

Environmental Remediation Research Infrastructure at the University of Kentucky



UK Center for Applied Energy Research

- Research Focus
 - Biofuels and Environmental Catalysis
 - Carbon Materials Group
 - Clean Fuels and Chemicals Group
 - Electrochemical Power Sources Group
 - Environmental and Coal Technologies Group
 - Power Generation and Utility Fuels



National Institutes for Water Resources



DISTRICT OF COLUMBIA

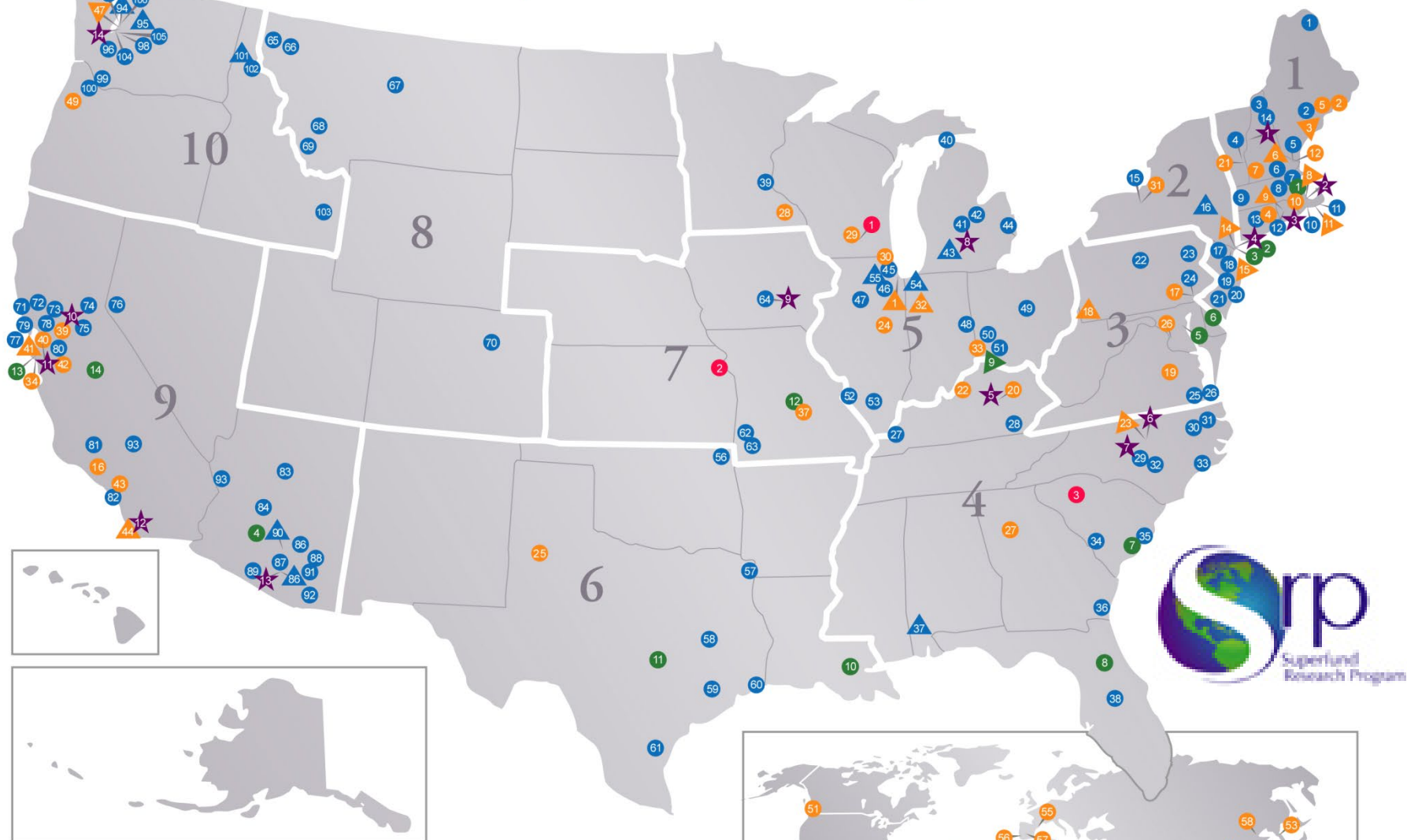
GUAM

PUERTO RICO

US VIRGIN ISLANDS



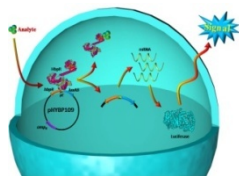
NIEHS Superfund Basic Research Program



KEY

- ★ Superfund Basic Research Programs (14)
- Superfund Basic Research Program Partnering Institutions (89)
- Superfund Basic Research Program Research and Outreach at Hazardous Waste Sites (210)
- Small Business Innovation Research Grants (3)
- Individual Research Projects (15)
- ▲ Indicates more than one site at location





Bio sensors



Nano Laboratory

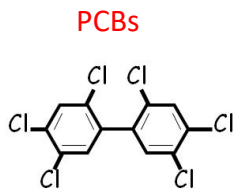
● Non Biomed Projects

① Detect (*Daunert*)

Superfund

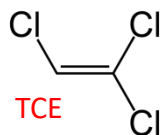


Sites



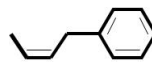
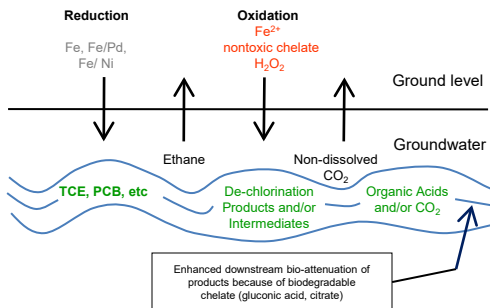
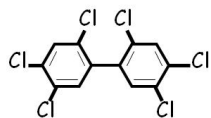
Superfund
Chemicals

Environment



② Remove (*Bhattacharyya*)

Groundwater Remediation Using Combined Strategies
For Reduction and Oxidation



③ Brain Cancer (*Toborek*)

④ Obesity - Cardiovascular Diseases (*Cassis*)

⑤ Atherosclerosis (*Hennig*)

