Lockwood Solvents Groundwater Plume Site

Public Meeting

November 10, 2016

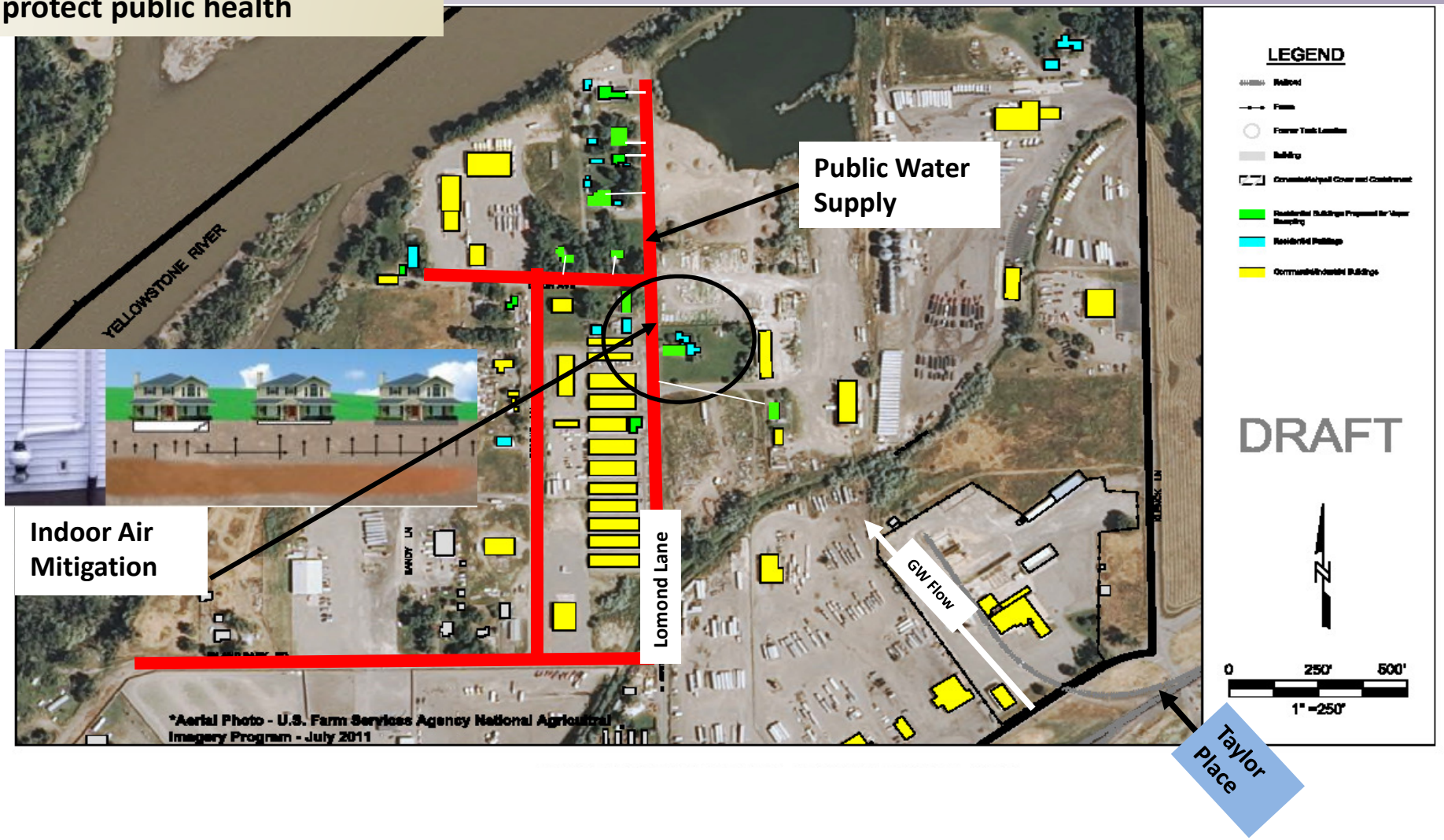
Brief Overview of the Site and the Contaminants of Concern

Regulatory Involvement

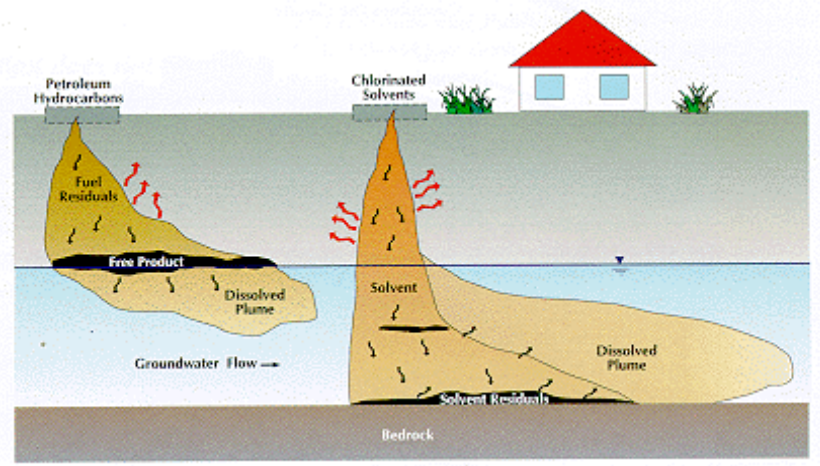
State involved since late 1990s

Superfund listing in 2000

Two emergency actions to protect public health



Site Contaminants of Concern are Chlorinated Solvents

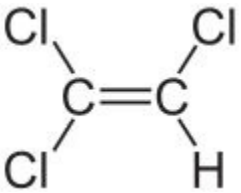


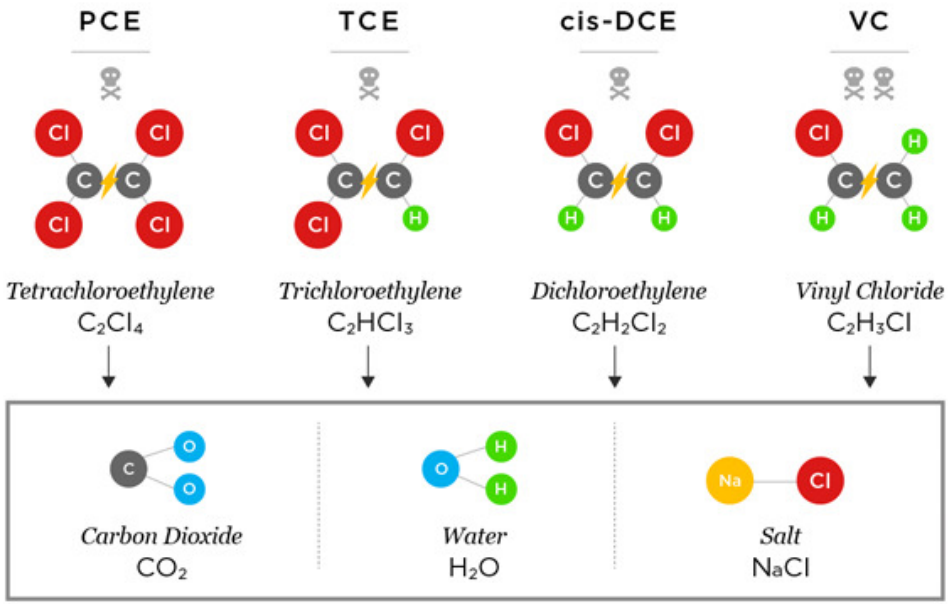
Four Chlorinated Solvents found

Tetrachloroethylene – PCE
Trichloroethylene – TCE
Cis – 1,2 Dichloroethylene – cis-DCE
Vinyl Chloride - VC

