

US EPA ARCHIVE DOCUMENT

GENERAL STATEMENTS

Indiana Sites

- All of the Indiana sites analyzed for this presentation are located in southwestern Indiana, which has a bedrock geology generally consisting of complexly interbedded, discontinuous layers of sandstone, siltstone, shale, thin limestone and bituminous coal. There are two main sources of groundwater which include the unconsolidated sand and gravel deposits along major rivers/streams and the Pennsylvanian age bedrock. Groundwater flow in the bedrock is primarily fracture flow and along bedding planes and cleats in the coal seams and in unfractured sandstones and other permeable units.
- Up-gradient and down-gradient wells were not identified in the reports reviewed for this study. The Indiana Department of Natural Resources (IDNR) stated that it is not possible to determine the pre-mining ground-water flow conditions at this time, however, due to the physical attributes and dynamic nature of mining, it is possible that the initial ground-water flow direction will not be maintained during mining and possibly after mining operations are complete. For example, a well identified as down-gradient under baseline conditions may become an up-gradient well during mining. Therefore, groundwater data was reviewed to determine if there were any noticeable trends pre- and post-placement. The wells selected for graphical purposes are based on well location, well construction (i.e. position relative to ash placement and bedrock vs. unconsolidated) and overall monitoring data.
- Ms. Deborah A. Dale, Hydrogeologist-Indiana Department of Natural Resources Division of Reclamation, states that “It has been Indiana’s experience that the quality of spoil water, with regard to mining parameters, does not appear to change significantly with the disposal of CCW. This observation is based on a comparison of water-quality data obtained from surface mines in Indiana with, and without, CCW material.”
- Groundwater monitoring data and surface water quality data were provided for several sites, however, only groundwater monitoring data was utilized for analysis for this presentation.
- Groundwater constituents identified above the MCLs at one or more of the sites reviewed for Indiana include: pH, total dissolved solids (TDS), aluminum, iron, manganese, zinc, and sulfate (Secondary MCLs) and cadmium (Primary MCL). General statements regarding groundwater quality at the sites are as follows: Groundwater analysis at Universal and Viking show no significant effect on the metals (aluminum, iron, manganese, zinc, and cadmium) concentrations pre- and post placement. However, results show metal concentrations are decreasing at Deer Ridge and the NW Area of Prides Creek. The South Area of Prides Creek showed increasing trends for metals.

Pennsylvania Sites

- The geology of the B-D mine site and Big Gorilla were very similar being that they are located in Schuylkill County. The bedrock present at these sites is predominately middle to late Pennsylvanian in age, consisting of the Llewellyn formation, Mauch Chunk formation and the Pottsville formation. The two sites are located in Pennsylvania's southern anthracite region.
- The Revloc and Maple Coal site are also very similar in geology, both sites are located within Cambria County located in Pennsylvania's main bituminous area producing a medium to low volatile bituminous coal. Cambria County's bedrock geology is Pennsylvanian in age and is categorized by cyclic sequences of sandstone and shale with thin beds of limestone and bituminous coal.
- The Pennsylvania Department of Environmental Protection (DEP) Bureau of Mining and Reclamation provided data for this project. Monitoring points were pre-determined by DEP and depicted as background or up/down-gradient relative to the disposal area.
- Pennsylvania did not provide any conclusions regarding this type of disposal of CCW, with respect to how this disposal practice is generally affecting the over-all groundwater quality at sites.
- Groundwater monitoring data and surface water quality data was provided for several sites, however, only groundwater monitoring data was utilized for analysis for this presentation.
- Groundwater constituents identified above the MCLs at one or more of the sites reviewed for Pennsylvania include: pH, total dissolved solids (TDS), aluminum, iron, manganese, zinc, and sulfate (Secondary MCLs) and arsenic, chromium, and cadmium (Primary MCLs). General statements regarding groundwater quality at the sites are as follows: Groundwater analysis at the anthracite mines (Big Gorilla and B-D) show baseline pH ranges between 3 and 4.5, with no significant effect on the metals concentrations post placement at the B-D Site and variable effects on metal concentrations at Big Gorilla. Groundwater analysis showed down-gradient pH ranges between 2 and 4.5 at the bituminous mines (Revloc and Maple Creek). The results show that all constituent concentrations are decreasing post-placement at Revloc and Maple Creek.

ADDITIONAL INFORMATION

Indiana

- Additional water quality data was analyzed to include surface water monitoring points when included with the data submittal from the Indiana Department of Natural Resources (IDNR). However, only surface water quality sample data were reviewed for sites that monitored potential discharges to streams and rivers; water quality data for sediment basin samples were not utilized for this presentation. Additional data were provided for the Universal and Deer Ridge sites.
- The Universal site included three years of up-stream (post-placement) and fourteen years of down-stream (1 year pre- and 13 years post-placement) monitoring data along Coal Creek. Down-stream monitoring data show an increase in pH to background levels and significant reductions in total dissolved solids (TDS) and iron post placement. Manganese concentrations decreased down stream, however, remain slightly higher than the up-stream monitoring point. The overall trend appears more positive than negative.
- At Deer Ridge, approximately ten years (3 years pre-placement and 7 years post-placement) of down-stream monitoring data exists. Baseline data were initially collected for an adjacent watershed where disposal did not occur and is no longer monitored. Down-stream monitoring data from show reductions in cadmium, manganese, TDS, and iron post placement. The overall trend in water quality appears to be positive post-placement.
- Additionally, at Viking Mine, sulfate was not graphed for this presentation. Groundwater monitoring data at Viking Mine shows sulfate concentrations below the MCLs at placement time. The sulfate concentrations spiked above the MCLs during the first quarter of 2000 (~ 4 years post placement), then decreased below the MCLs through most recent sampling data.

Indiana Mine Sites

Vigo County



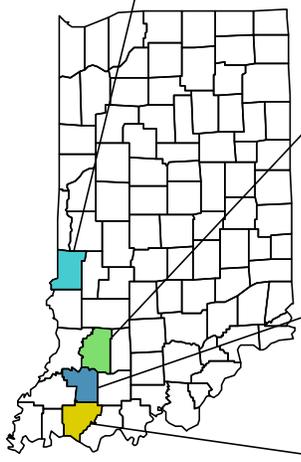
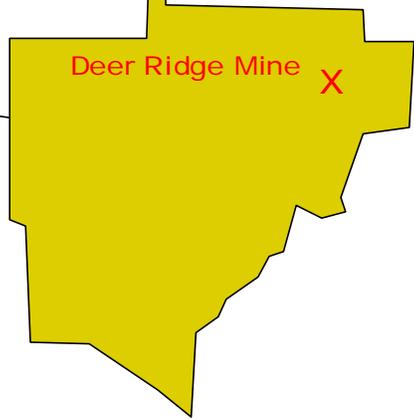
Daviess County



Pike County



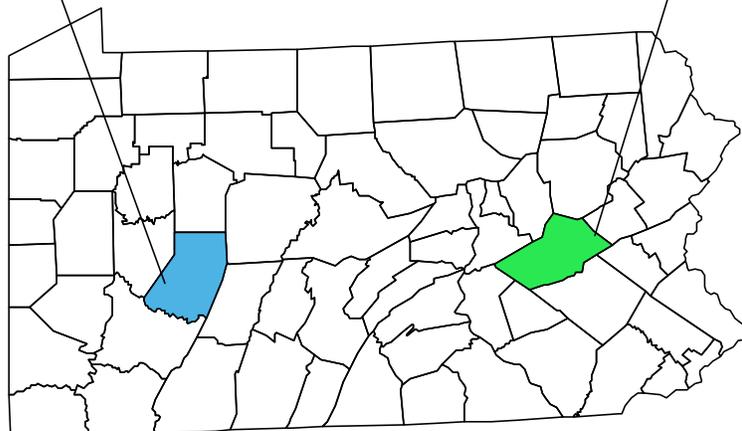
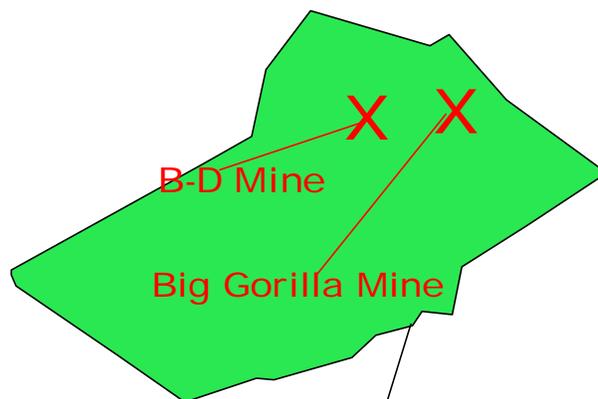
Warrick County



Pennsylvania Mine Sites

Cambria County

Schuykill County



Indiana				Pennsylvania			
Prides Creek	Universal	Deer Ridge	Viking	Big Gorilla	B-D	Revloc	Maple Coal
Acidity	Acidity	Acidity	Acidity	ALUMINUM	ALUMINUM	Arsenic	Arsenic
Alkalinity	Alkalinity	Alkalinity	Alkalinity	ARSENIC	ARSENIC	Barium	Barium
Aluminum	Aluminum	Aluminum	Aluminum	CADMIUM	CADMIUM	Cadmium	Cadmium
Arsenic	Arsenic	Arsenic	Arsenic	CALCIUM	CALCIUM	Chromium	Chromium
Barium	Barium	Barium	Barium	CHLORIDE	CHLORIDE	Fluoride	Fluoride
Bicarb	Bicarb	Bicarb	Bicarb	CHROMIUM	CHROMIUM	Lead	Lead
Boron	Boron	Boron	Boron	COPPER	COPPER	Mercury	Mercury
Cadmium	Cadmium	Cadmium	Cadmium	LEAD	LEAD	Nitrate	Nitrate
Calcium	Calcium	Calcium	Calcium	MAGNESIUM	MAGNESIUM	Selenium	Selenium
Carbonate	Carbonate	Cat_Ion	Cat_Ion	MERCURY	MERCURY	Silver	Silver
Cat_Ion	Cat_Ion	Chloride	Chloride	NICKEL	NICKEL	Calcium	Calcium
Chloride	Chloride	Chromium	Chromium	POTASSIUM	POTASSIUM	Magnesium	Magnesium
Chromium	Chromium	Copper	Copper	SELENIUM	SELENIUM	Chloride	Chloride
Copper	Copper	Field_pH	Field_pH	SODIUM	SODIUM	Phenol	Phenol
Field_pH	Field_pH	Flow_Rate	Flow_Rate	ZINC	ZINC	Sodium	Sodium
Flow_Rate	Flow_Rate	Fluoride	Fluoride	BARIUM	BARIUM	Ammonia Nitrogen	Ammonia Nitrogen
Fluoride	Fluoride	Hardness	Hardness	SILVER	SILVER	Potassium	Potassium
Hardness	Hardness	Iron	Iron	LAB pH	LAB pH	Copper	Copper
Iron	Iron	Lab_pH	Lab_pH	FIELD pH	FIELD pH	Zinc	Zinc
Lab_pH	Lab_pH	Lead	Lead	SPECIF. COND.	SPECIF. COND.	LAB pH	LAB pH
Lead	Lead	Magnesium	Magnesium	Alkalinity	Alkalinity	FIELD pH	FIELD pH
Magnesium	Magnesium	Manganese	Manganese	ACIDITY	ACIDITY	SPECIF. COND.	SPECIF. COND.
Manganese	Manganese	Mercury	Mercury	IRON	IRON	Alkalinity	Alkalinity
Mercury	Mercury	Molybdenum	Molybdenum	MANGANESE	MANGANESE	ACIDITY	ACIDITY
Molybdenum	Molybdenum	Nickel	Nickel	SULFATE	SULFATE	IRON	IRON
Nickel	Nickel	Nitrate	Phospor	TDS	TDS	MANGANESE	MANGANESE
Phospor	Potassium	Phosphate	Potassium	TSS	TSS	ALUMINUM	ALUMINUM
Potassium	Selenium	Phospor	Selenium	AMMONIA-NITROGEN	AMMONIA-NITROGEN	SULFATE	SULFATE
Selenium	Silver	Potassium	Silicon	NITRATE-NITROGEN	NITRATE-NITROGEN	TDS	TDS
SiliDiox	Sodium	Selenium	SiliDiox	BICARB	BICARB	TSS	TSS
Silver	Sp_Con	Silicon	Silver	TURBIDITY	TURBIDITY		
Sodium	Sulfate	SiliDiox	Sodium	CHEM OX DEMAND	CHEM OX DEMAND		
Sp_Con	Sulfide	Silver	Sp_Con	FLUORIDE	FLUORIDE		
Sulfate	TDS	Sodium	Sulfate	CHLORIDE	CHLORIDE		
Sulfide	Temperature	Sp_Con	Sulfide	SODIUM	SODIUM		
TDS	Tot_Org	Sulfate	TDS				
Temperature	TotSetS	Sulfide	Temperature				
Titanium	TotSusS	TDS	Titanium				
Tot_Org	Zinc	Temperature	Tot_Org				
TotSusS		Titanium	TotSusS				
Vanadium		Tot_Org	Vanadium				
Zinc		TotSusS	Zinc				
		Vanadium					
		Zinc					

DEER RIDGE MINE, WARRICK COUNTY, INDIANA

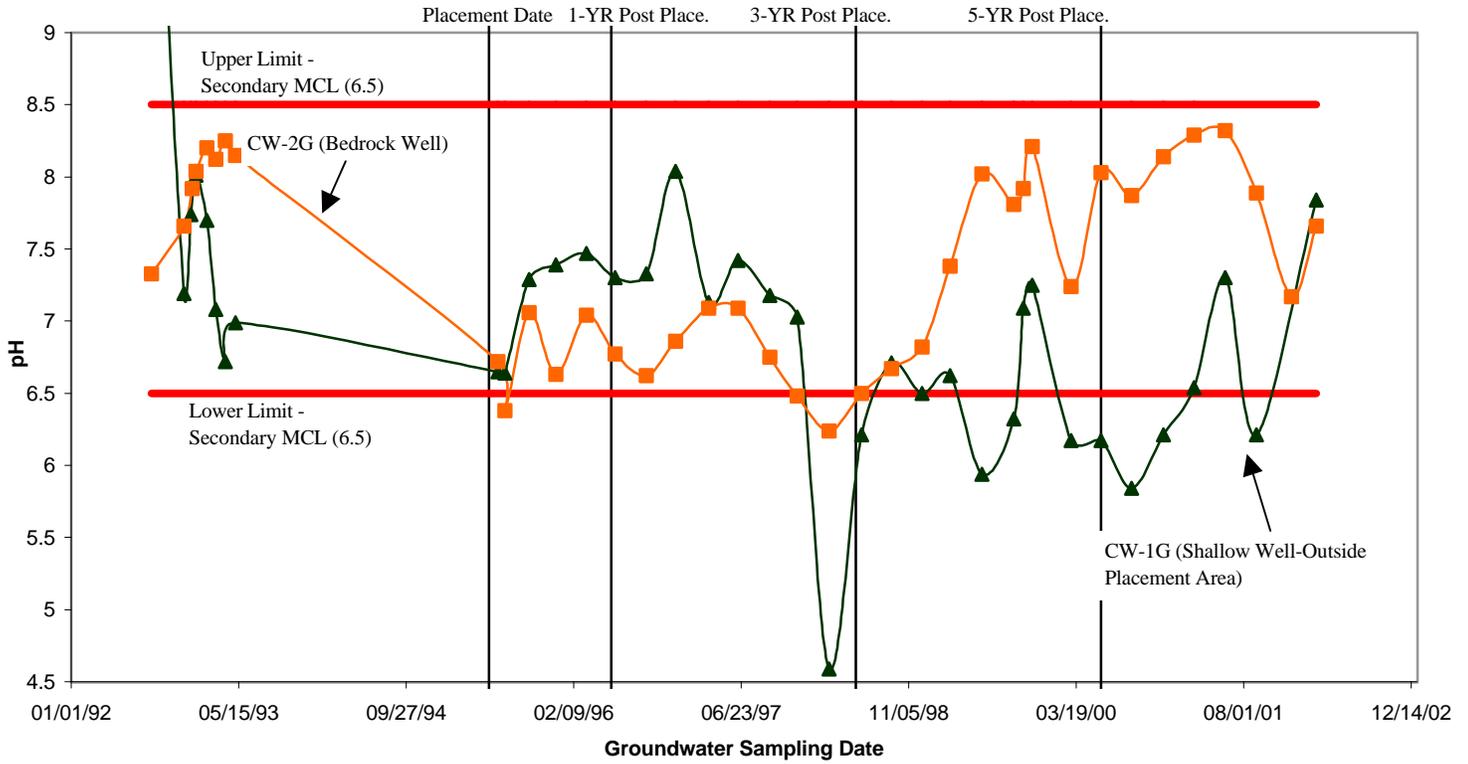
Site Information

- Former surface bituminous mine, temperate to humid climate
- Primary purpose - site reclamation
- Fly ash from United Minerals and Black Beauty Coal Company
- Dry ash was placed below water table with 5' of soil placed on top with a vegetation cover

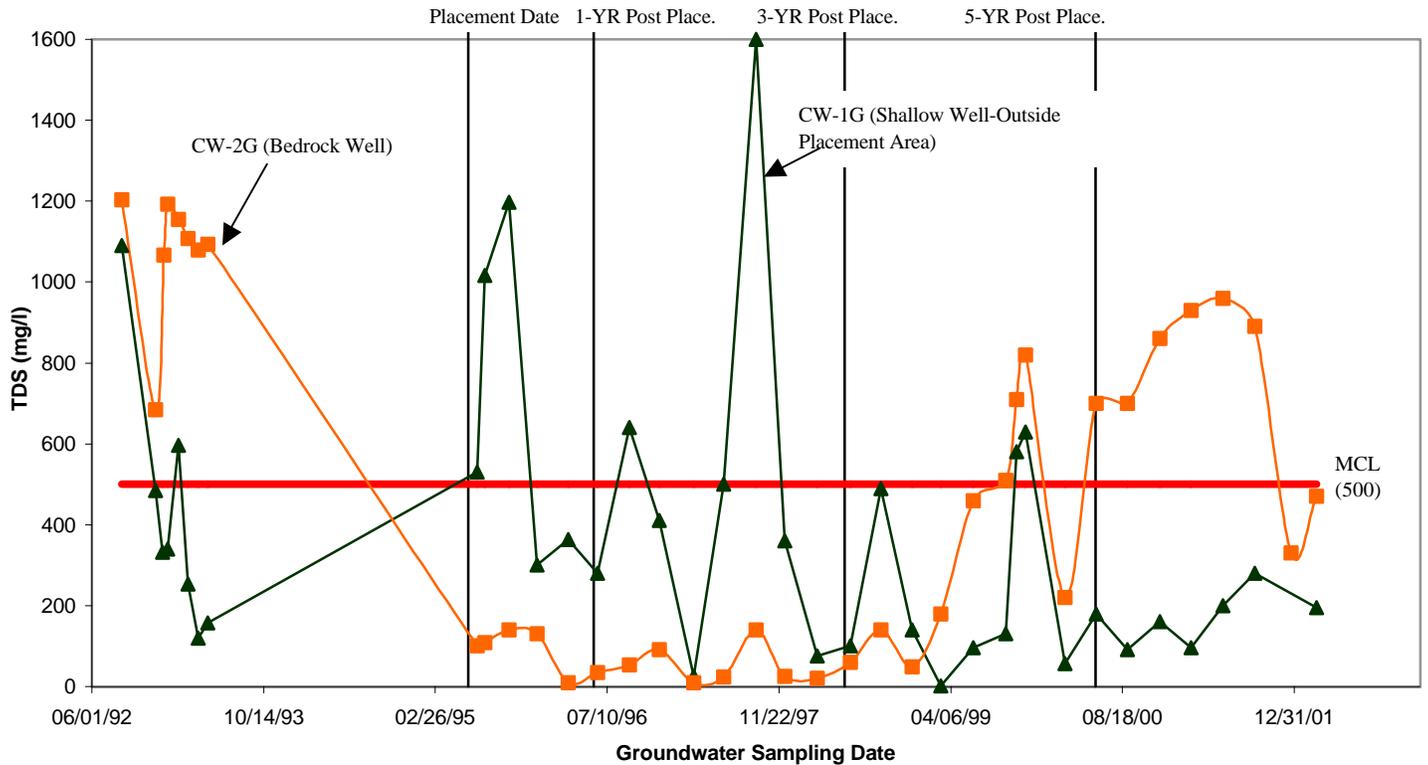
Groundwater Information

- Groundwater monitoring data were available for 2 years pre-placement and for 5 years post-placement of the ash.
- pH levels in the shallow well between the upper and lower MCL limit prior to placement; since then it has decreased to at or below lower MCL limit. pH in bedrock well generally unchanged, between upper and lower MCL limit since placement.
- Cadmium prior to placement was above the MCL in both wells. Since placement, cadmium has dropped below the MCL.
- TDS for both wells above MCL prior to placement and has since decreased to at or below MCLs with spikes above the MCL.
- Manganese and iron concentrations in both wells above MCL prior to placement and have since decreased to at or below MCLs with spikes in the shallow well.

