Meeting Minutes

Broadway-Pantano (BP) Water Quality Assurance Revolving Fund (WQARF) Site
Community Advisory Board (CAB) Meeting

MINUTES

Wednesday, November 30, 2016
6 p.m. - 8 p.m.
Wilmot – Murphy Public Library
530 N. Wilmot Rd.
Tucson, Arizona 85711

CAB Members present: Janet Marcus (Co-Chair), Aubrey McMullen, Jean Sabo, Dr. Mark Brusseau, Michael Smith, Cheri Bludau

CAB Members absent: Bill Petroutson (Co-Chair), Jackie Olson, Wanda Ryckman

ADEQ Staff (and consultants) in attendance: Gretchen Wagenseller, ADEQ Project Manager; Wendy Flood, ADEQ Community Involvement Coordinator (CIC); Isabel Gutierrez, CIC; Natalie Chrisman Lazarr, Amec Foster Wheeler; Doug Fisher, Amec Foster Wheeler; and Rachel Romo, Amec Foster Wheeler.

Members of the public present: Lori Ehman, City of Tucson and Molly Collins, Tucson Water

1. Call to order/introductions
Ms. Isabel Gutierrez opened the meeting with introductions of CAB members and other present as listed in these minutes. The meeting began at 6:25 p.m. due to a change in location.

2. Acceptance and/or changes to March 8, 2016 minutes
Ms. Jean Sabo made a motion to accept the minutes as is. The motion was seconded by Mr. Mark Brusseau; motion passed.

3. WQARF Program Phases Update -
Ms. Gretchen Wagenseller presented the WQARF process and the current phase status.

4. Update on Current Site Work and Overview of Feasibility Study Results (SEE ATTACHED PRESENTATION) –
The following are question asked during the presentation:

- Ms. Bludau asked for clarification on the movement of a specific plume. Ms. Chrisman Lazarr explained in more detail the migration of the plume.
- Mr. Smith questioned why one specific plume had no current data. He also asked where the well with the highest concentrations was located. Ms. Chrisman Lazarr explained that

the well with the highest concentrations is WR-274A and that it is currently being monitored. Ms. Wagenseller also provided additional clarification regarding representation of plumes and maximum contaminant levels (MCLs).

- Mr. Smith asked for additional clarification regarding the well depths.
- Mr. Smith commented that previously they were provided with concentration data on the wells that were being sampled. Ms. Chrisman Lazarr explained that the results from the last round of sampling were provided on the website.
  Ms. Wagenseller stated ADEQ will only continue to sample the most important wells instead of all the wells and semiannual sampling results will be included in the FS report.
- Ms. Bludau asked for clarification regarding the ISCO pilot study, she also expressed concern that only groundwater is being addressed and not shallow vapor. Ms. Chrisman Lazarr explained the purpose of the ISCO pilot study and how the vapor samples show that shallow soil vapor levels are low and do not pose a risk.
- Mr. McMullen asked if the soil vapors are continuing to be produced or migrate. Ms. Chrisman Lazarr stated there does not appear to be a continuing source to soil vapor at the site and soil vapor migration is negligible.
- Mr. Smith asked what would happen if water above MCLs impacted Tucson Water production wells. Ms. Chrisman Lazarr replied that well head treatment would occur. Ms. Collins stated that Tucson Water does not endorse well head treatment on their wells and is encouraging ADEQ to proceed with the most aggressive treatment option.
- Ms. Sabo expressed concerns about having access to information and the ability to input on the selected remedy prior to finalization. Ms. Flood explained there will be a comment period that involves all parties to discuss the best possible solution and course of action.
- Mr. McMullen asked if the dross metals could impact groundwater. Ms. Chrisman Lazarr stated it does not pose a risk to groundwater and have proposed stopping possible infiltration. The option proposed will be an asphalt cap to protect from exposure as well as a possible reuse. Mr. McMullen asked if there was a possibility in removing the dross. Ms. Chrisman Lazarr explained that it was proposed in the past, but covered the additional problems that could cause.
- The CAB agreed that they want to receive the lab results from the semiannual sampling event and not wait for the data to be presented in the final FS report.

5. Call to the public*
No public comments or statements.

6. Future meeting and agenda discussion
The tentative meeting date will be March or April of 2017.

7. Adjournment – 8 pm

This meeting was recorded on a digital device as a record of the proceedings. To listen to a recording, or for additional documents mentioned in these minutes, contact ADEQ.

Broadway Pantano WQARF Site
Community Advisory Board Meeting
November 30, 2016

Update on Current Site Work and

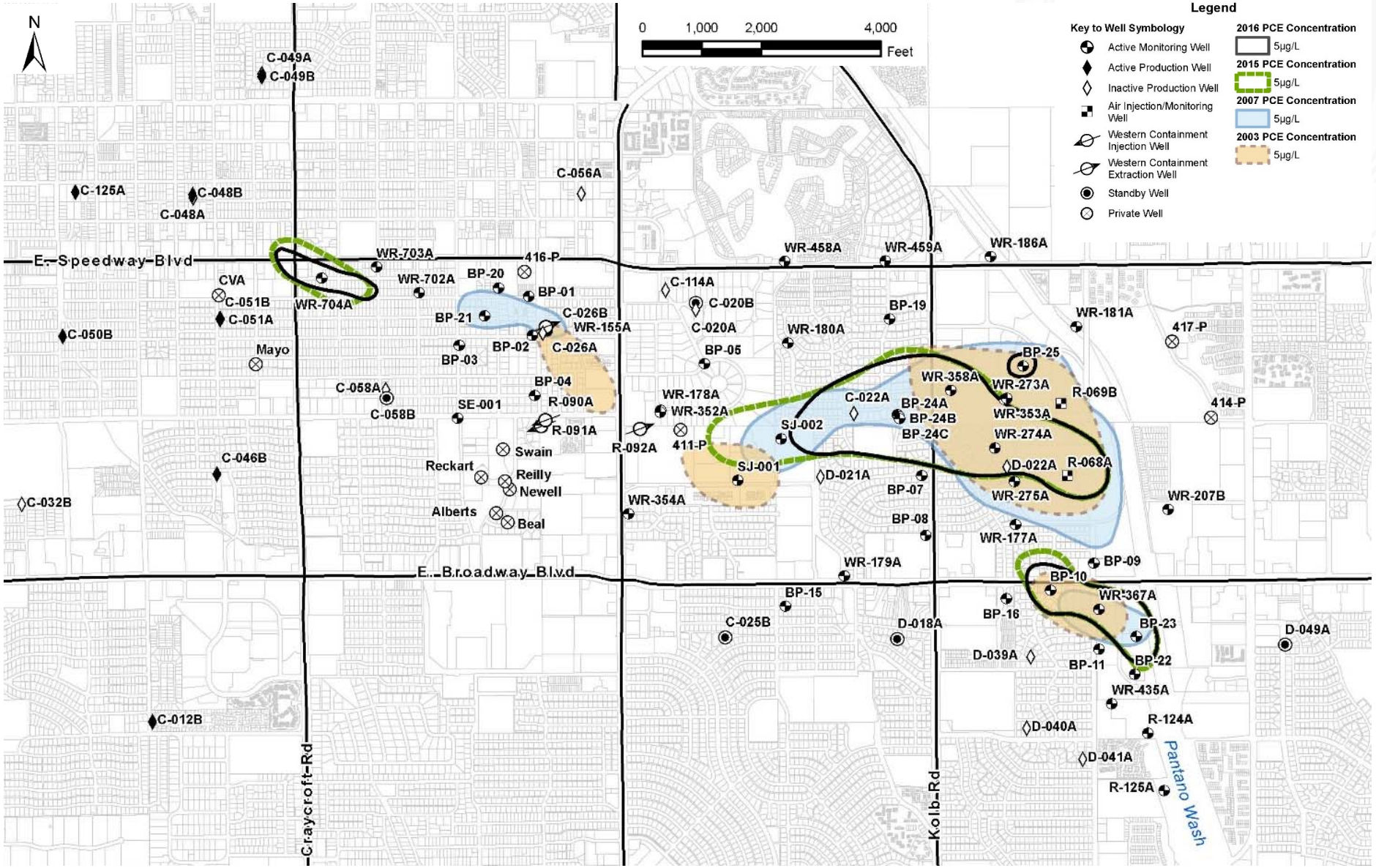
Overview of Feasibility Study Results

ADEQ
Arizona Department
of Environmental Quality

Agenda

- Update on current site work
  - Groundwater monitoring
  - In Situ Chemical Oxidation (ISCO) pilot testing
- Overview of Feasibility Study (FS) Results
  - Conceptual Site Model
  - Exposure Pathway Assessment
  - Development and evaluation of alternatives
  - Remedy selection
- Look Ahead

