

East Helena Project Groundwater Update

- ✓ Groundwater Flow Direction and Water Level Trends
- ✓ Groundwater Contaminant Plumes and Water Quality Trends
- ✓ Future Monitoring



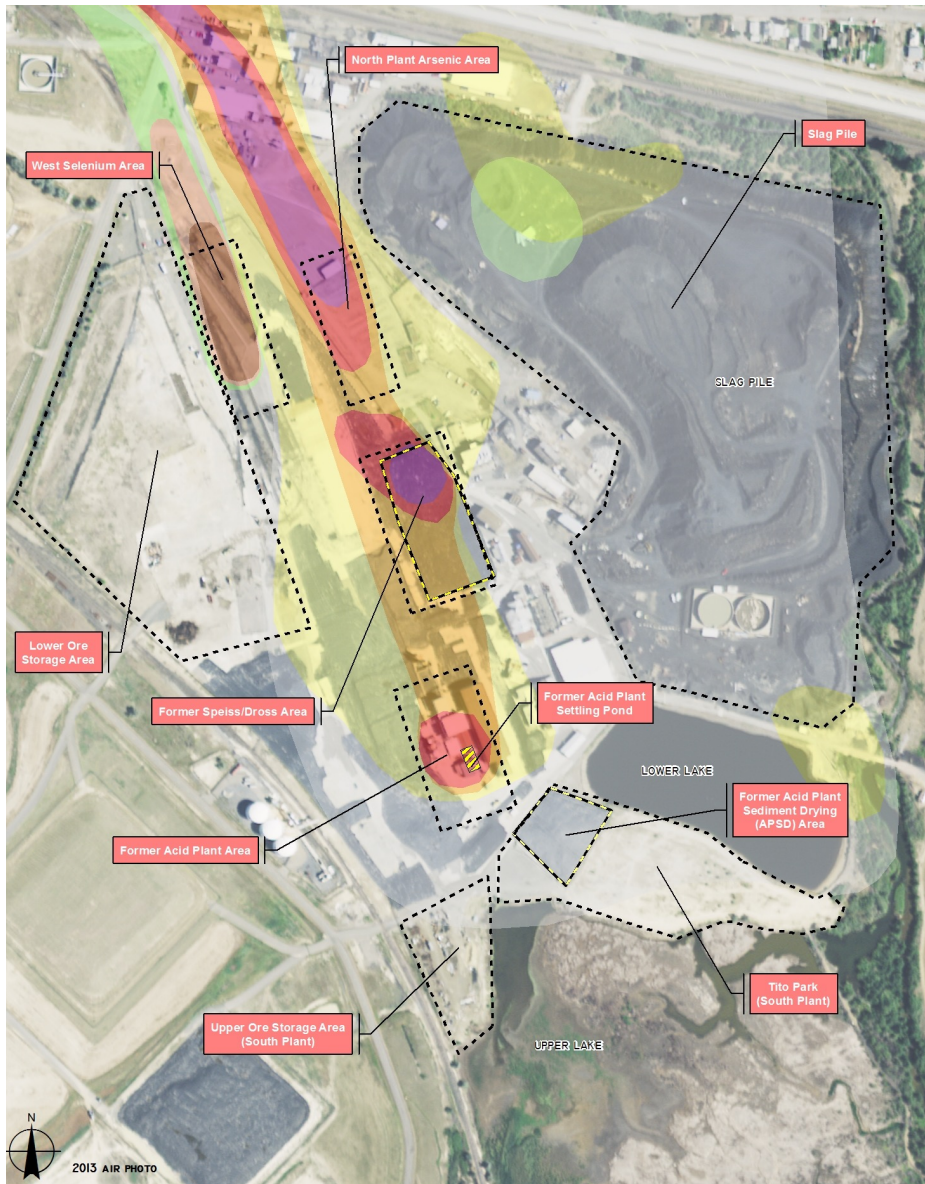
GROUNDWATER CONTAMINANT SOURCE AREAS

PRIMARY SOURCE AREAS

- ❖ West Selenium Area
- ❖ North Plant Arsenic Area
- ❖ Former Speiss-Dross Area
- ❖ Former Acid Plant Area
- ❖ South Plant
- ❖ Slag Pile

INTERIM MEASURES

- ❖ South Plant Hydraulic Control
- ❖ Source Removals
- ❖ Plant Site Evapotranspiration Cap