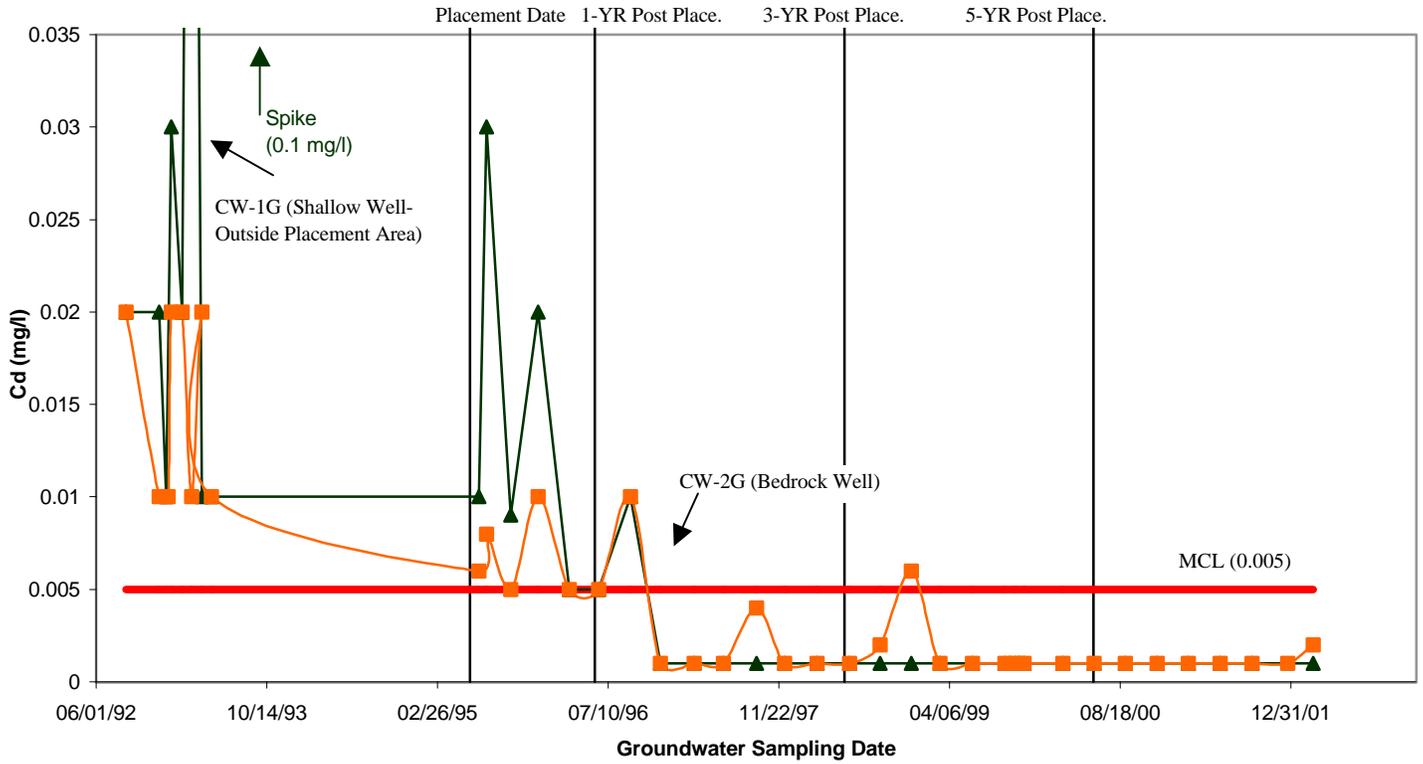
Deer Ridge Mine: Groundwater pH Levels - Pre and Post CCB Placement



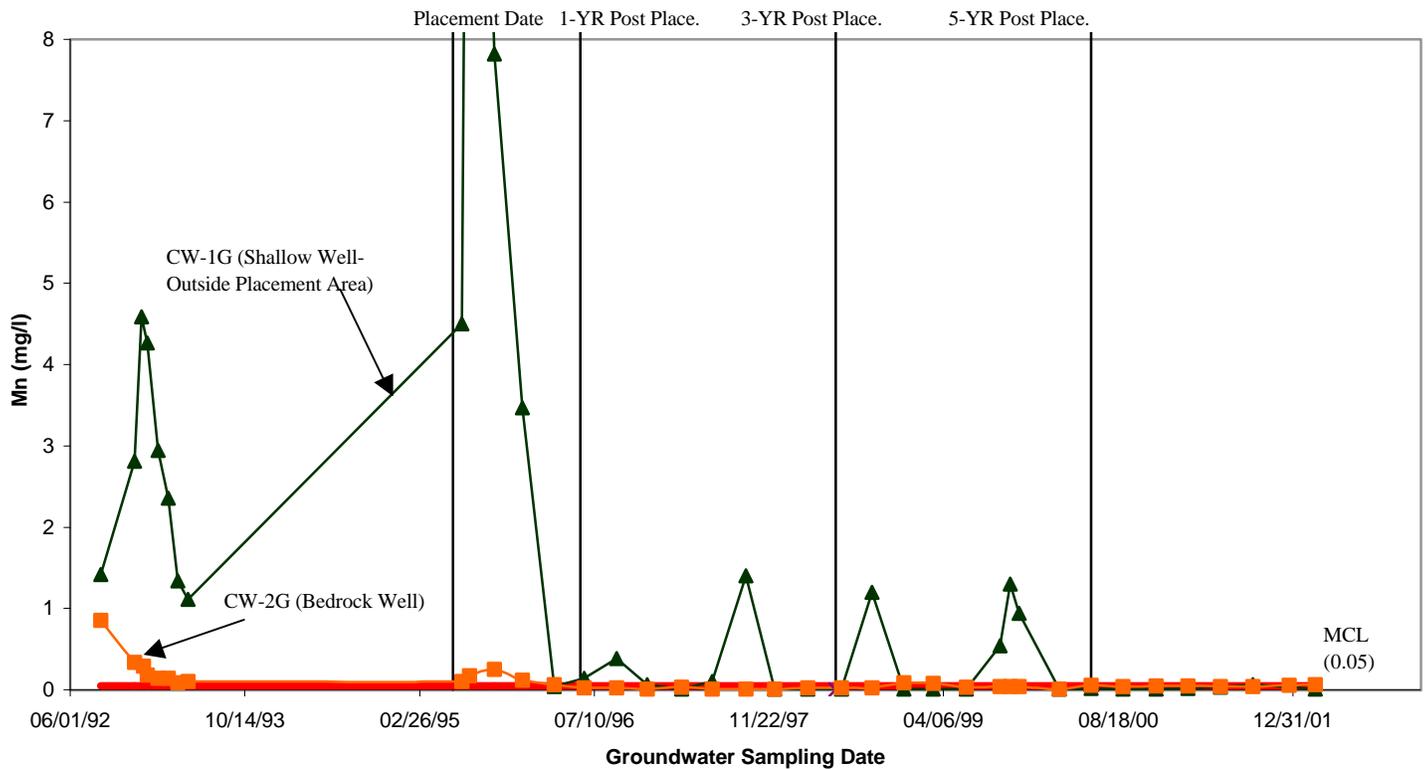
Deer Ridge Mine: Groundwater TDS Concentrations - Pre and Post CCB Placement



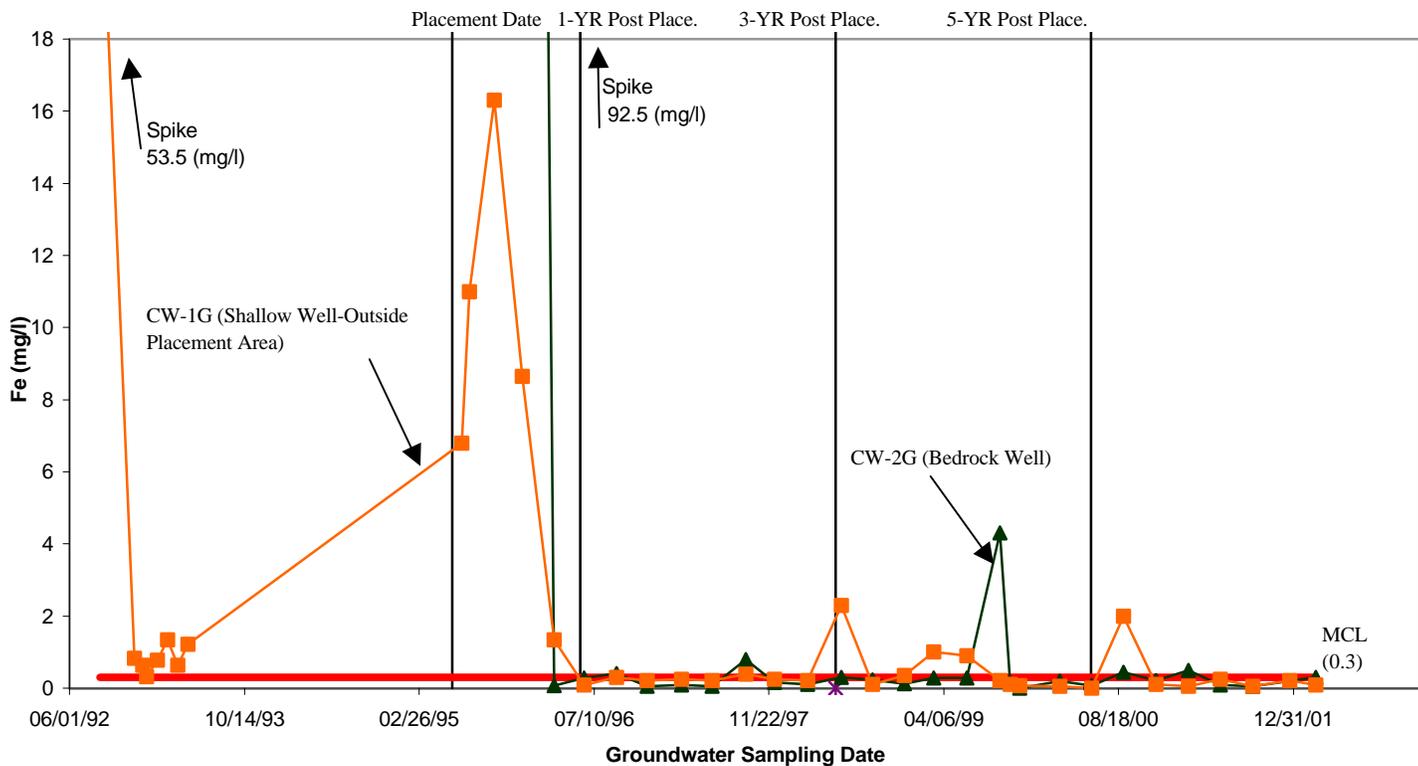
Deer Ridge Mine: Groundwater Cadmium Concentrations - Pre and Post CCB Placement



Deer Ridge Mine: Groundwater Manganese Concentrations - Pre and Post CCB Placement



Deer Ridge Mine: Groundwater Iron Concentrations - Pre and Post CCB Placement



PRIDES CREEK MINE SITE, PIKE COUNTY, INDIANA

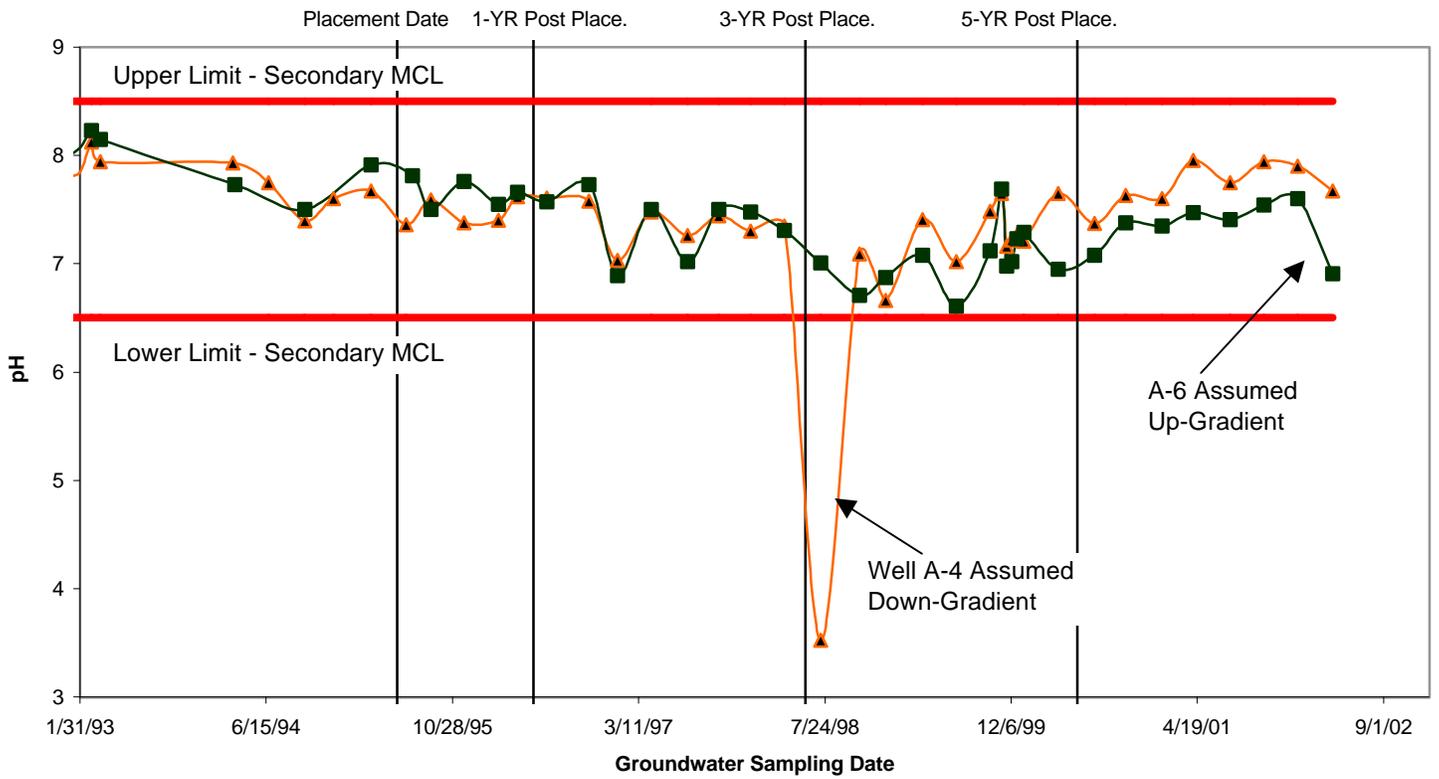
Site Information

- Former/active surface bituminous mine, temperate to humid climate
- Primary purpose - site reclamation
- Fly and bottom ash from Hoosier Energy Ratts Plant, PSI Edwardsport Station, and PSI Noblesville Station
- No other material added to the ash, except mine spoils also are used for backfill; minimum of 8 feet of cover placed on top of ash; no liner; ash placed below the water table

Groundwater Information

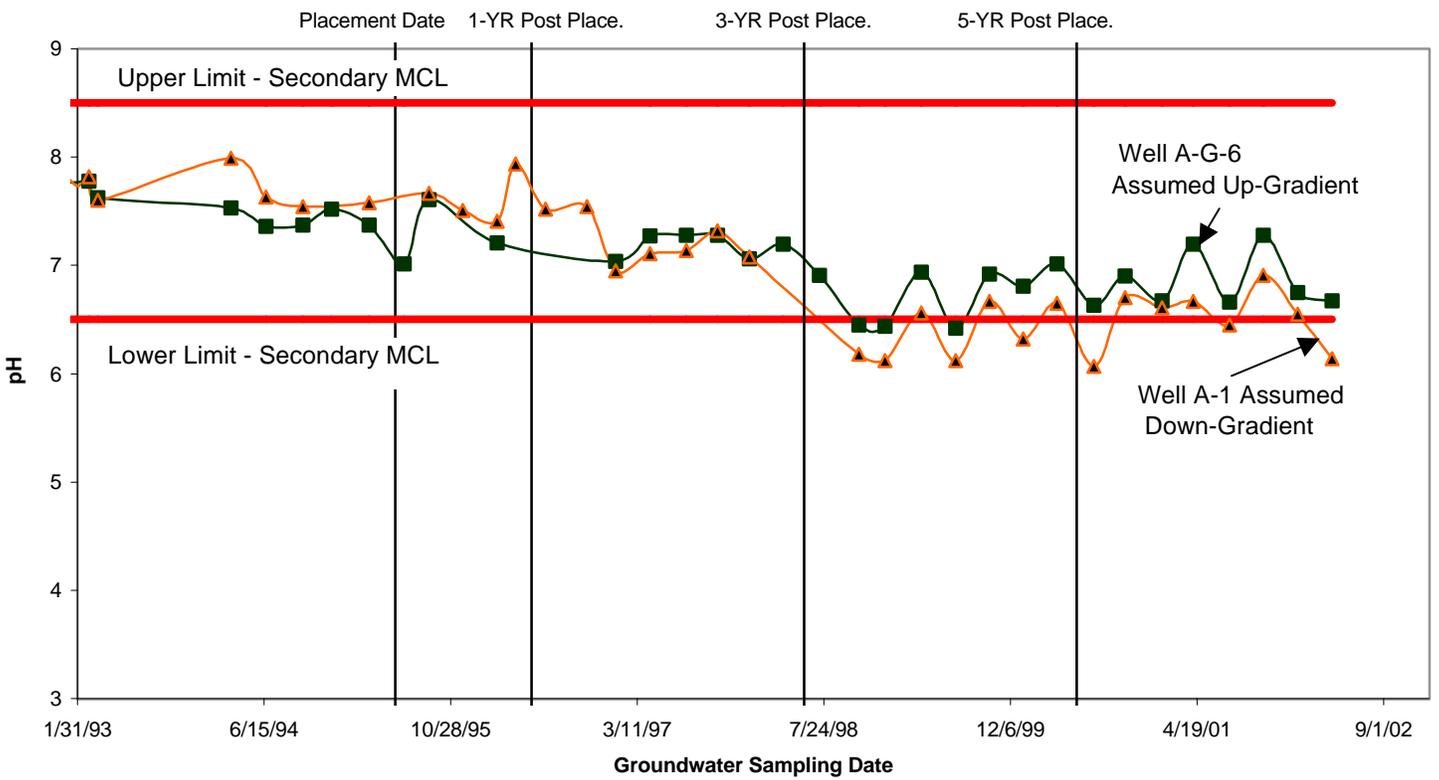
- pH pre-placement within the MCLs; since placement, decreased to at or below lower MCL at the South Area.
- TDS were consistent over time, except for the up-gradient well at the South Area, which increases.
- Manganese fluctuated around the MCL for both wells in the NW Area and were above the MCL in the up-gradient well and fluctuating around the MCL in the down-gradient well in the South Area pre-placement. Post-placement conc. remained below the MCL for the NW Area and increased above the MCL for both wells at the South Area.
- Iron concentrations before placement were above the MCLs, but have gradually decreased with time at the NW Area and increased with time at the South Area.
- Cadmium levels prior to placement were above the MCLs in both up- and down-gradient wells in both areas, but have decreased below the MCLs post-placement.
- Aluminum in both up- and down-gradient wells in both areas were above the MCLs pre- placement. Post placement conc. of aluminum at the NW Area have decreased to near the MCL for both wells; the South Area conc. have decreased up-gradient, while the down-gradient conc. have generally increased.