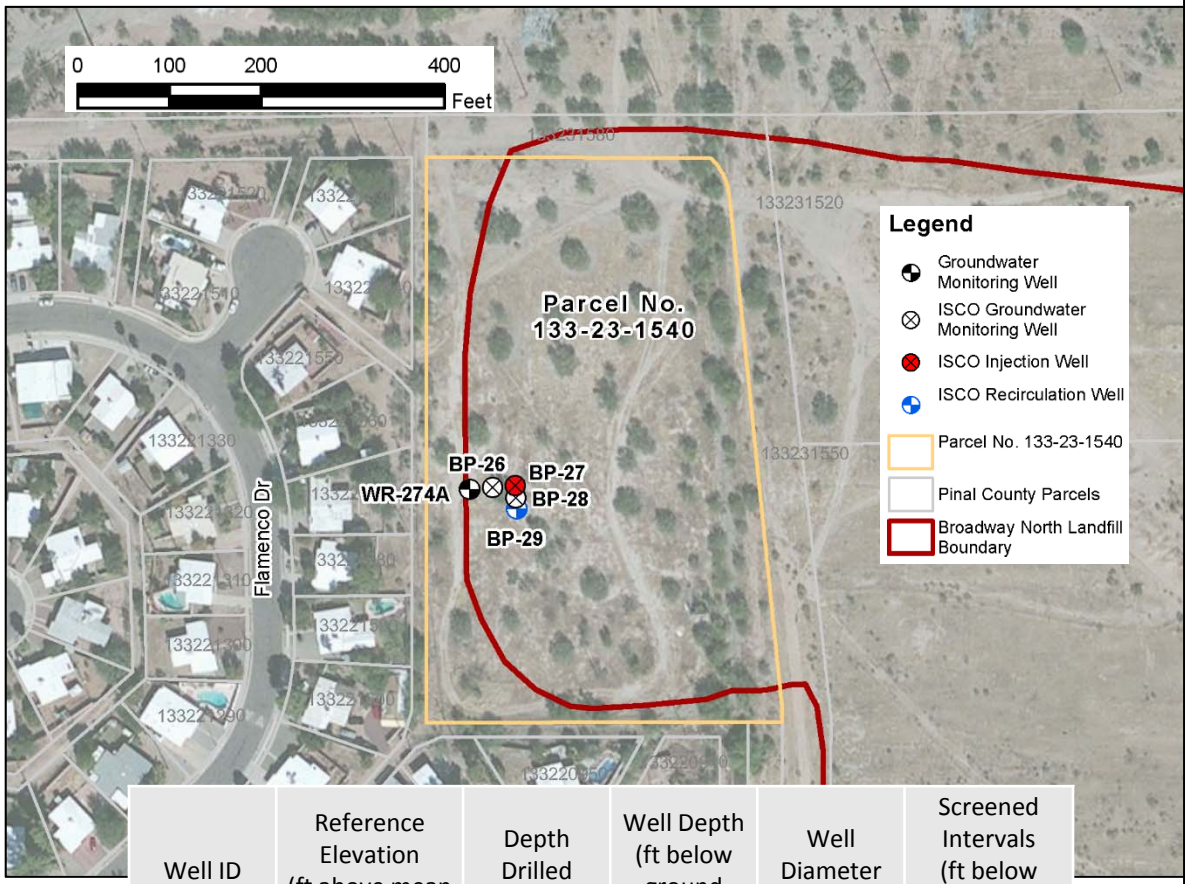
Groundwater Monitoring – Tetrachloroethene (PCE) Plume Over Time (2003-2016)



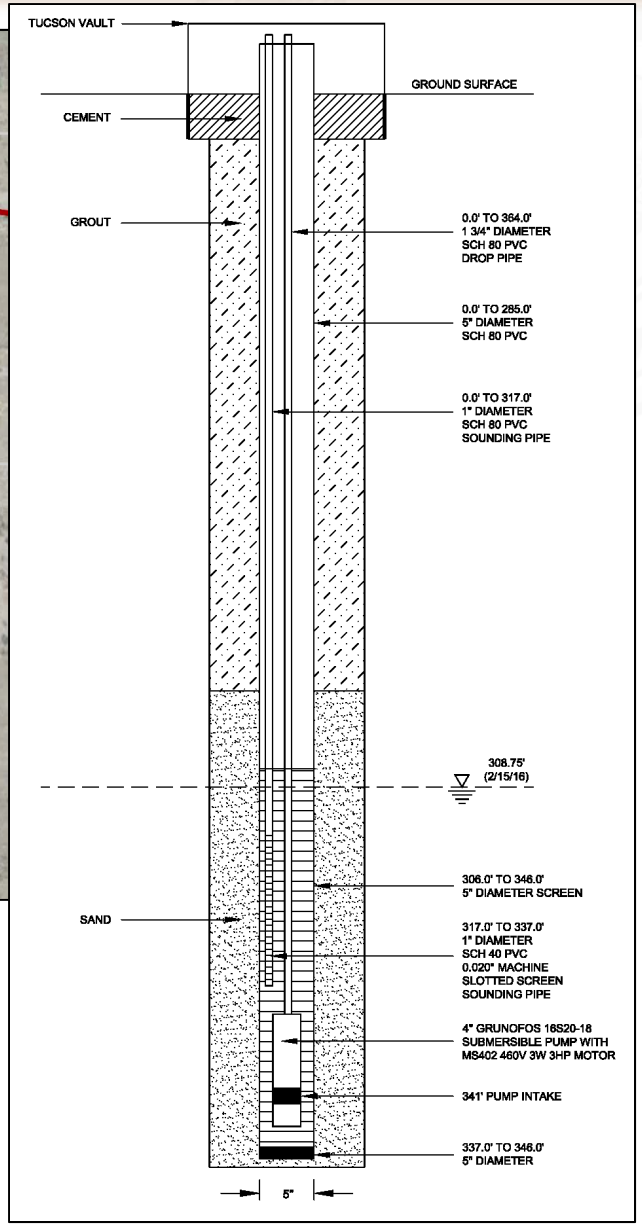
Groundwater Monitoring - Takeaways

- Limited changes in PCE plume over one year
  - Semiannual sampling program sufficient to evaluate plume during FY2017
  - Arrival of the 5 micrograms per liter (µg/L) PCE contour at the Western Containment System (WCS) extraction wells is not imminent
- Stable PCE concentrations at Broadway North Landfill (BNL)
- Increasing PCE concentrations at Broadway South Landfill (BSL)