● Biomed Projects

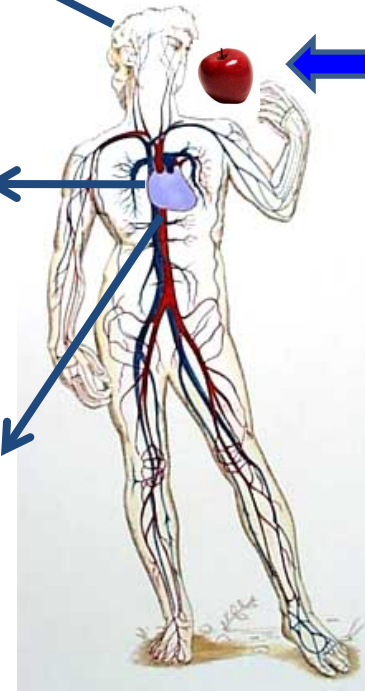


Genetics



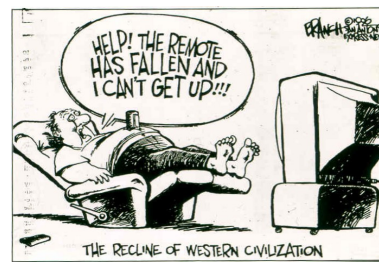
Omega 3
Fatty Acids

Nutrition

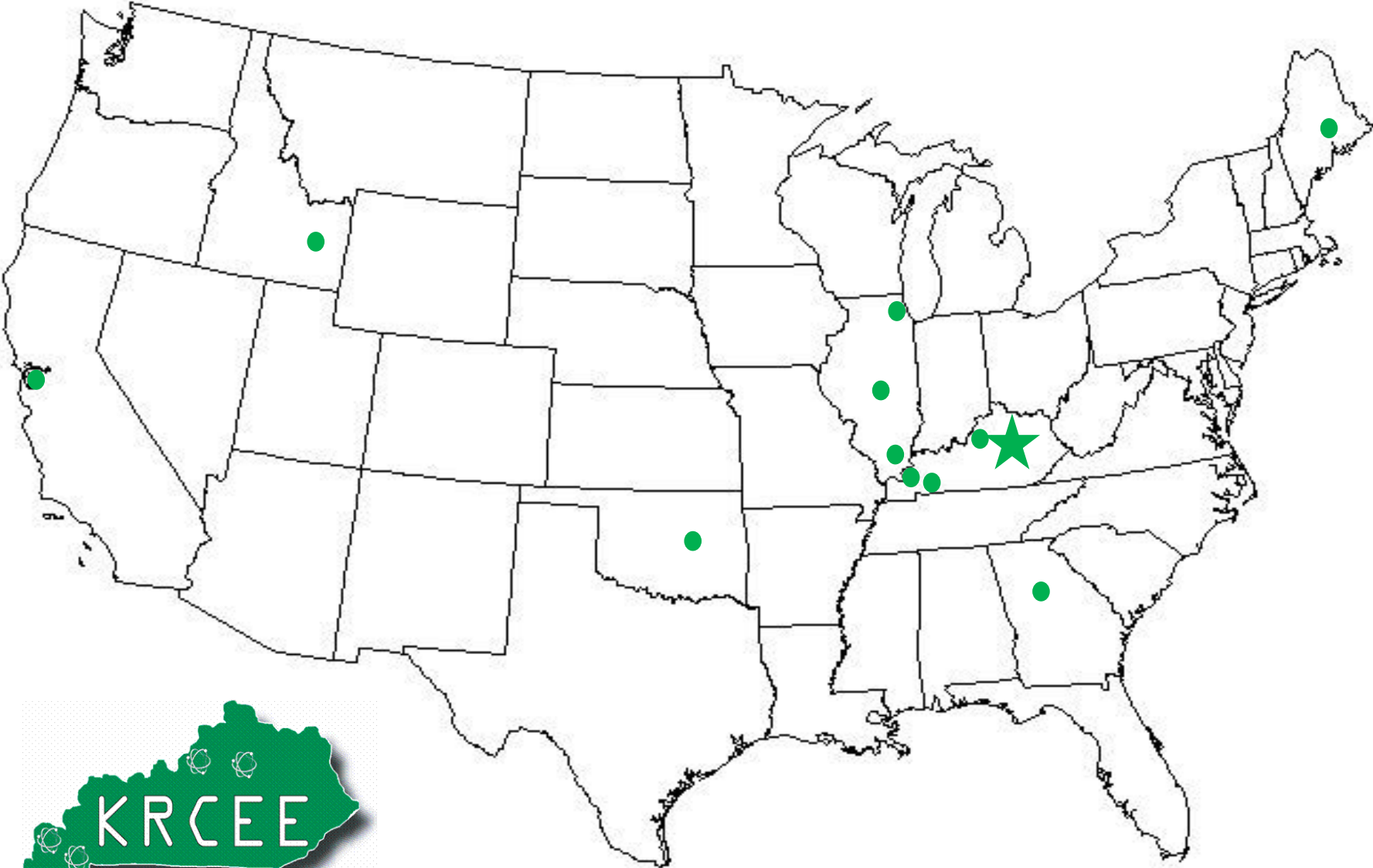


Health

Lifestyle



Kentucky Research Consortium for Energy and the Environment



KRCEE Goals

- Created in 2003 by Senator Mitch McConnell through a congressional earmark
- Provide an independent perspective on technical issues associated with the clean-up efforts at the PGDP.
 - University faculty/staff
 - Independent consultants
- Identify and investigate innovative technologies for possible application at the Paducah Gaseous Diffusion Plant.

2003-2008 KRCEE Projects

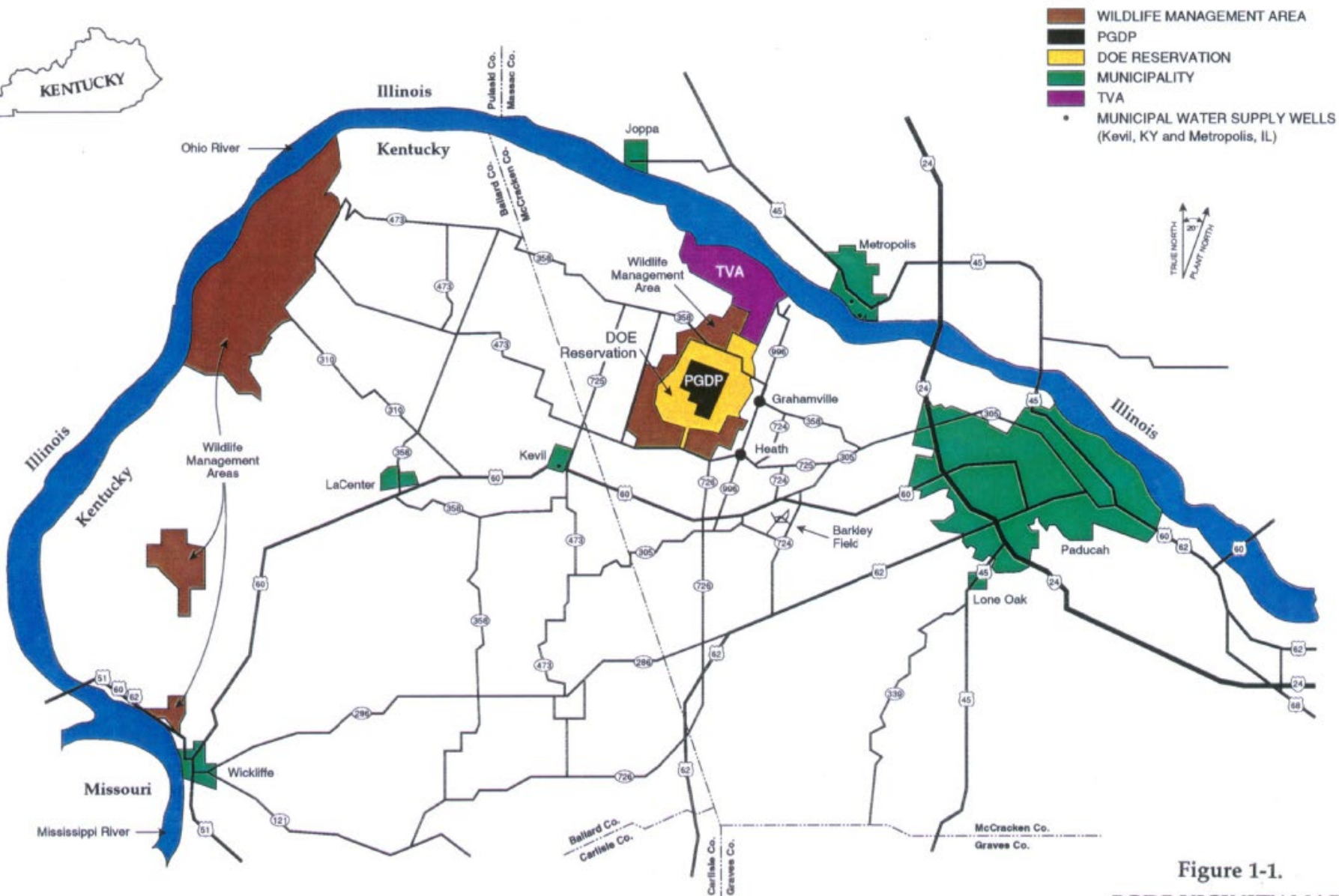
- 22 Projects
 - Metal Recovery Projects (3)
 - Technology Development Projects (3)
 - Seismic Projects (6)
 - Groundwater Projects (5)
 - Surface Water Projects (4)
 - Ecological Projects (1)
- Total Number of Reports (60)



2009-2011 KRCEE Projects

- 7 Projects
 - TCE Fate and Transport
 - End State Vision Project
 - Ecological Project
 - Nano-Particle Remediation Project
 - Seismic Issues
 - DWGIS Database Tool Development
 - Technical Support Training



