compounds. The CAB acknowledges the uniqueness of this project because the Record of Decision is already in place. Further, the CAB is aware that the actual pump and treat process is not changing; only the location of the extraction wells. That being said, the CAB believes this process of expediting time frames through enhanced communication between the Department of Energy and the regulators is a good idea, and should continue in the future.

Recommendation (3)

In addition, the PGDP CAB recommends the lessons learned from this project be applied to future projects.

Committee Position

- The Groundwater Committee wants to endorse the optimization project for the Northwest Plume Pump and Treat
- The committee wants to encourage DOE to continue to expedite possible projects, if possible
- The committee wants to ensure that DOE fully benefits from the lessons learned from this process: realtime editing of documents, accelerated regulatory timelines and cooperation in meeting designated timelines be



Presented March 18, 2010