Chlorinated Solvents – Denser than water and petroleum in liquid form

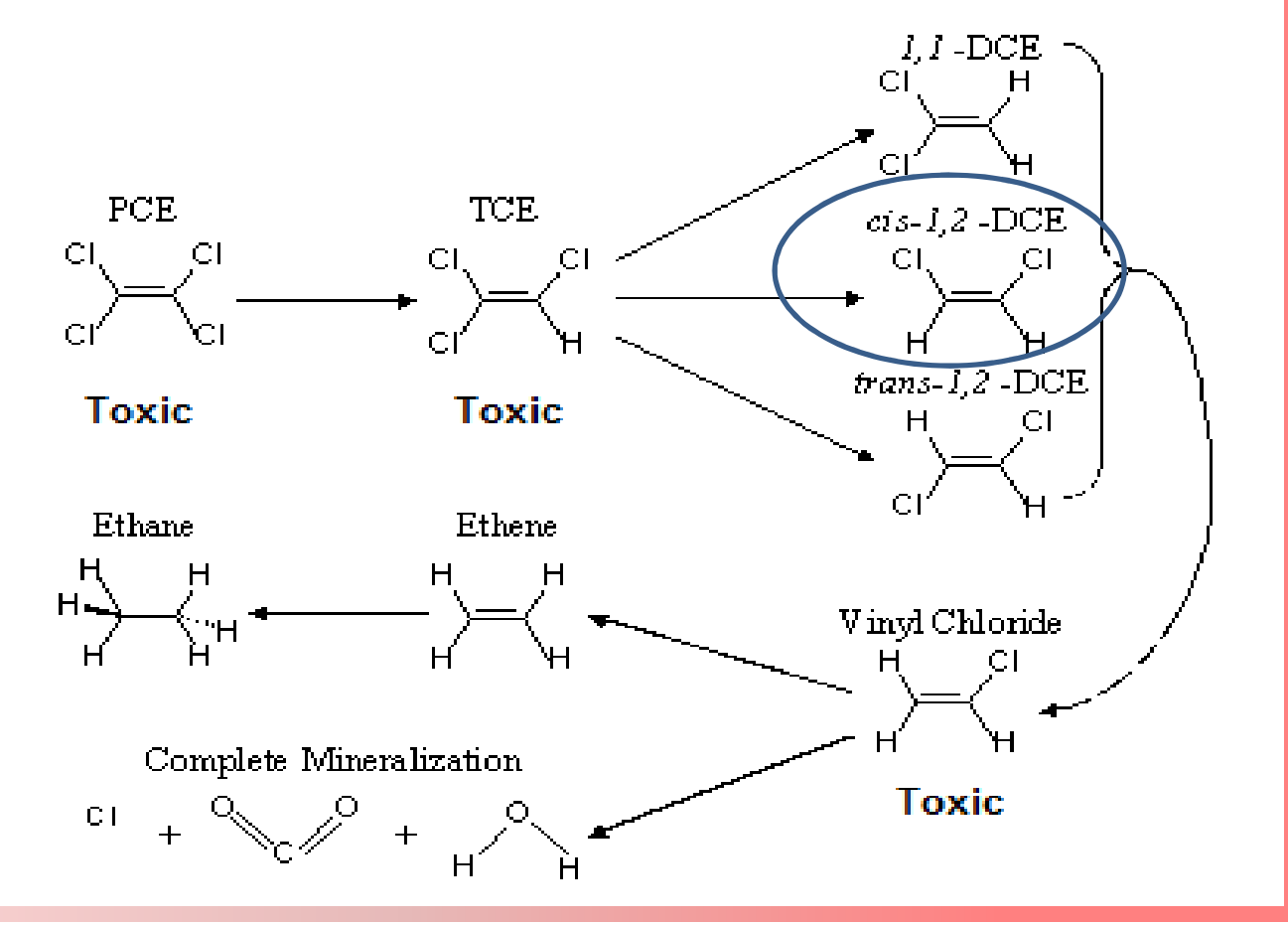
Pose health hazards through breathing, drinking, and skin contact



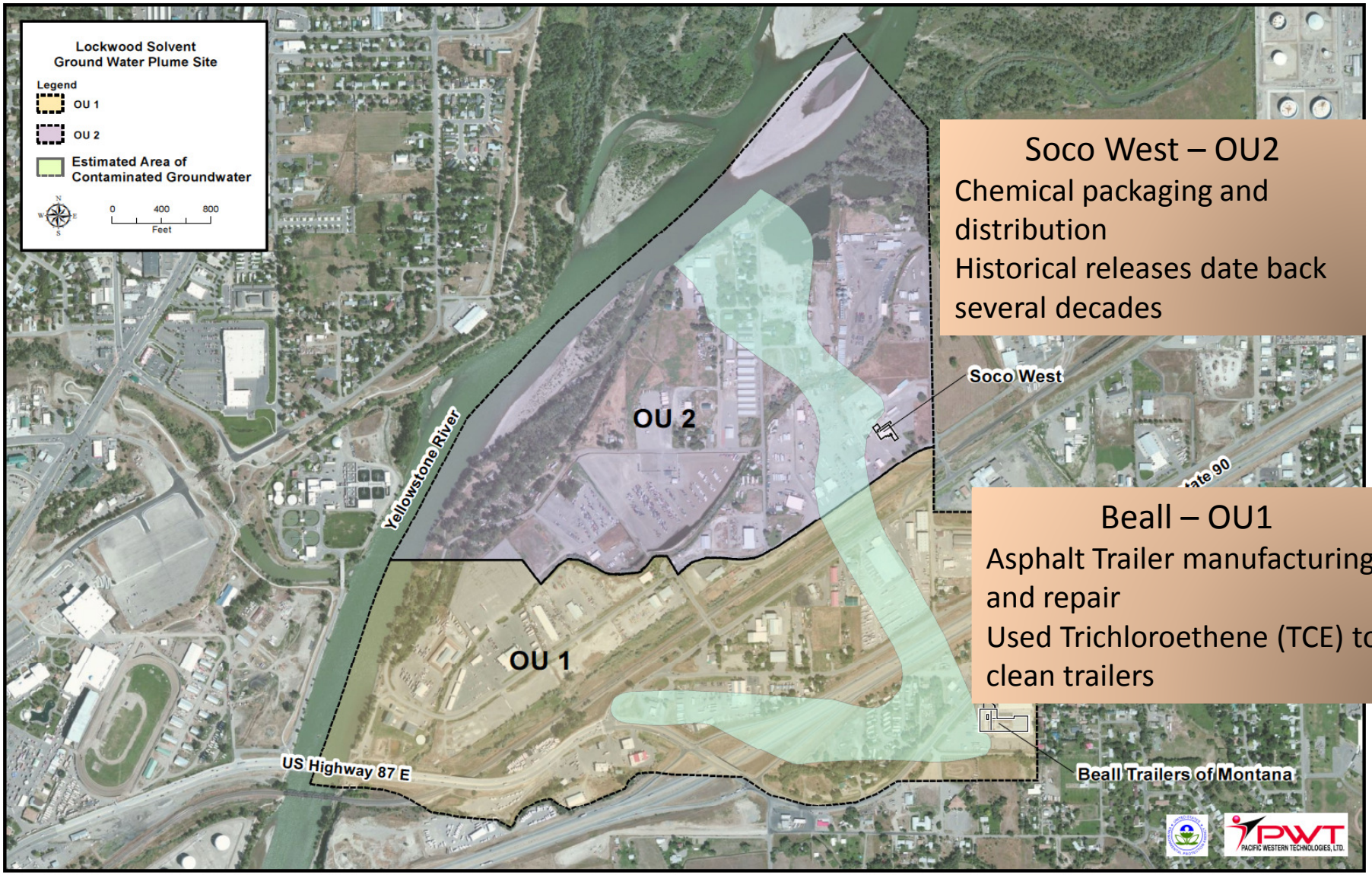


Chlorinated Solvents

Can naturally break down in soil and groundwater if under favorable conditions



Two Source Areas (Operable Units)