Prides Creek Mine Site NW Area: Groundwater pH - Pre and Post CCB Placement



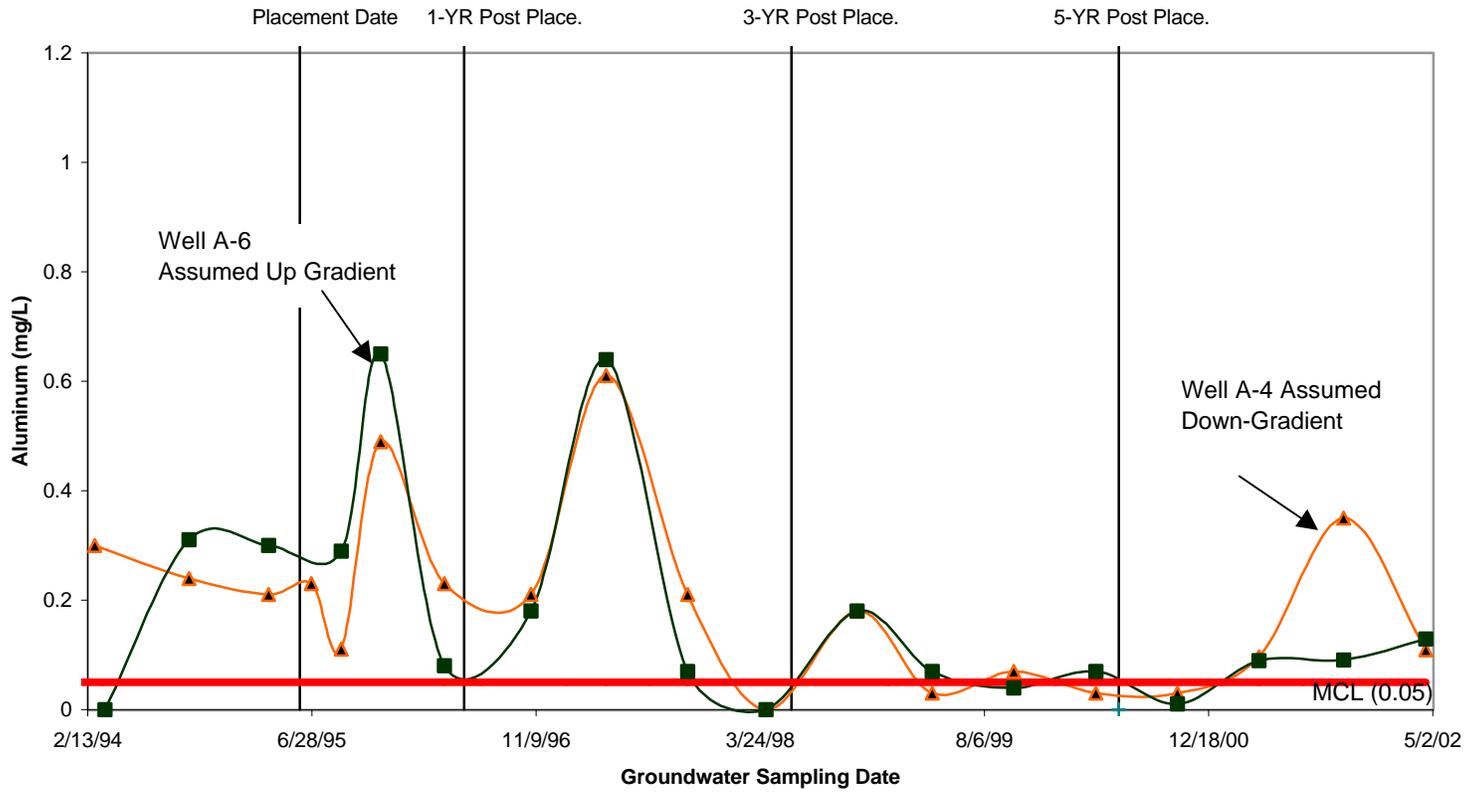
Note : Groundwater flow direction assumed to be SSW

Prides Creek Mine Site South Area : Groundwater pH - Pre and Post CCB Placement



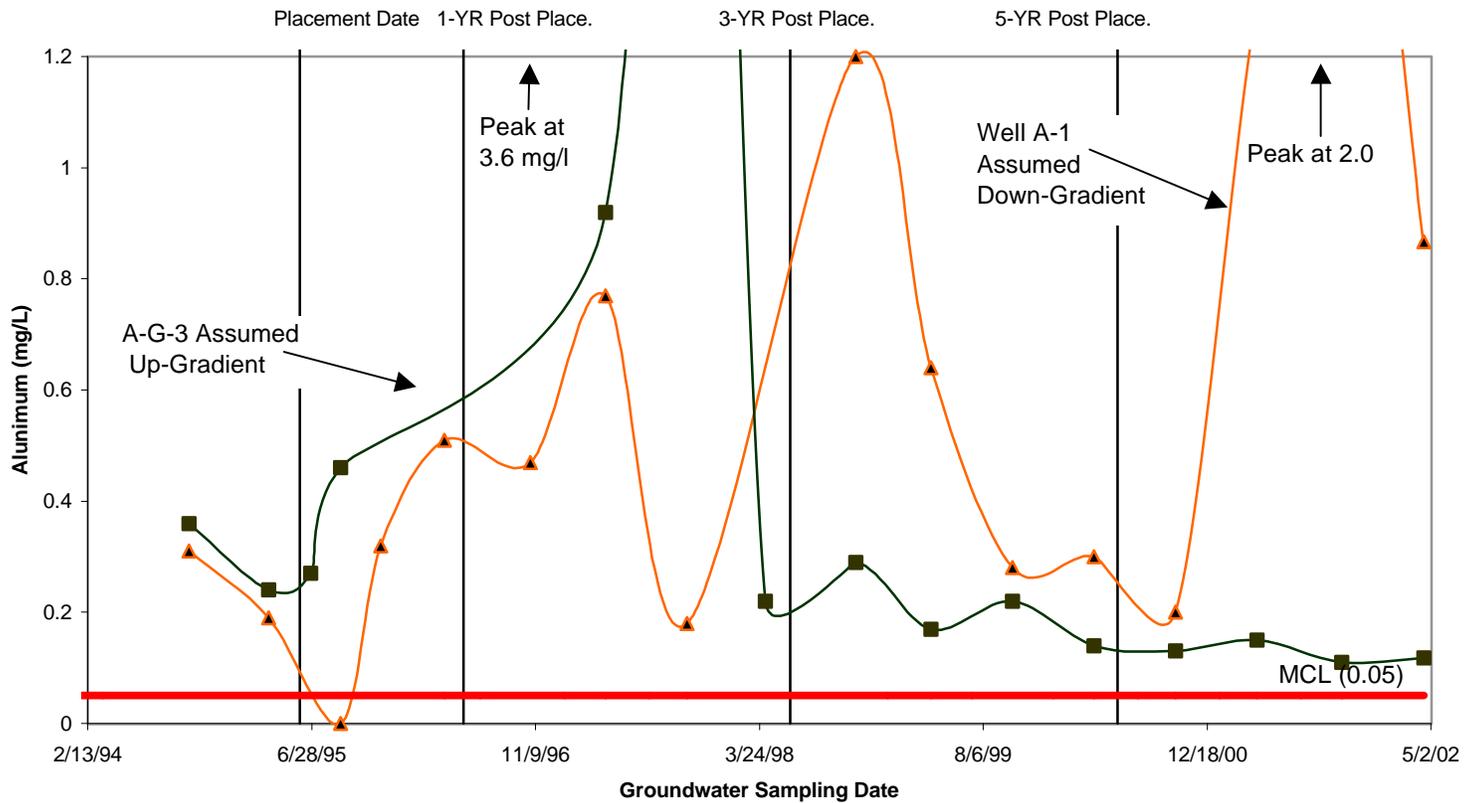
Note : Groundwater flow direction assumed to be SSW

Prides Creek Mine NW Area: Aluminum Groundwater Concentrations - Pre and Post CCB Placement



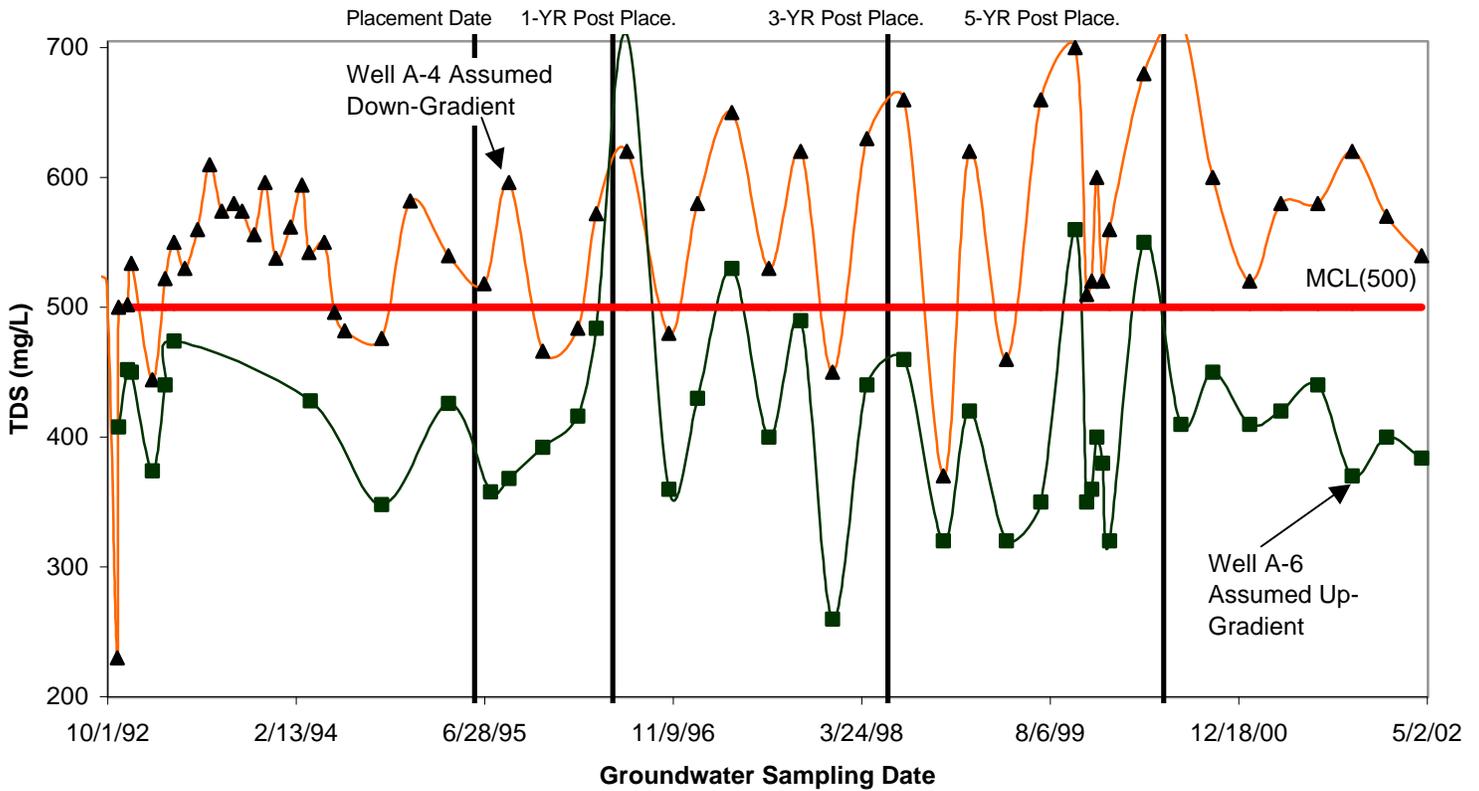
Note : Groundwater flow direction assumed to be SSW

Prides Creek Mine South Area: Aluminum Groundwater Concentrations - Pre and Post CCB Placement



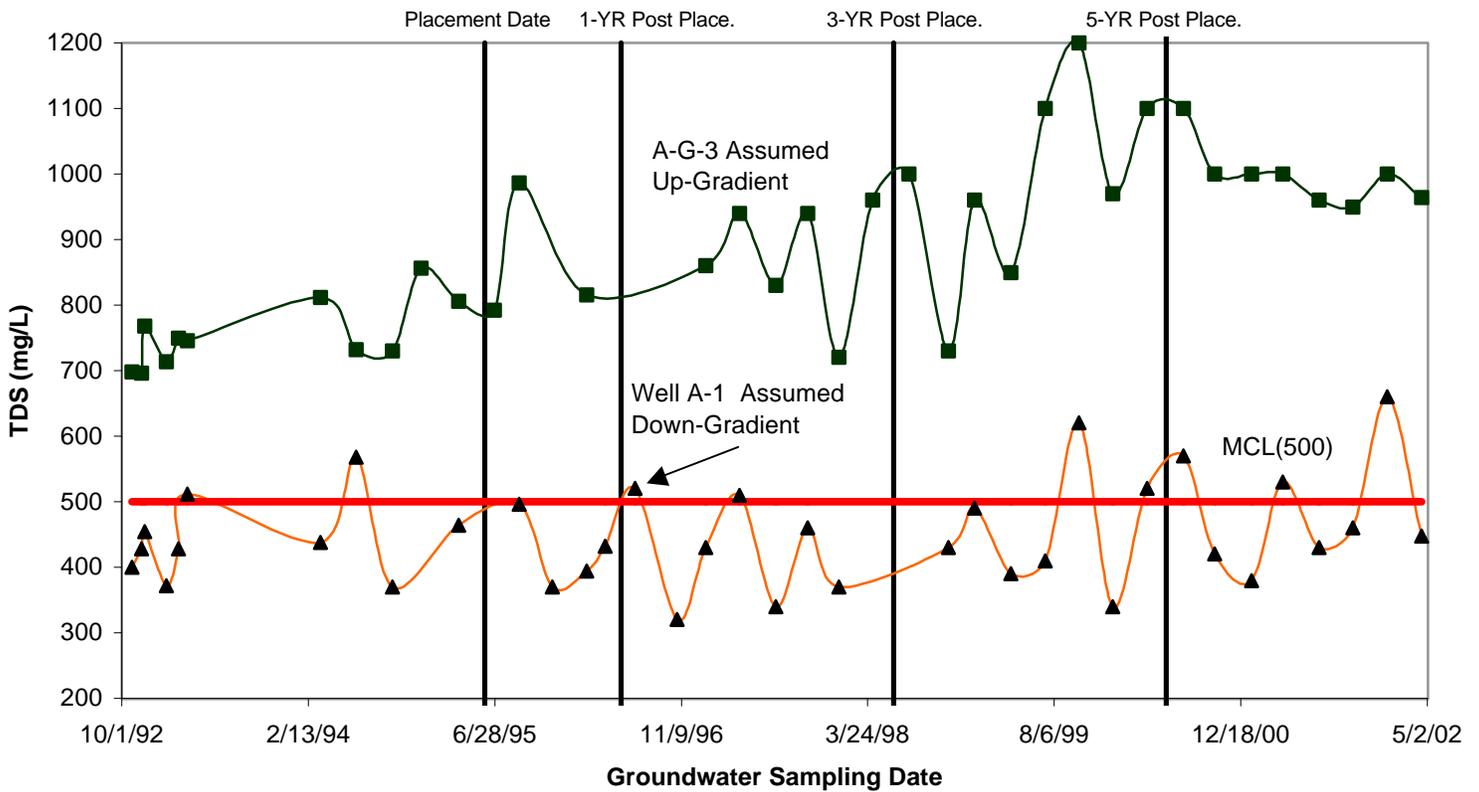
Note : Groundwater flow direction assumed to be SSW

Prides Creek Mine NW Area: TDS Groundwater Concentrations- Pre and Post CCB Placement



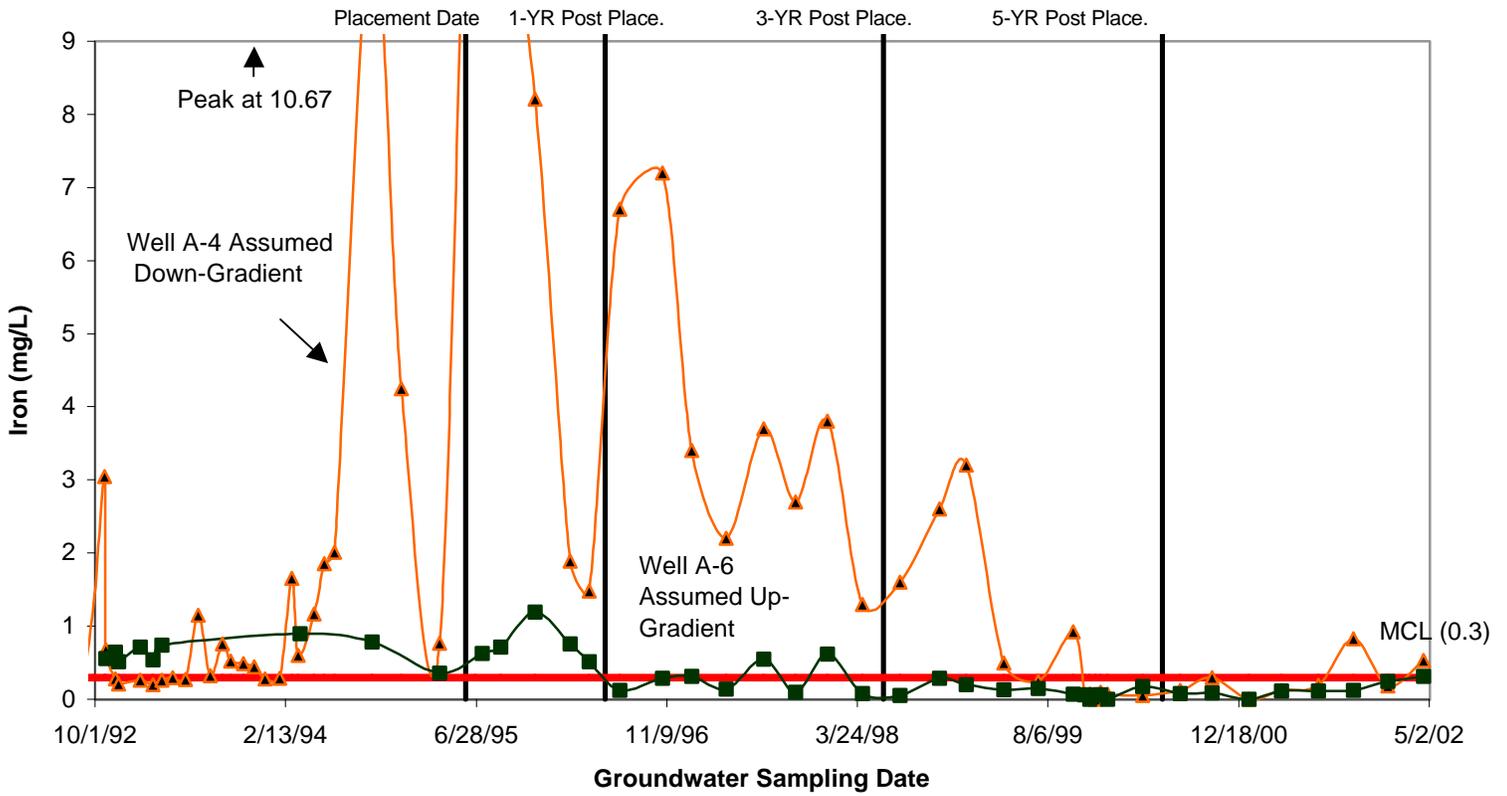
Note : Groundwater flow direction assumed to be SSW