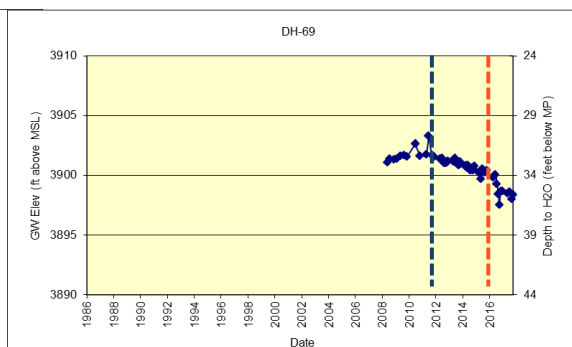
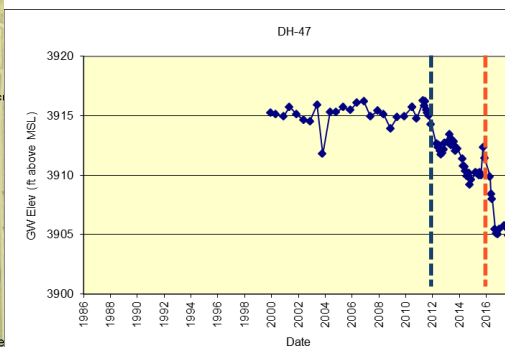
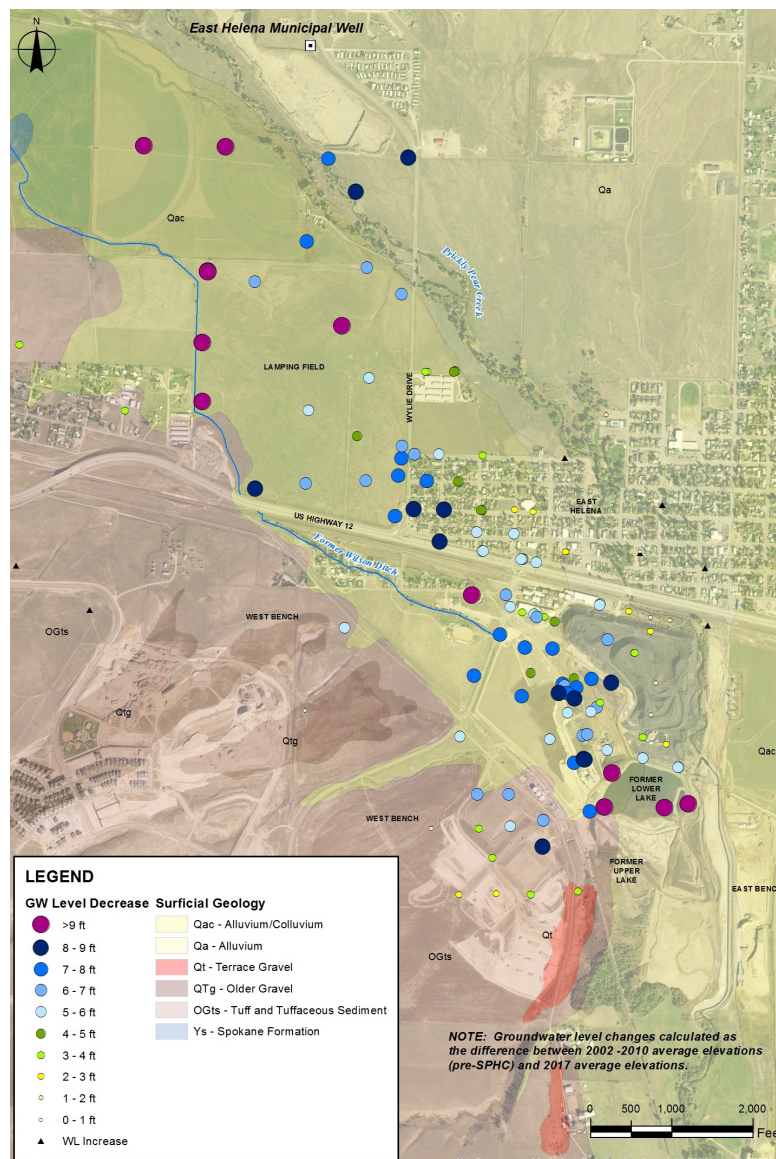
GROUNDWATER FLOW DIRECTIONS

- ☐ October 2017 Water Level Data
- ☐ Leakage from Prickly Pear Creek forms hydrologic divide
- ☐ Groundwater inflow from southwest buttresses flow to west
- ☐ Groundwater flow velocity about 8 feet/day; takes about 4 years for groundwater to travel from smelter to Canyon Ferry Road