Soco West – OU2

Chemical packaging and distribution

Historical releases date back several decades

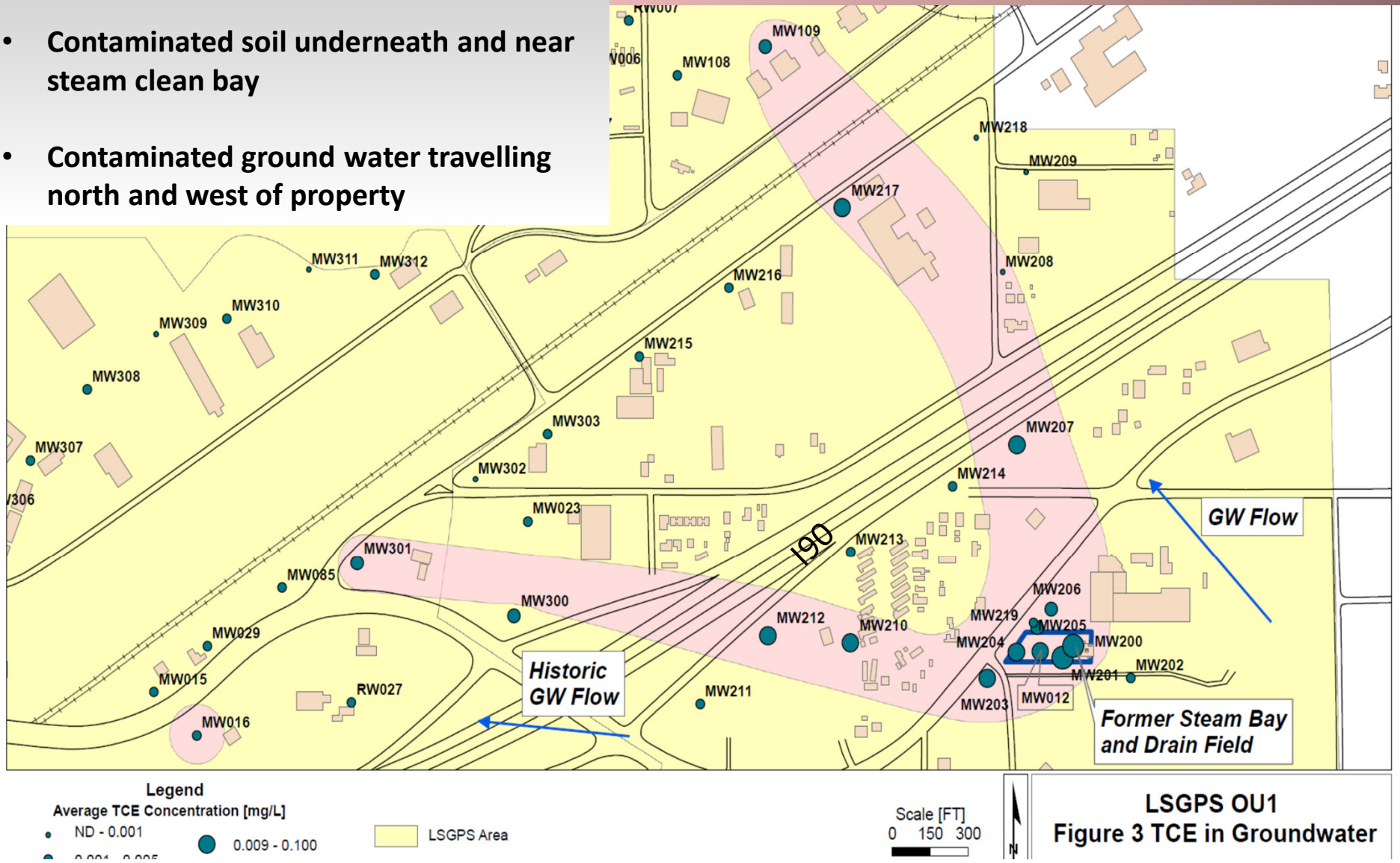
Beall – OU1

Asphalt Trailer manufacturing and repair

Used Trichloroethene (TCE) to clean trailers

Former Beall Trailers Facility – OU1

- **Main contaminant: Trichloroethene (TCE)**
- **Historically used to clean tanker trailers prior to repair**
  Disposal through septic system
- **Contaminated soil underneath and near steam clean bay**
- **Contaminated ground water travelling north and west of property**



Soco West Facility – OU2

- **Bulk chemical redistributor – Railroad tanker cars were offloaded into 55 gallon drums**
- **Main contaminant: Tetrachloroethene (PCE) and its biodegradation products**
- **Contaminated soil underneath several areas**
- **Groundwater travelling northwest**

Condition of Rail Spur Crossing Taylor Place

Record of Decision

- **Site wide Record of Decision issued in 2005**
  - **Public document that explains which cleanup alternatives (remedy) will be used to clean up a Superfund site.**
  - **Soil and groundwater components**

- **Soil components of remedy include:**
  - **Excavate/Treatment – source area soils**
  - **Soil Vapor Extraction – source areas vadose soil**
  - **Institutional Controls – deed restrictions on source area properties**

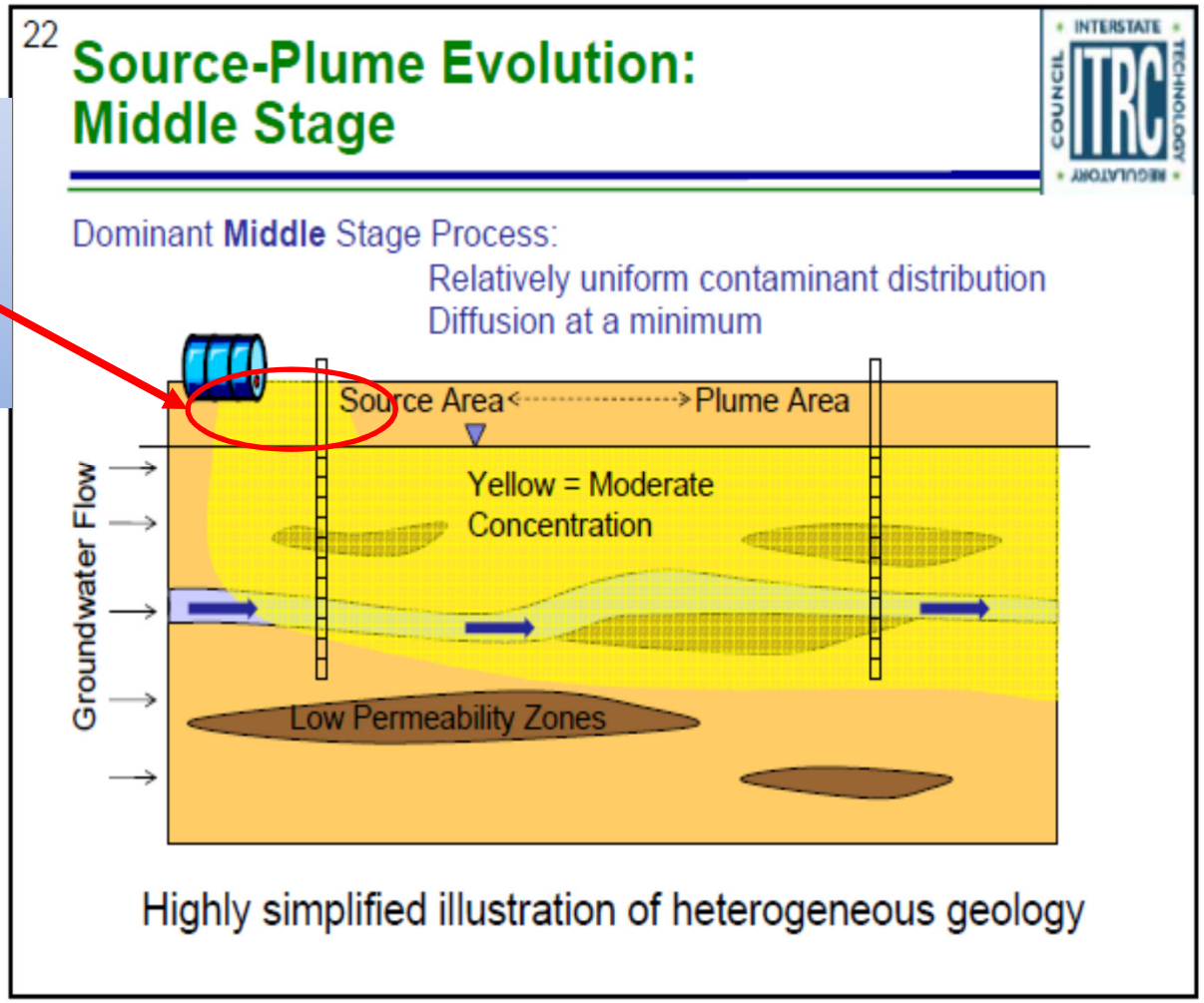
- **Groundwater components of remedy include:**
  - **Treatment/Containment Barrier – source area (OU2)**
  - **Enhanced Bioremediation/Chemical Oxidation – source areas**
  - **Enhanced Bioremediation/Monitored Natural Attenuation – downgradient groundwater from source areas**
  - **Institutional Controls – Controlled Groundwater Area**

What’s Going On at OU1?

What’s Going On at OU2?