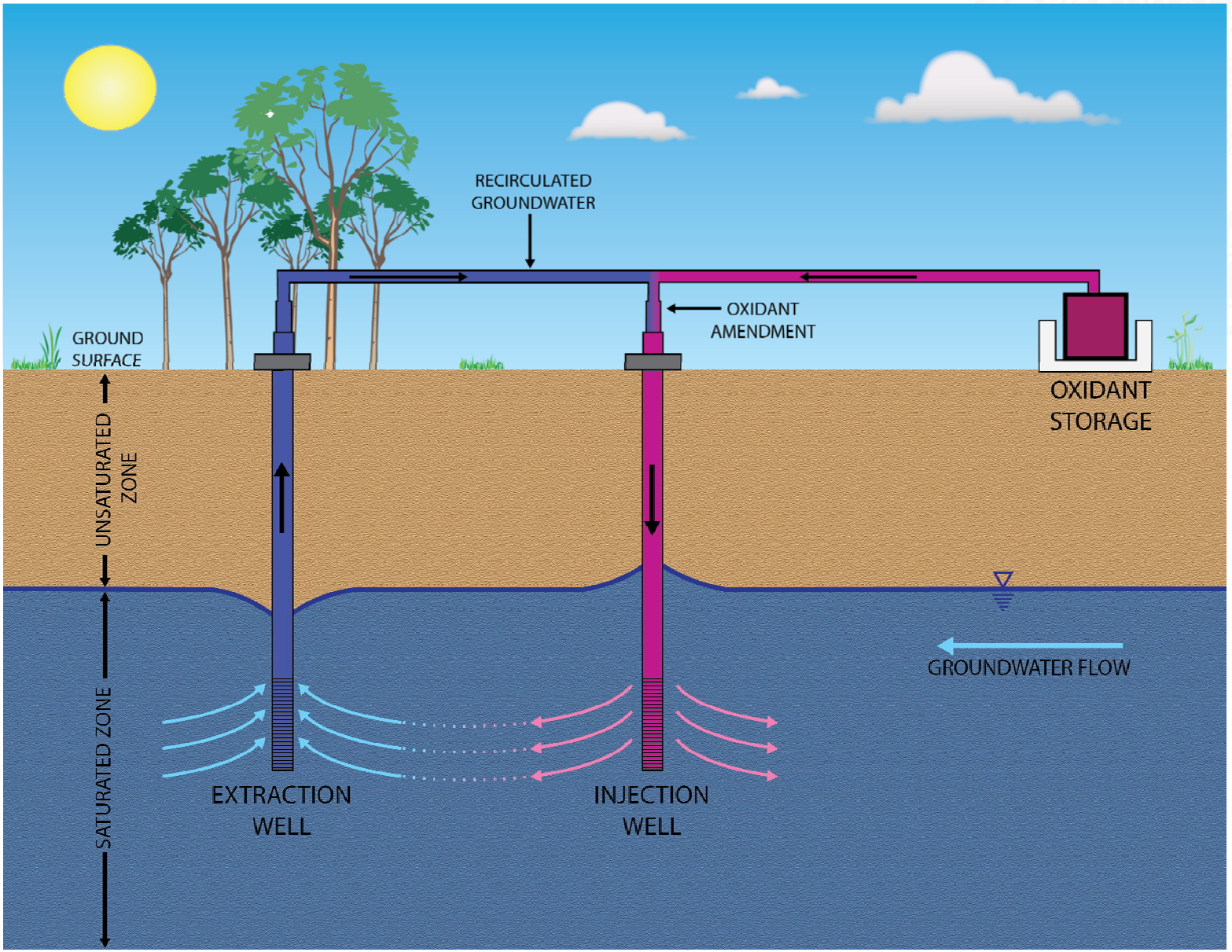
ISCO Pilot Study – Test Site



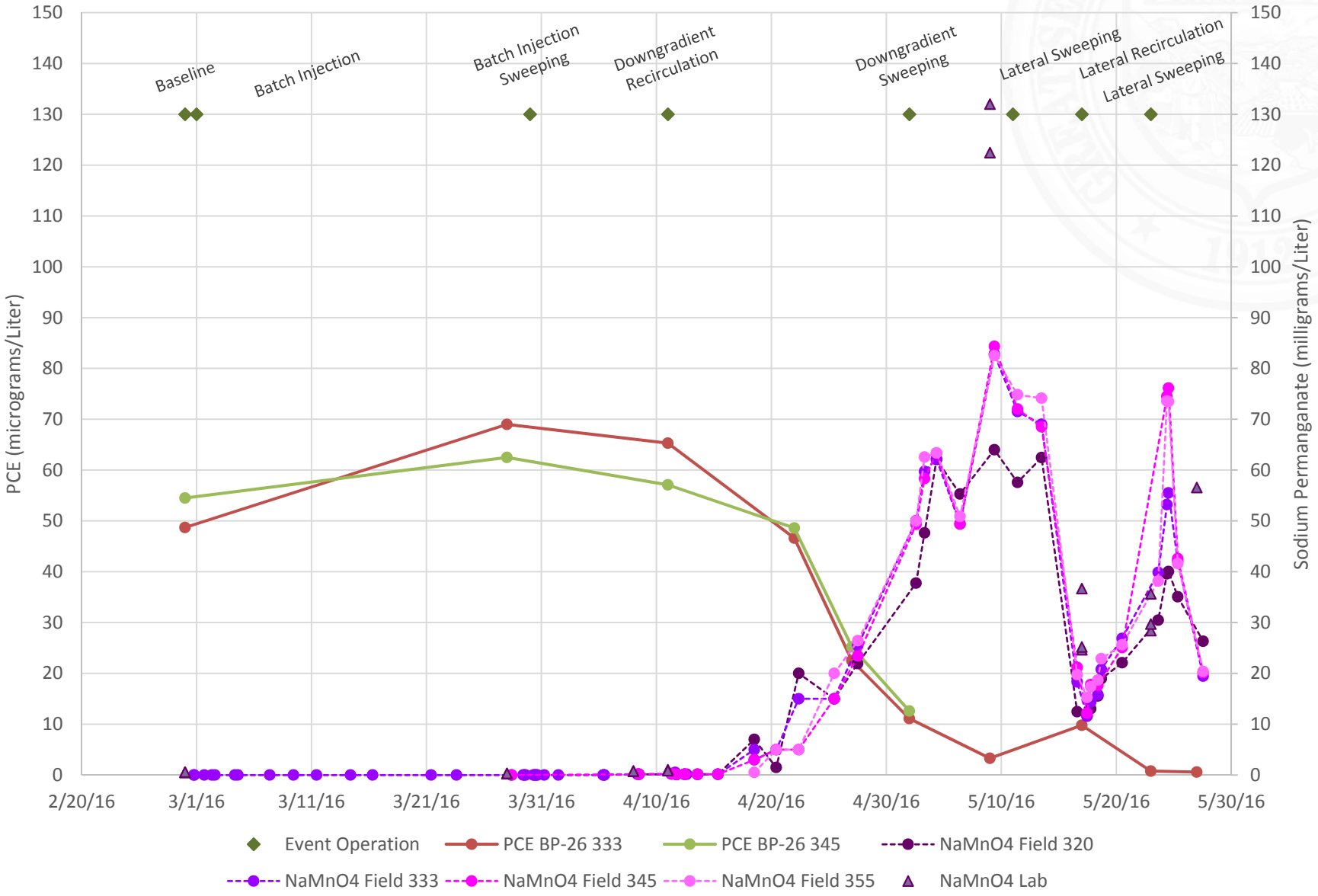
Well ID	Reference Elevation (ft above mean sea level)	Depth Drilled (ft bgs)	Well Depth (ft below ground surface)	Well Diameter (inches)	Screened Intervals (ft below ground surface)
BP- 26	2567.43	367	365	6	305-365
BP-27	2567.69	367	365	6	285-365
BP-28	2568.07	367	365	6	305-365
BP-29	2568.08	380.9	380	6	305-375
WR-274A	2568.65	---	350	5	306-346



ISCO Pilot Study – Conceptual Design



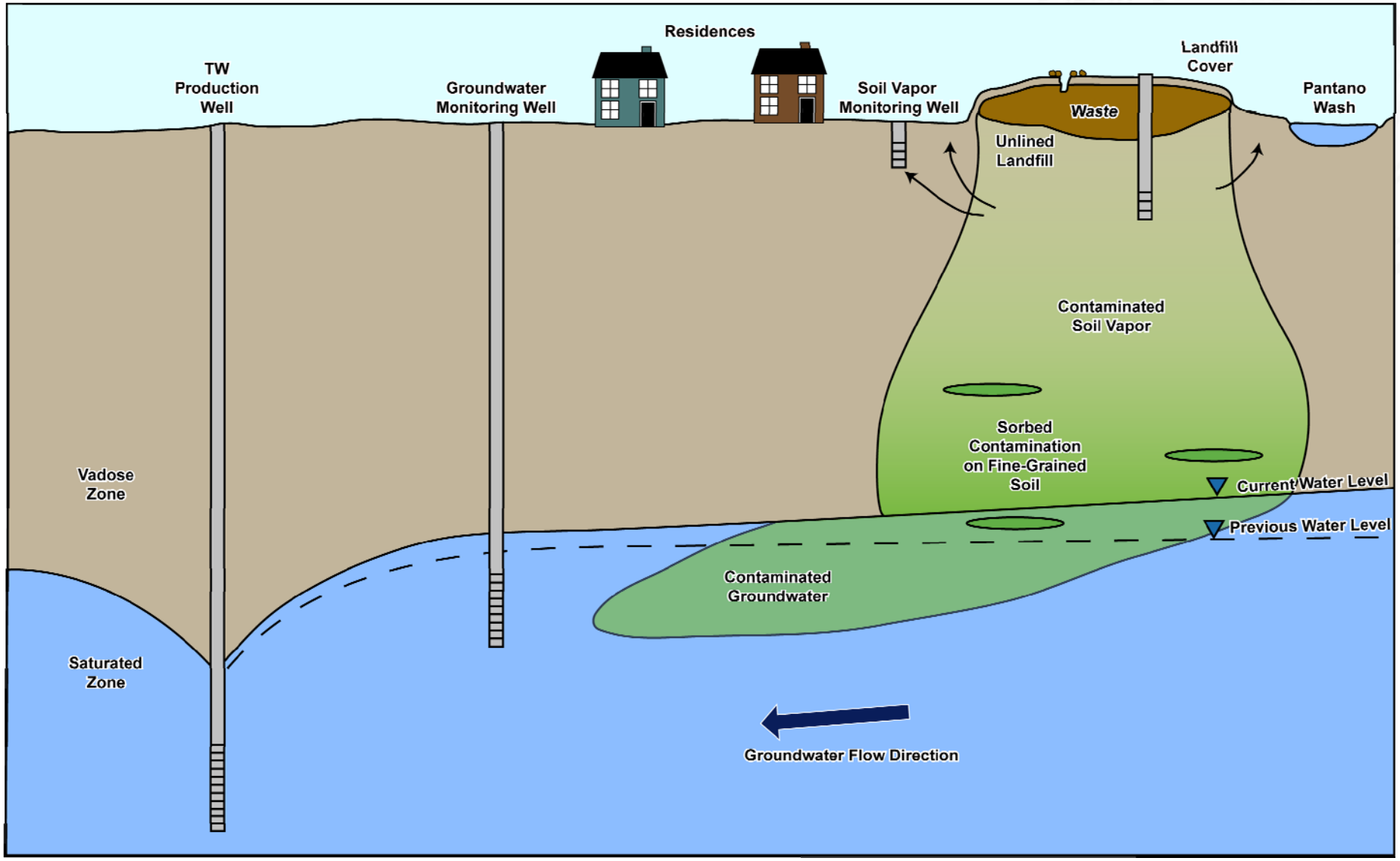
ISCO Pilot Study - PCE and Permanganate in BP-26



ISCO Pilot Study - Results

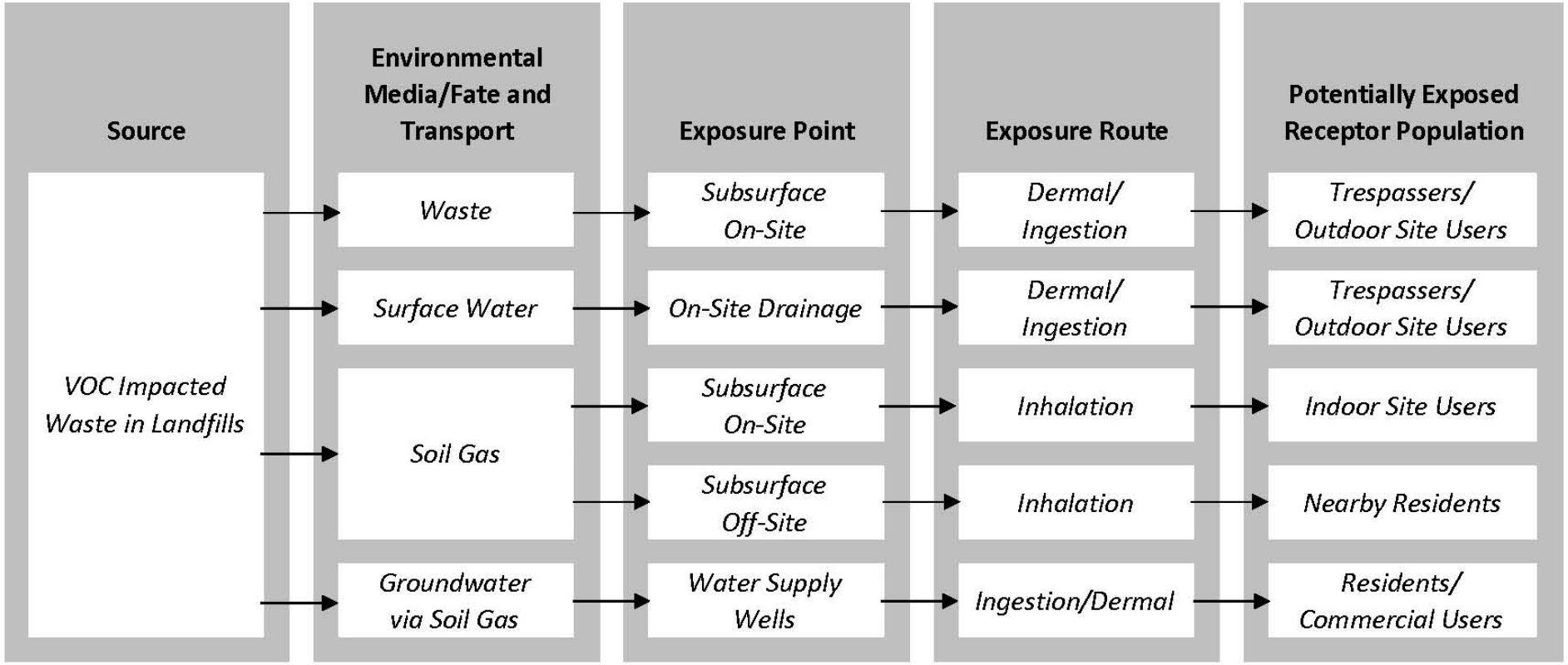
- Demonstrated that ISCO is technically feasible
- Collected information supporting design of a full-scale oxidant injection system
  - Natural oxidant demand
  - Oxidant dosage
  - Oxidant distribution
  - Changes in aquifer chemistry due to oxidant injection
- Addressed high concentrations in current plume