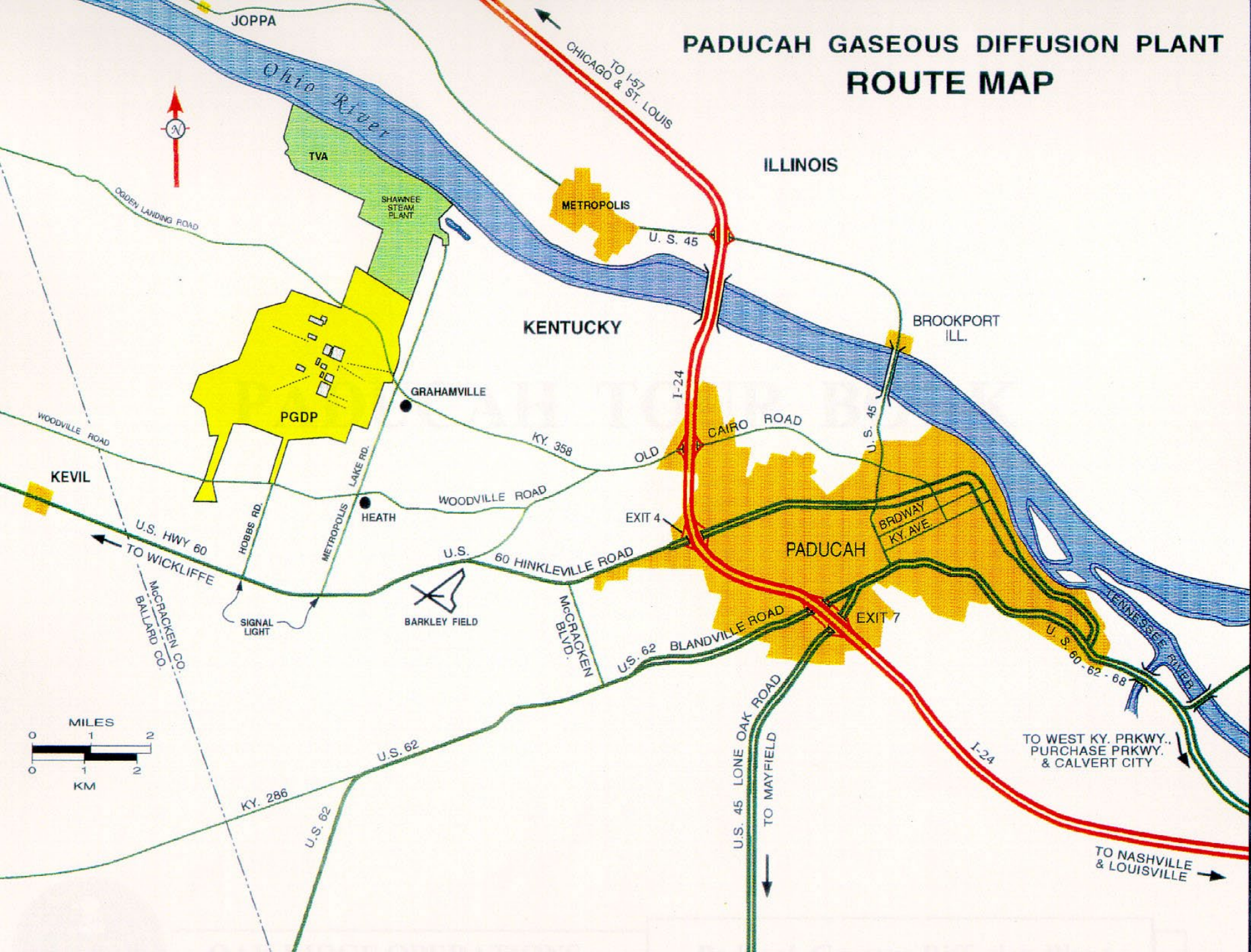


- WILDLIFE MANAGEMENT AREA
- PGDP
- DOE RESERVATION
- MUNICIPALITY
- TVA
- MUNICIPAL WATER SUPPLY WELLS (Kevil, KY and Metropolis, IL)



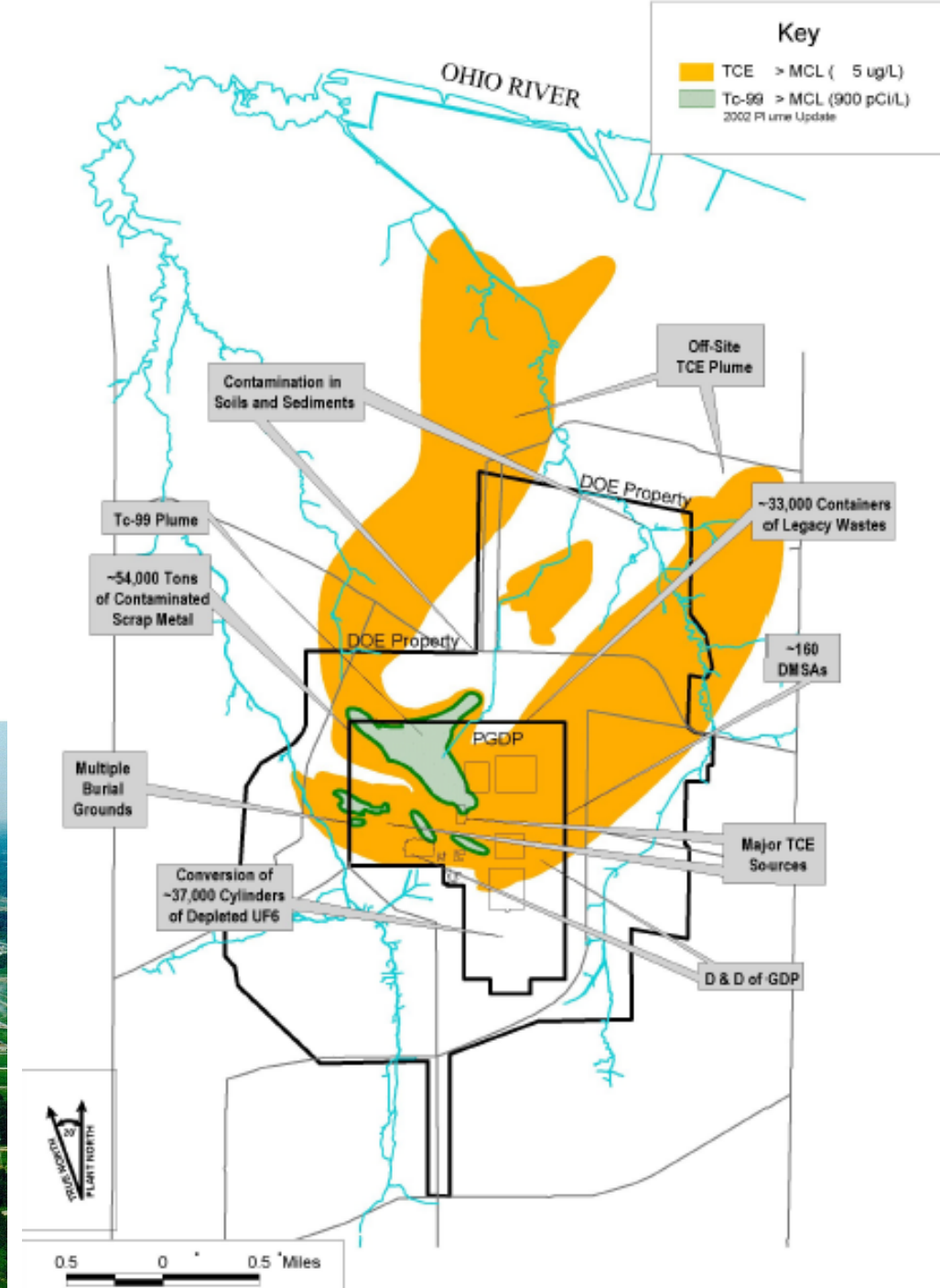
Figure 1-1.
PGDP VICINITY MAP
Paducah Gaseous Diffusion Plant
Paducah, Kentucky

