

Predicting Groundwater Contaminant Plume Migration at the Paducah Gaseous Diffusion Plant

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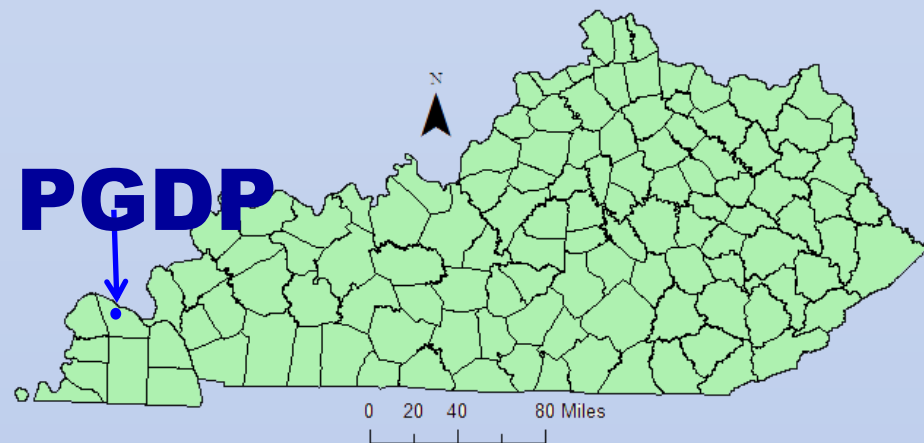
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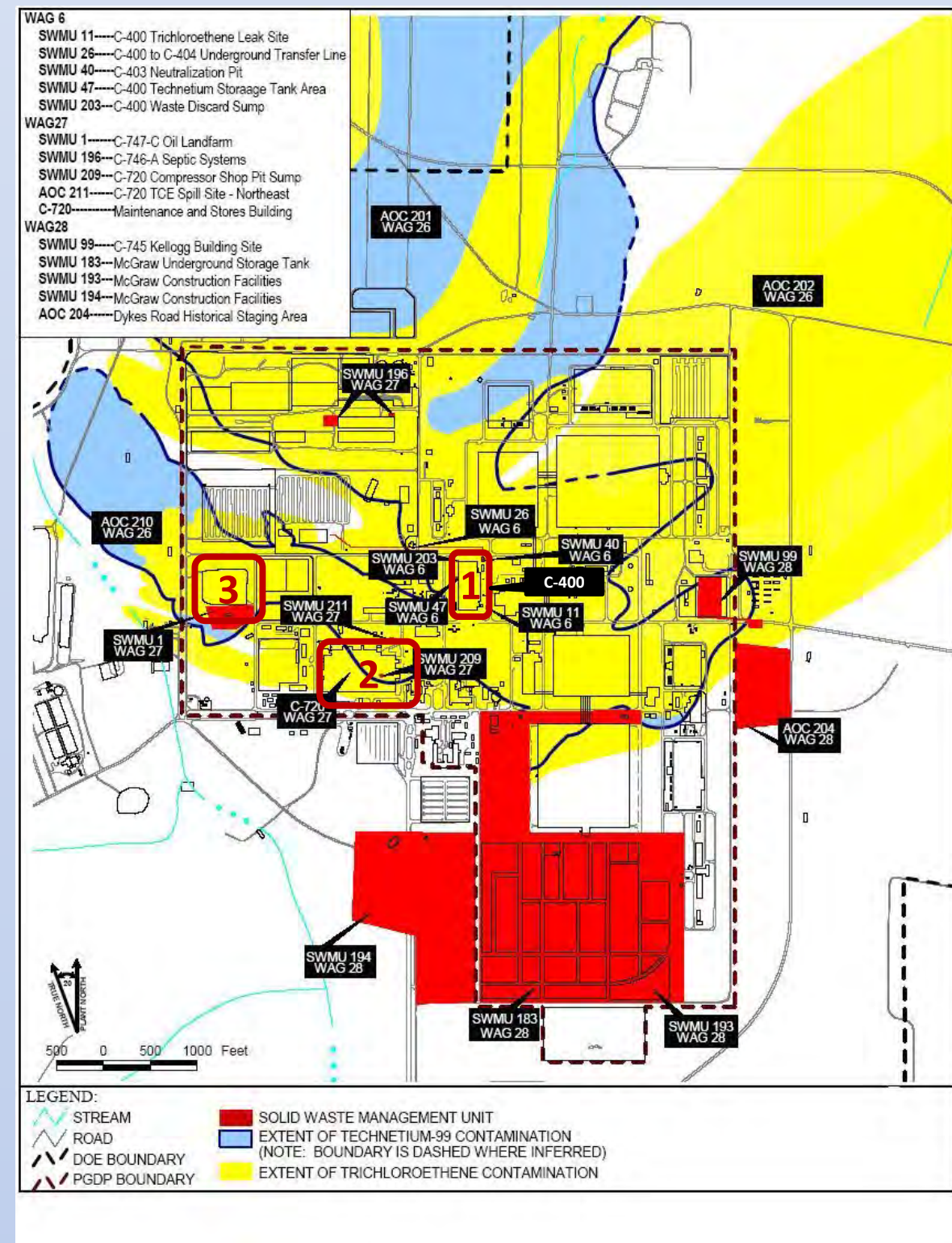
BACKGROUND