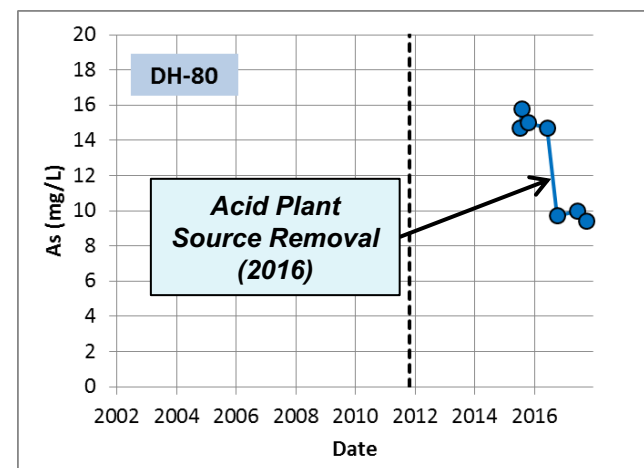
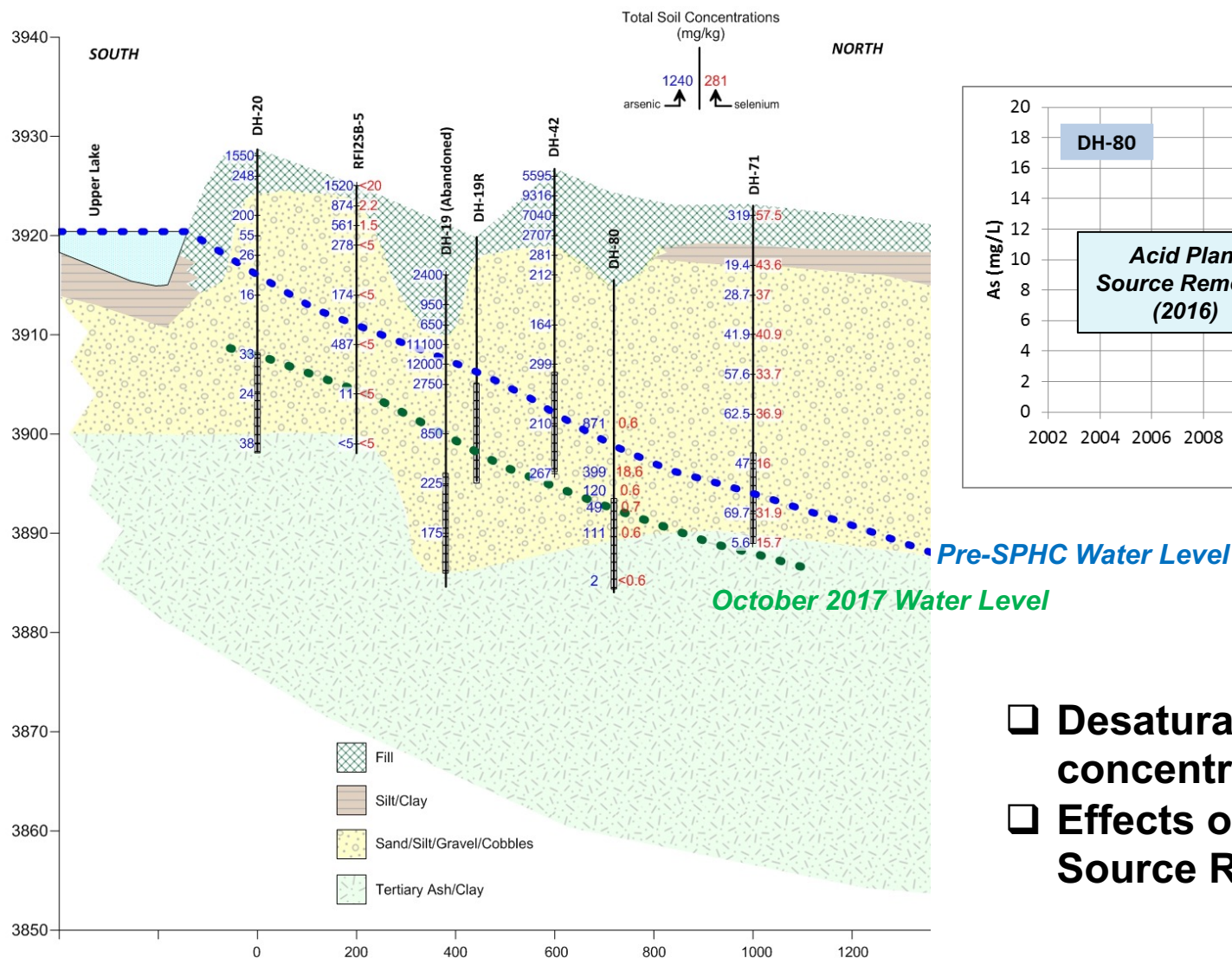


GROUNDWATER LEVEL TRENDS

- ❑ Plant site decreases:
 - 1-6 feet under slag pile
 - 4-10 feet in west plant site
- ❑ 2016-17 changes evident throughout plant site with PPC realignment, particularly in slag pile and former acid plant areas
- ❑ Significant declines noted northeast of Prickly Pear Creek presumably due to unrelated stresses