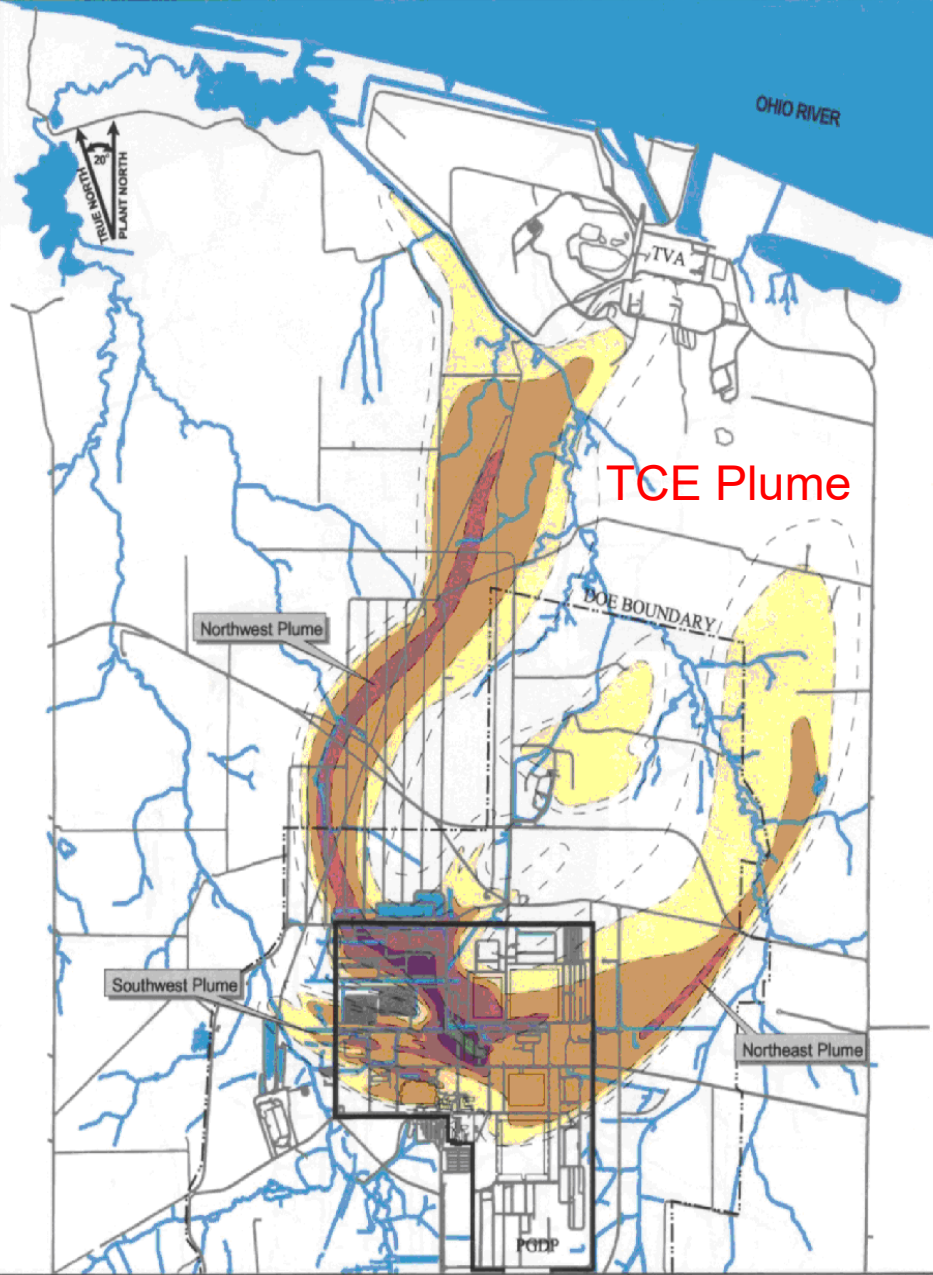
PADUCAH GASEOUS DIFFUSION PLANT ROUTE MAP



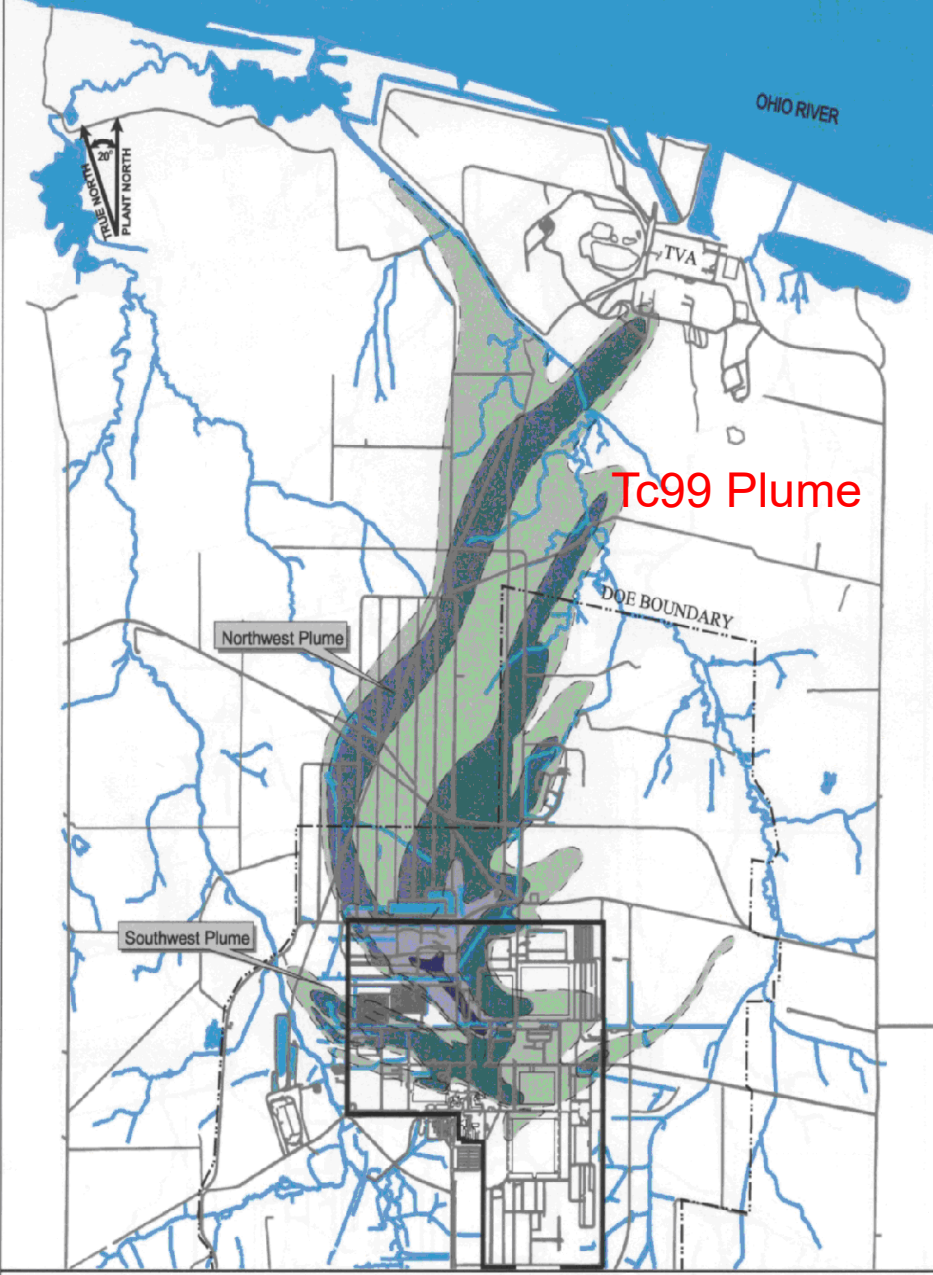
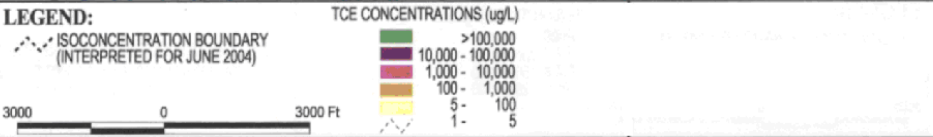
Paducah Gaseous Diffusion Plant