Prides Creek Mine South Area: TDS Groundwater Concentrations - Pre and Post CCB Placement



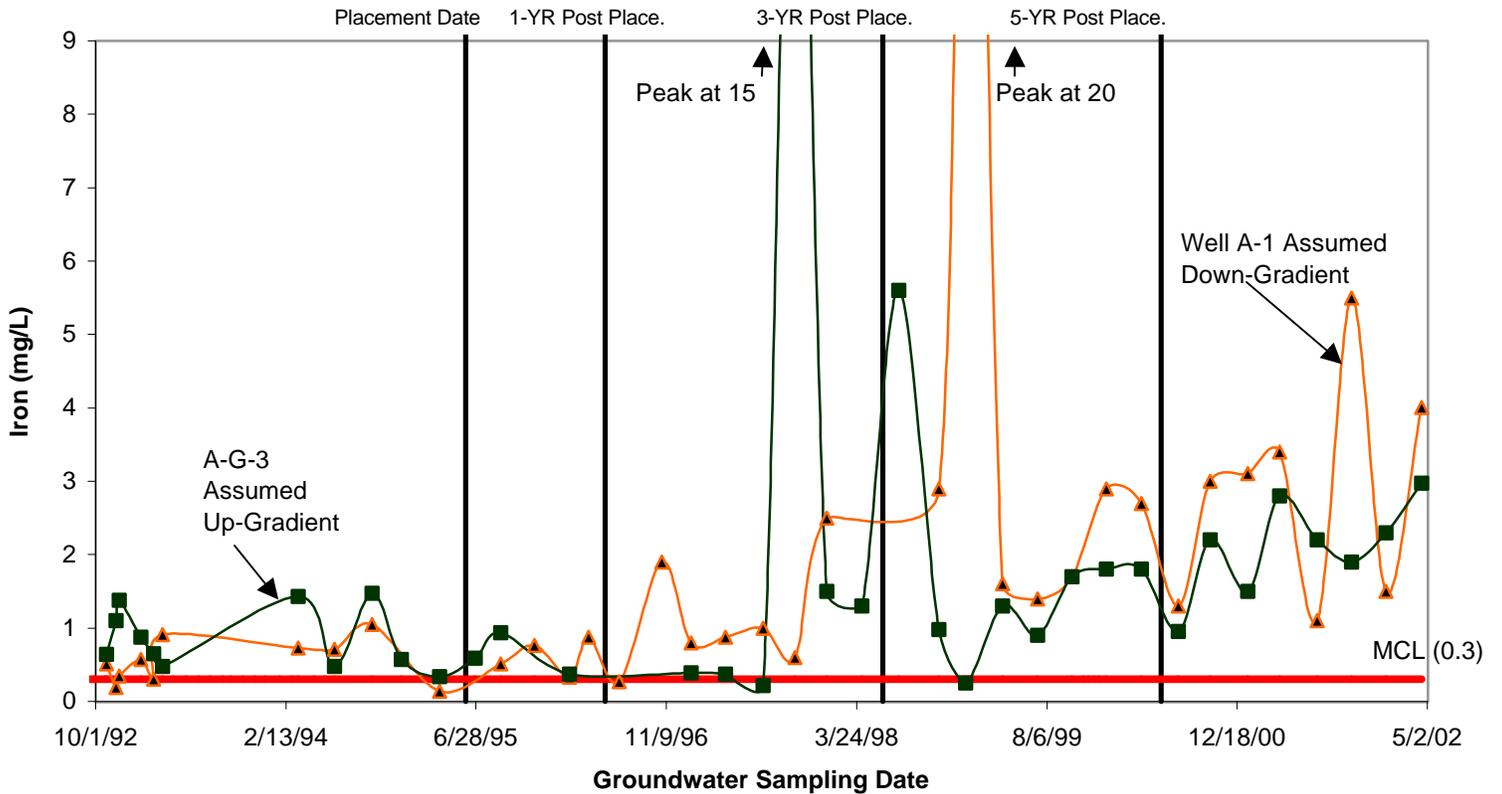
Note : Groundwater flow direction assumed to be SSW

Pride's Creek Mine Site NW Area: Iron Groundwater Concentrations- Pre and Post CCB Placement



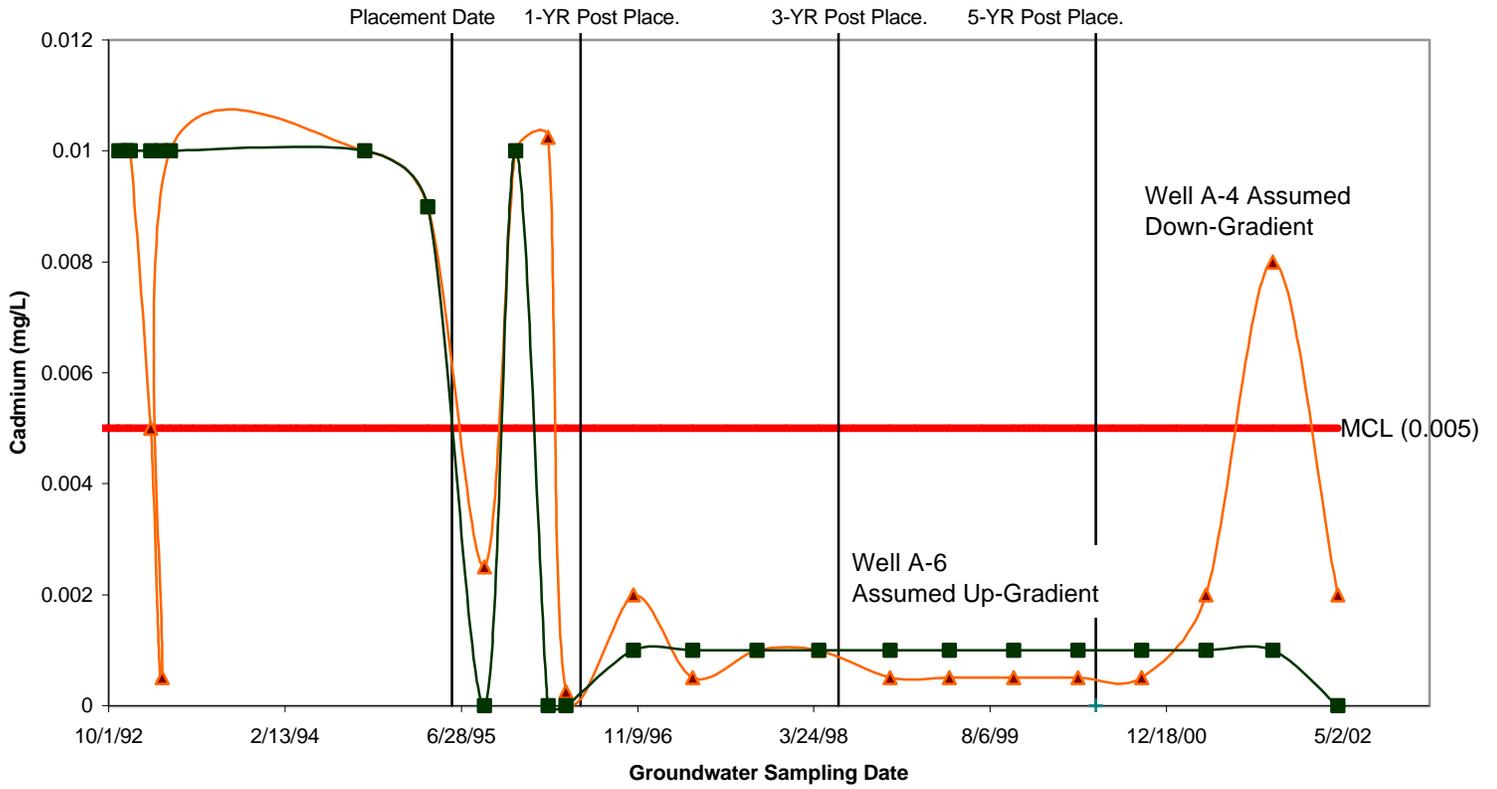
Note : Groundwater flow direction assumed to be SSW

Prides Creek Mine Site South Area: Iron Groundwater Concentrations- Pre and Post CCB Placement



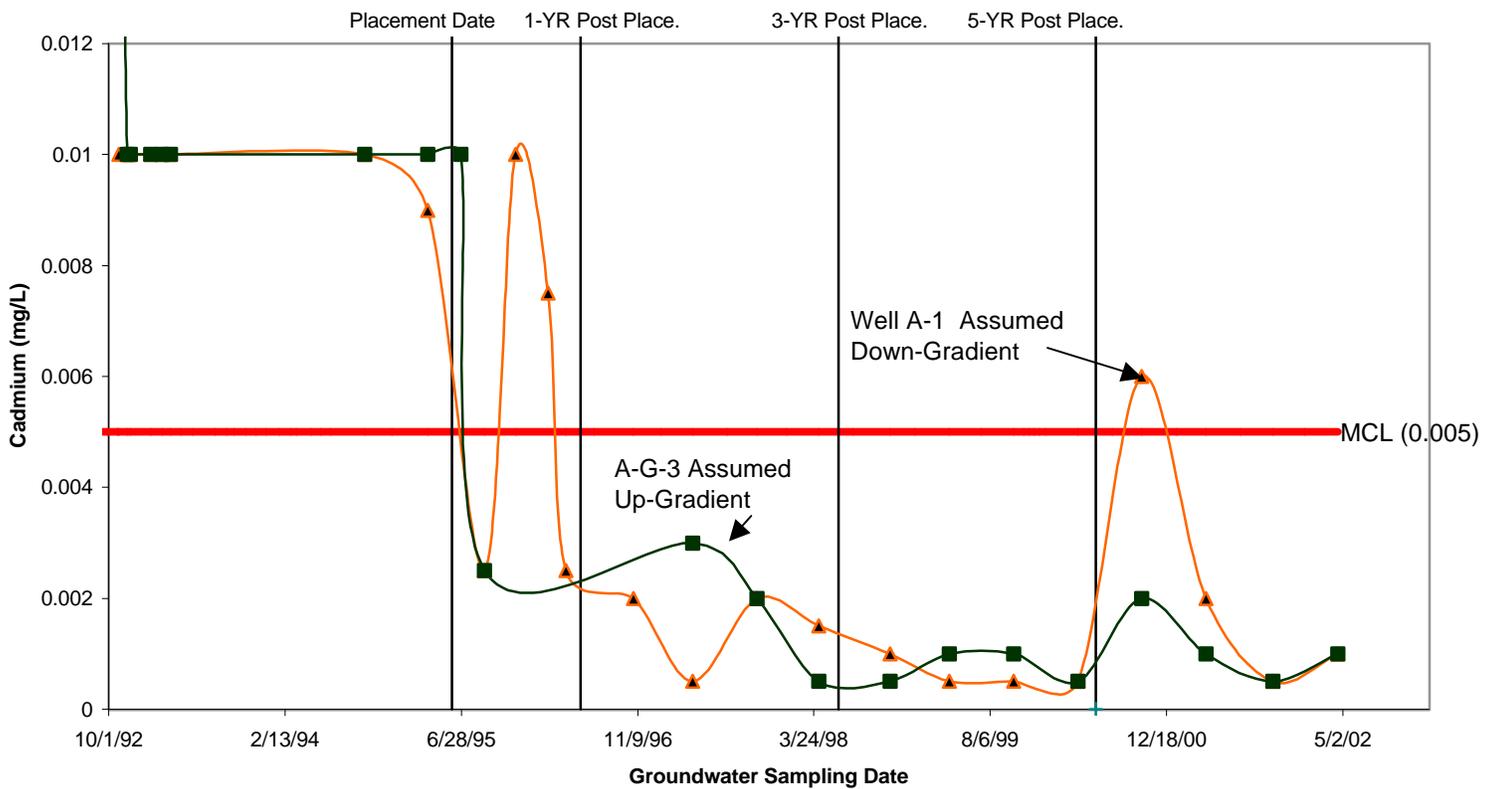
Note : Groundwater flow direction assumed to be SSW

Prides Creek Mine Site NW Area: Cadmium Groundwater Concentrations- Pre and Post CCB Placement



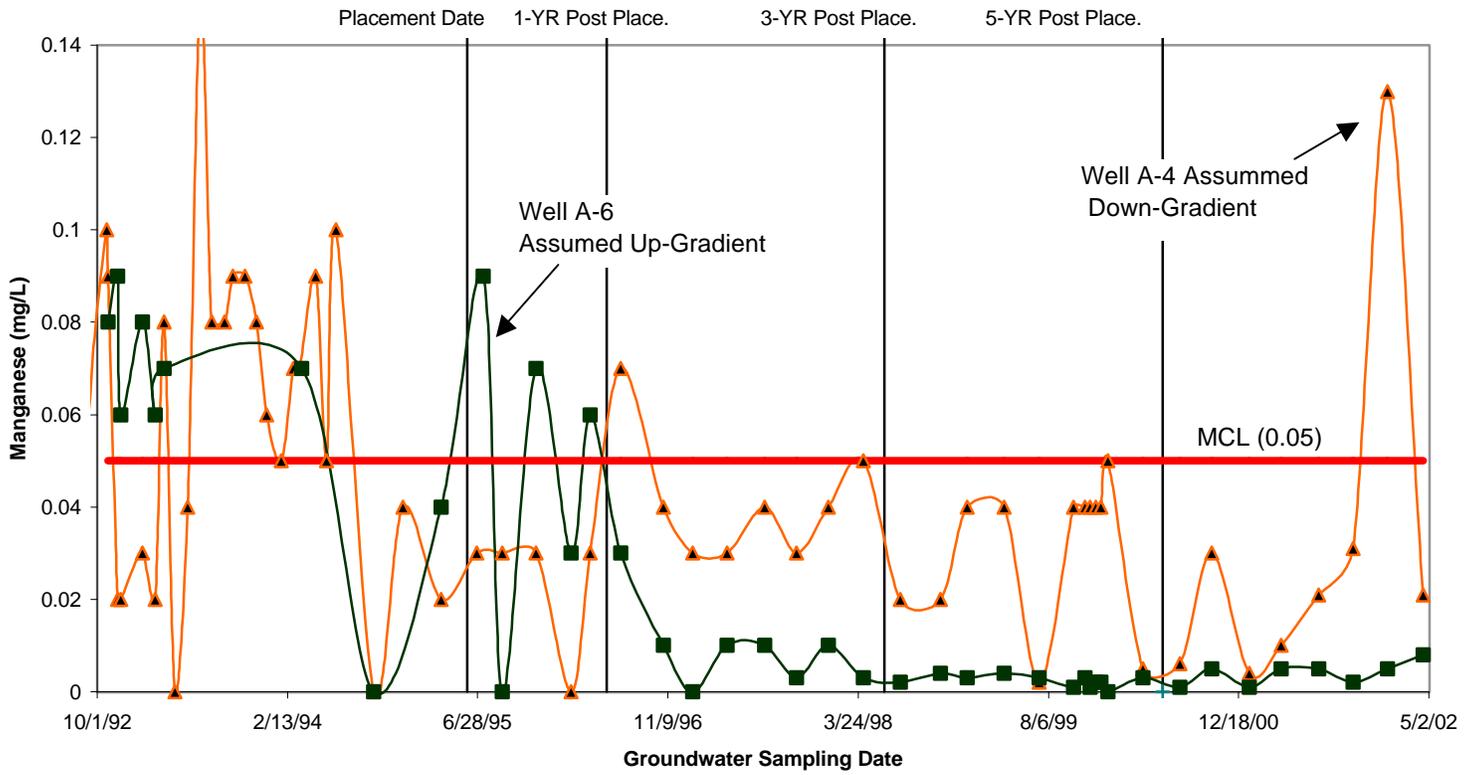
Note : Groundwater flow direction assumed to be SSW

Prides Creek Mine Site South Area: Cadmium Groundwater Concentrations- Pre and Post CCB Placement



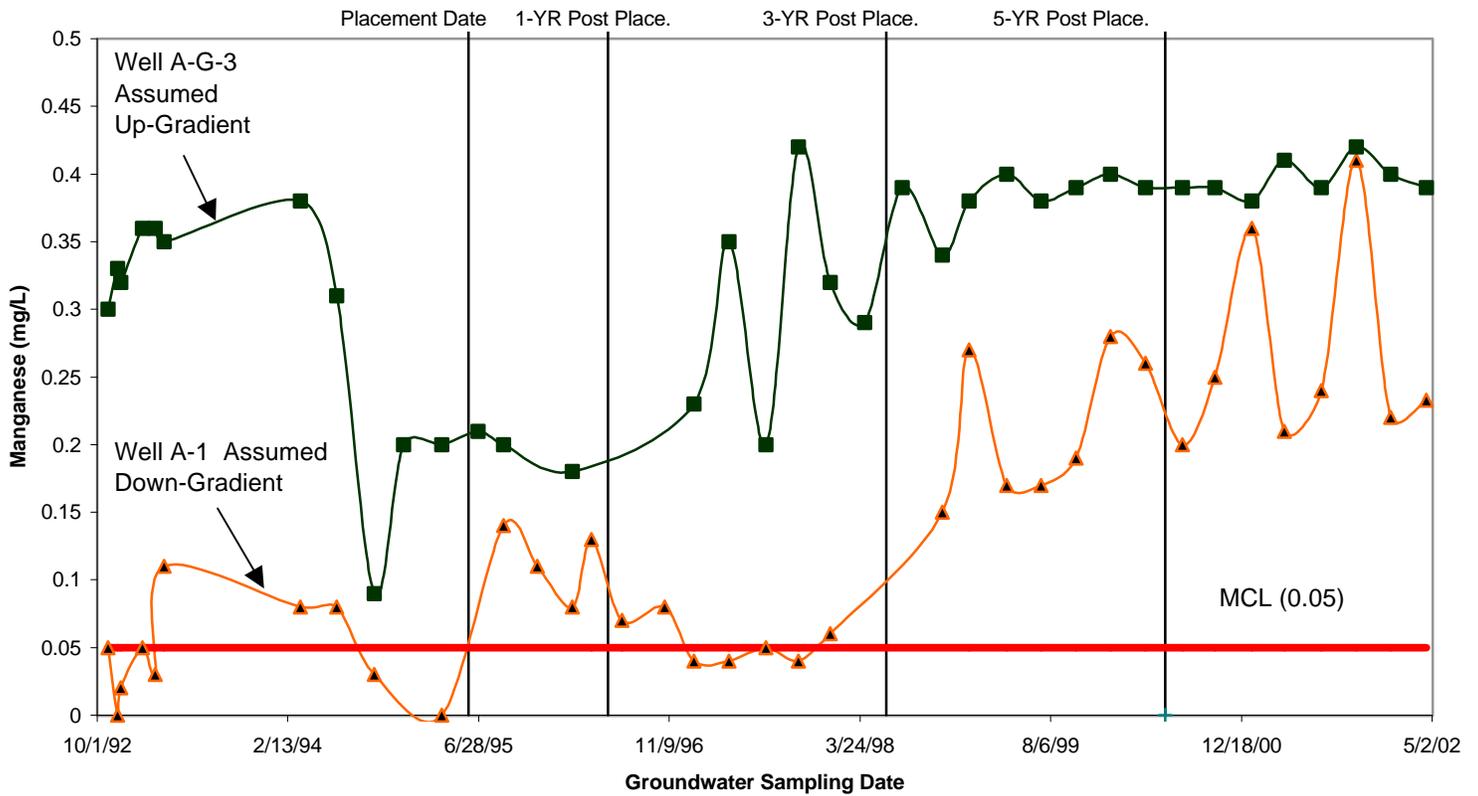
Note : Groundwater flow direction assumed to be SSW

Prides Creek Mine NW Area: Manganese Groundwater Concentrations- Pre and Post CCB Placement



Note : Groundwater flow direction assumed to be SSW

Prides Creek Mine South Area: Manganese Groundwater Concentrations- Pre and Post CCB Placement