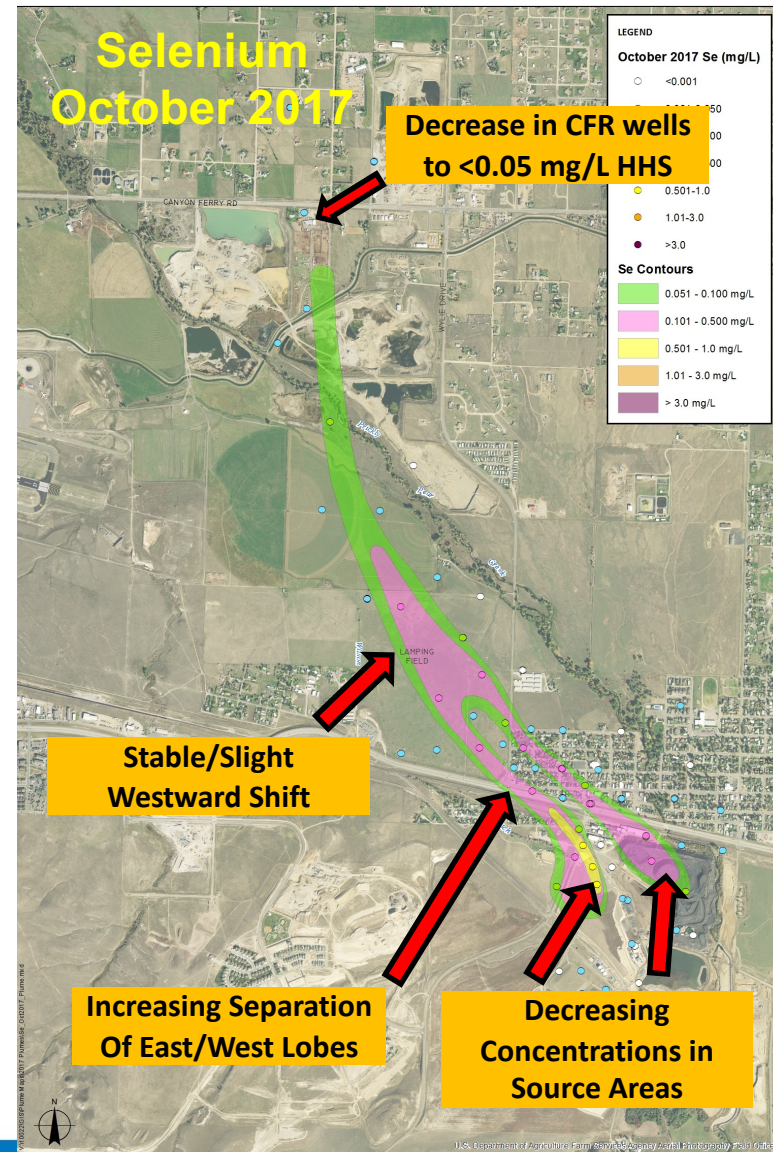
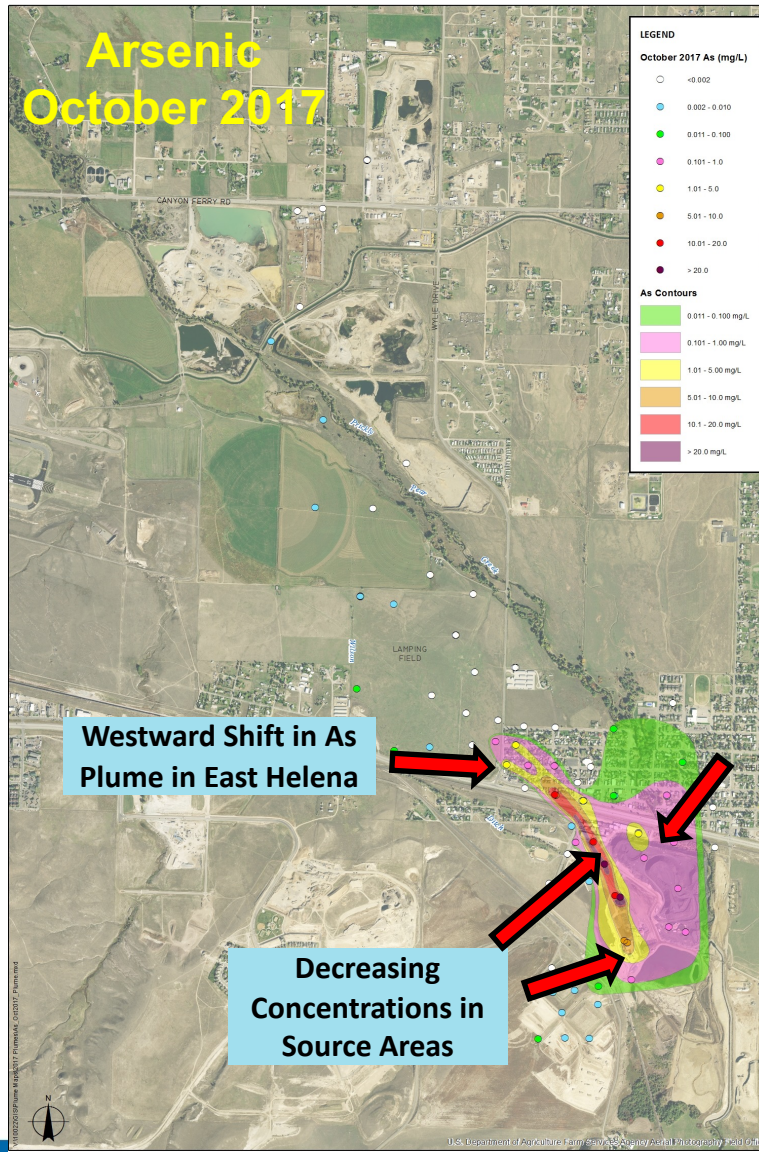
GROUNDWATER LEVEL TRENDS



- ❑ Desaturation of higher concentration soils
- ❑ Effects of Acid Plant Source Removal IM