1988 Tc99 discovered in
off-site residential wells
1994 PGDP placed on NPL
Large TCE plumes
Radio-nuclides
PCBs

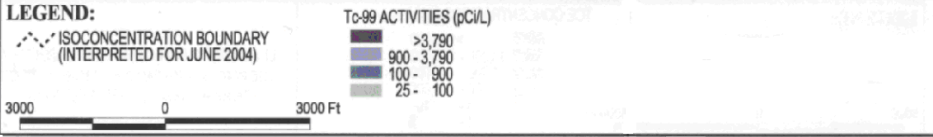




TCE Plume



Tc99 Plume



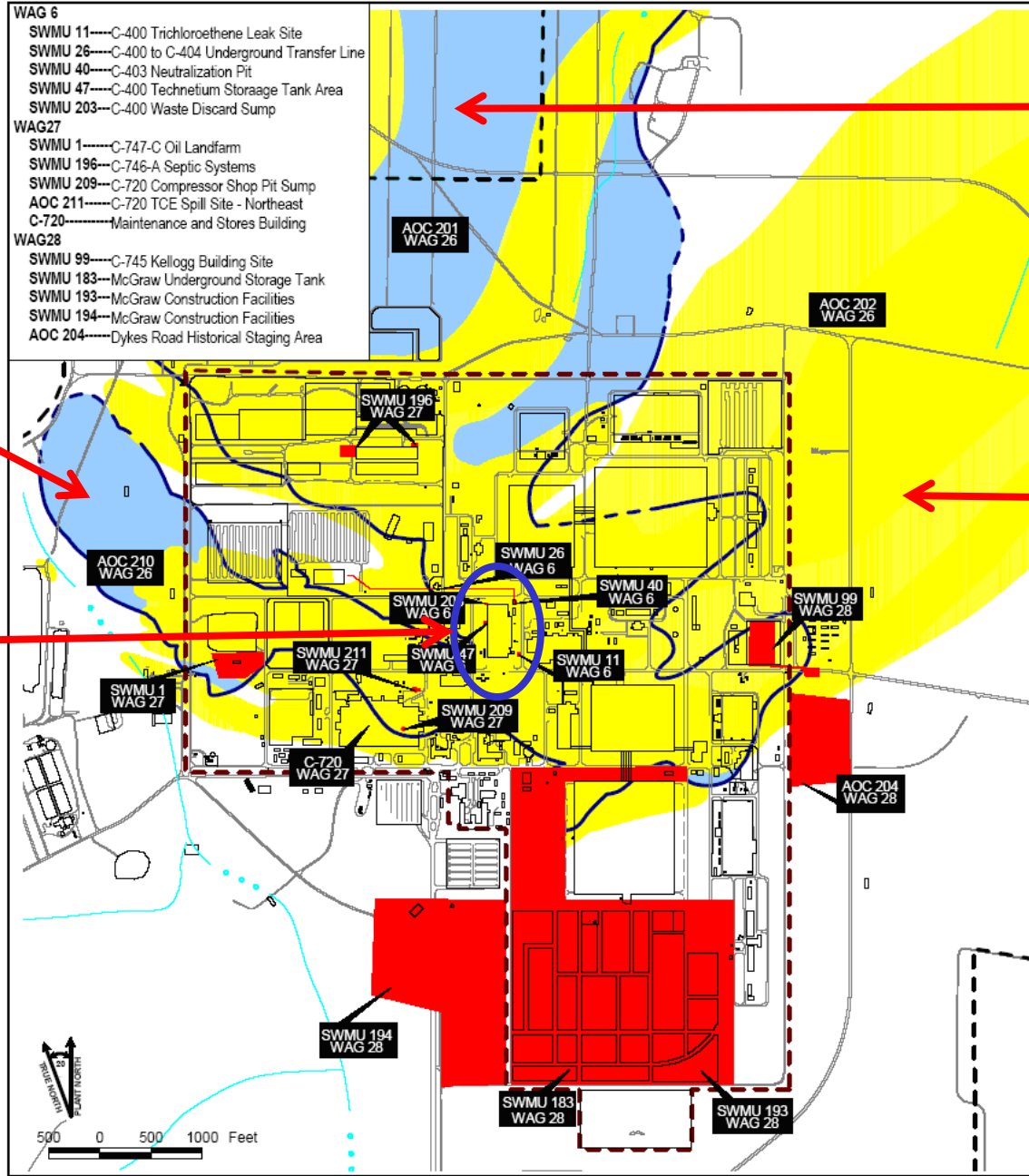
- WAG 6
- SWMU 11---C-400 Trichloroethene Leak Site
- SWMU 26---C-400 to C-404 Underground Transfer Line
- SWMU 40---C-403 Neutralization Pit
- SWMU 47---C-400 Technetium Storage Tank Area
- SWMU 203---C-400 Waste Discard Sump
- WAG27
- SWMU 1---C-747-C Oil Landfarm
- SWMU 196---C-746-A Septic Systems
- SWMU 209---C-720 Compressor Shop Pit Sump
- AOC 211---C-720 TCE Spill Site - Northeast
- C-720---Maintenance and Stores Building
- WAG28
- SWMU 99---C-745 Kellogg Building Site
- SWMU 183---McGraw Underground Storage Tank
- SWMU 193---McGraw Construction Facilities
- SWMU 194---McGraw Construction Facilities
- AOC 204---Dykes Road Historical Staging Area

Southwest Plume

Northeast Plume

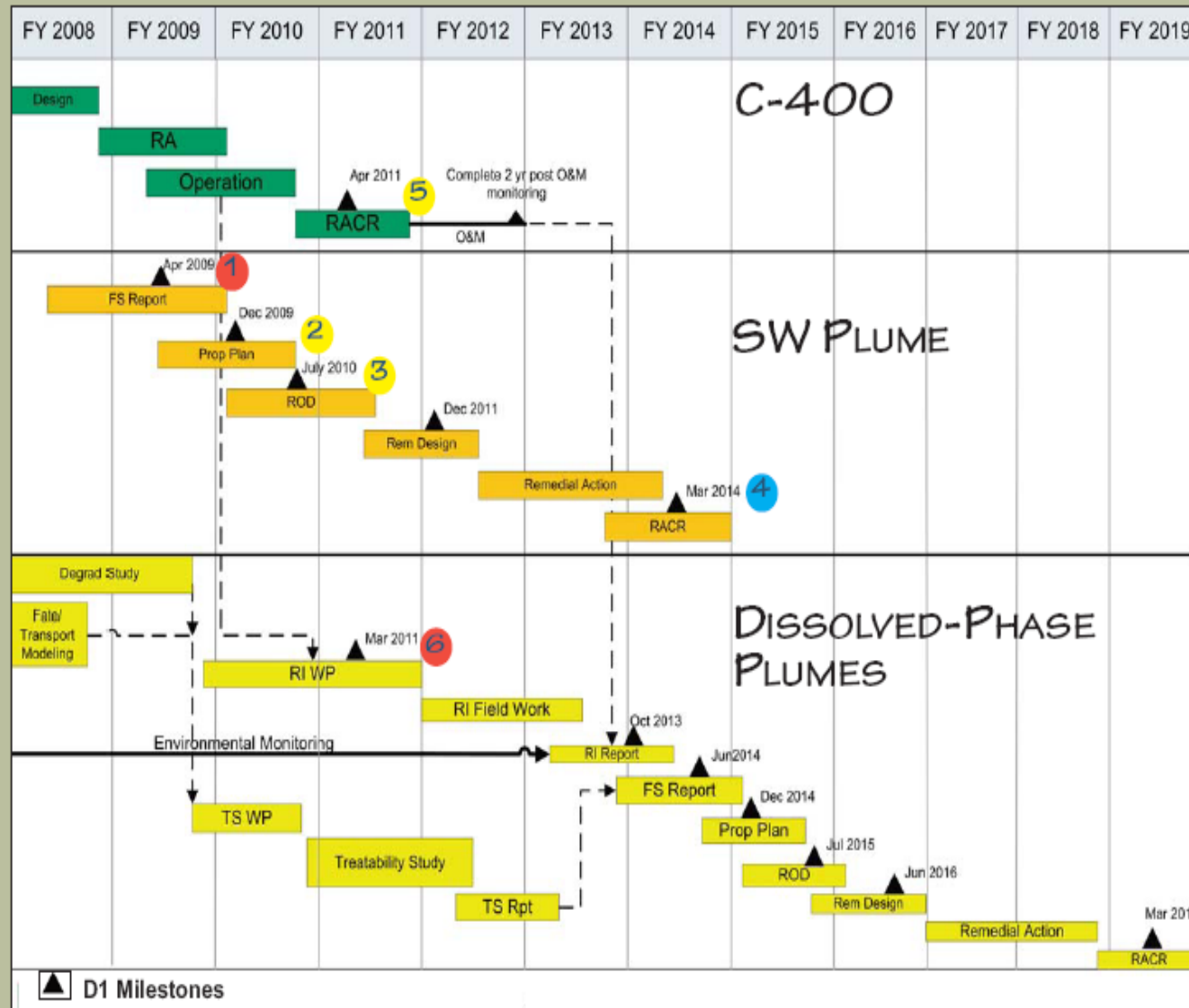
Electrical Resistance Heating

Northwest Plume



- LEGEND:
- STREAM
 - ROAD
 - DOE BOUNDARY
 - PGDP BOUNDARY
 - SOLID WASTE MANAGEMENT UNIT
 - EXTENT OF TECHNETIUM-99 CONTAMINATION (NOTE: BOUNDARY IS DASHED WHERE INFERRED)
 - EXTENT OF TRICHLOROETHENE CONTAMINATION