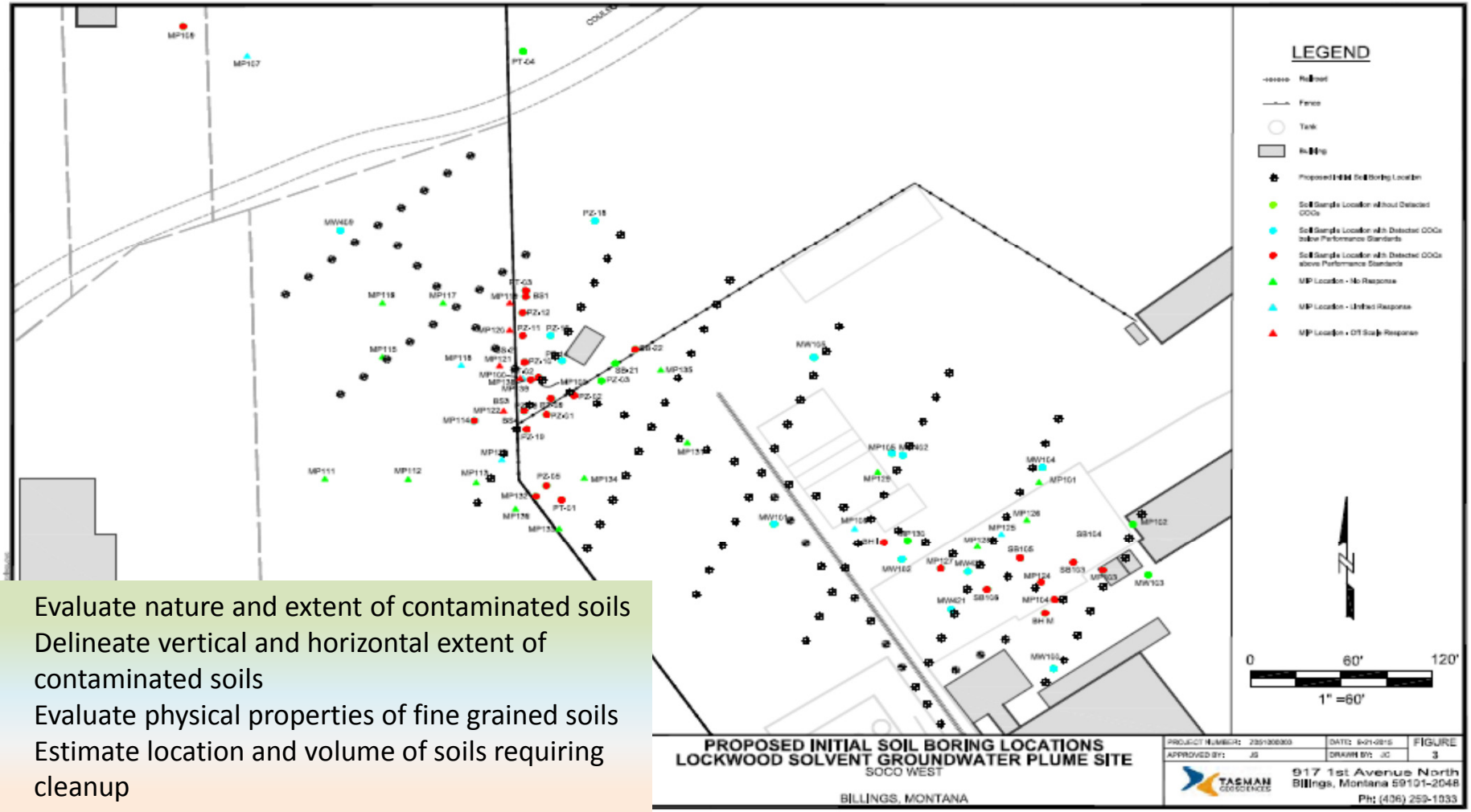
Soil Impacts

Source becomes trapped in the soil pores as an immobile, residual phase



No associated notes.

Fine Grained Soils Investigation
August 2016



- Evaluate nature and extent of contaminated soils
- Delineate vertical and horizontal extent of contaminated soils
- Evaluate physical properties of fine grained soils
- Estimate location and volume of soils requiring cleanup

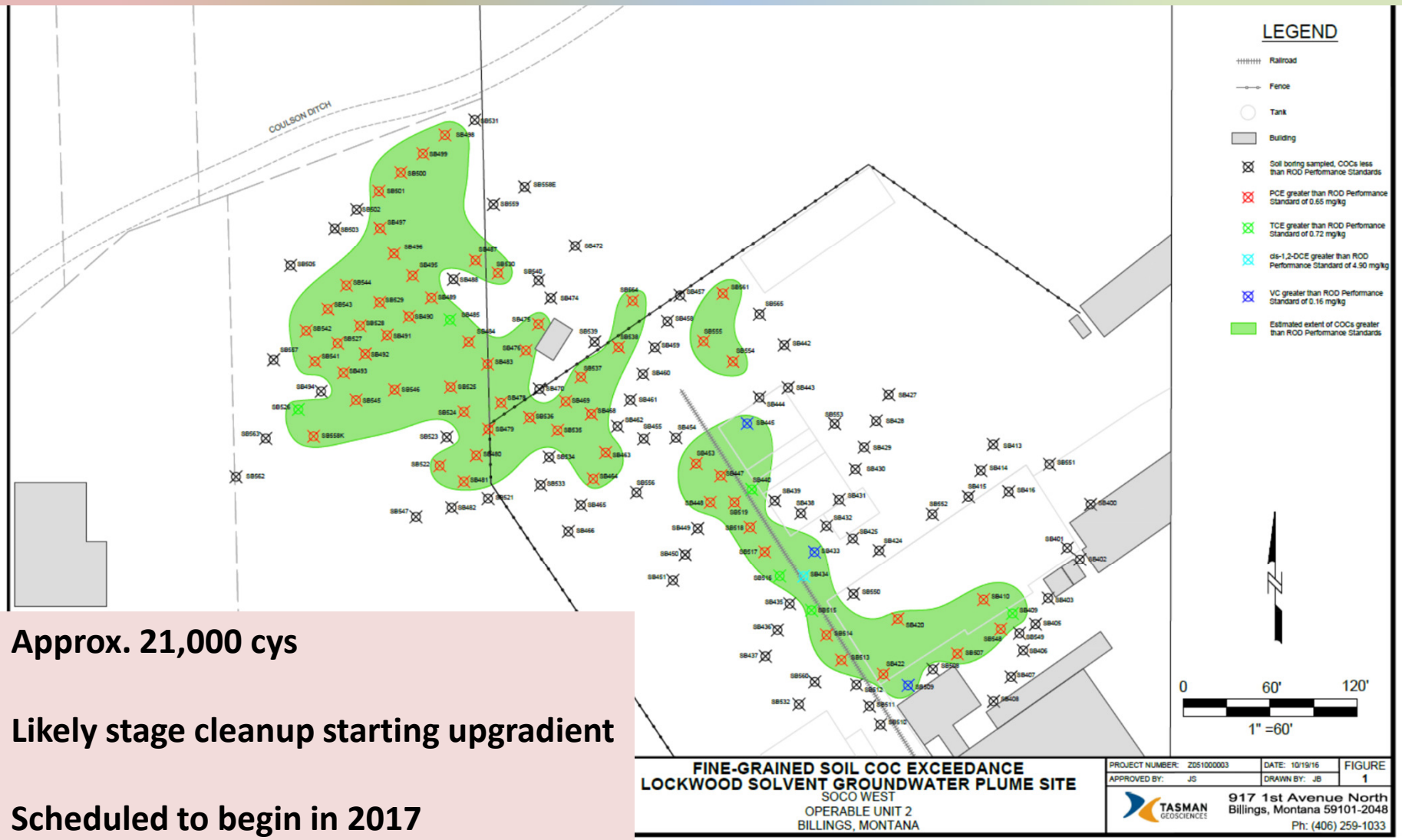
Work completed between August 1 and 18

148 borings completed down to depth of groundwater (9 to 12 feet)

Over 400 soils samples analyzed for chlorinated solvents

Soils also collected for agronomic analysis

Extent of Soils That May Require Remediation



Approx. 21,000 cys

Likely stage cleanup starting upgradient

Scheduled to begin in 2017

Groundwater Impacts

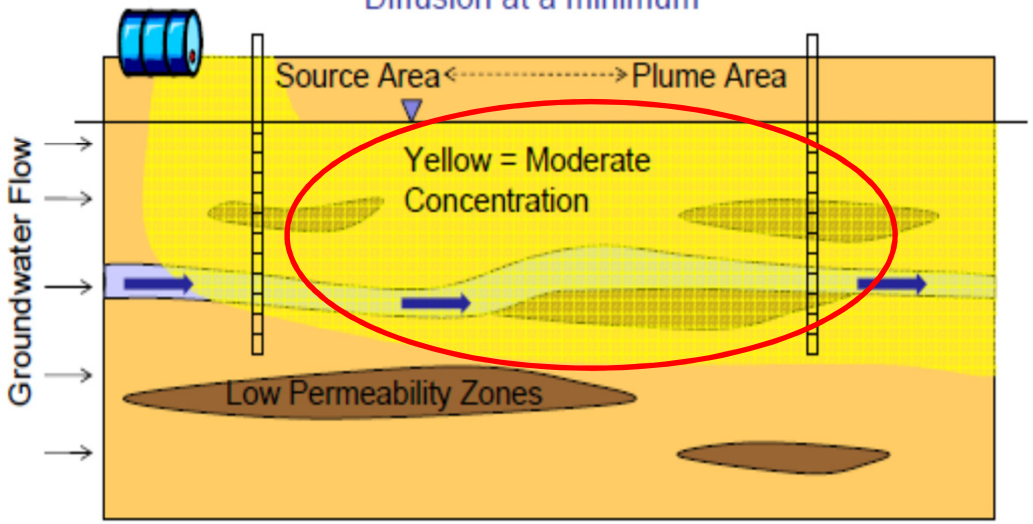
22

Source-Plume Evolution: Middle Stage

Dominant **Middle** Stage Process:

Relatively uniform contaminant distribution

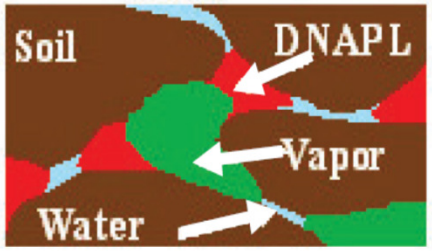
Diffusion at a minimum



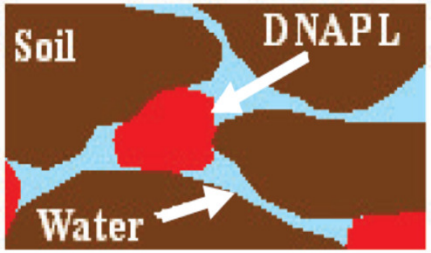
Highly simplified illustration of heterogeneous geology

No associated notes.

What is Happening at the Soil/Groundwater (Vadose Zone) Interface and in the Saturated Zone?



Vadose Zone



Saturated Zone

Figure 2-2. Pore-scale distribution of chemical phases of chlorinated solvents.

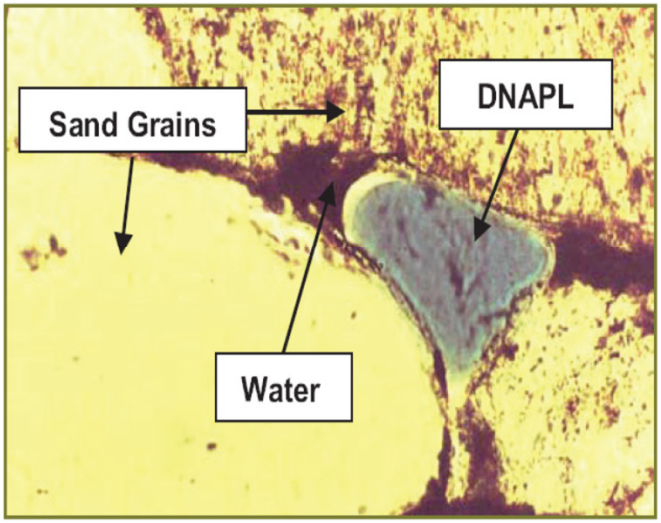


Figure 2-3. Photograph of nonaqueous-phase liquid and water sharing pore space in sand. *Source*: Wilson et al. 1990.

Reactions that degrade or transform chlorinated solvents are very important to the subsurface

Air Sparge/Vapor Recovery System

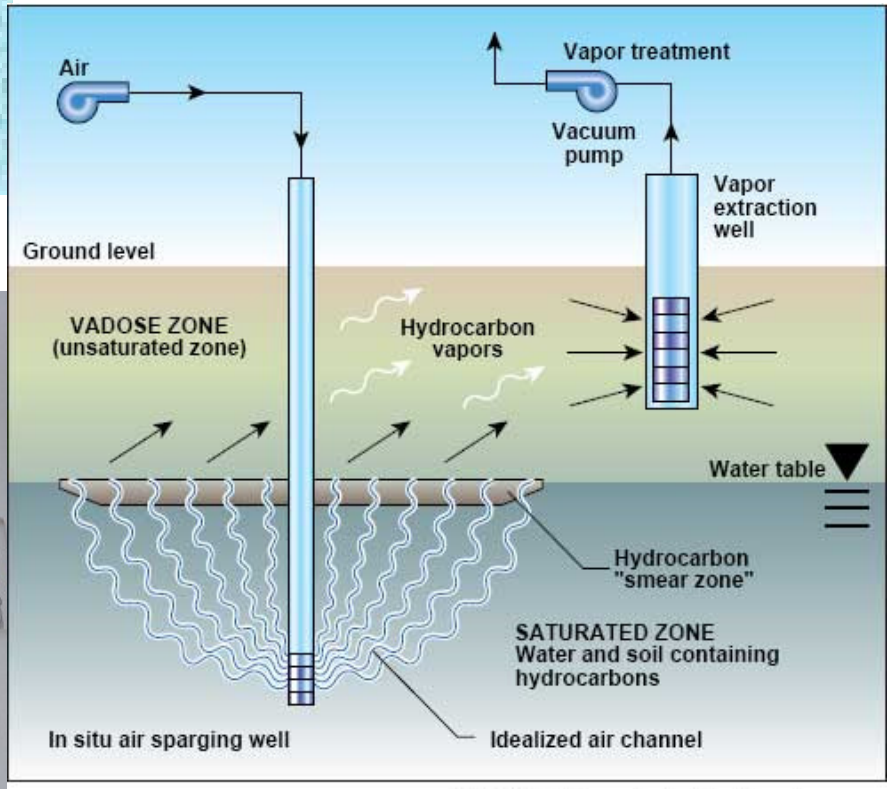


FIGURE 1 (above). By injecting air beneath a groundwater aquifer, air sparging operations can induce aquifer mixing, and promote the volatilization or biodegradataion of dissolved organic contaminants. Vapor-extraction wells then create a vacuum in the subsurface, to direct the flow of liberated vapors to recovery or monitoring wells

Works better on dissolved phase of chlorinated solvents in groundwater and NAPL in vadose zone (top of groundwater)

System operated intermittently between 2003 and 2011 using one sparge point and 11 trenches

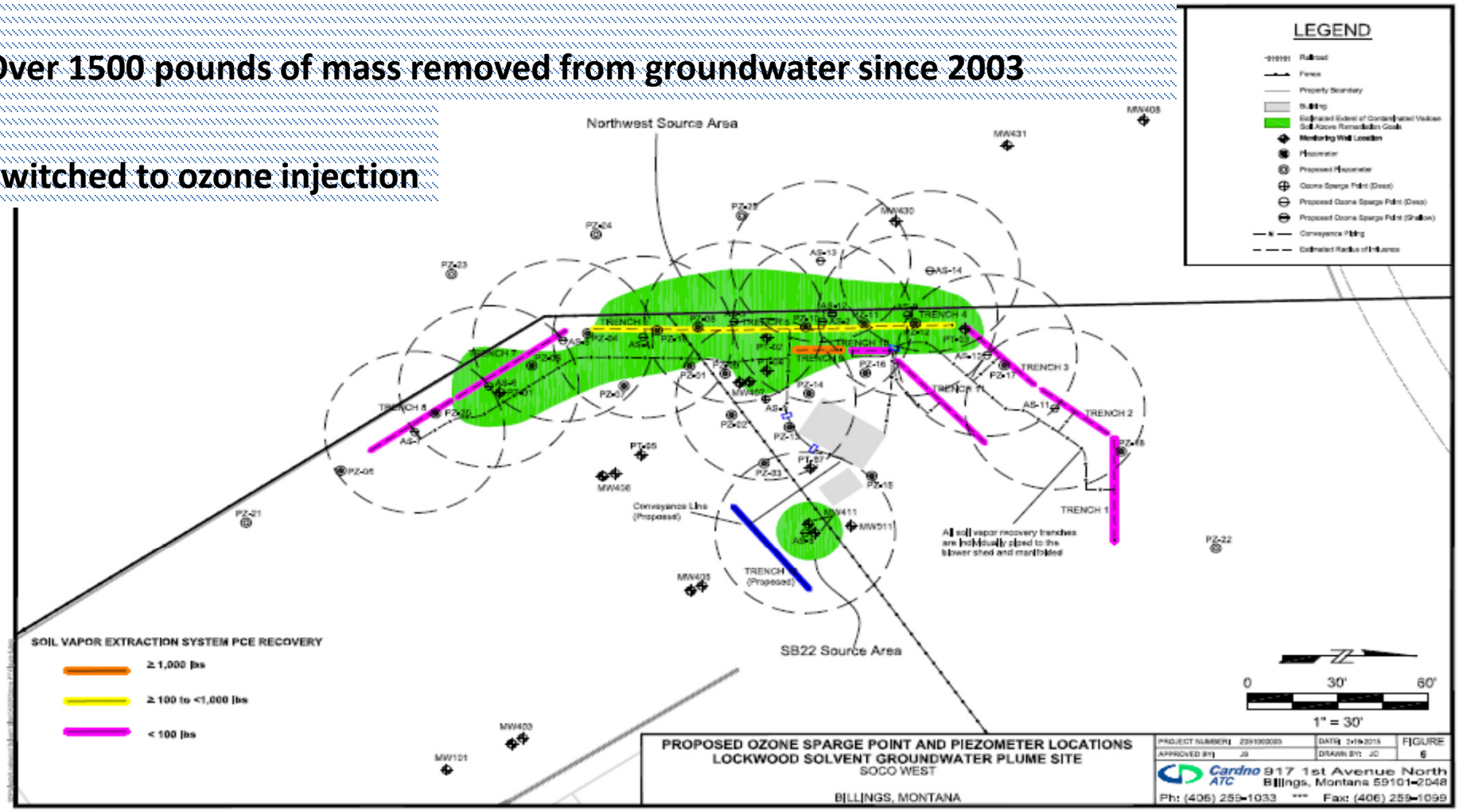
Initially injected ambient air into subsurface to sparge groundwater