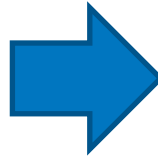
GROUNDWATER PLUMES



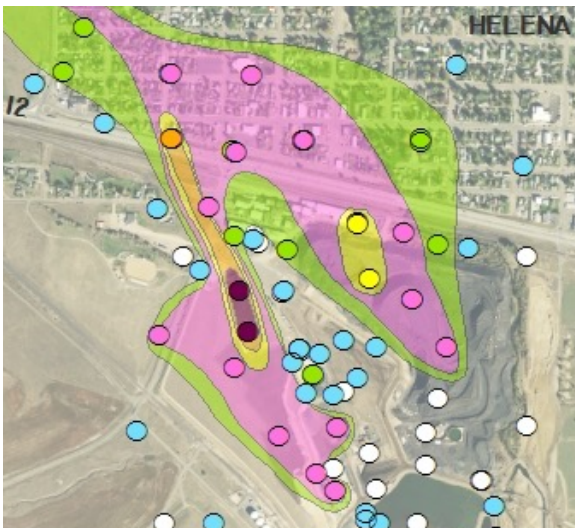
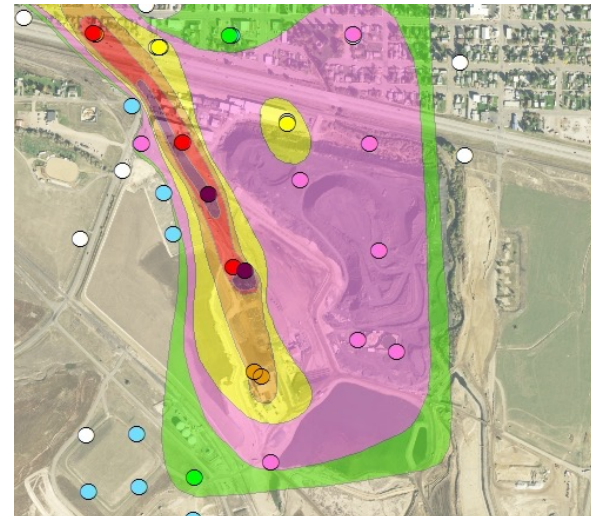
GROUNDWATER PLUMES