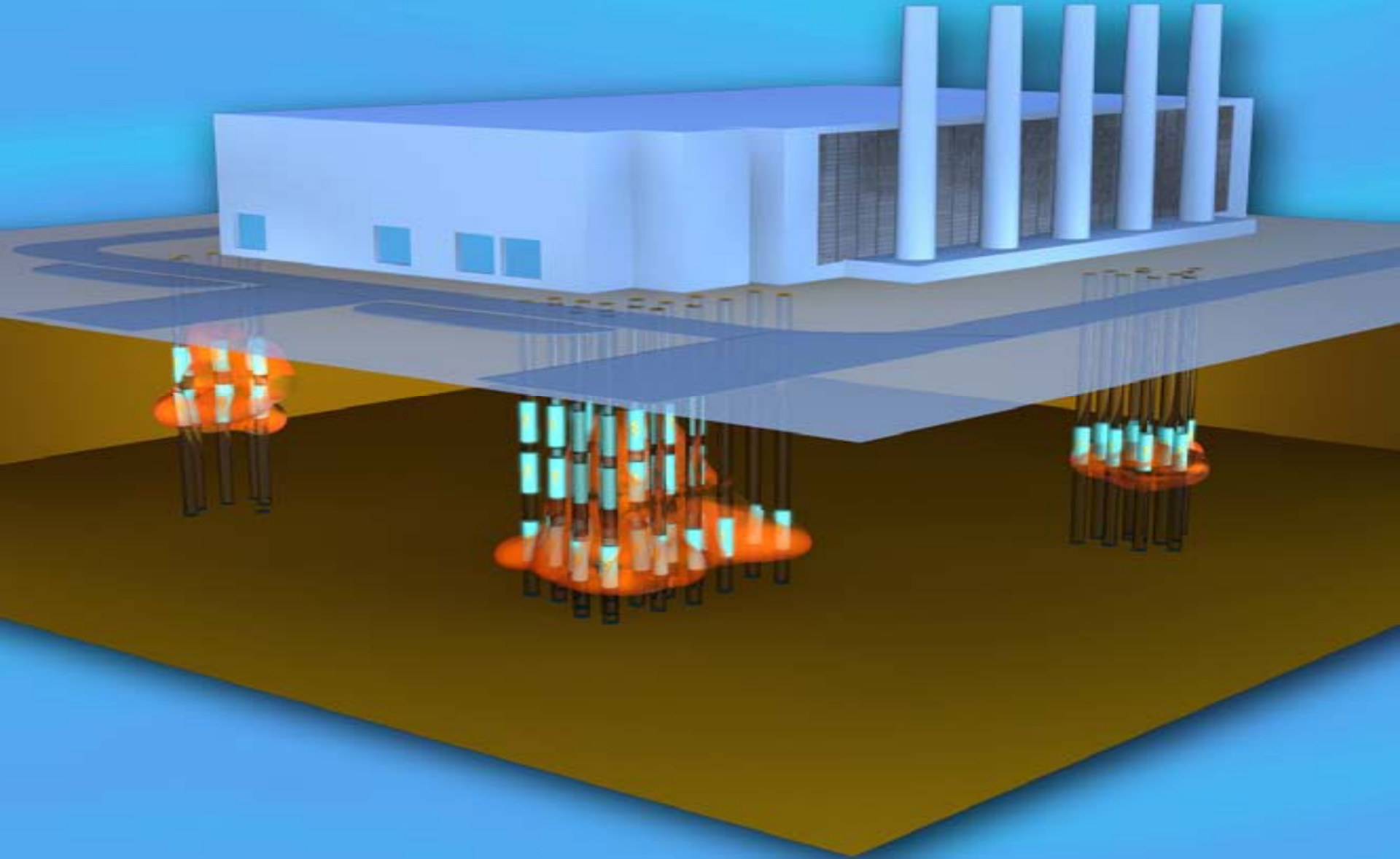
Groundwater Operable Unit Schedule



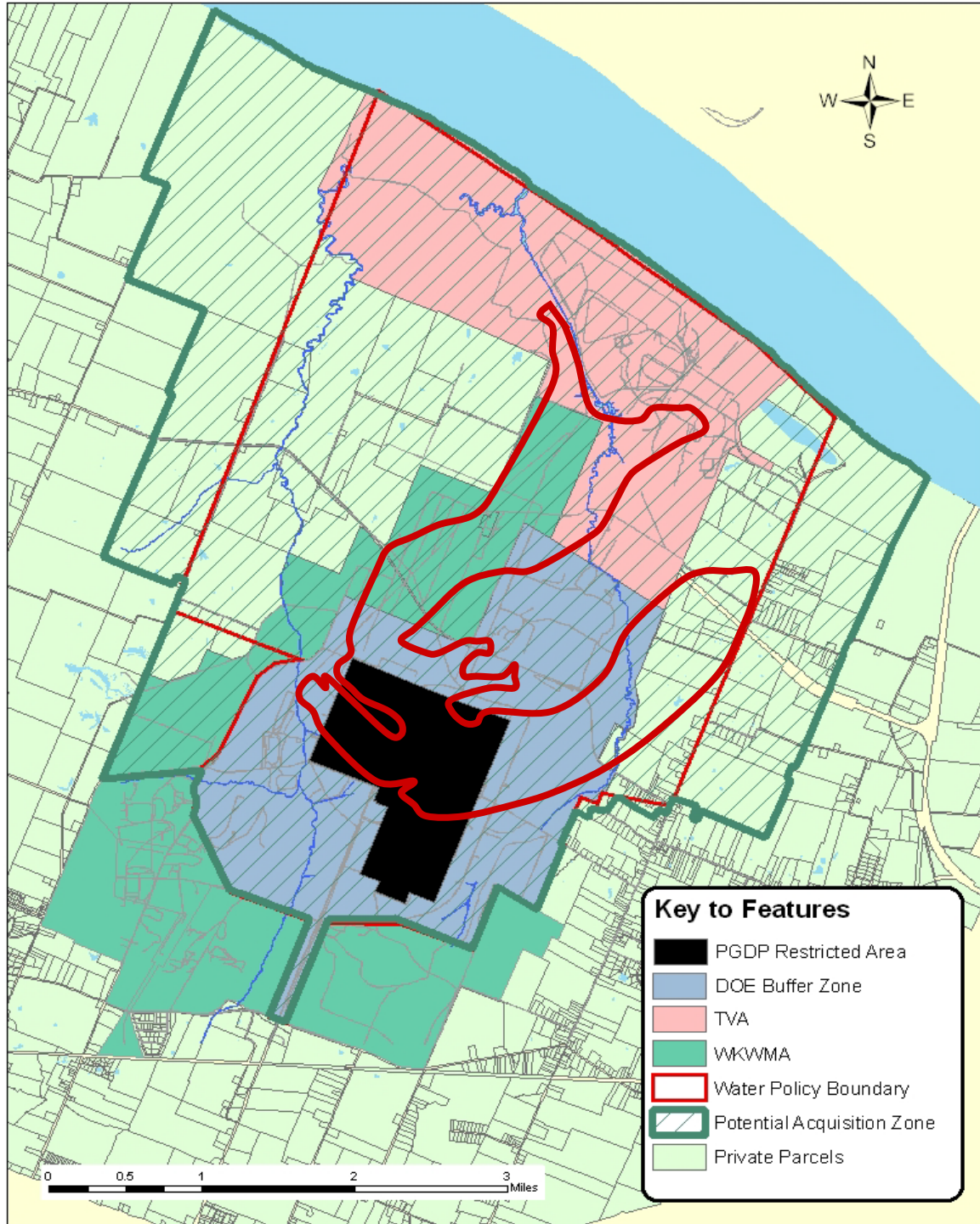
SMP Milestones

- 1 SW Plume FFS - 7/28/09
 - 2 SW Plume Proposed Plan - 3/25/10
 - 3 SW Plume ROD - 9/17/10
 - 4 SW Plume Remedial Action Completion Report - 6/28/15
 - 5 C-400 Remedial Action Completion Report - 4/26/2011
 - 6 Dissolved-Phase Plume RI/FS Work Plan - 3/10/11 (planning date)
- FY-07 SMP Approved Enforceable Milestone included in FY-08 SMP
 - FY-08 SMP Proposed New Milestone
 - Out-year milestone proposed for evaluation/modification in FY09 SMP