FS - Conceptual Site Model



FS - Exposure Pathway Analysis

Volatile Organic Compounds (VOCs) in Waste



Volatile organic compounds (VOCs) identified as contaminants of concern (COCs): tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (DCE), vinyl chloride and methylene chloride

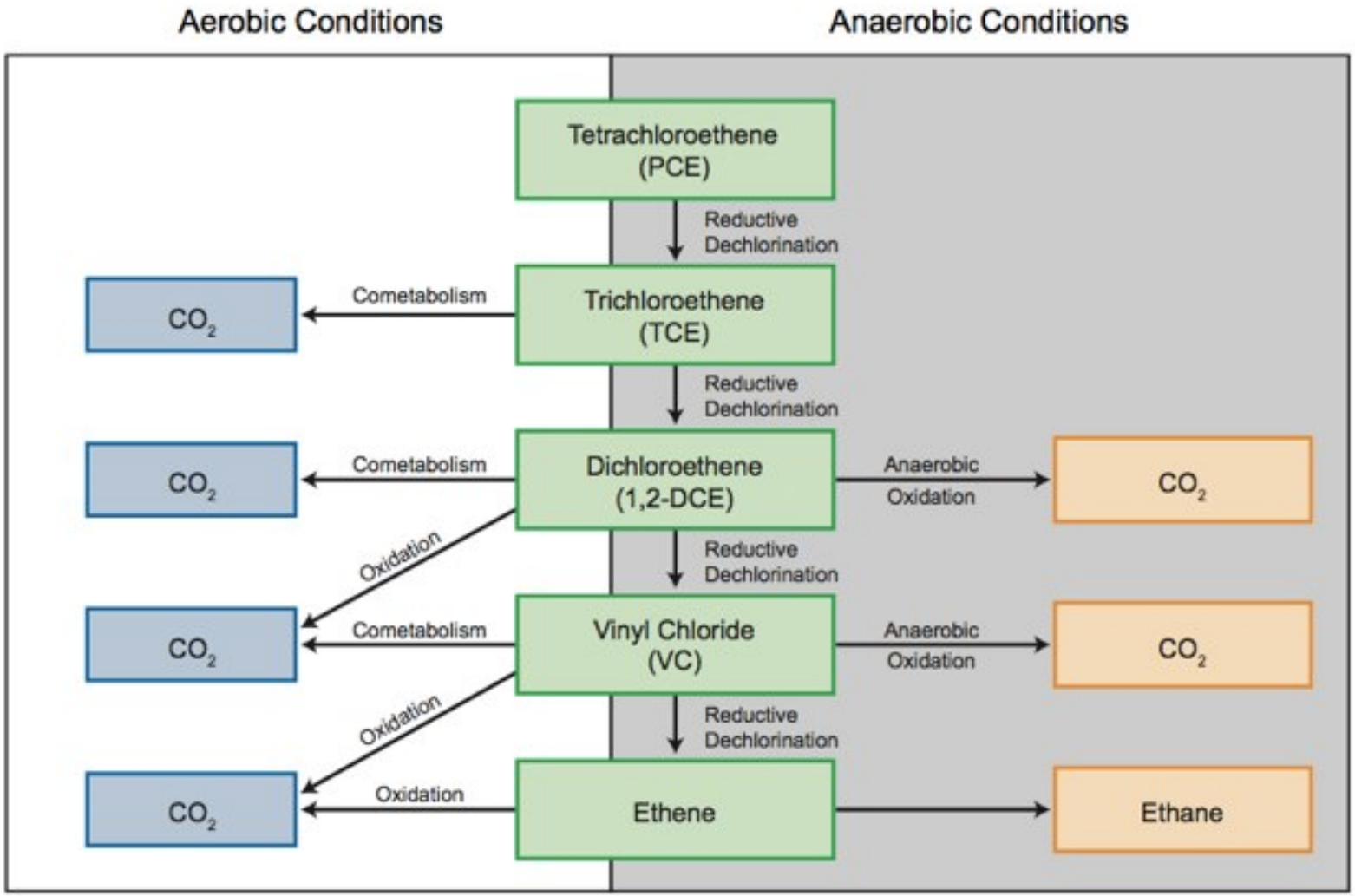
FS - Screening of Alternatives – VOCs in Waste

Treatment Technologies	Strategies (AAC R18-16-407)	Measures (AAC R18-16-401)
Soil Vapor • Soil Vapor Extraction (SVE) *Groundwater* • Monitored Natural Attenuation (MNA) • Pump & Treat • Air Sparging • In Situ Bioremediation (ISB) • In Situ Chemical Oxidation (ISCO) • Permeable Reactive Barriers (PRBs)	*Plume Remediation* *Containment* *Controlled Migration* *Source Control* *Monitoring (Inspection)* *No Action*	*Well Replacement* *Well Modification* *Wellhead Treatment* *Provision of Replacement Water Supply* *Engineering Controls*

Source Control must be an element of the reference remedy and applicable alternative remedies

FS - Why ISCO and not bioremediation?

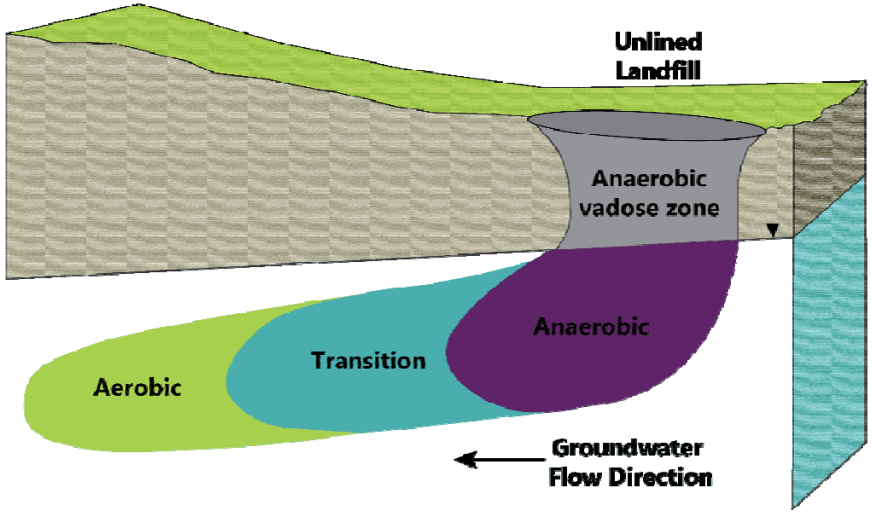
The fundamentals of chlorinated ethene degradation…



CO_2 = carbon dioxide

FS - Site Conditions Impact Technology Selection

What you think of at a typical landfill site…



What we have in groundwater under many unlined landfills in Arizona…

- Deep aquifers
- Oxygenated groundwater
- Dilute contaminant plumes
- Relatively no organic carbon
- Limited microbial communities

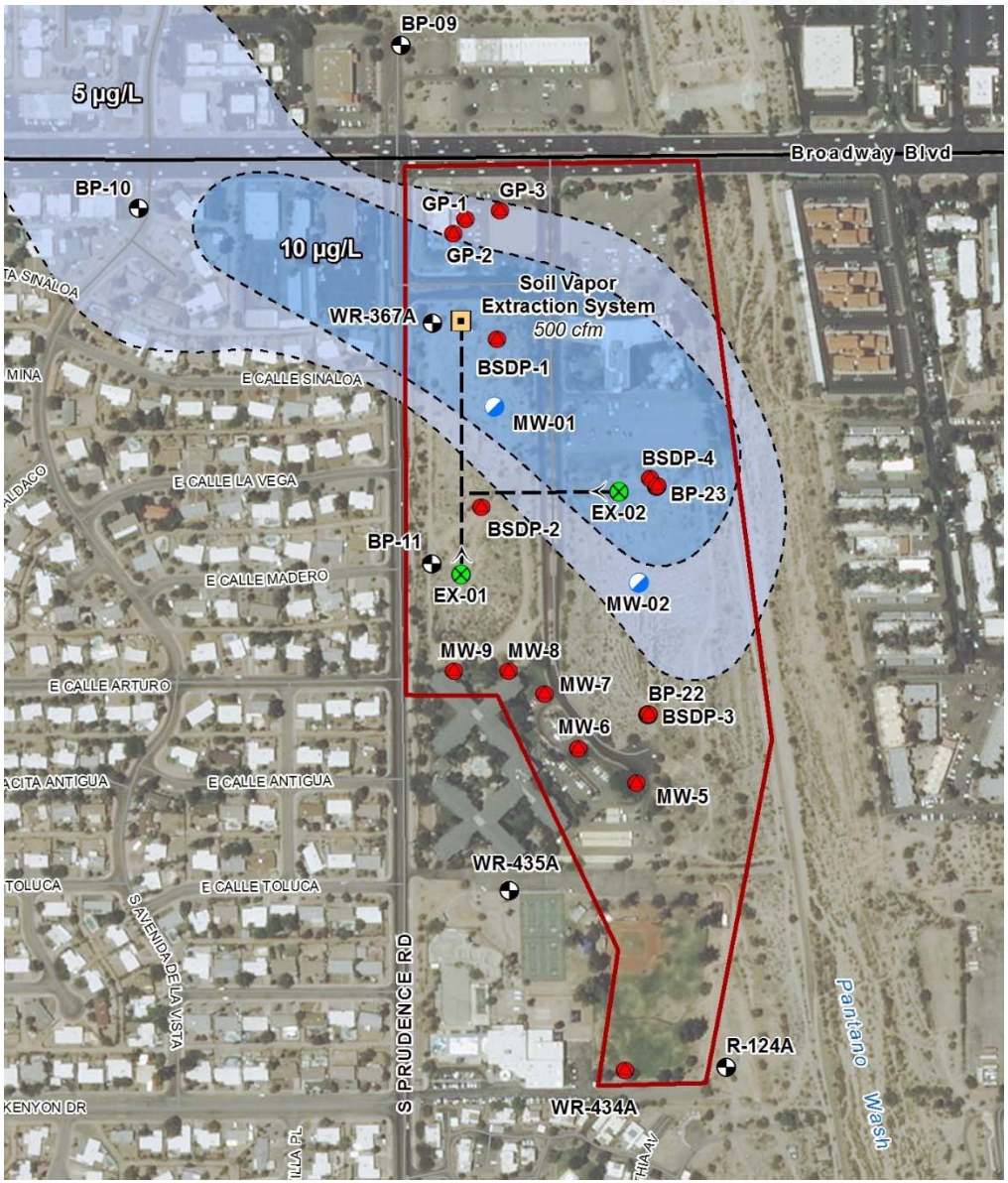
FS - Alternative Identification – VOCs in Waste