Note : Groundwater flow direction assumed to be SSW

UNIVERSAL MINE, VIGO COUNTY, INDIANA

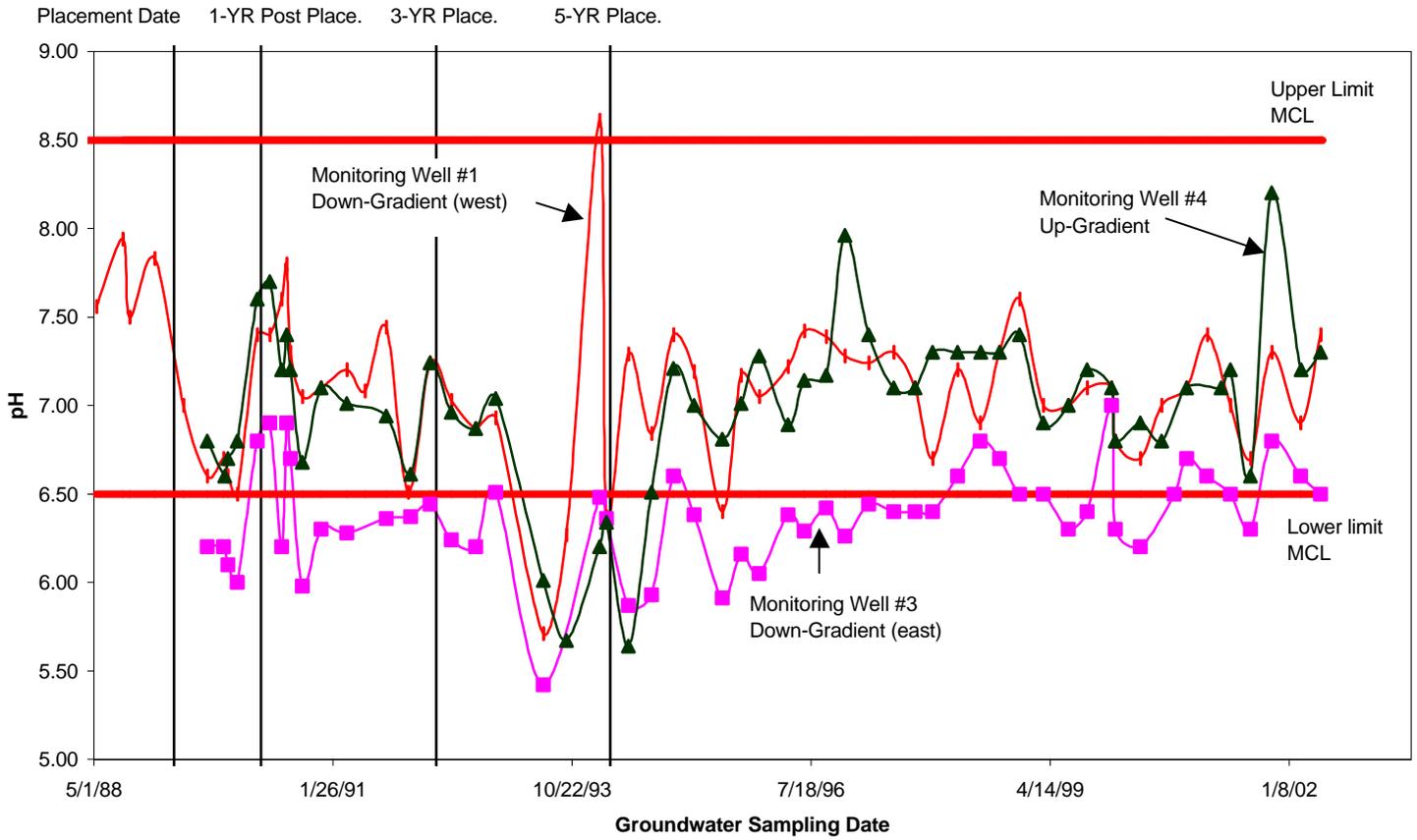
Site Information

- Former surface bituminous mine, semiarid to temperate climate
- Primary purpose - site reclamation and AMD abatement
- Fill material used was coal ash and coal gasification slag with a high pH (9)
- Dry ash placed above the water table with a 5-foot non-compacted soil cap with vegetation

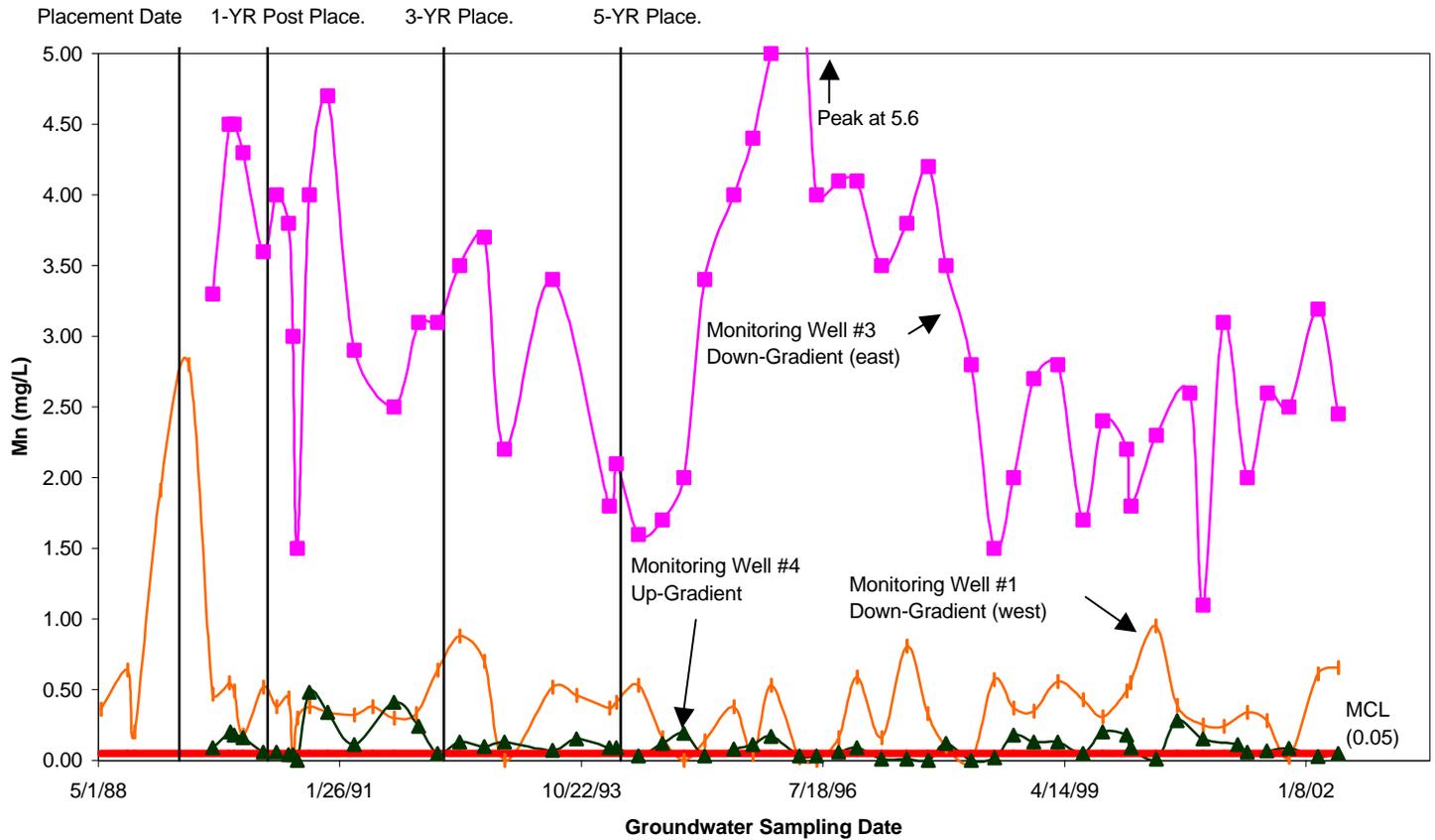
Groundwater Information

- Groundwater monitoring data limited prior to placement, however, approximately fourteen years of groundwater monitoring data exists for this site; CBRC-sponsored study now underway.
- Iron concentrations at or slightly below the MCL in the up-gradient and down-gradient (west) well but above the MCL in the down-gradient (east) well.
- The general trend for manganese in the down-gradient (west) well appears to be increasing, but in the down-gradient (east) well it appears to be decreasing.
- pH level in the down-gradient (east) well increased to lower MCL; the up- and down-gradient (west) well have remained relatively constant between the upper and lower MCLs.
- TDS in up-gradient well generally below MCL, with spikes above MCL; TDS for down-gradient (west) well is at or above the MCL with gradual increasing trend; TDS for down-gradient (east) well is above MCL with gradual decreasing trend.
- Sulfate in up-gradient well below the MCL with a spike in the most recent data. Sulfate in down-gradient (west) well below the MCL with spikes one and five years after placement and in most recent data. Sulfate in down-gradient (east) well above the MCL since placement.

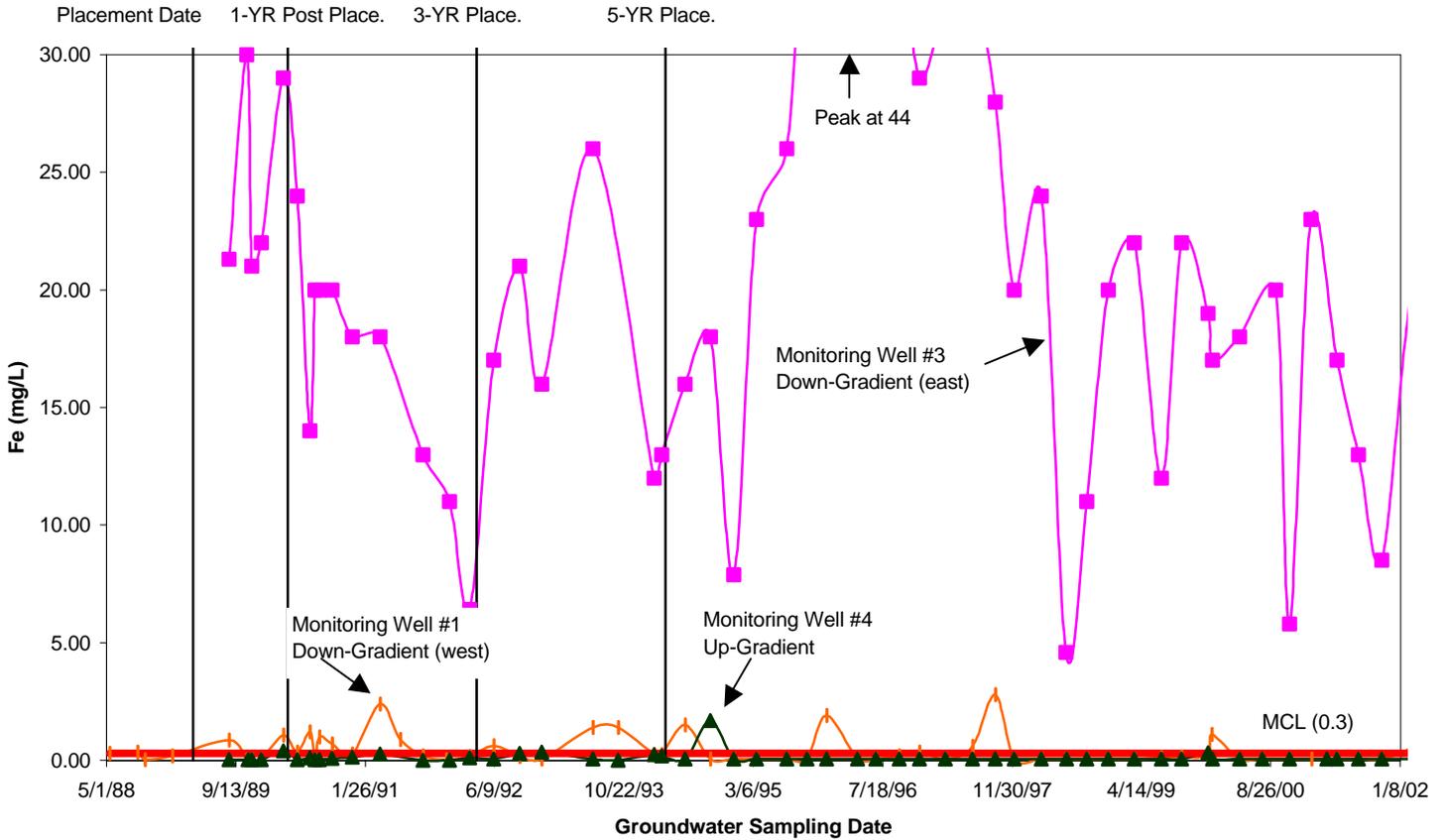
Universal Mine: Groundwater pH Levels - Pre and Post CCB Placement



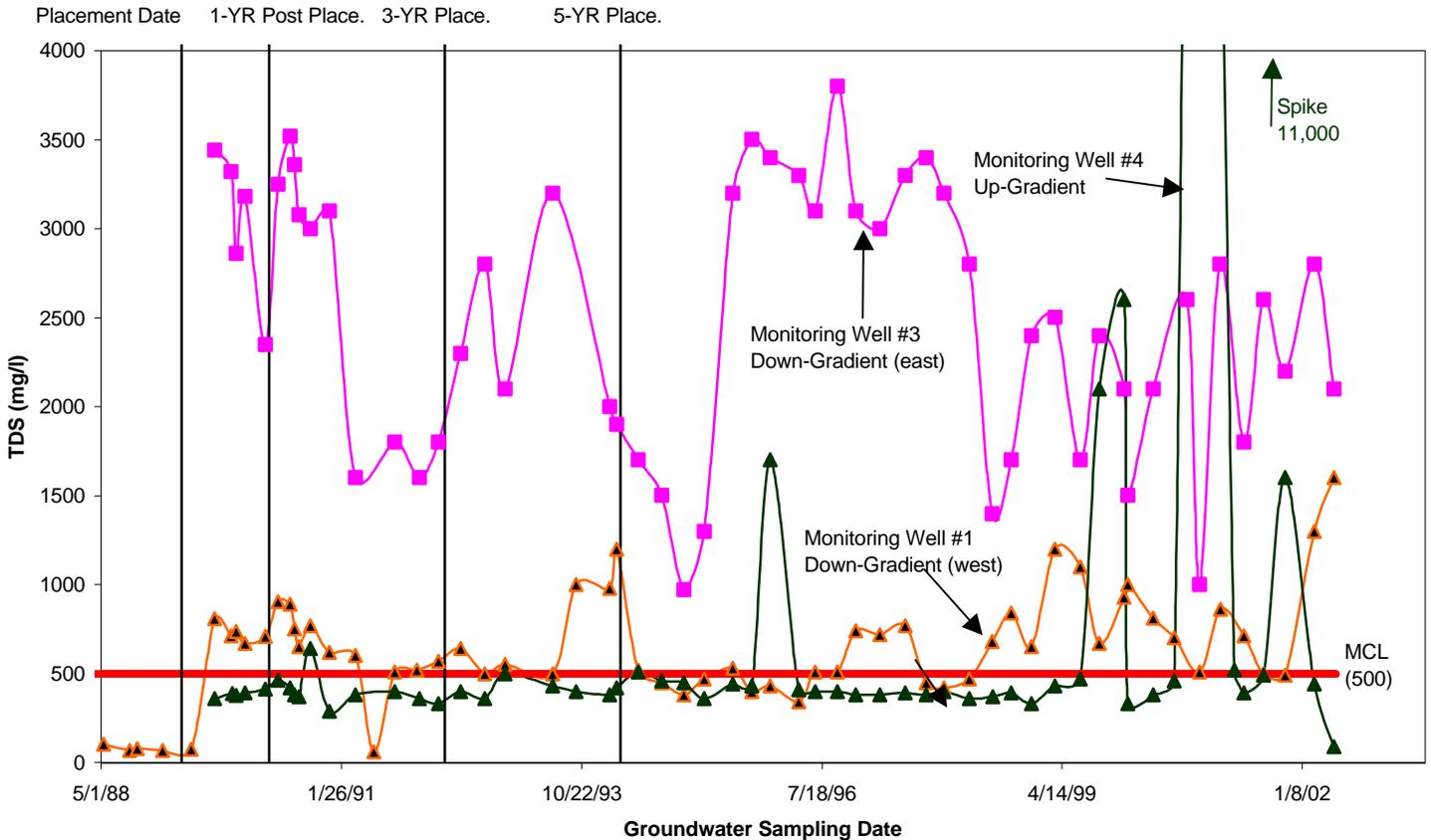
Universal Mine: Manganese Groundwater Concentrations- Pre and Post CCB Placement



Universal Mine: Groundwater Iron (Fe) Concentrations - Pre and Post CCB Placement

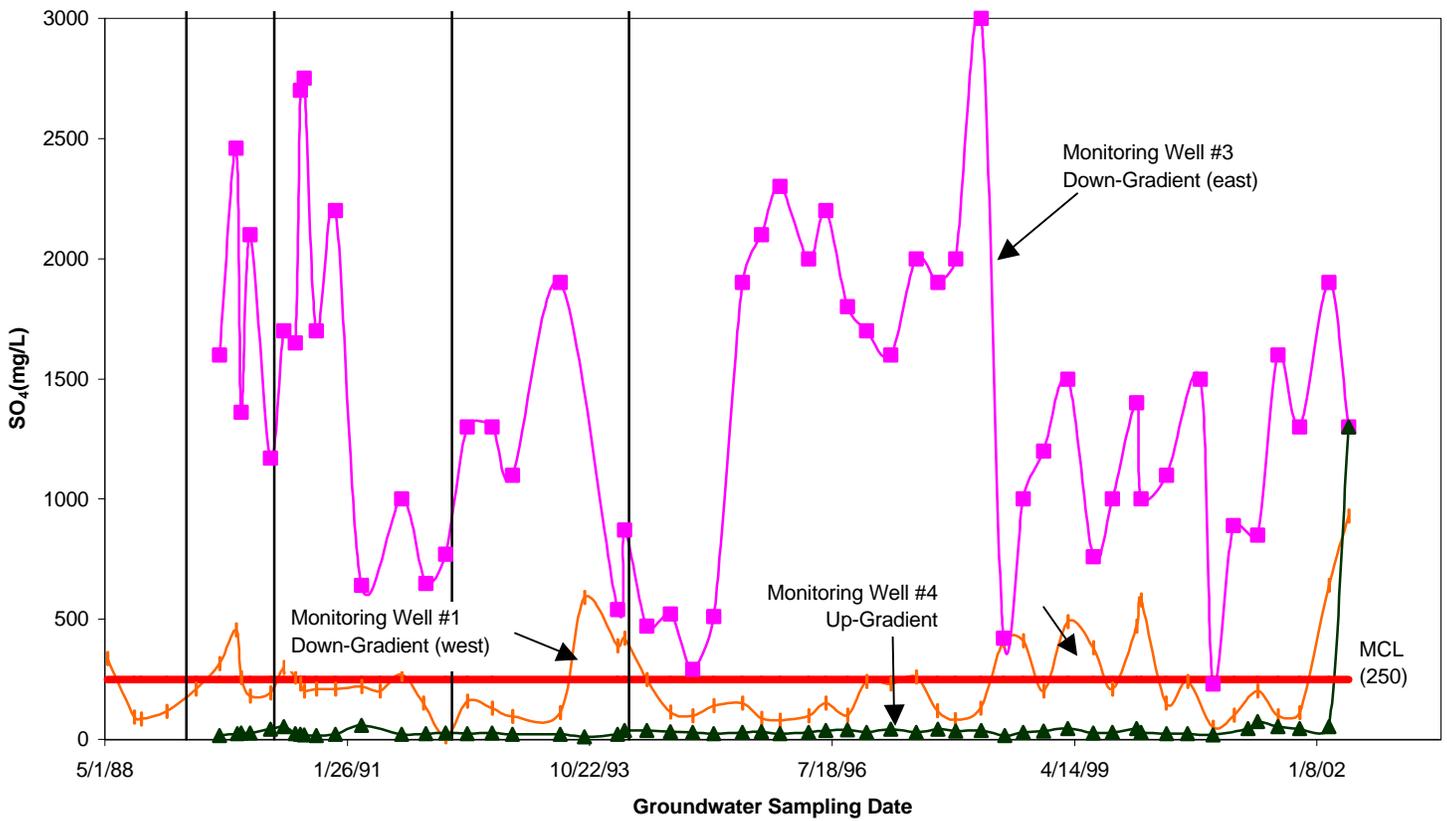


Universal Mine: Groundwater Total Dis. Solids (TDS) Levels- Pre and Post CCB Placement



Universal Mine: Groundwater Sulfate (SO₄) Concentrations - Pre and Post CCB Placement

Placement Date 1-YR Post Place. 3-YR Place. 5-YR Place.