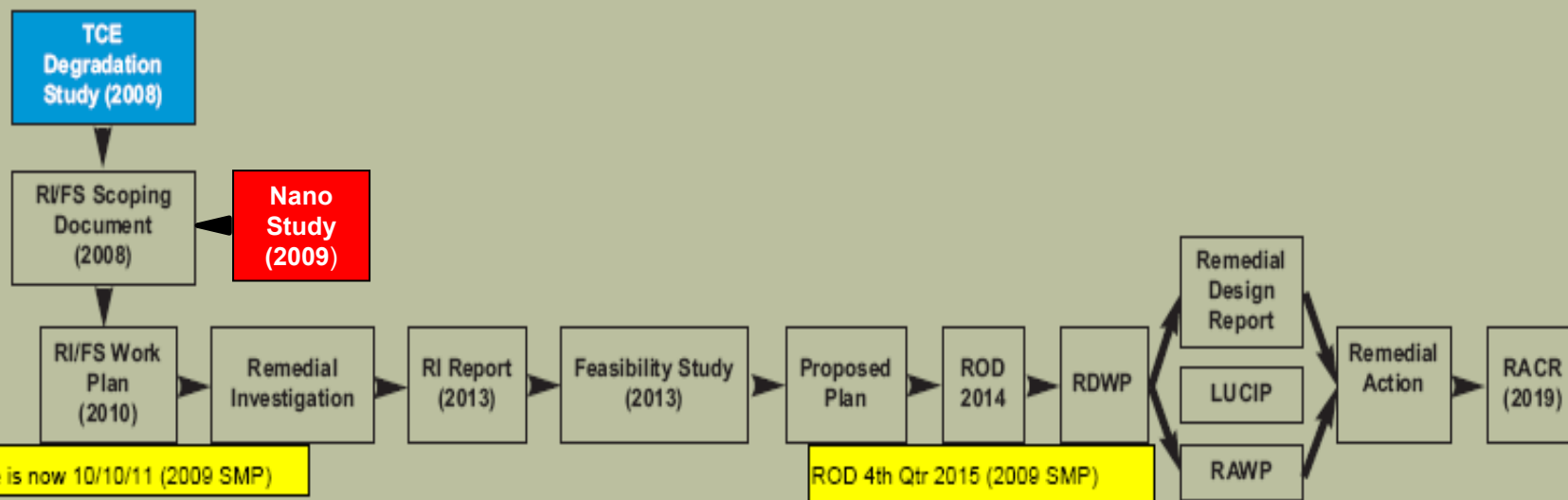
Electrical Resistance Heating



TCE Dissolved Phase Plume Extents



Dissolved Phase Plume Schedule Overview and Status



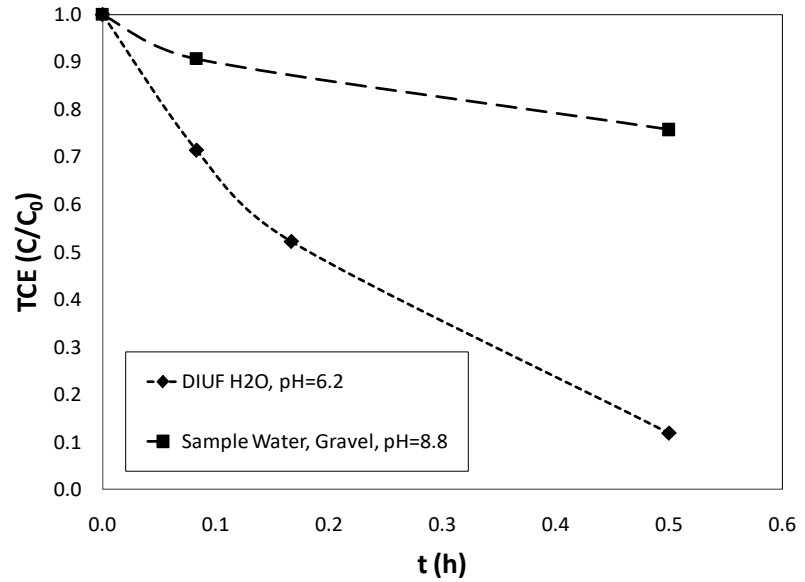
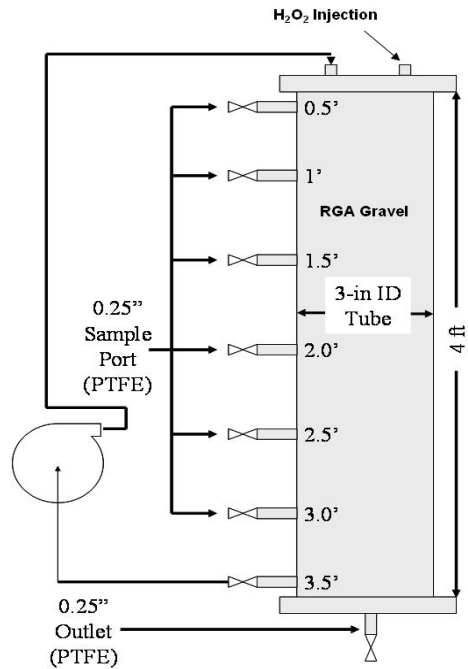
Near-Term 2006 - 2009

- Support TCE Fate & Transport analysis by performing necessary fieldwork and analysis as identified by Fate & Transport Working Group
- Update groundwater model
- Develop and submit to regulators RI/FS Scoping Document

Out-Year 2010-2019

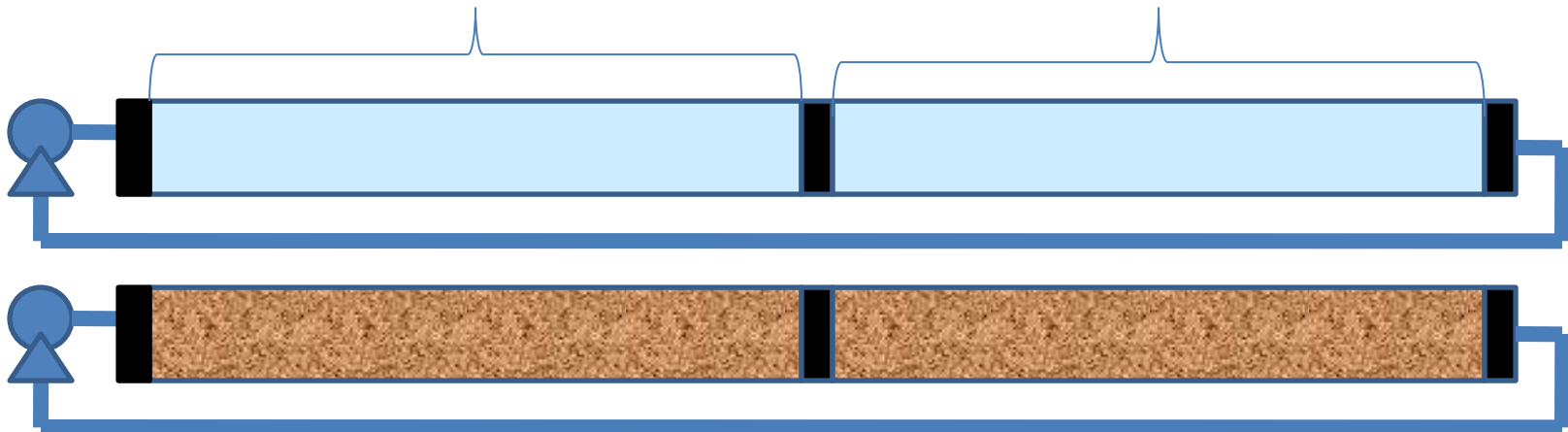
- Development and regulatory approval of RI/FS Work Plan
- Implement RI fieldwork
- Development and regulatory approval of RI Report
- FS development and regulatory approval
- Development and regulatory approval of Proposed Plan
- Development and regulatory approval of ROD and LUCIP
- Development and regulatory approval of Remedial Design Work Plan
- Development and regulatory approval of Remedial Design Report and Remedial Action Work Plan
- Implement remedial action
- Development and regulatory approval of Remedial Action Completion Report