Less Aggressive Remedy *(MNA, SVE and Contingencies)*	Reference Remedy *(MNA, SVE, ISCO and Contingencies)*	More Aggressive Remedy *(Accelerated Pumping)*
– ICs to limit waste exposure and protect future groundwater use – SVE in BSL (source control) – Soil vapor monitoring – Groundwater monitoring – Wellhead treatment/ supply of alternative water source at impacted supply wells	– ICs to limit waste exposure and protect future groundwater use – SVE in BSL (source control) – ISCO at BNL – Soil vapor monitoring – Groundwater monitoring – Wellhead treatment/ supply of alternative water source at impacted supply wells	– ICs to limit waste exposure and protect future groundwater use – SVE in BSL (source control) – ISCO at BNL – Soil vapor monitoring – Groundwater monitoring – New extraction wells downgradient of BNL and BSL; new conveyance piping; use of Western Containment System (WCS) treatment system and injection well

MNA = monitored natural attenuation; SVE = soil vapor extraction; ICs = institutional controls

FS - Common Remedy Components – VOCs in Waste

- *Soil Vapor Extraction in BSL*
  (1 year)
  - At least two new SVE wells
  - Two new vapor monitoring wells
  - Temporary treatment compound with electrical power connection
  - Rented SVE blower and granular activated carbon (GAC)

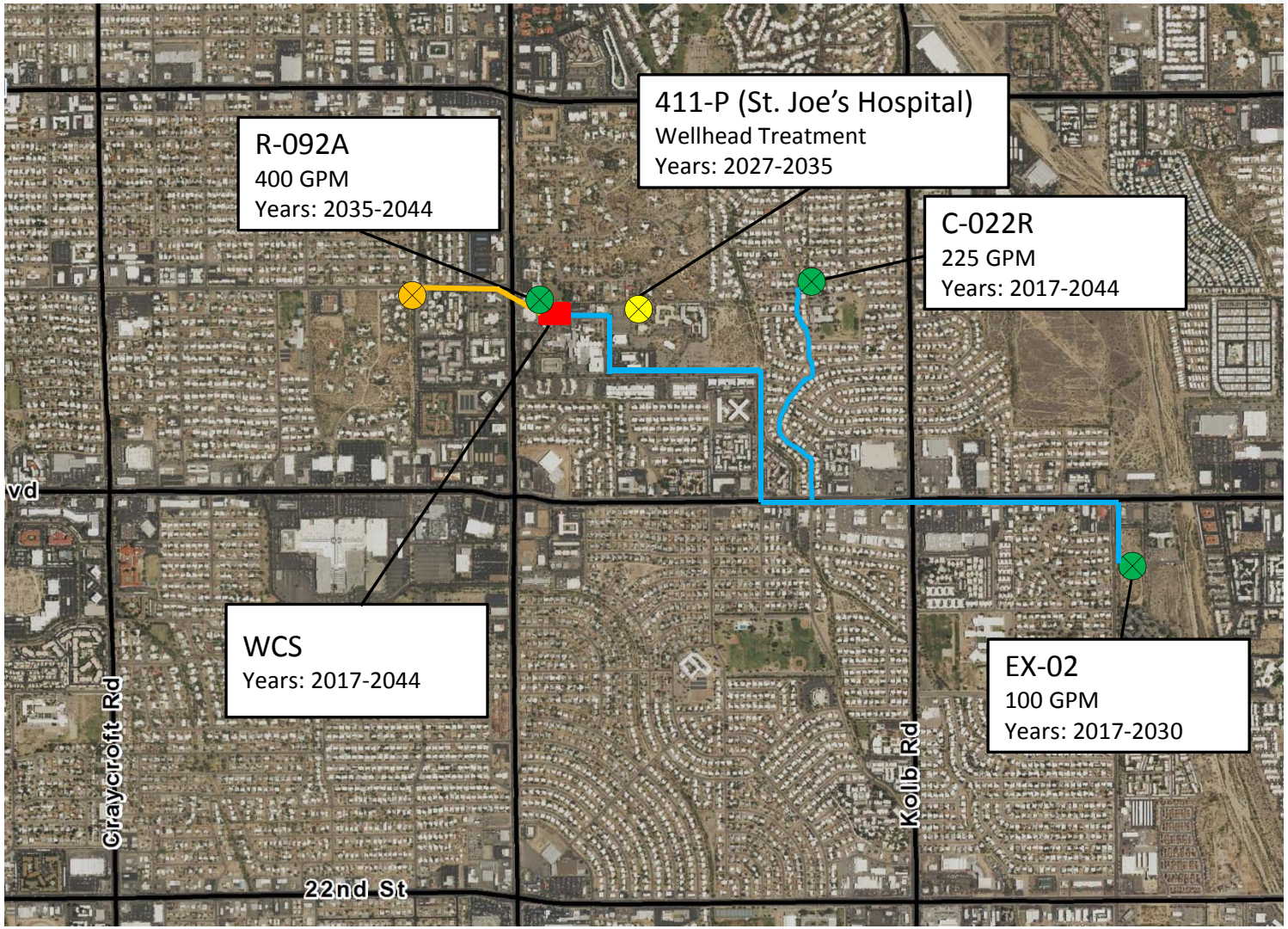


FS - Common Remedy Components – VOCs in Waste

Particle Tracks Year 3

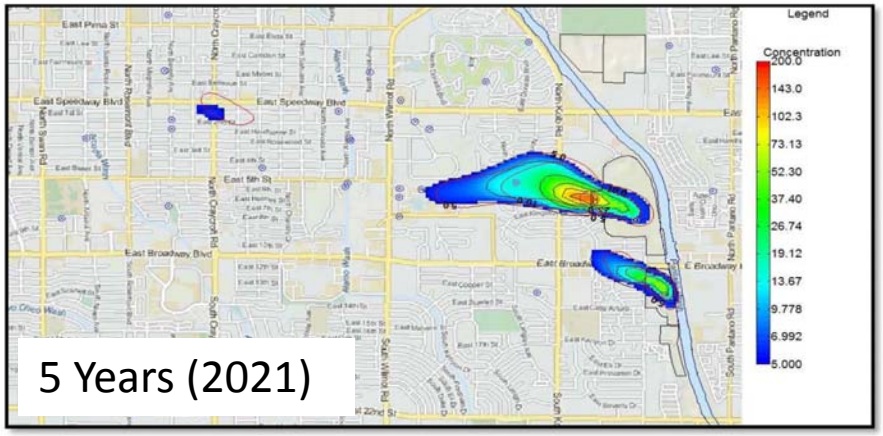
- *In Situ Chemical Oxidation at BNL*
  (7 years)
  - At least five new process wells, pumps, connective piping
  - Treatment compound with concrete slab, masonry wall, and electrical power connection
  - Equalization and oxidant storage tanks, metering equipment, transfer pump, process appurtenances