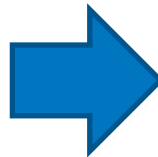
**Arsenic
September
2011**



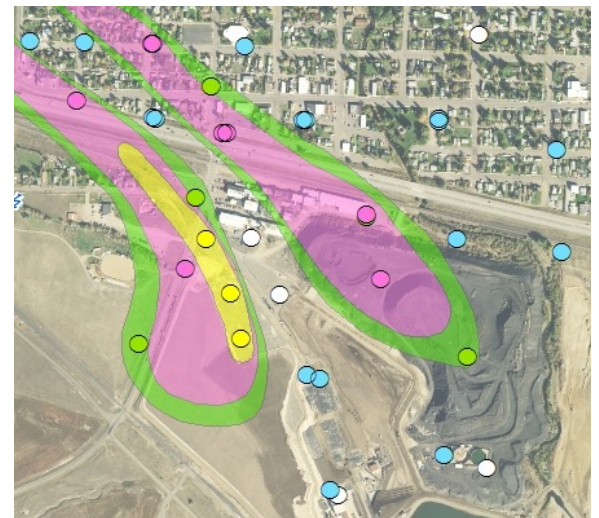
**Arsenic
October
2017**



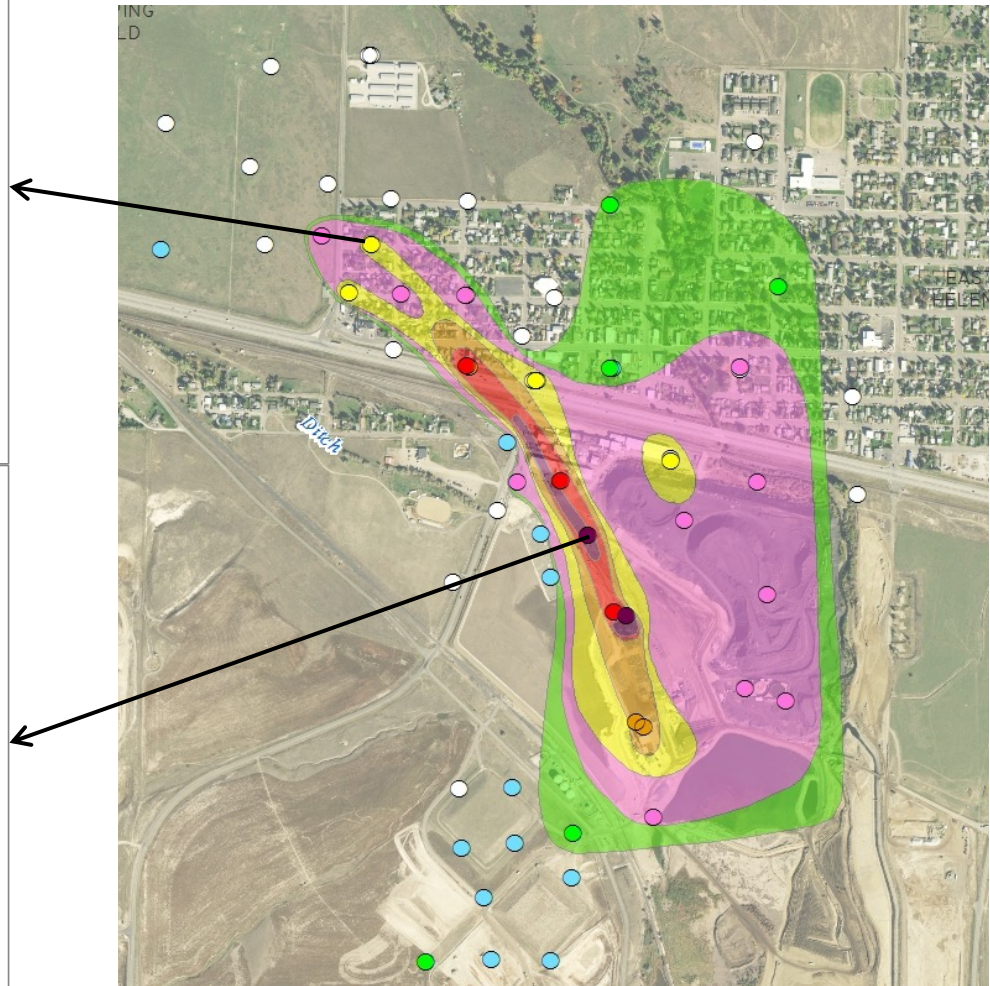
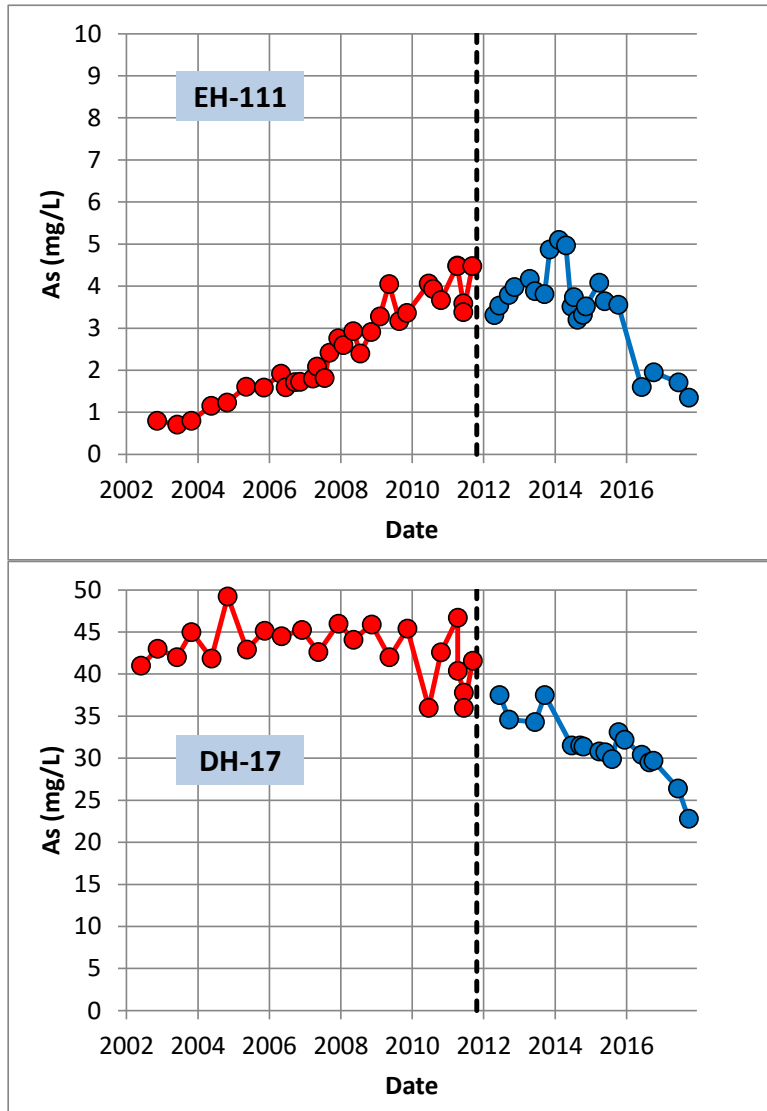
**Selenium
September
2011**