Laboratory/Bench Experiments

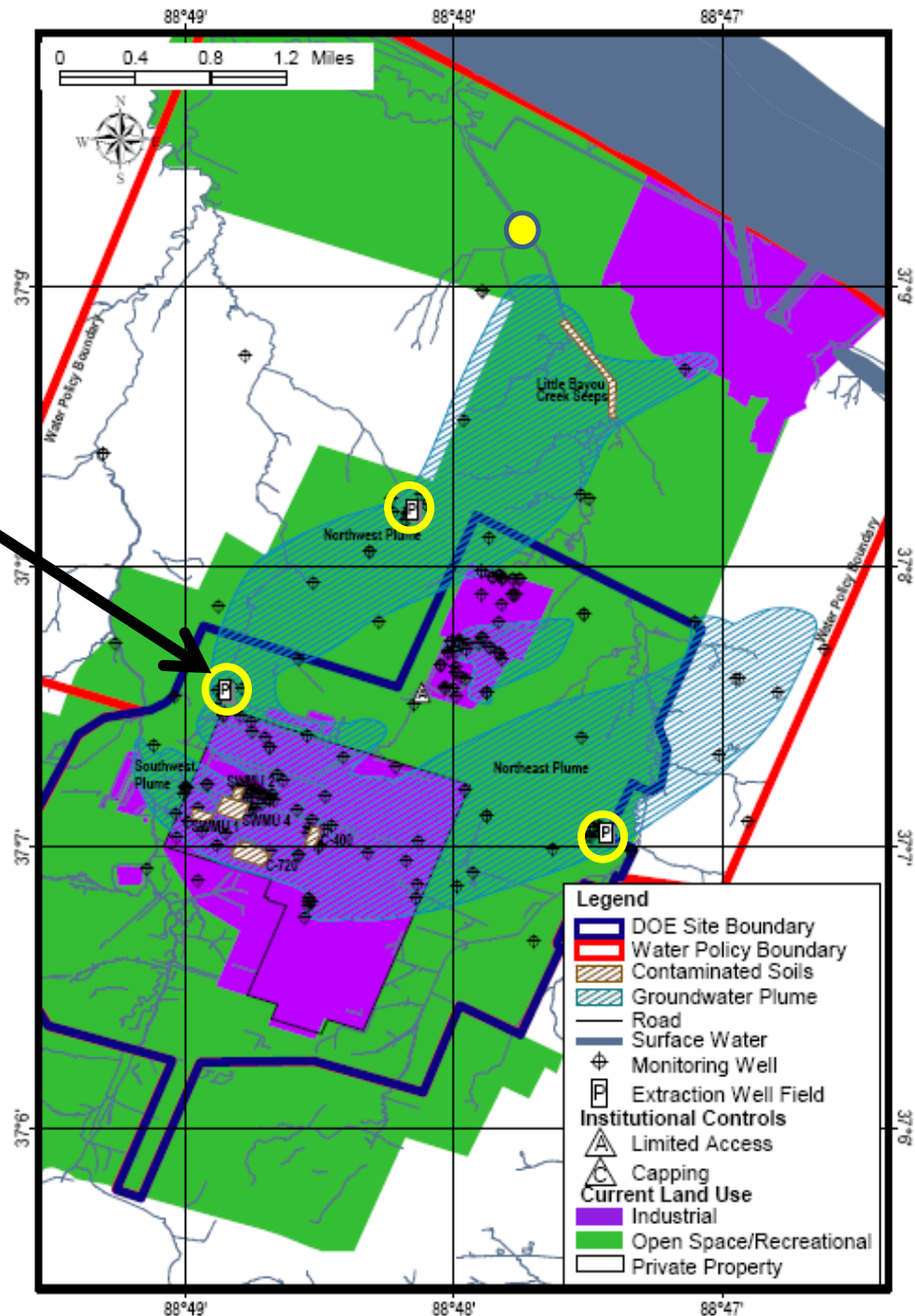
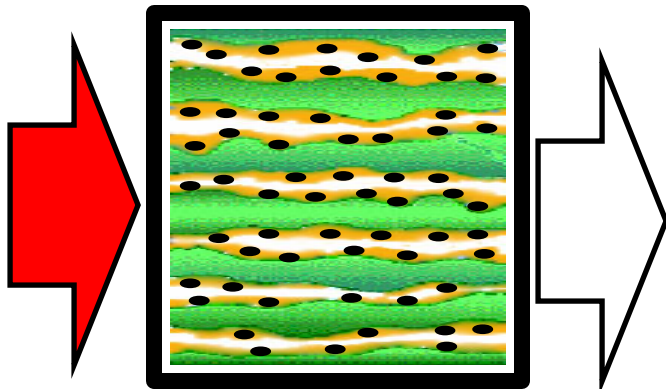


Treatment

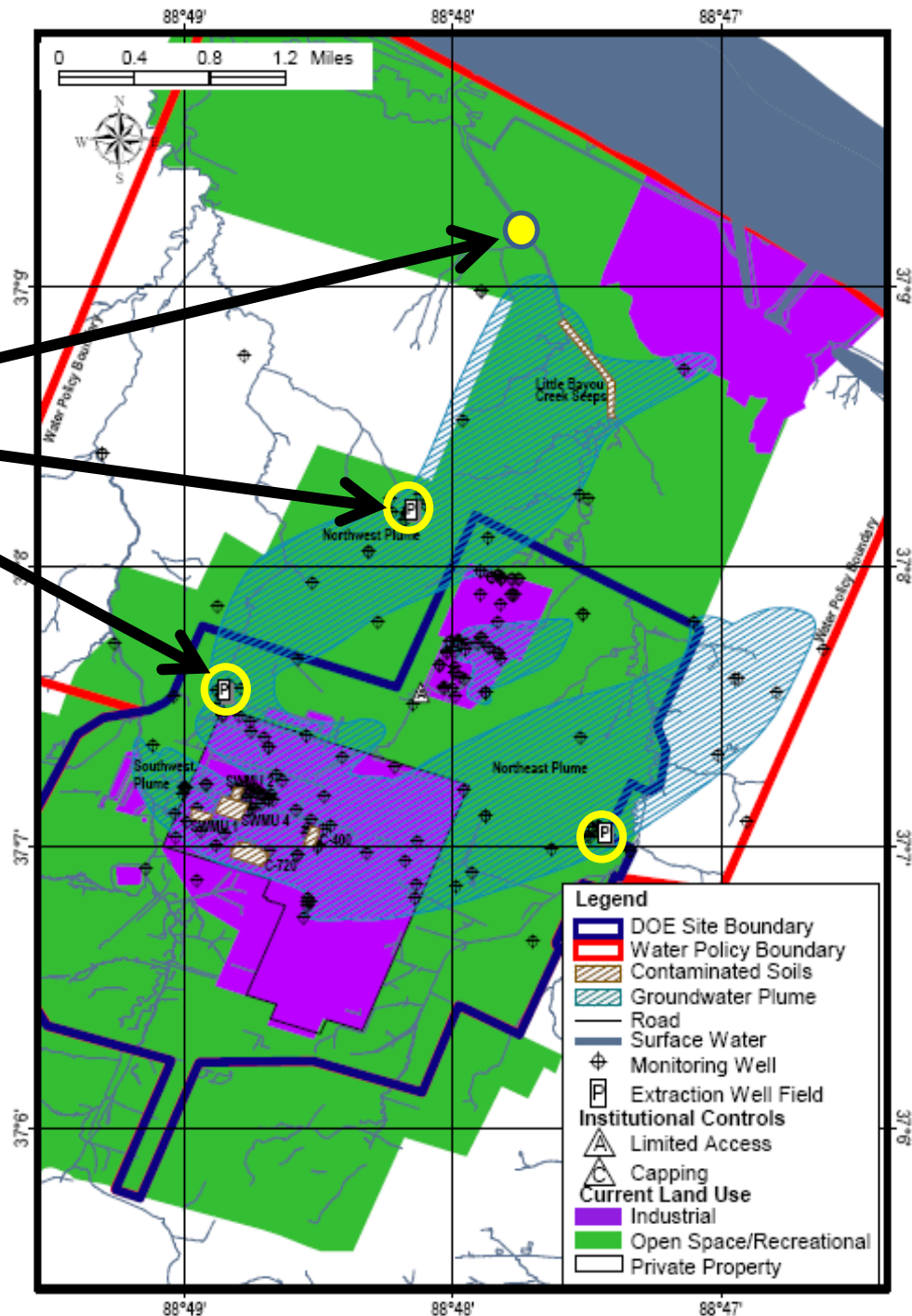
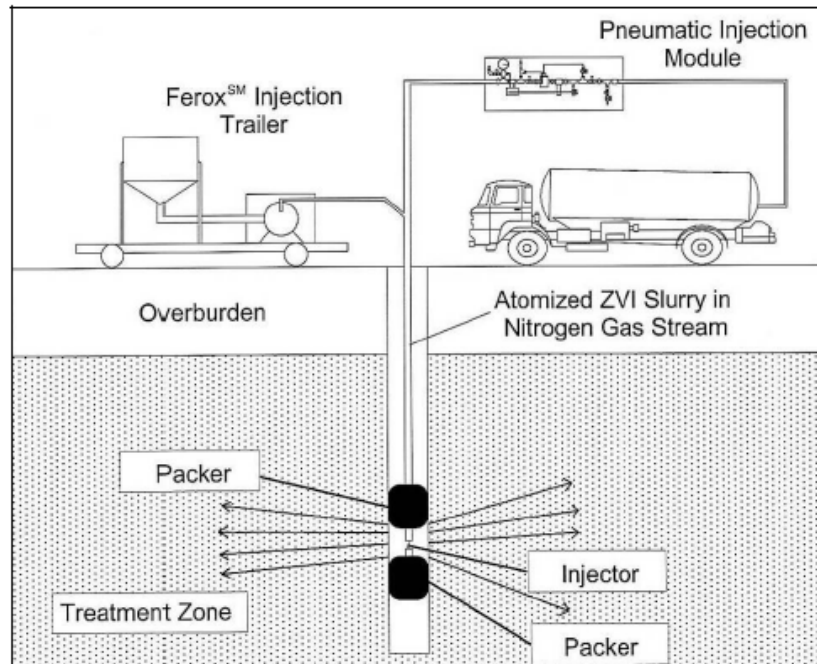
Stabilization



Perform Ex-situ Experiments at P&T site



Perform In-Situ Experiments



Characterize Aquifer Geology and Flow Path