FS - More Aggressive Remedy – VOCs in Waste

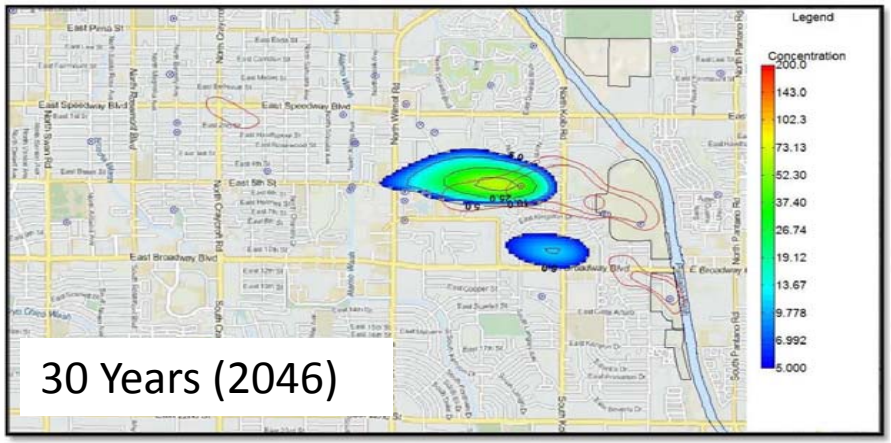


GPM = gallons per minute

FS - Less Aggressive Remedy – VOCs in Waste

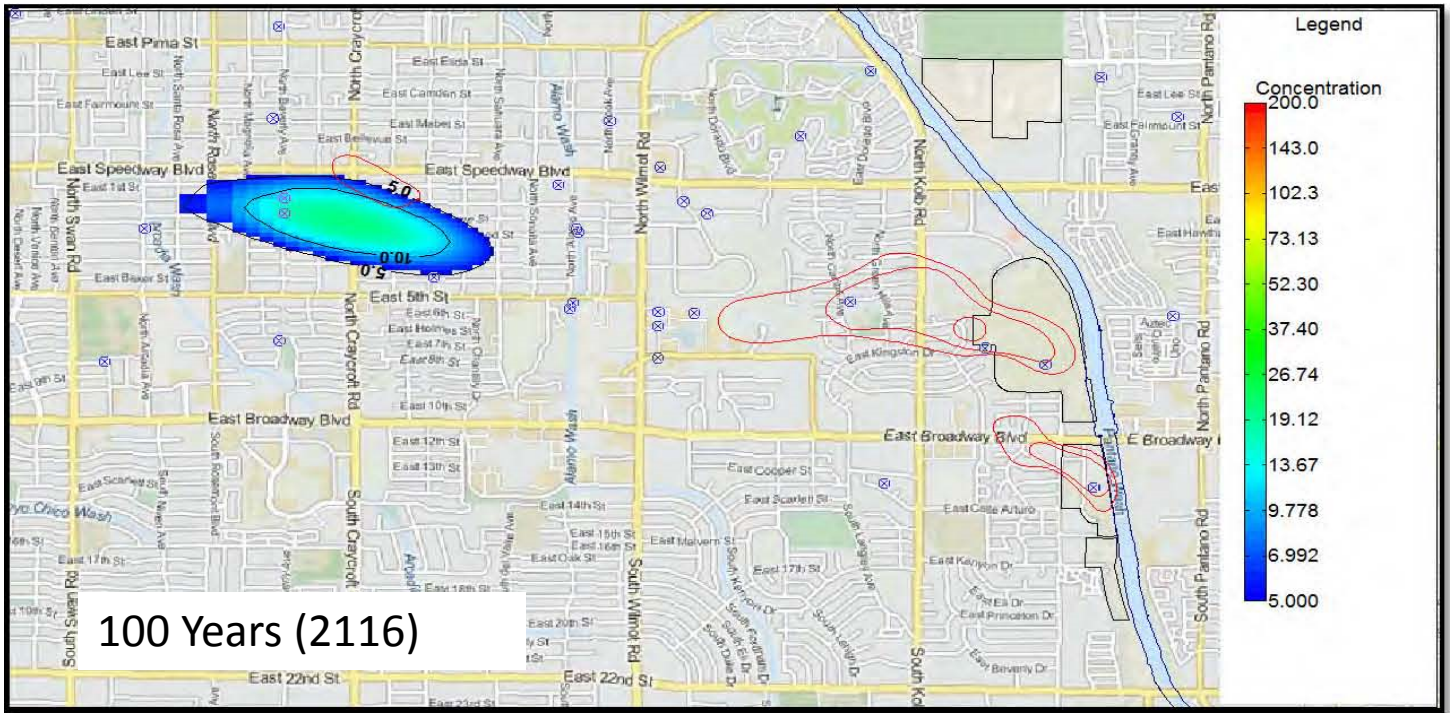


5 Years (2021)



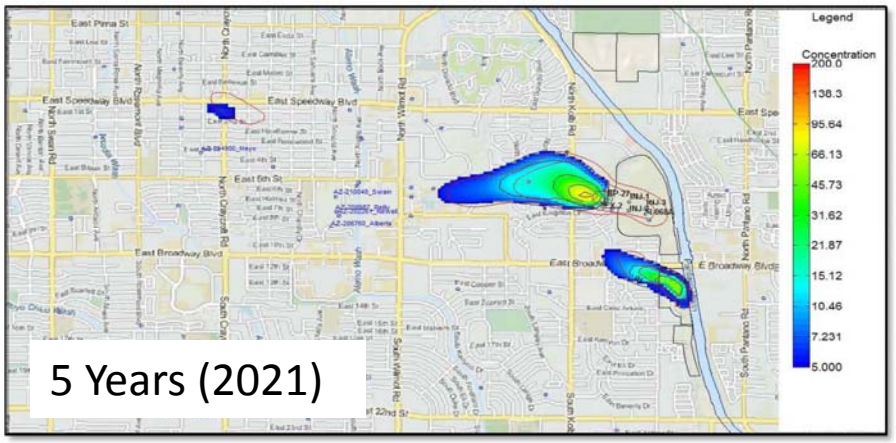
30 Years (2046)

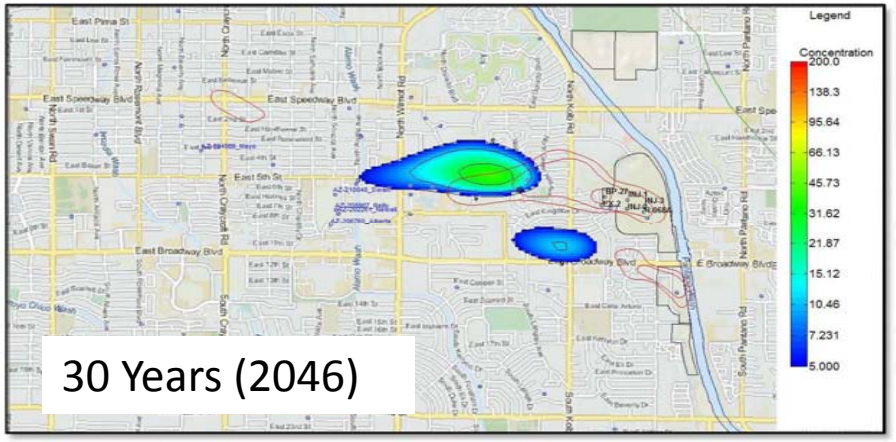
Concentrations are presented in micrograms per liter



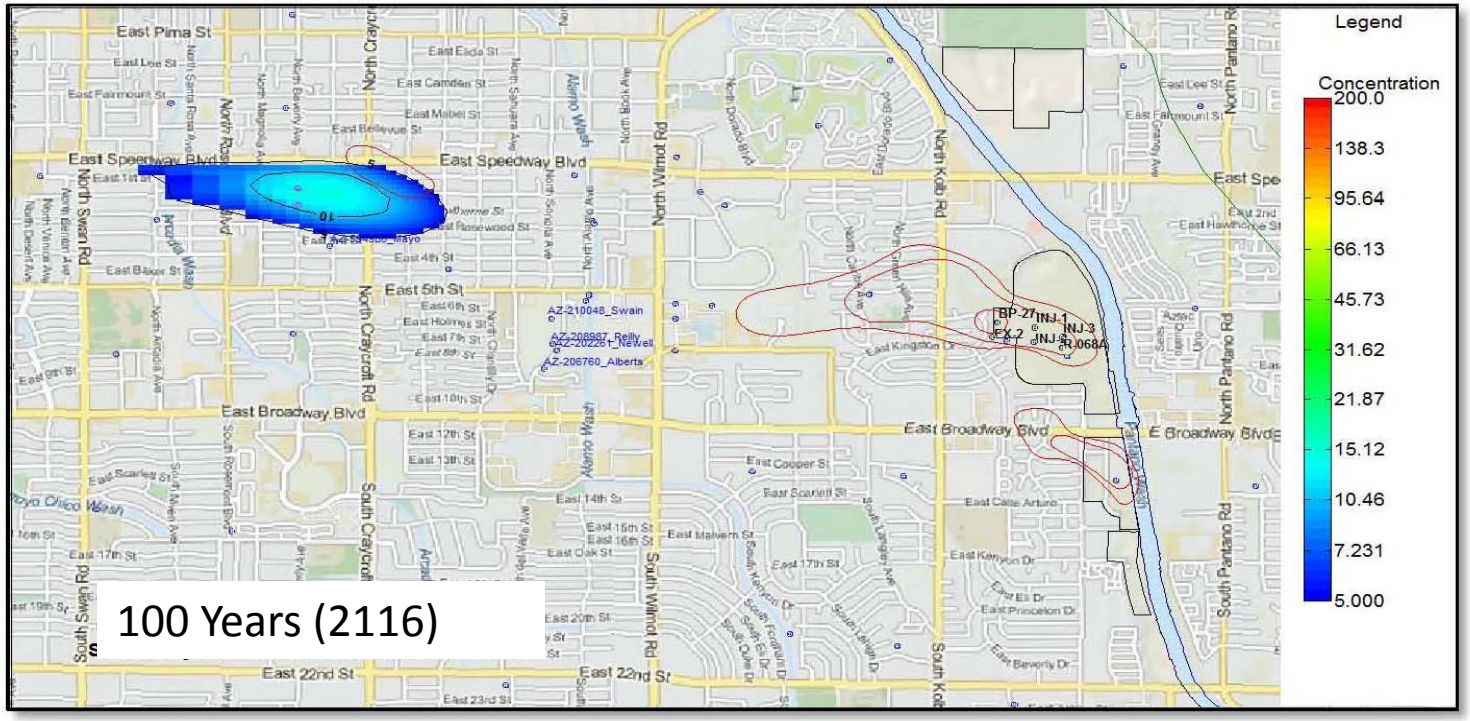
100 Years (2116)

FS - Reference Remedy – VOCs in Waste

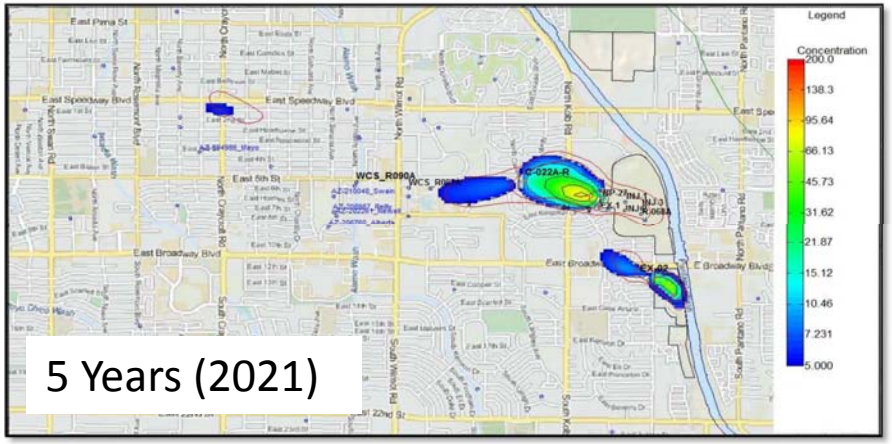




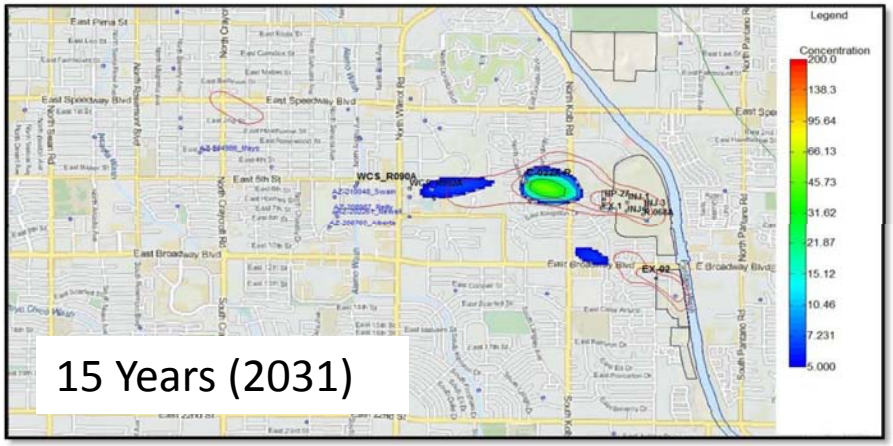
Concentrations are presented in micrograms per liter