Ozone Sparge/Vapor Recovery System

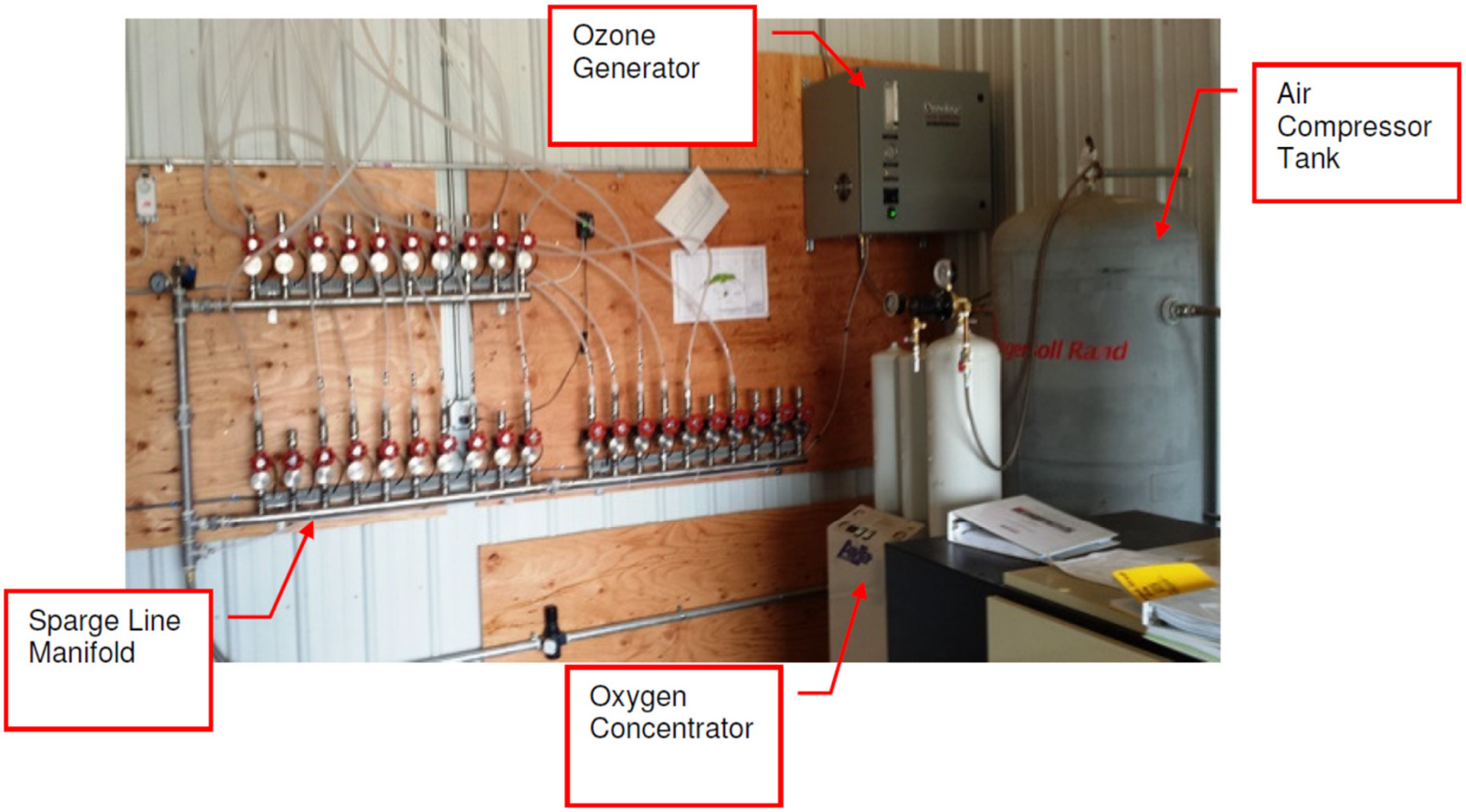
12 additional sparge points and one additional vapor recovery trench installed in 2015 to compliment 2003 infrastructure