VIKING MINE, DAVIESS COUNTY, INDIANA

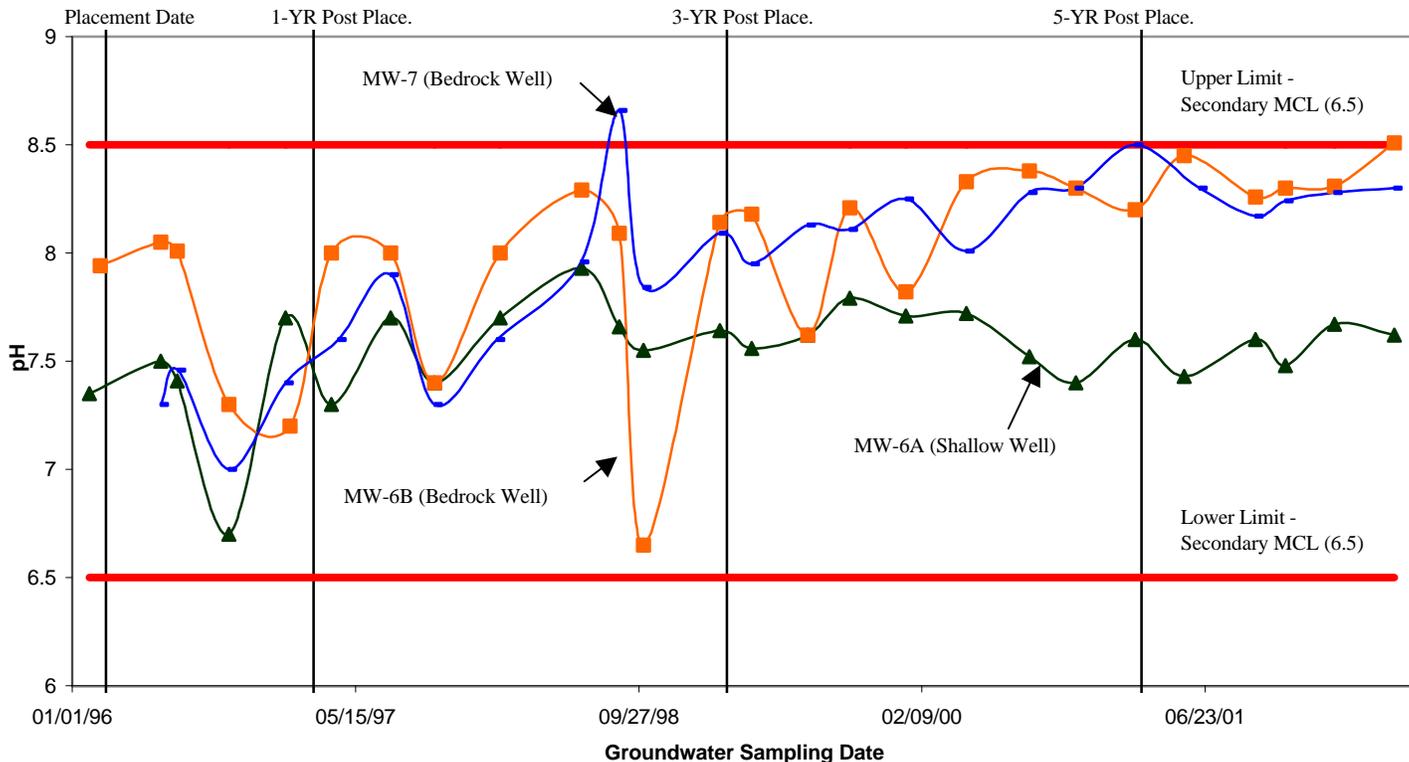
Site Information

- Active surface bituminous mine, temperate to humid climate
- Primary purpose - not defined in available file materials
- Fly ash, bottom ash, FGD by-products, Poz-O-Tec (fly ash/FGD mix) from five different sources
- Ash placed within spoils in inactive areas of mine below the water table

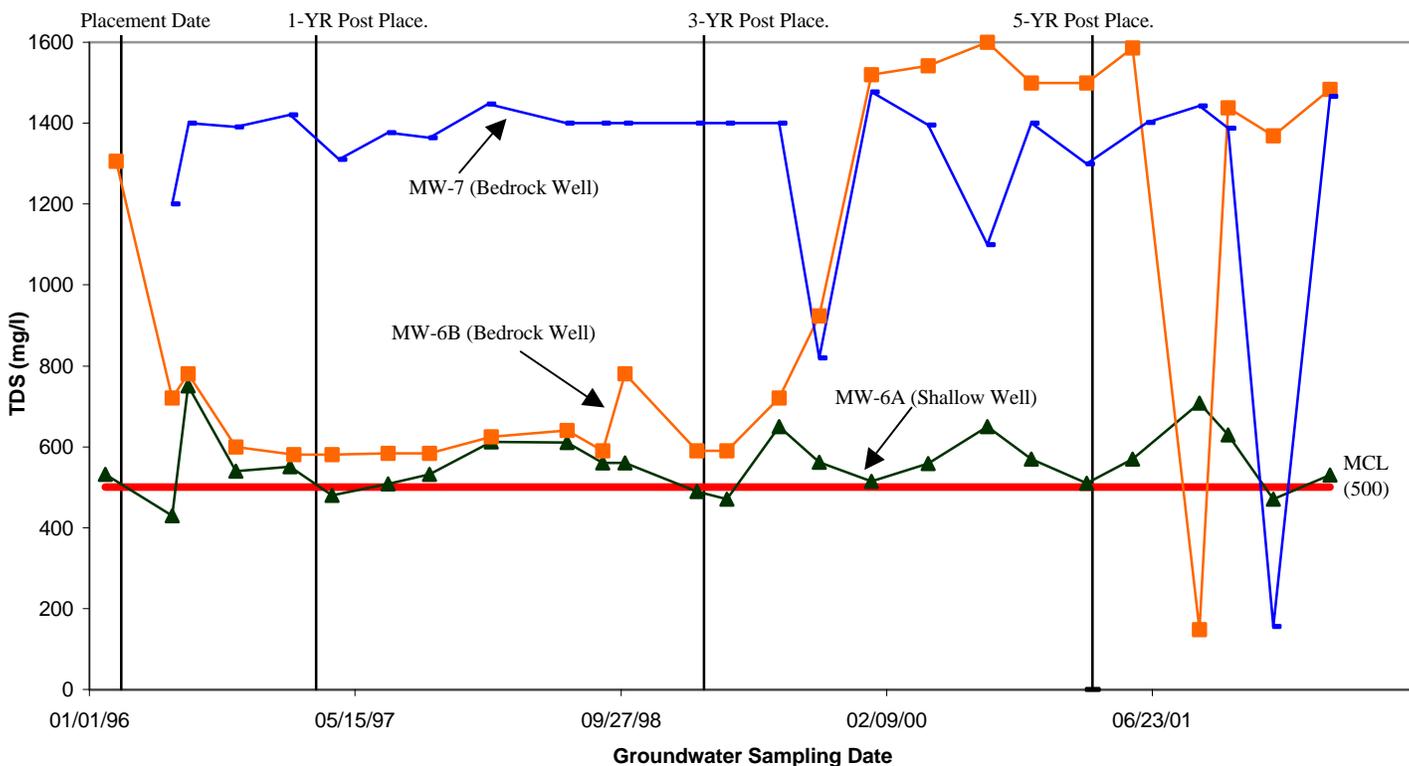
Groundwater Information

- Pre-placement groundwater monitoring data not available. Seven years of post-placement data.
- Iron concentrations above MCL in the shallow well; at or below MCL in the bedrock wells.
- Manganese concentrations have varied, generally staying above the MCL. The general trend are decreasing concentrations approaching the MCL in the shallow well and at the MCL in the bedrock wells.
- Total Dissolved Solids (TDS) is generally above MCLs, generally are unchanged since placement with higher levels in the bedrock wells.
- Zinc concentrations have been at or slightly above the MCL except for a spike approximately 4 years after placement.
- pH levels have remained between the upper and lower MCL limits, with a general trend toward the upper limit in the bedrock wells.

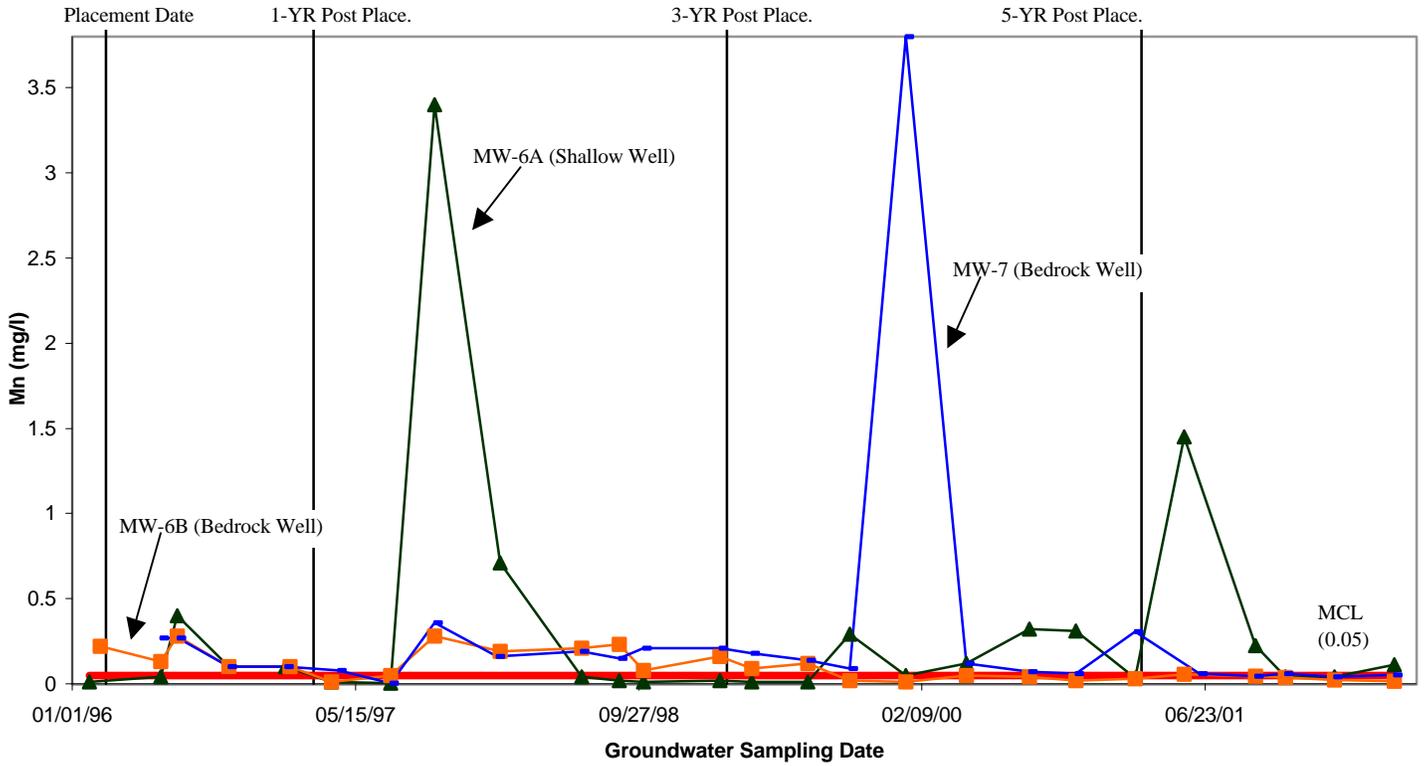
Viking Mine: Groundwater pH Levels - Pre and Post CCB Placement



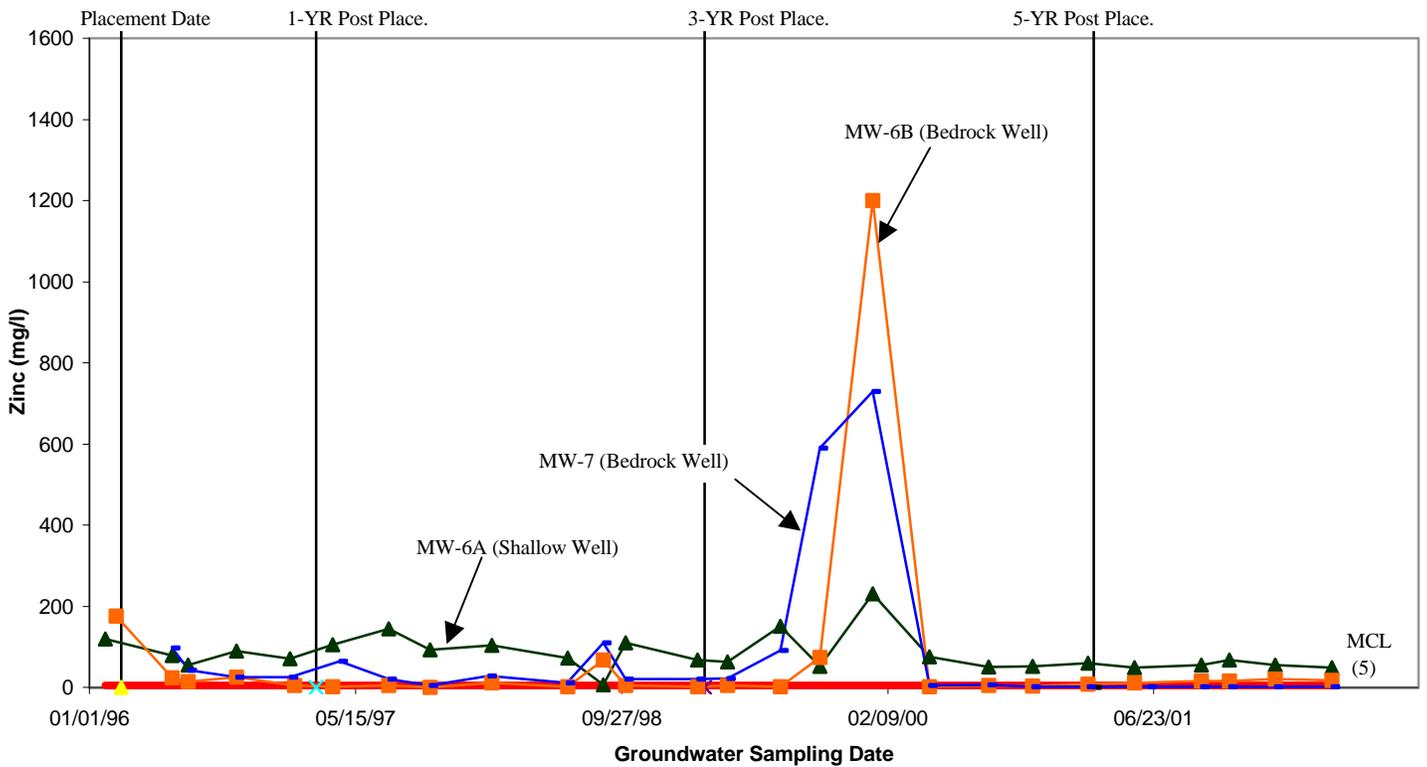
Viking Mine: Groundwater TDS Concentrations - Pre and Post CCB Placement



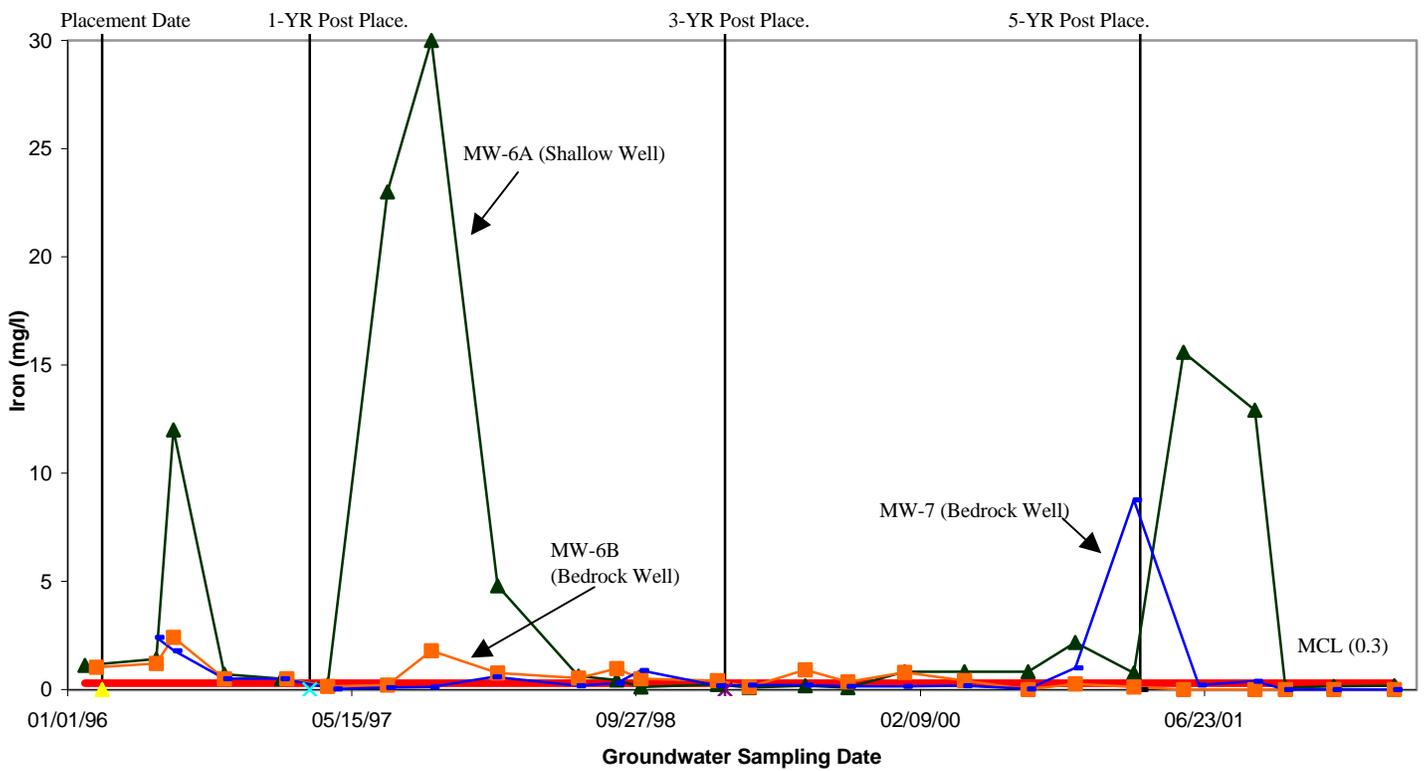
Viking Mine: Groundwater Manganese Concentrations - Pre and Post CCB Placement