FS - More Aggressive Remedy – VOCs in Waste

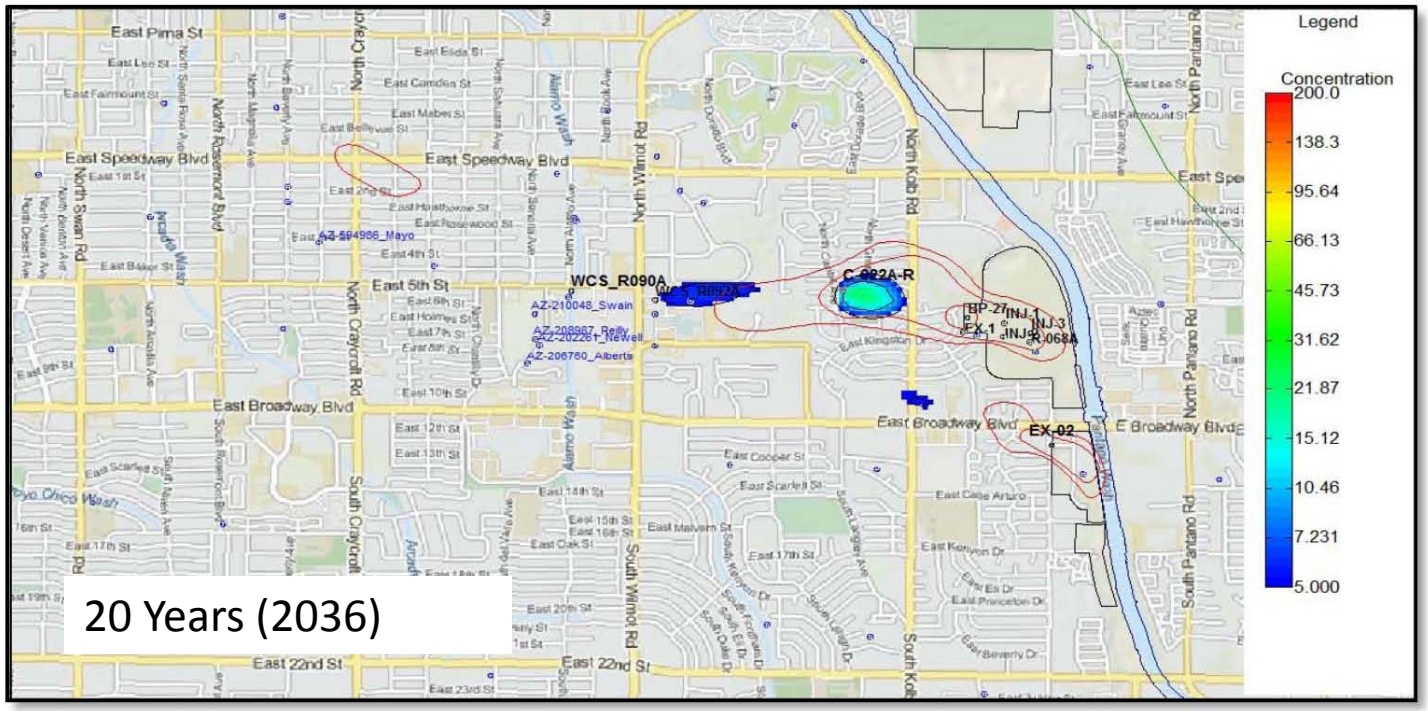


5 Years (2021)



15 Years (2031)

Concentrations are presented in micrograms per liter



20 Years (2036)

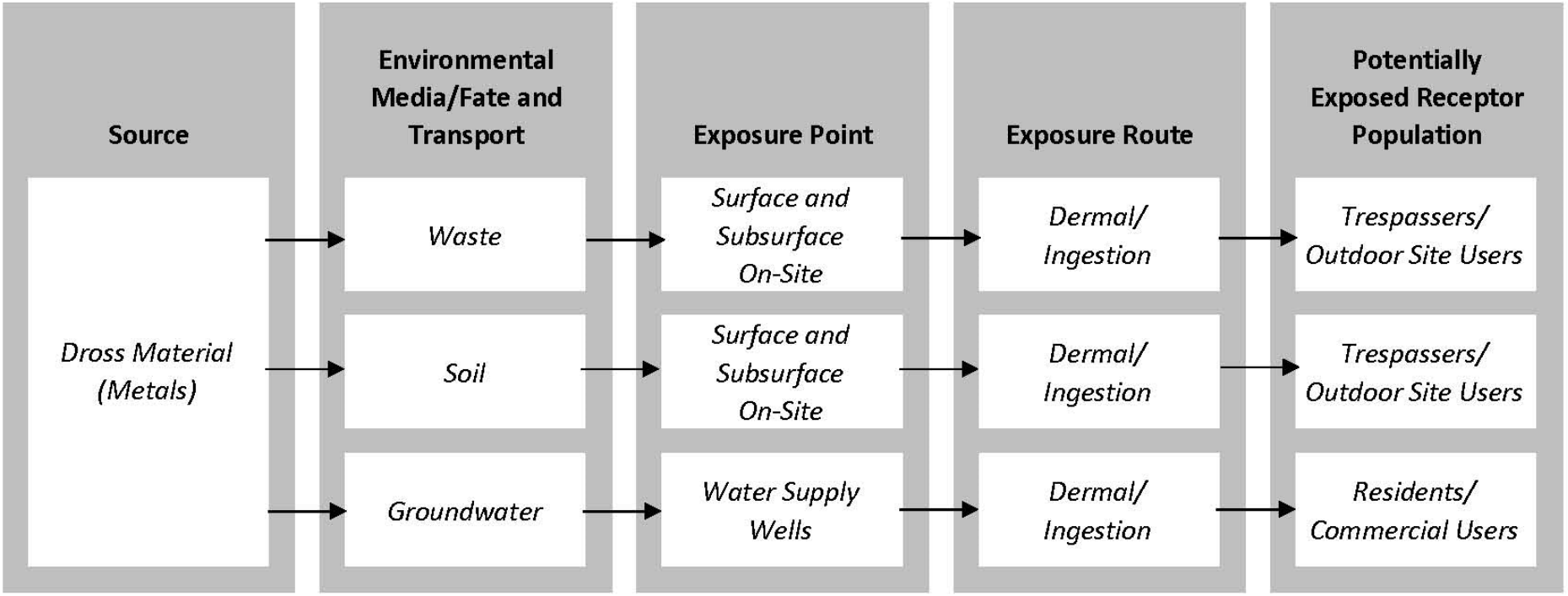
FS - Alternative Evaluation – VOCs in Waste

Remedy	Practicability	Risk	Benefit	Cost
Less Aggressive Remedy	– Moderately implementable – Least feasible – Potentially effective	– Highly impacted by changing conditions – Some health and environmental risk	– Protects water supply	$23M or $179M with inflation (over 100 years)
Reference Remedy	– Moderately implementable – Moderately feasible – Potentially effective	– Highly impacted by changing conditions – Some health and environmental risk	– Protects water supply	$21M or $126M with inflation (over 100 years)
More Aggressive Remedy	– Least implementable – Moderately feasible – Likely effective	– Likely impacted by changing conditions – Some health and environmental risk	– Protects water supply – Cleans up to AWQS	$18M or $26M with inflation (over 29 years)

AWQS = Aquifer Water Quality Standard; M = million

FS - Exposure Pathway Analysis

Dross Material



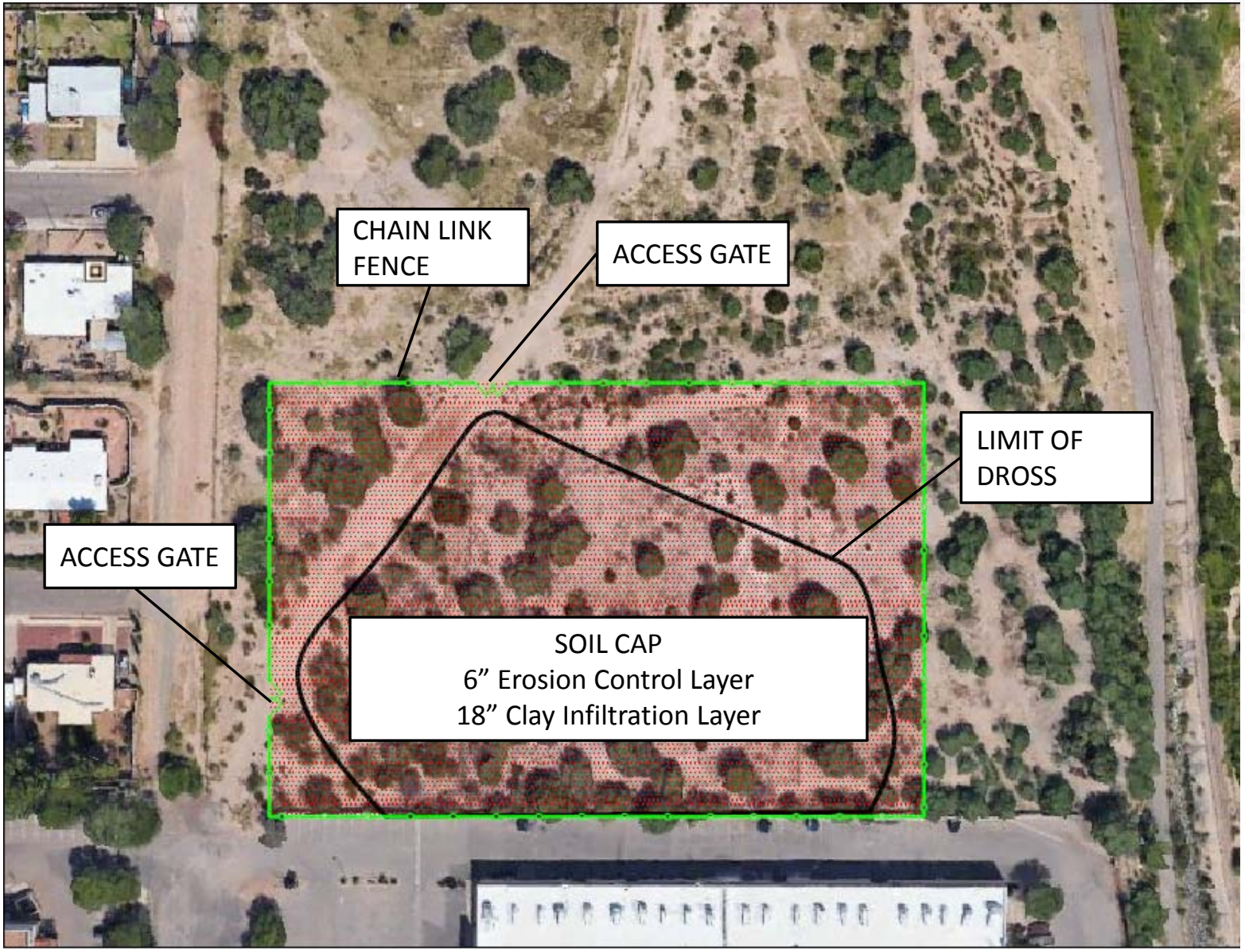
Metals identified as COCs:
arsenic, lead, and cadmium exceed Soil Remediation Levels
cadmium, chromium, and lead exceed minimum Groundwater Protection Levels