Over 1500 pounds of mass removed from groundwater since 2003

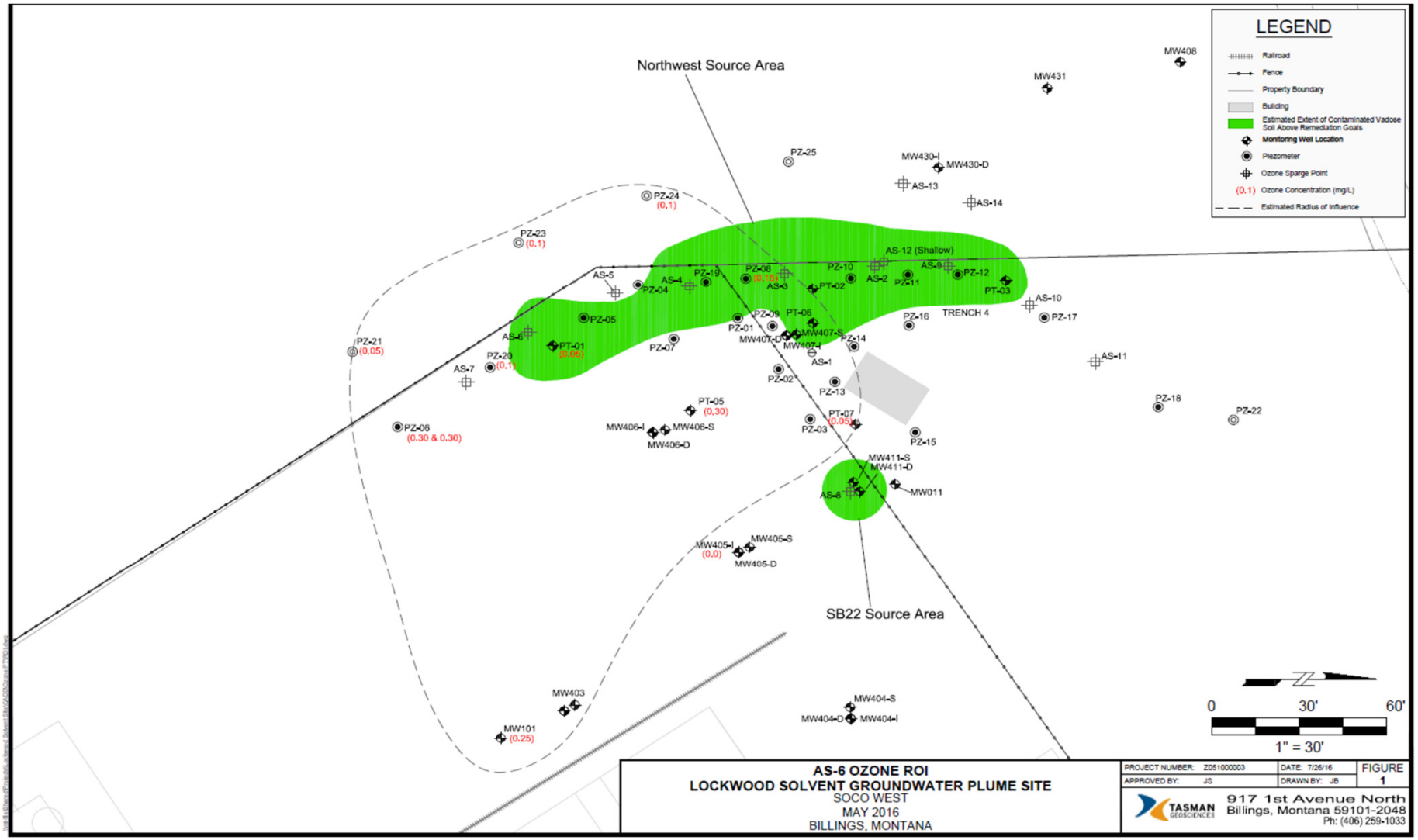
Switched to ozone injection



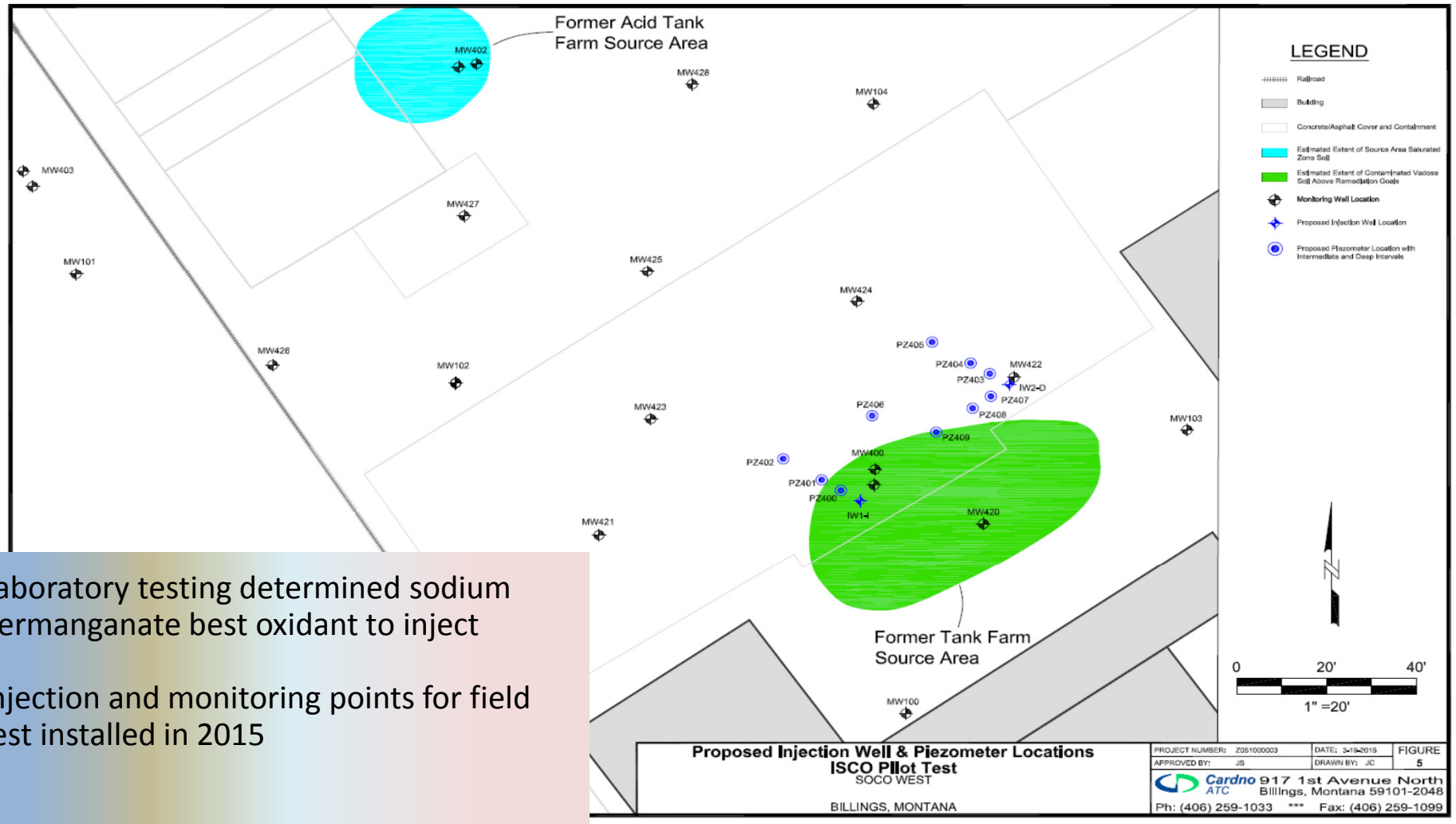
Sparge System



Radius of Influence of Sparge Point



In Situ Chemical Oxidation Pilot



Laboratory testing determined sodium permanganate best oxidant to inject

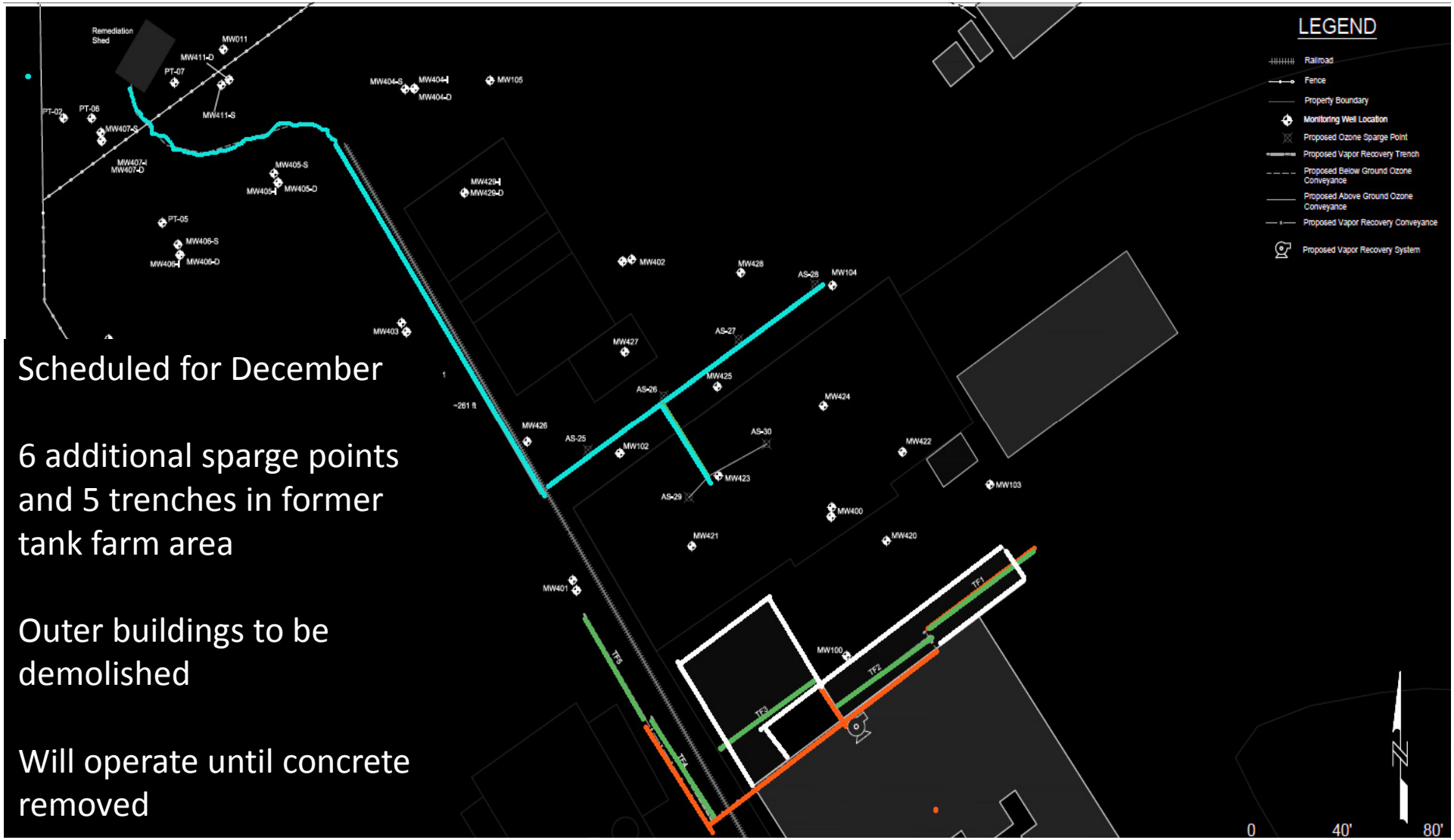
Injection and monitoring points for field test installed in 2015

Approx 2,275 of solution injected in both the intermediate and deep zones of aquifer

Works best on dissolved phase in groundwater

Documented initial reduction of concentrations in groundwater followed by a rebound