Viking Mine: Groundwater Zinc Levels - Pre and Post CCB Placement



Viking Mine: Groundwater Iron Concentrations - Pre and Post CCB Placement



B-D MINE, SCHUYKILL COUNTY, PENNSYLVANIA

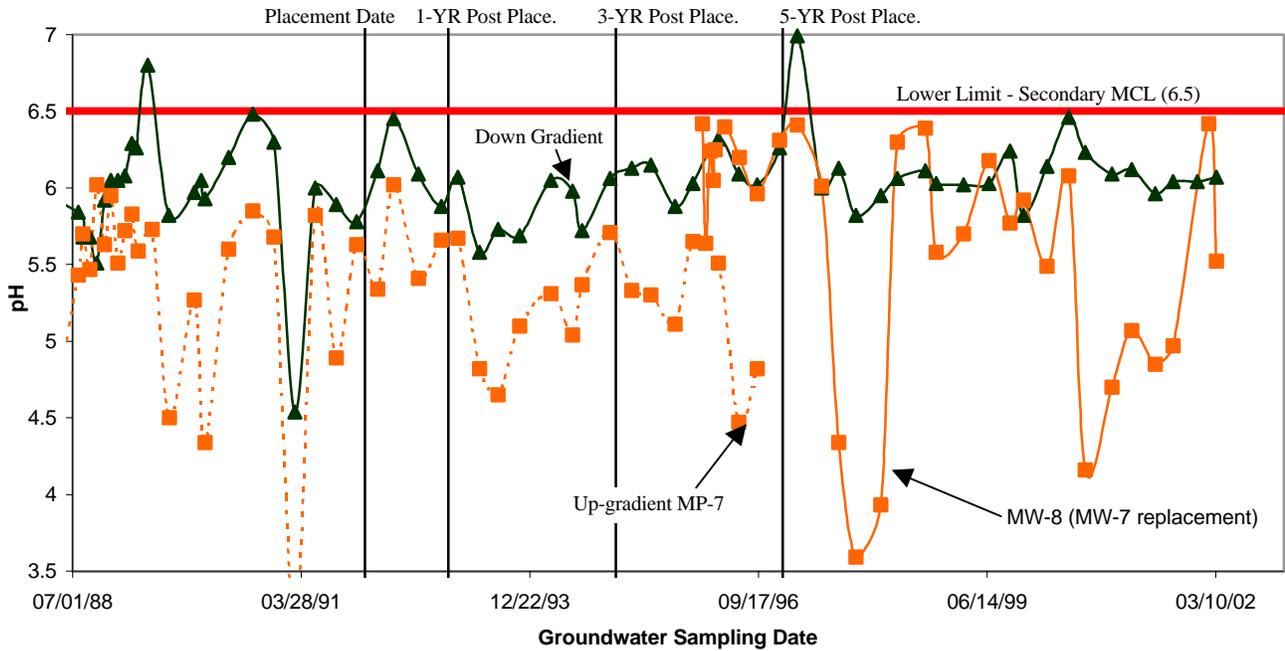
Site Information

- Active surface anthracite mine, temperate to humid climate
- Primary purpose - site reclamation
- Fly ash and FBC from Gilberton Power Co., Panther Creek Partners, UGI-Hunlock, AES Thames, Inc., and the Logan (Keystone) Generating Plant.
- Ash mixed with water to achieve 100% compaction
- Ash placed above water table with no liner

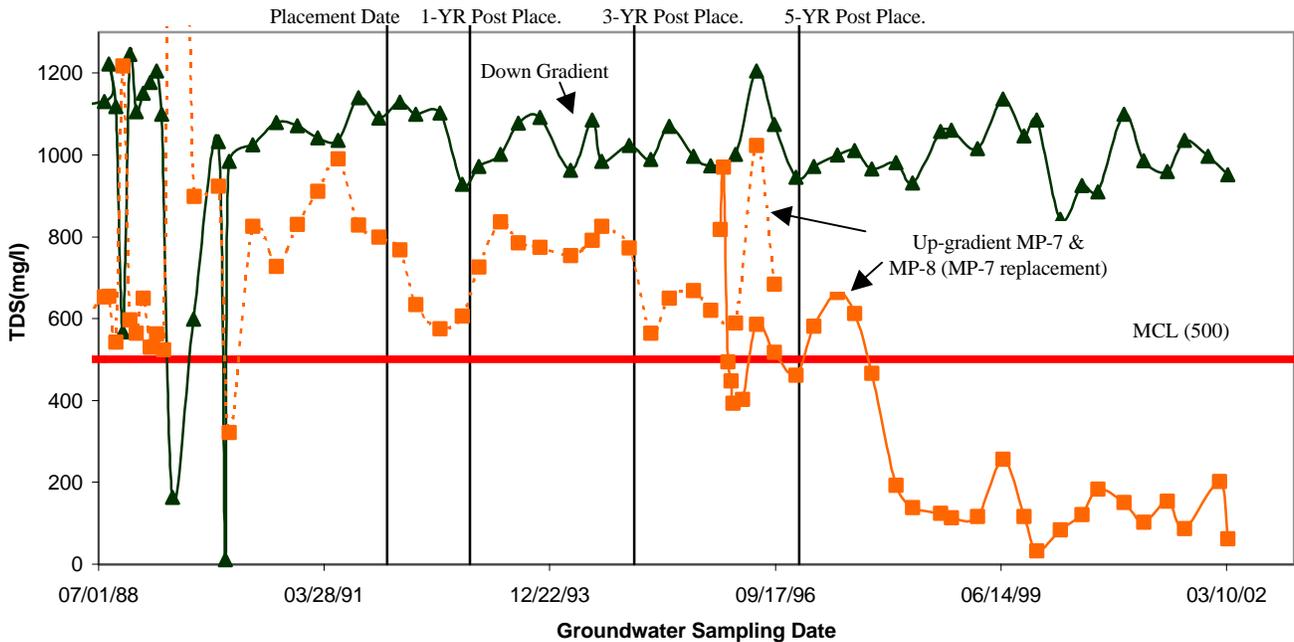
Groundwater Information

- Groundwater sampling data available 4 years pre-placement and 11 years post placement.
- Manganese in both wells was above MCL prior to placement but has decreased in the upgradient well to close to the MCL and has only decreased slightly in the downgradient well.
- Iron in both wells prior to placement were above MCL. Since placement, iron in the upgradient well has decreased to close to MCL, with a spike observed when MP-8 was first sampled, and has remained relatively constant in the downgradient well.
- TDS were above the MCL prior to placement in both wells. Since placement, TDS decreased to below MCL in the upgradient well and remained relatively constant in the downgradient well.
- pH in both wells was below lower MCL limit prior to placement and has remained relatively unchanged.

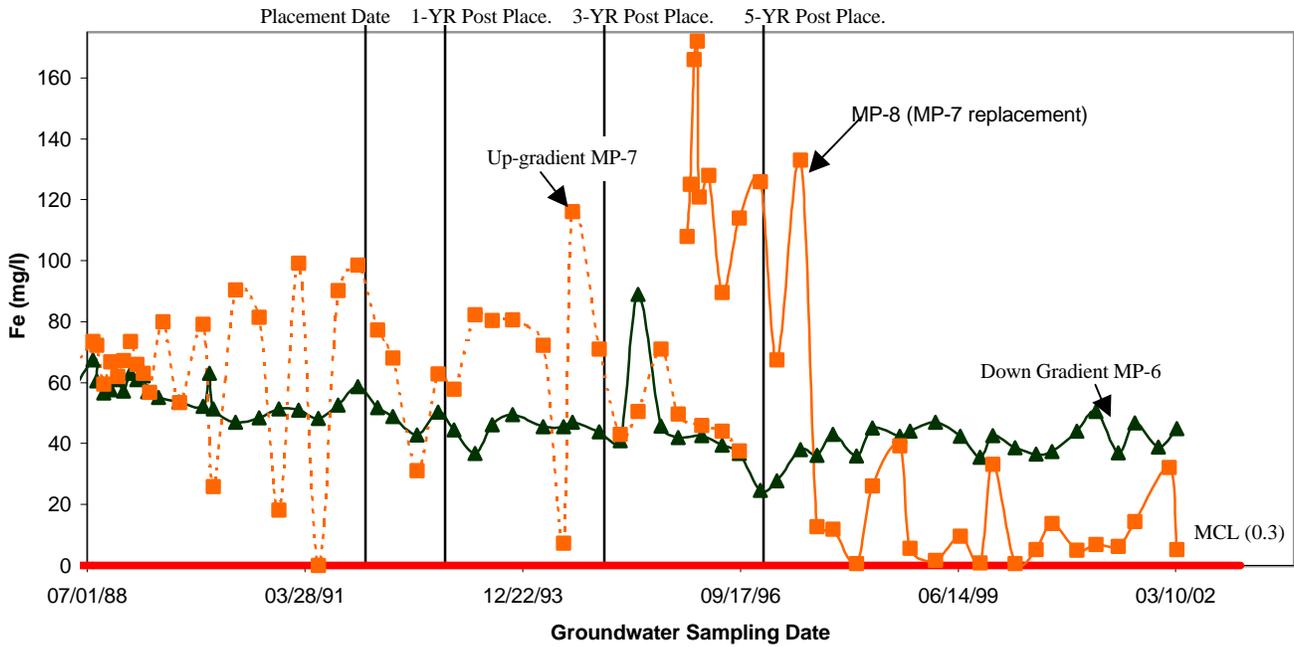
B-D Mine Site: Groundwater pH Levels - Pre and Post CCB Placement



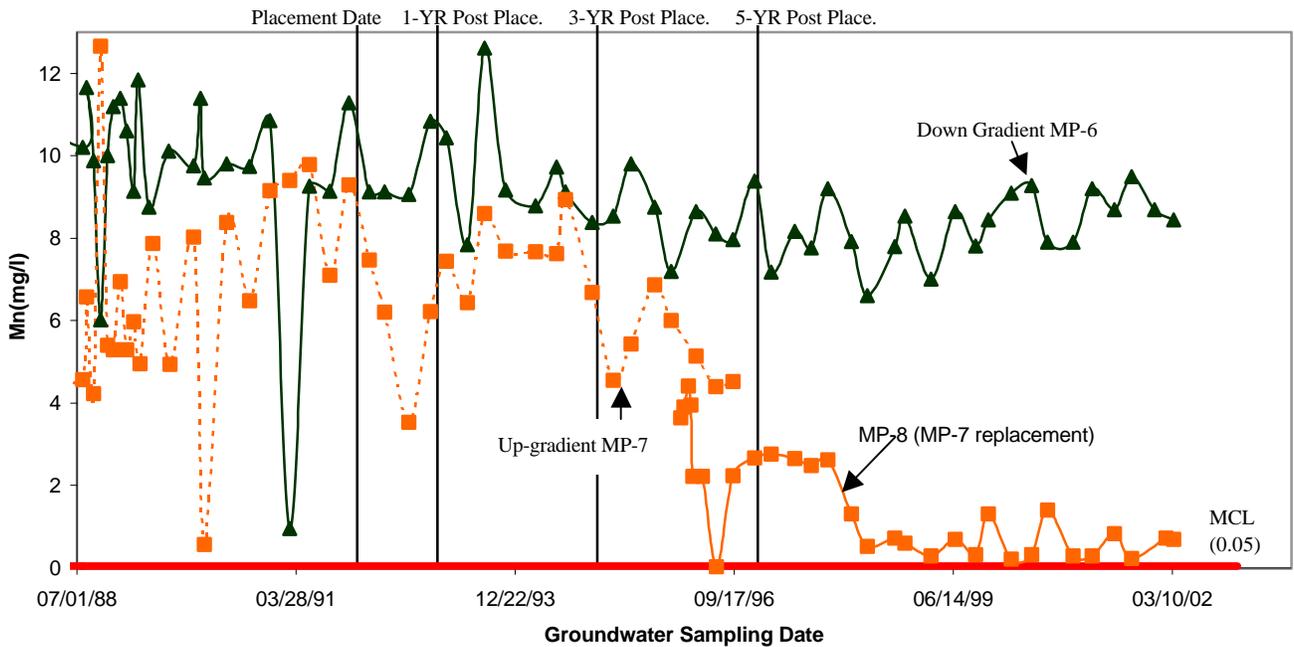
B-D Mine Site: Groundwater Total Dissolved Solids (TDS) - Pre and Post CCB Placement



B-D Mine Site: Groundwater Iron (Fe) Concentrations - Pre and Post CCB Placement



B-D Mine Site: Groundwater Manganese (Mn) Concentrations- Pre and Post CCB Placement



BIG GORILLA DEMONSTRATION PROJECT, SCHUYLKILL COUNTY, PENNSYLVANIA

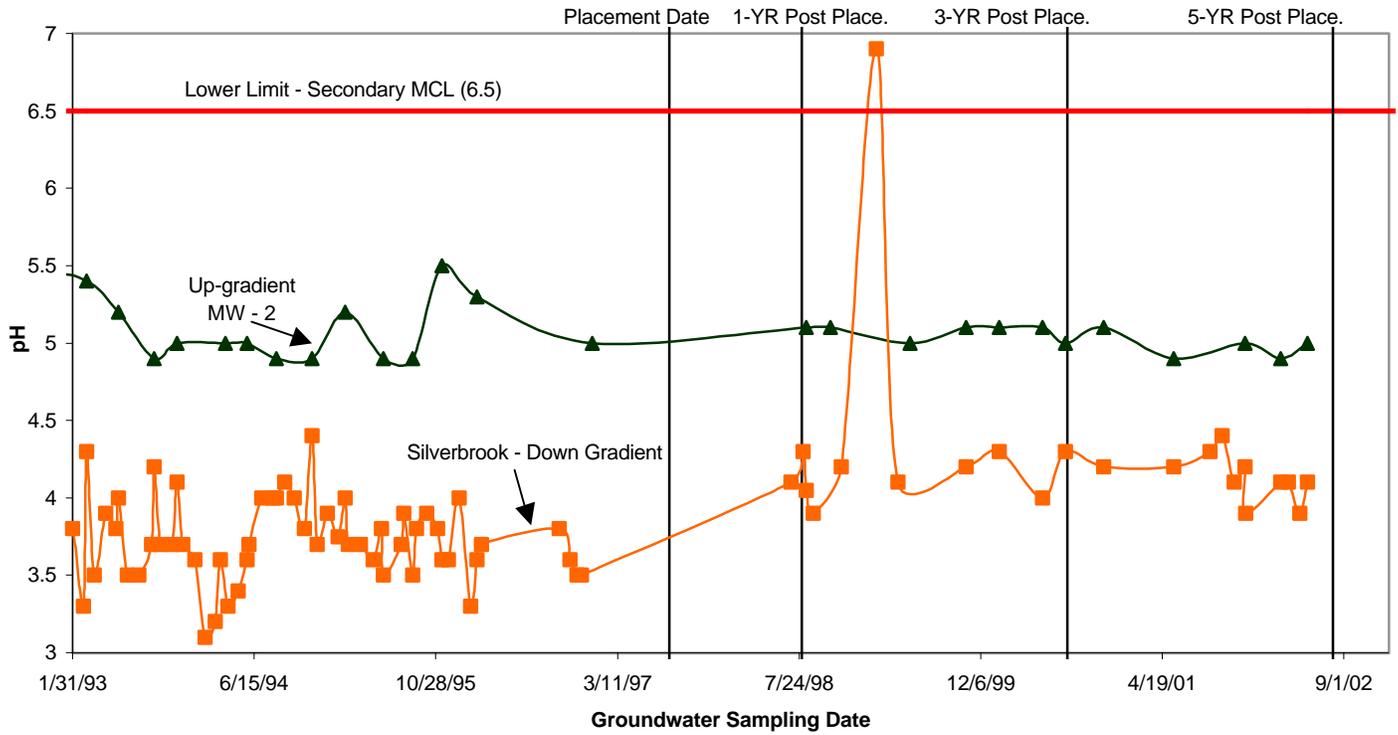
Site Information

- Former surface anthracite mine, temperate to humid climate
- Primary purpose - site reclamation and AMD abatement
- Fluidized bed combustion (FBC), dry ash, and bottom ash from NEPCO Co.
- No other material added to the ash
- Dry ash placed directly into standing water in the mine pit
- No cap or liner used to prevent rain infiltration or the release of leachate

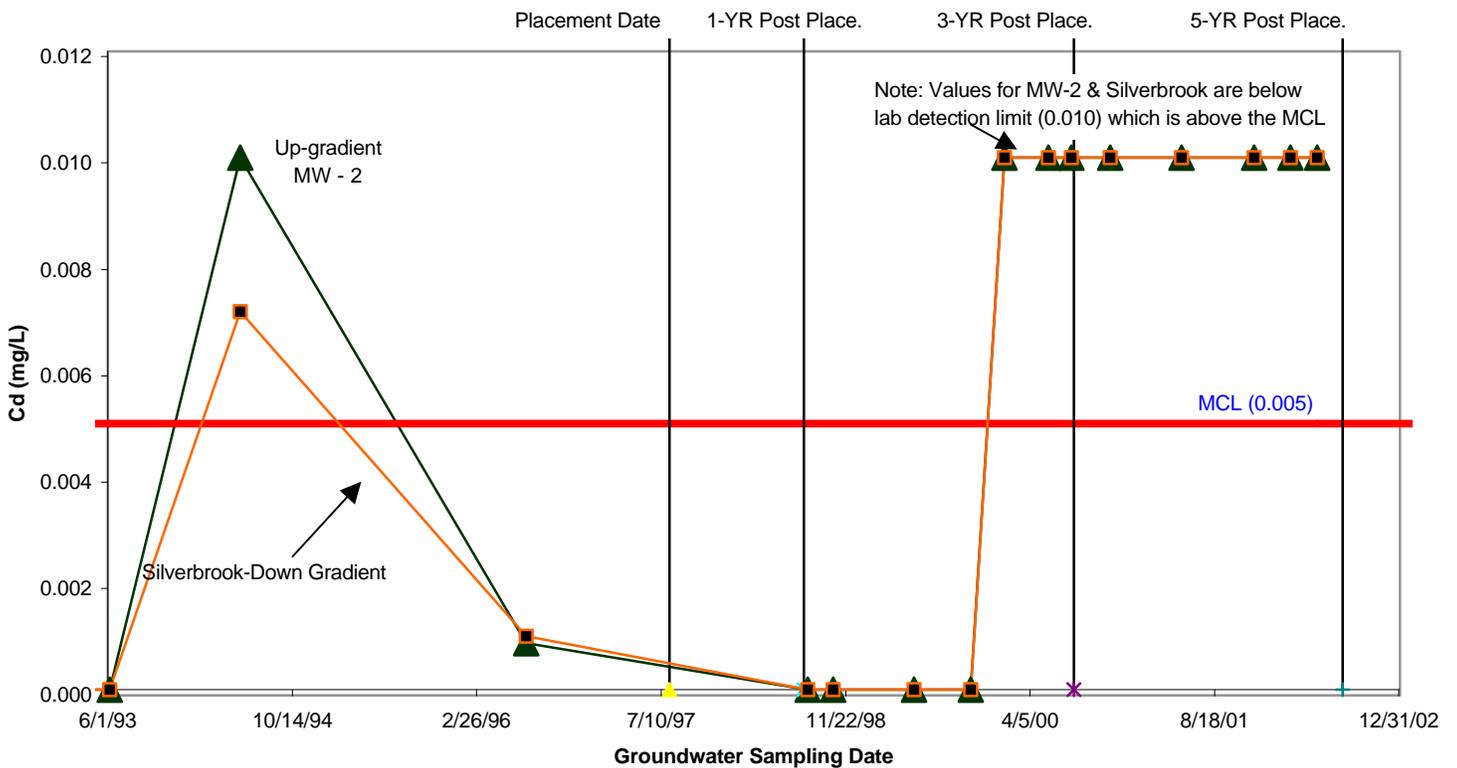
Groundwater Information

- Groundwater monitoring data available for 4 years pre-placement and 5 years post-placement.
- Cadmium concentrations above the MCL prior to placement; since then have decreased to below the MCL.
- Iron and manganese concentrations above the MCL prior to placement; 3 years post placement - still above the MCL at higher levels.
- Up-gradient pH levels remained between 5 and 5.5 before and after the placement; down-gradient pH was between 3 and 4 before placement and has since risen to between 4 and 4.5 after placement.