FS - Alternative Identification – Dross Material

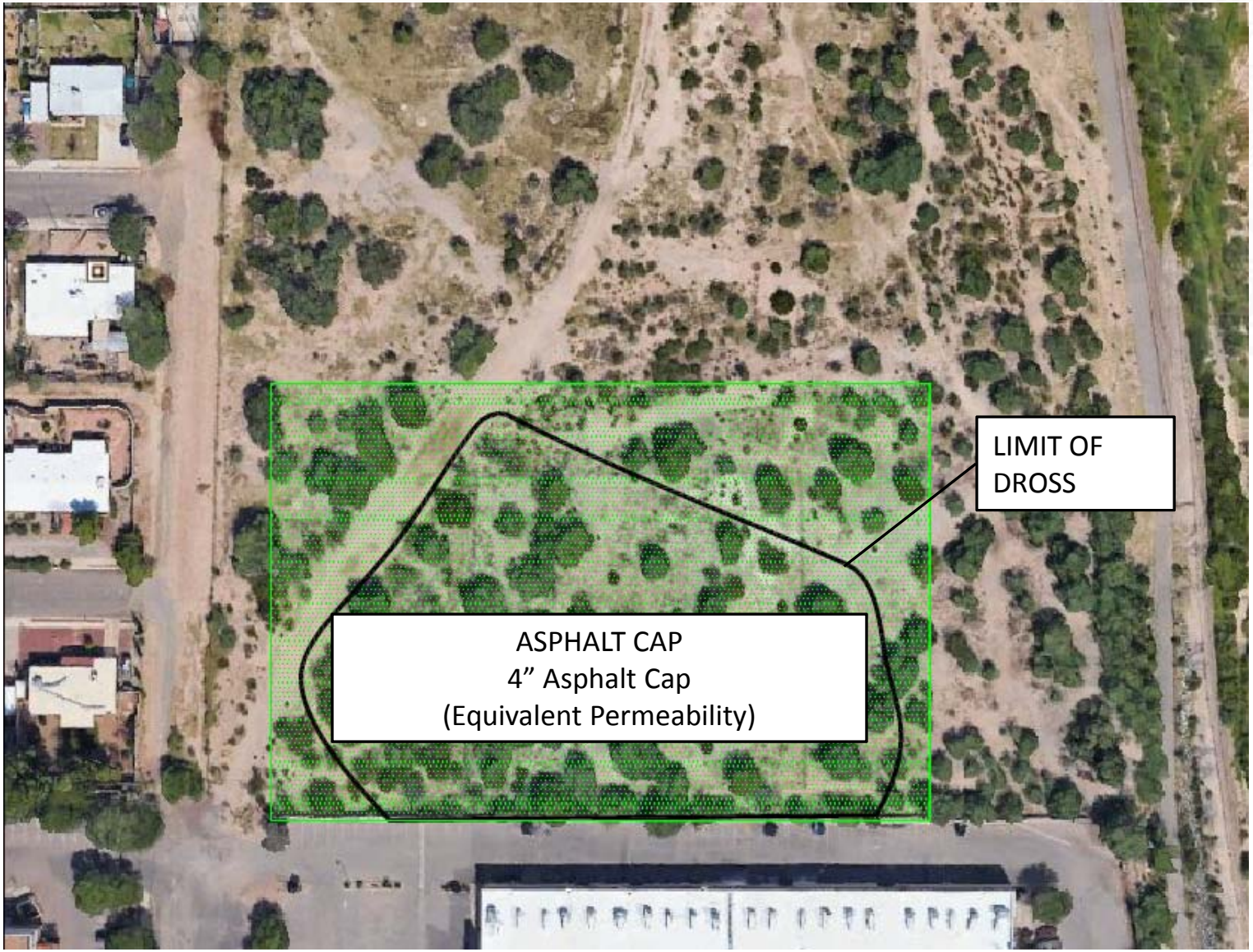
Less Aggressive Remedy (Security Fencing)	Reference Remedy (Soil Cap)	More Aggressive Remedy (Asphalt Cap)
– ICs to restrict activities in Dross Area – Installation and maintenance of a new security fence around dross area	– ICs restrict activities in Dross Area – Construction and maintenance of a new engineered soil cap and fence around dross area	– ICs to restrict activities in Dross Area – Construction and maintenance of a new engineered asphalt cap on the dross area

FS - Less Aggressive Remedy – Dross Material

FS - Reference Remedy – Dross Material



FS - More Aggressive Remedy – Dross Material



FS - Alternative Evaluation – Dross Material

Remedy	Practicability	Risk	Benefit	Cost
Less Aggressive Remedy	– Highly implementable – Highly feasible – Least effective	– Continued risk to trespassers – Some potential health and environmental risk	– Limited – Most frequent O&M	$0.21M or $0.28M with inflation (over 30 years)
Reference Remedy	– Moderately implementable – Moderately feasible – Moderately effective	– Less health and environmental risk	– Decreased liability – Least frequent O&M	$1.4M or $1.6M with inflation (over 30 years)
More Aggressive Remedy	– Moderately implementable – Moderately feasible – More effective	– Less health and environmental risk	– Decreased liability – Less O&M – Beneficial land use	$2.1M or $2.9M with inflation (over 30 years)

O&M = operations and maintenance

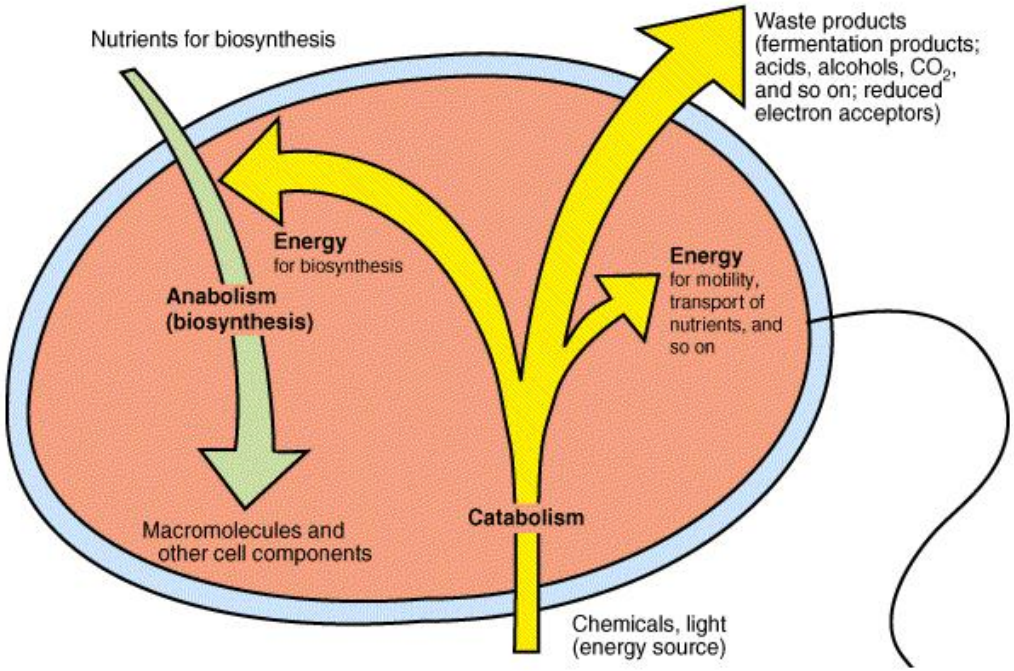
Project Look Ahead

- Continue routine monitoring and inspection programs
  - Semiannual groundwater sampling (select wells)
  - Dross Area inspection program will continue
- Feasibility Study completion
- Preliminary Remedial Action Plan development

- Questions?

Reductive Dechlorination of PCE

- *Direct (Dehalorespiration)*
  - Use PCE as a final electron acceptor for the production of energy
  - Need an electron donor
  - Need a carbon source
- *Cometabolic*
  - Need electron acceptor
  - Need electron donor
  - Need a carbon source



Comparison of ISB and ISCO

Generally in situ technologies are engineered to heighten the effects of naturally occurring degradation mechanisms…

In Situ Bioremediation of PCE	In Situ Chemical Oxidation of PCE
Requires reducing environment, carbon source, electron donor and perhaps an electron acceptor	Oxidant demand is adversely impacted by natural carbon and reduced inorganics
If biostimulation is not adequate for site, bioaugmentation must be conducted	Oxidants can be toxic and have adverse water quality impacts
Successive transformation of contaminants required	Relatively fast transformation
Amendments must be effectively distributed to work properly	*Amendments must be effectively distributed to work properly*