The Paducah Gaseous Diffusion Plant (PGDP) is an active uranium-enrichment facility owned by the U.S. Department of Energy. Historic activities at PGDP have released hazardous, nonhazardous, and radioactive wastes to the environment, including PCBs, trichloroethene (TCE), uranium (multiple isotopes), and technetium-99 (⁹⁹Tc). PGDP is listed by the U.S. Environmental Protection Agency as a National Priority List Superfund site. TCE, a chlorinated solvent, is the most widespread groundwater contaminant associated with PGDP.

Using an existing groundwater flow and contaminant transport model, we simulated migration of the TCE plumes in the next 100 years under several potential remedial scenarios.

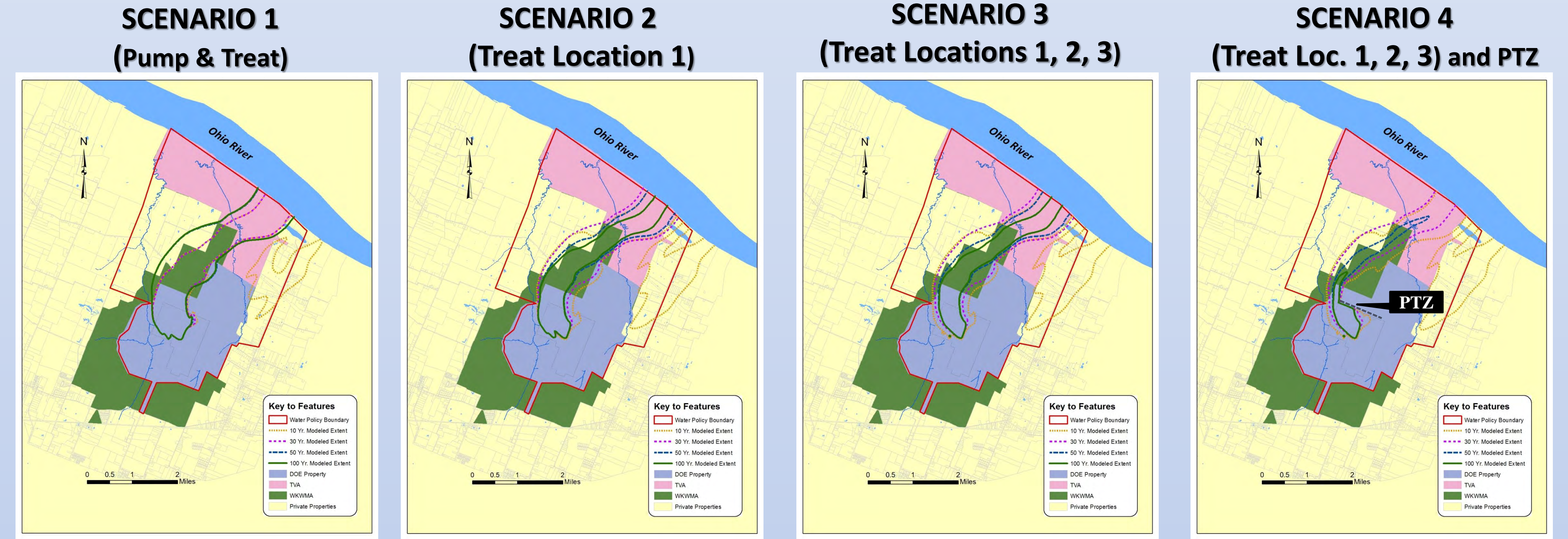


MAJOR TCE SOURCE LOCATIONS



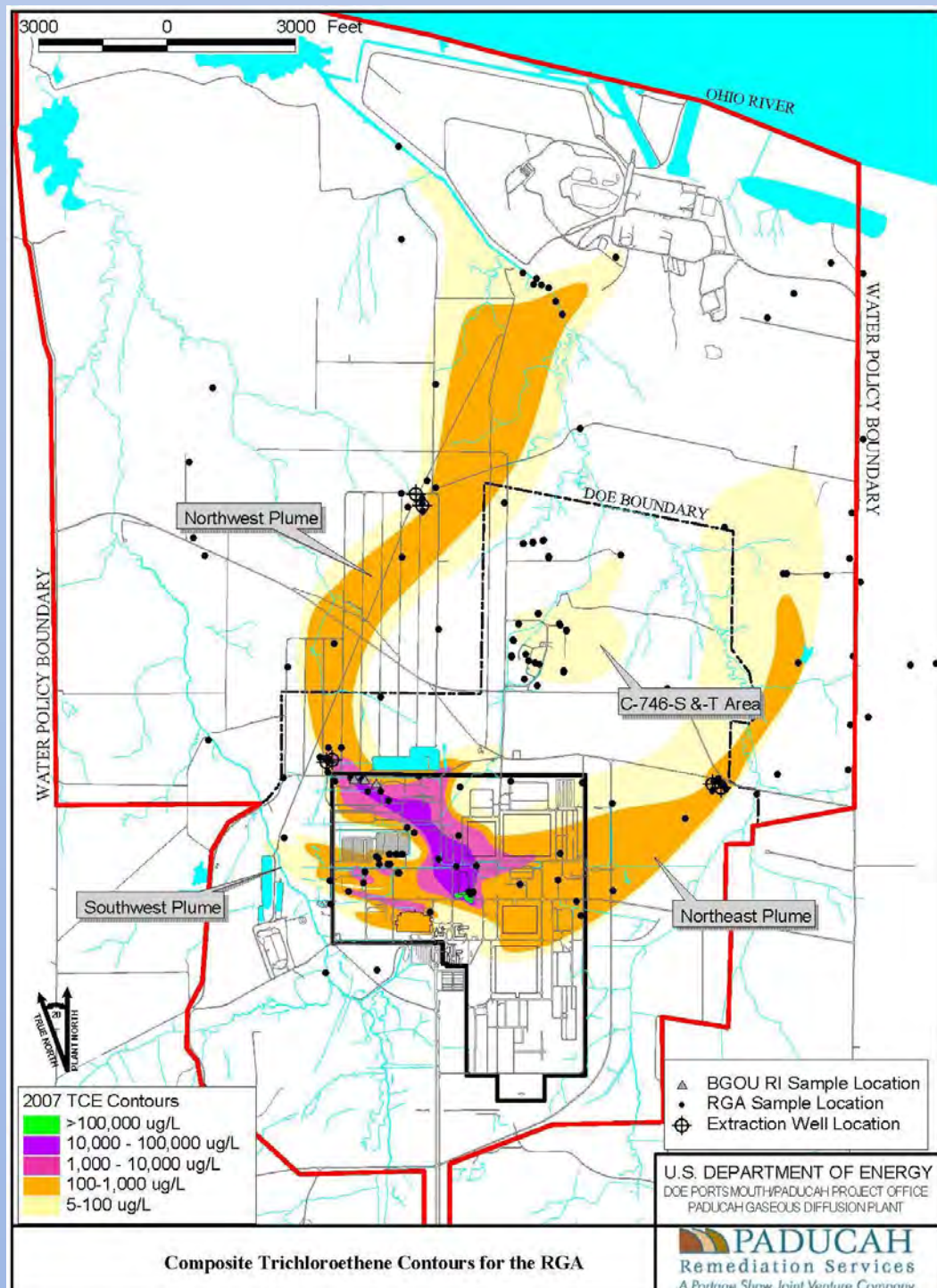
- Location 1: C-400 Building. The areas near C-400 building are believed as the major sources of the TCE plumes.
- Location 2: C-720 building.
- Location 3: SWMU 1 and SWMU 4.
- It's suspected TCE sources exist in many other areas within the facility.