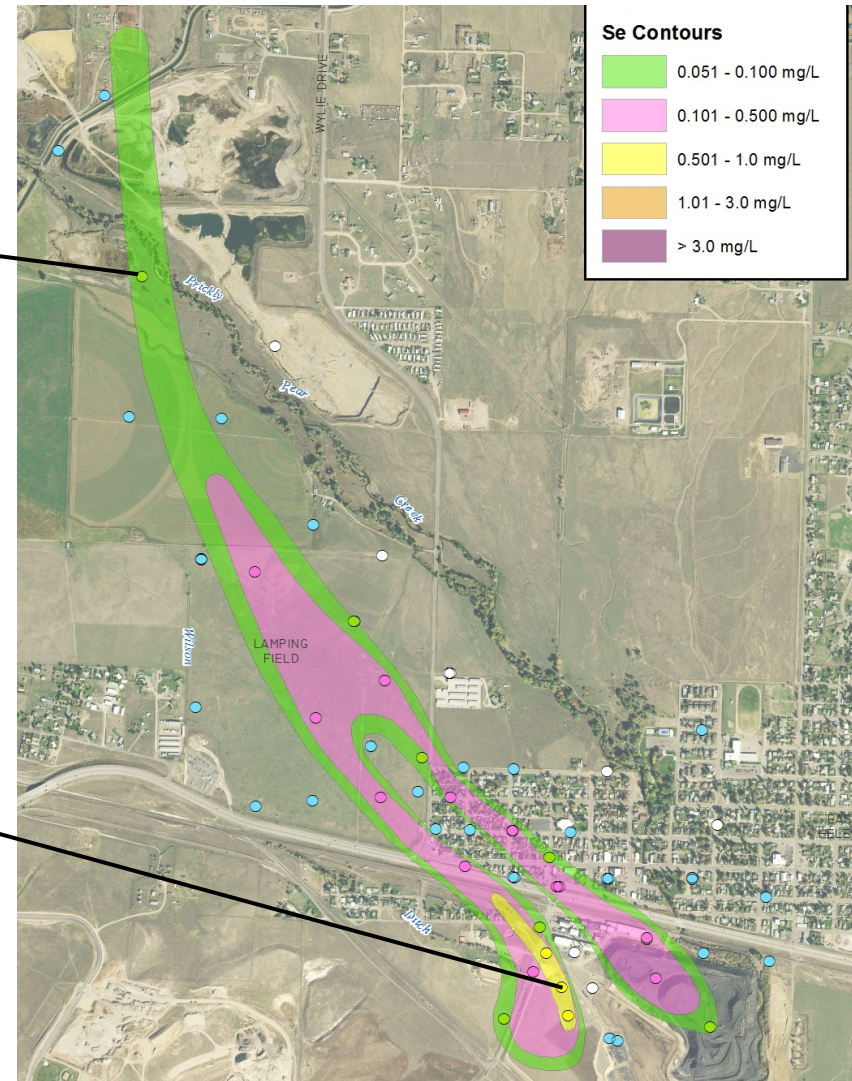
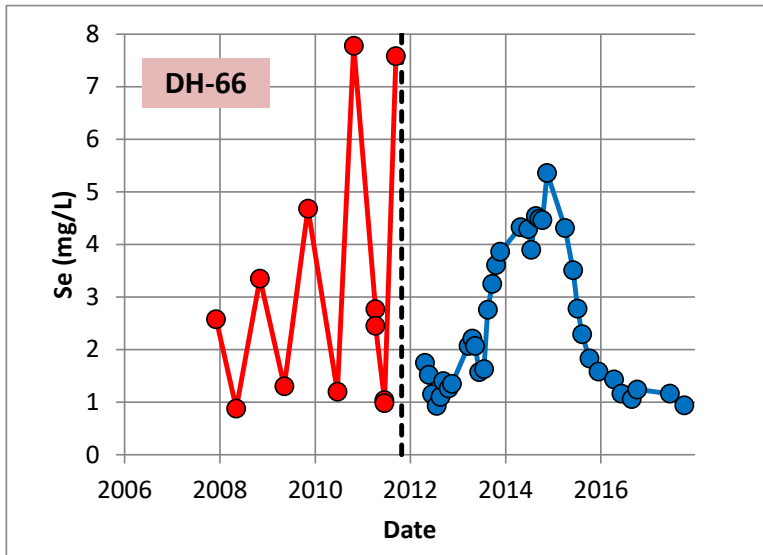
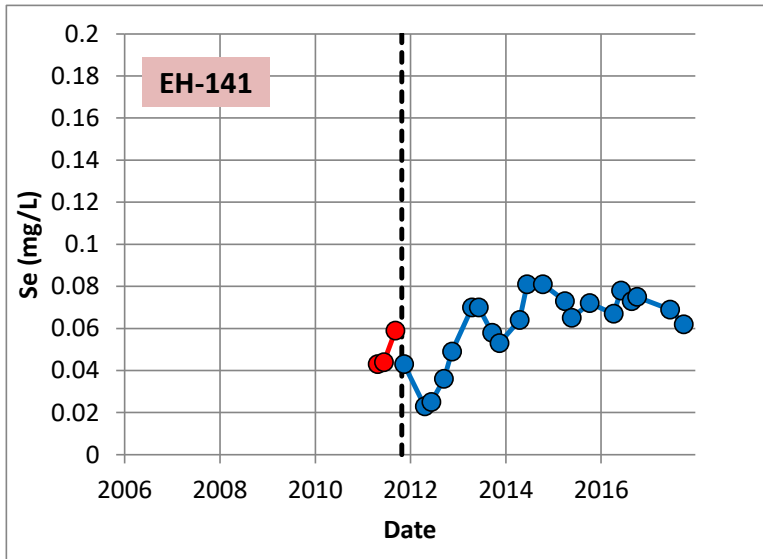
**Selenium
October
2017**



GROUNDWATER TRENDS - Arsenic

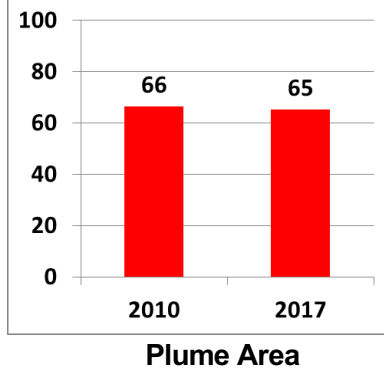
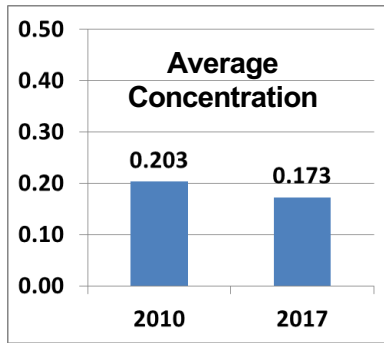