Phase 2 of Chemical Oxidation Pilot



Scheduled for December

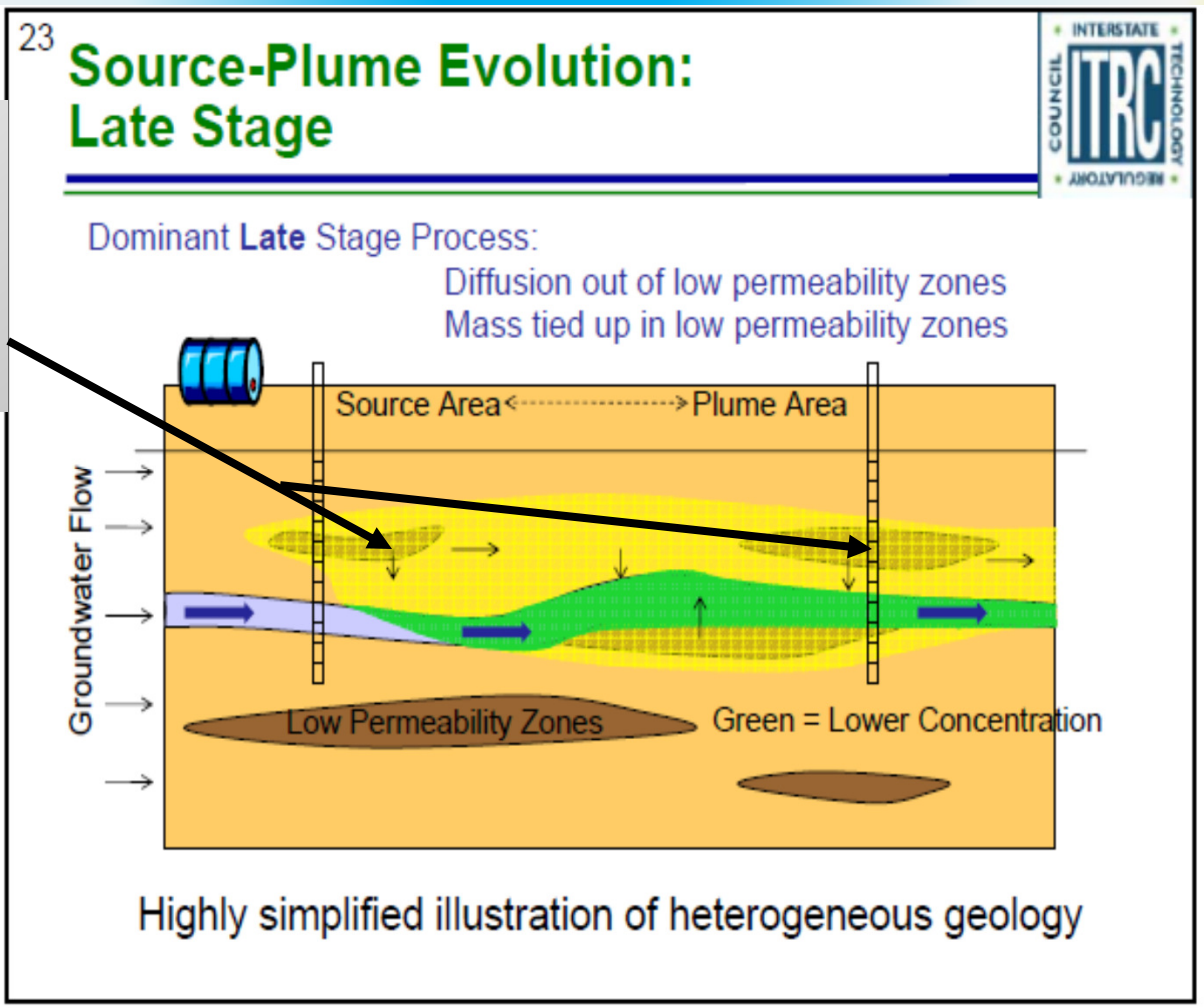
6 additional sparge points and 5 trenches in former tank farm area

Outer buildings to be demolished

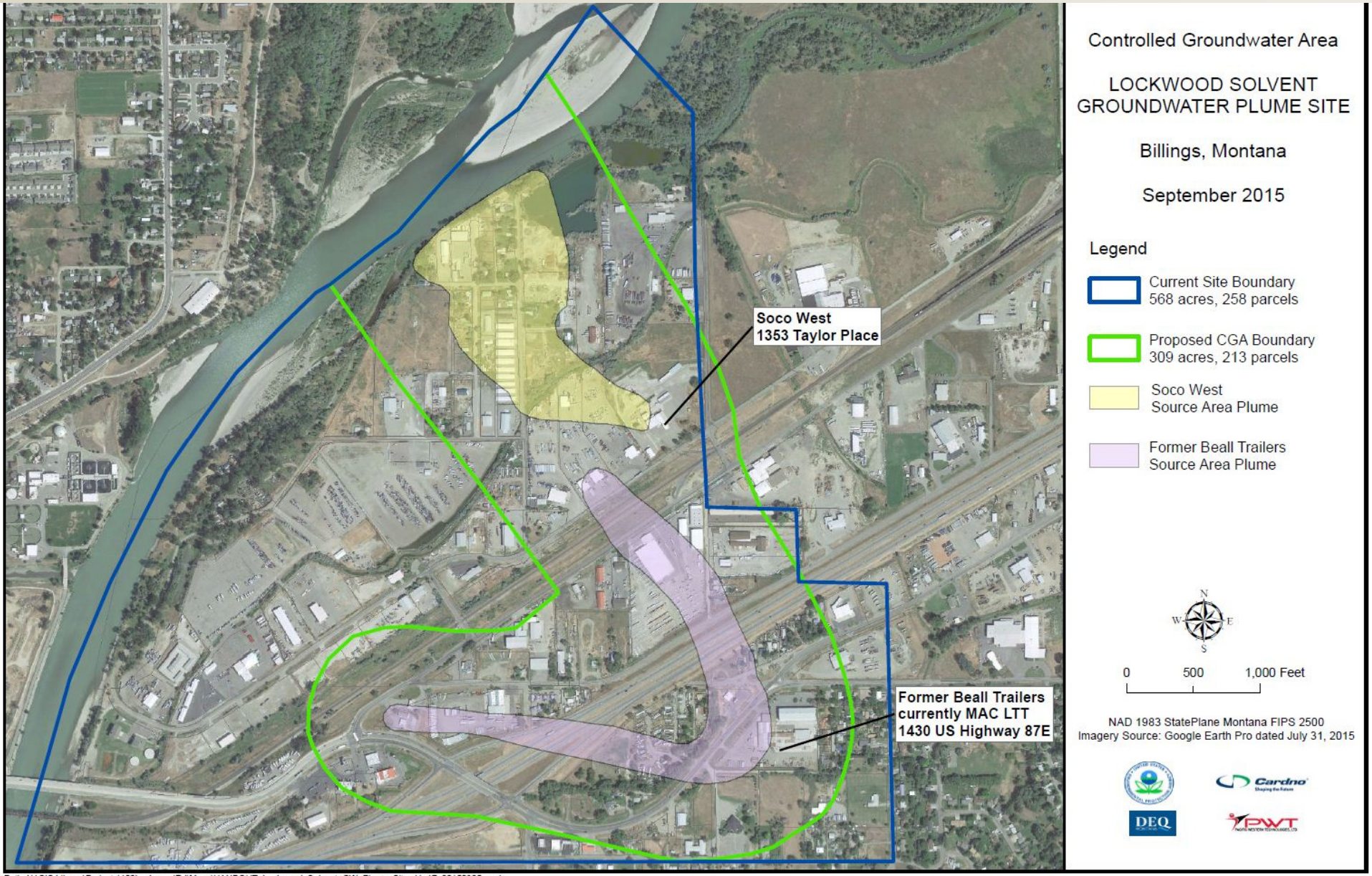
Will operate until concrete removed

Controlled Groundwater Area

Will source plume for many years after cleanup of soils is complete



Proposed Controlled Groundwater Area



Next Steps

- EPA, supported by the State of Montana and contractors, submit the petition, required fee, and technical documentation to Riverstone Board of Health (BoH).
  - BoH Chair signs the Controlled Groundwater Area (CGA) petition.
- Department of Natural Resources Conservation (DNRC) reviews petition; proposes rules; publishes application; and holds public meeting.
  - Letters go to water right owners; land owners (213); and well drillers.
- DNRC may designate a temporary or permanent CGA after receiving input.
  - CGA may be different from the original petition.
- DNRC administers new water use as set forth by adopted rules for CGA.

Questions/Comments