SIMULATED TCE PLUME MIGRATION



Continued Operation

TCE PLUMES AS 2007



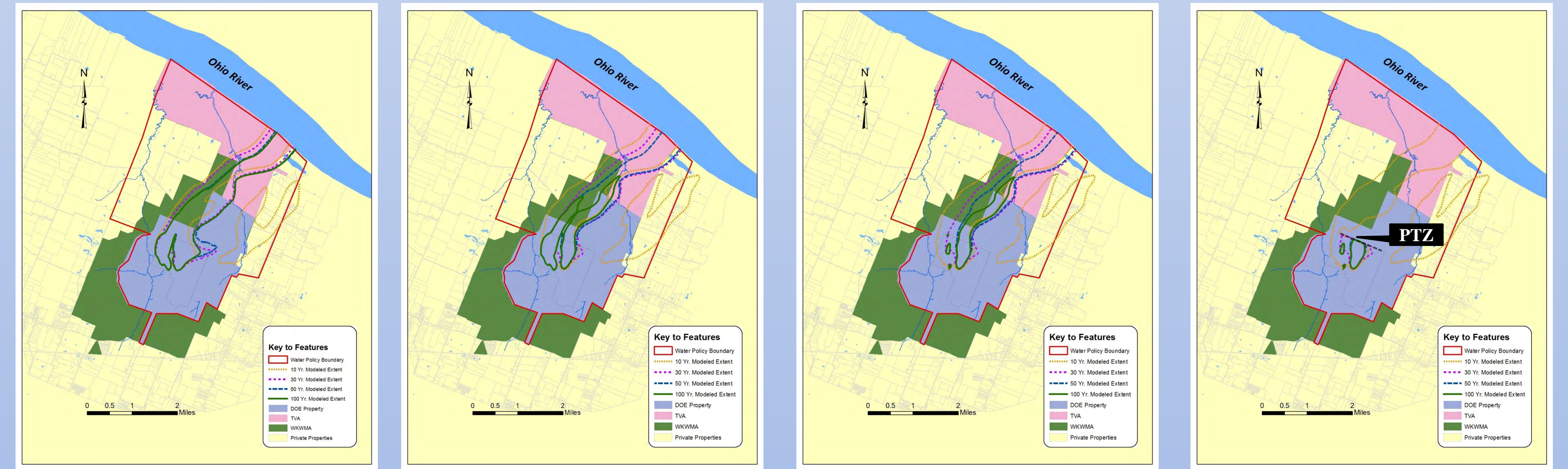
- TCE could cause liver damage and increase risk of cancer.
- TCE was a widely-used cleaning solvent from the construction of PGDP until June 30, 1993.
- Estimated about 1,000,000 kg of TCE presented in the subsurface.
- Estimated contaminated groundwater could fill 16,000 Olympic size swimming pools.

POTENTIAL RESPONSE ACTION SCENARIOS

Scenario	Proposed Remediation Method	Assumed TCE Concentration Reduction		
		C-400	C-720	SWMUs 1, 4
1	Pump & Treat (existing)	0%	0%	0%
2	Treat Location 1	97%	0%	0%
3	Treat Locations 1, 2, 3	97%	95%	95%
4	Treat Locations 1, 2, 3 and Permeable Treatment Zone (PTZ)	97%	95%	95%

PREDICTING METHOD AND ASSUMPTIONS

- Modify an existing PGDP site-wide groundwater flow and transport model to simulate a 100-year period from 2009 to 2108.
- Consider two options: 1) continued operation of the plant, and 2) plant shutdown.
- Assume 100% effectiveness of the permeable treatment zone, which is located along a fence north of the facility.



Plant Shutdown

Conclusions: under the continued operation scenario, even with the most aggressive action (response action 4), the plumes will still impact large areas between the Ohio River and the plant for more than 50 years. Under the plant shutdown scenario, only the response action 4 appears to be effective in preventing the plume migrating out of the plant site.

References: 1) 2008 Update of the Paducah Gaseous Diffusion Plant Site-wide Groundwater Flow and Transport Model (draft). 2) Trichloroethene and Technetium-99 Groundwater Contamination in the Regional Gravel Aquifer for Calendar Year 2005 at the Paducah Gaseous Diffusion Plant Paducah, Kentucky. 3) Property Acquisition Study for Areas near the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, April 2007; <http://www.paducahvision.com/>.