GROUNDWATER TRENDS - Selenium

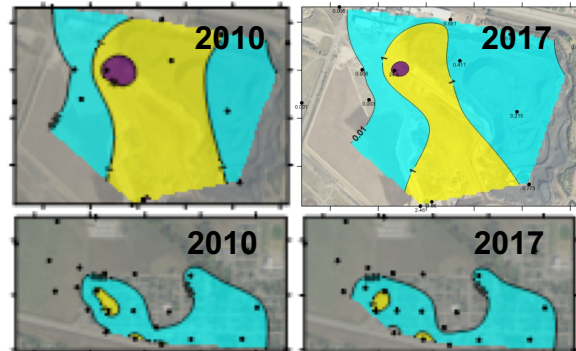
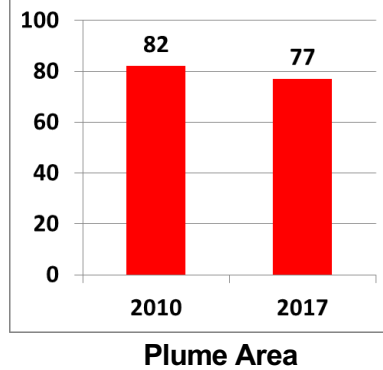
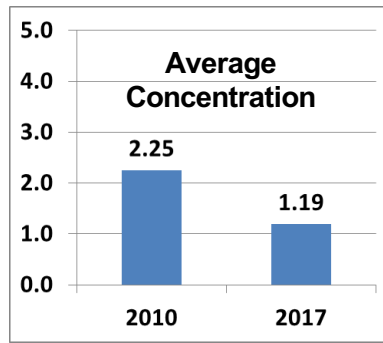


GROUNDWATER PLUME STABILITY

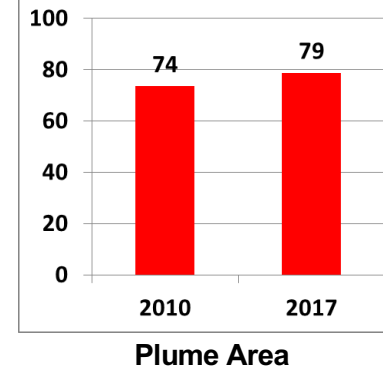
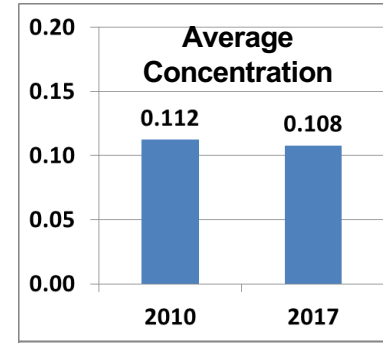
Arsenic – Off-Plant



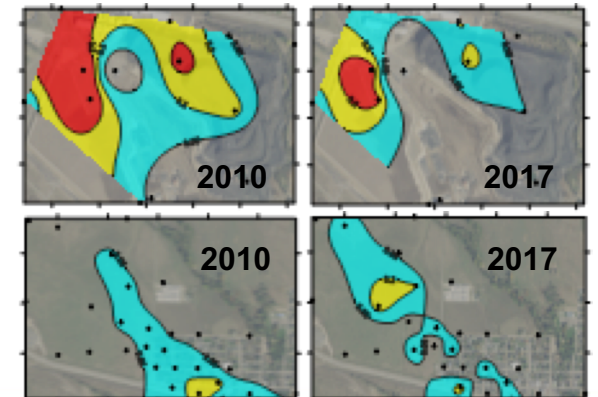
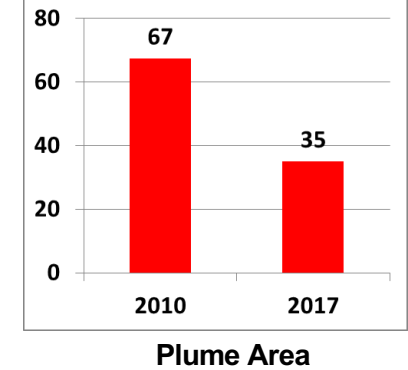
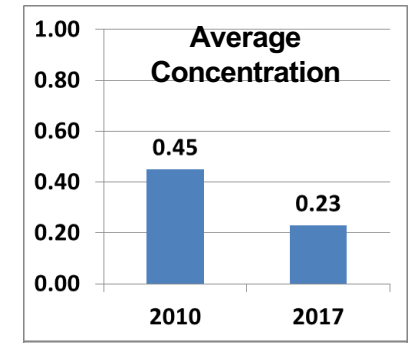
Arsenic – Plant Site



Selenium – Off-Plant



Selenium – Plant Site



GROUNDWATER MONITORING SUMMARY

- ❑ Significant WQ improvements continued through 2017 on plant site for both As and Se. Overall continuing positive response to recently completed Interim Measures.**
- ❑ Selenium concentrations at historic lows in Slag Pile, West Se areas; Arsenic concentrations at historic lows in North Plant Arsenic area.**
- ❑ Mixed trends offsite (westward plume shift) as post-IM hydraulic and geochemical steady state established.**
- ❑ Monitoring Program:**
 - Past monitoring has focused on contaminant source area and plume delineation; over 100 monitoring wells sampled.**
 - Current and future monitoring focused on plume stability and contaminant concentration trends to assess effectiveness of corrective measures; reduced scope of monitoring.**