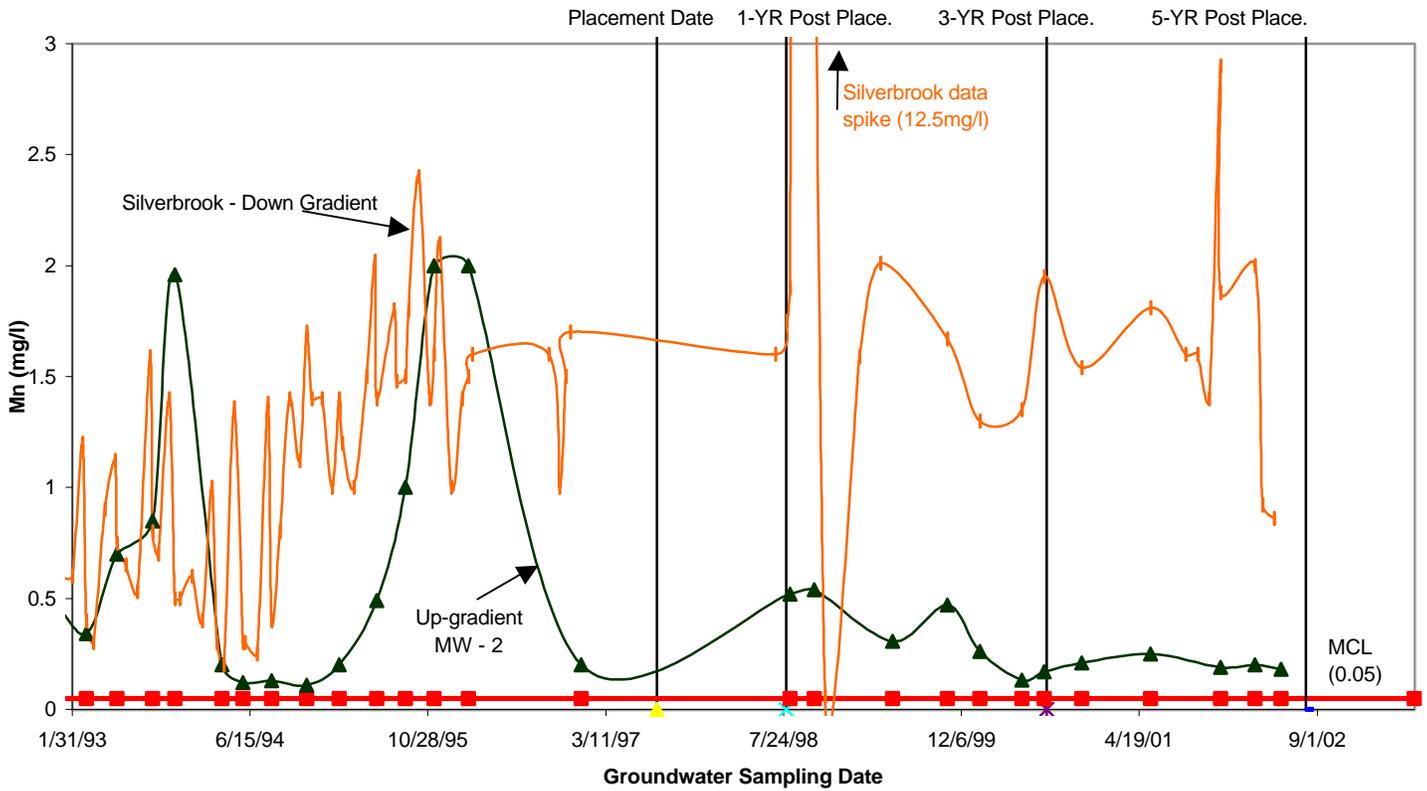
Big Gorilla Mine: Groundwater pH Levels - Pre and Post CCB Placement



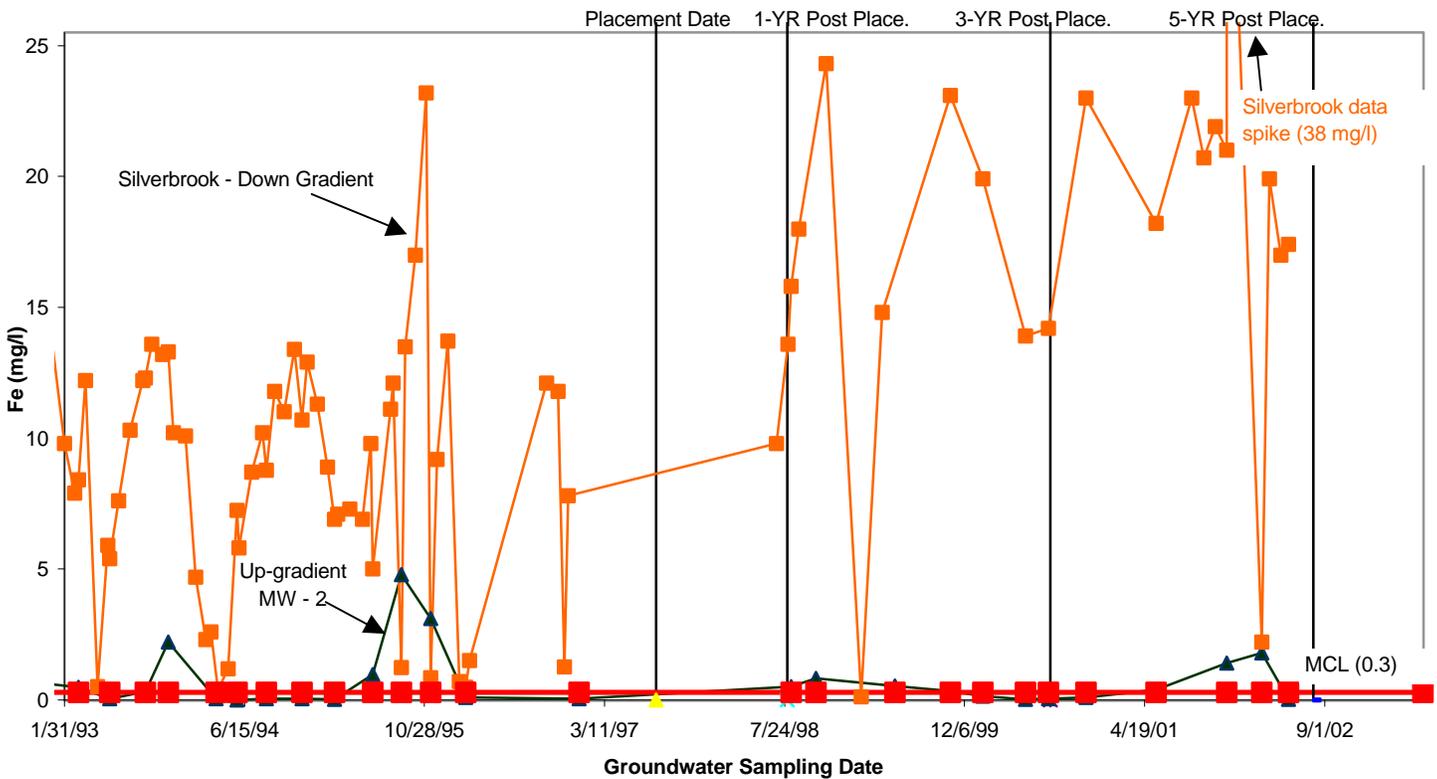
Big Gorilla Mine: Cadmium Concentrations - Pre and Post CCB Placement



Big Gorilla Mine: Groundwater Manganese Concentrations- Pre and Post CCB Placement



Big Gorilla Mine: Groundwater Iron Concentrations - Pre and Post CCB Placement



MAPLE COAL SITE, CAMBRIA COUNTY, PENNSYLVANIA

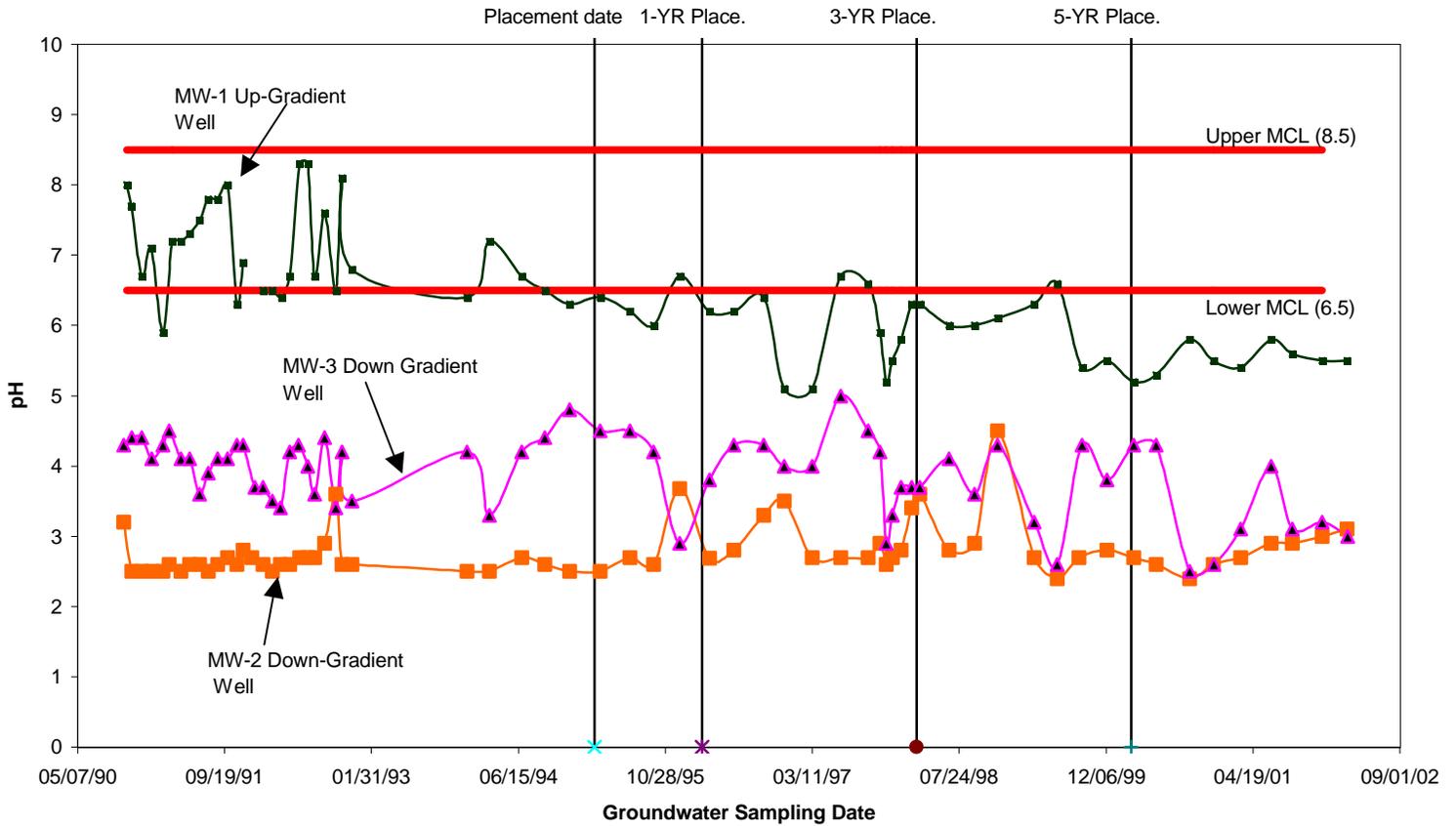
Site Information

- Inactive surface bituminous mine, temperate to humid climate
- Primary purpose - site reclamation and reduction of AMD
- Refuse (“gob”) pile used as fuel for Colver Fluidized Bed Combustion (FBC) Power Plant since 1995.
- FBC ash from Colver Plant; FBC ash blended with rejected material from refuse pile and placed above the water table

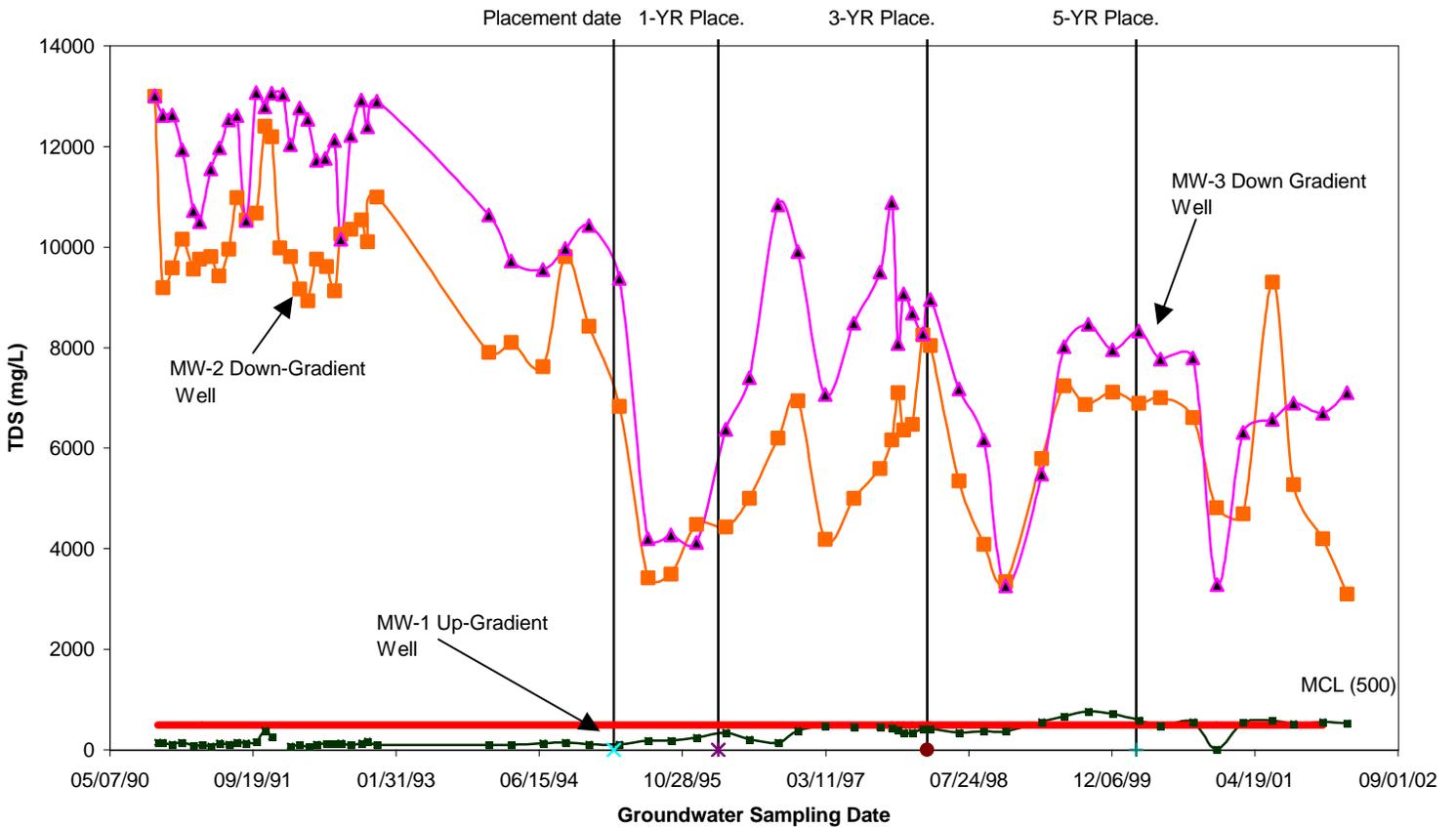
Groundwater Information

- Four years of pre-placement groundwater data and seven years of post-placement groundwater data
- Pre-placement pH levels between 2.5 and 5 for down-gradient and at or near the MCL for the up-gradient. Post-placement data shows stable pH levels for down-gradient wells and a slight decrease below the lower MCL limit for the up-gradient well.
- Pre-placement groundwater data shows elevated levels above MCLs for total dissolved solids (TDS), cadmium, iron, manganese, and sulfate in both down-gradient wells and chromium and arsenic in one down-gradient well, prior to placement.
- Up-gradient well at or below the MCL for all monitored constituents, pre- and post-placement; since placement, TDS, arsenic, manganese, iron, cadmium, chromium, and sulfate concentrations have declined. Of these constituents, cadmium and chromium declined to at or below MCLs in both wells and arsenic and manganese in one down-gradient well.

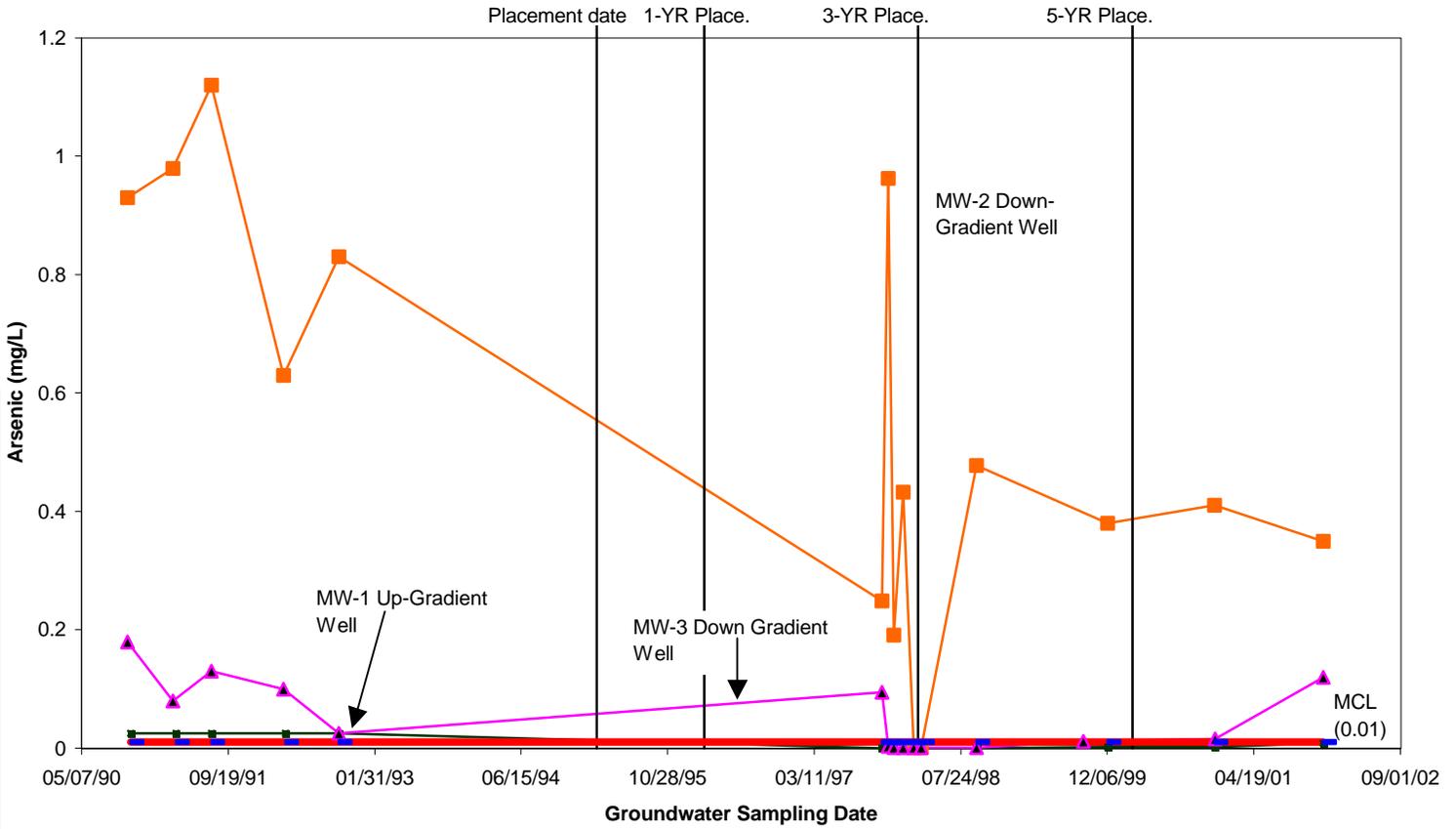
Maple Creek Coal Mine Site: Groundwater pH - Pre and Post CCB Placement



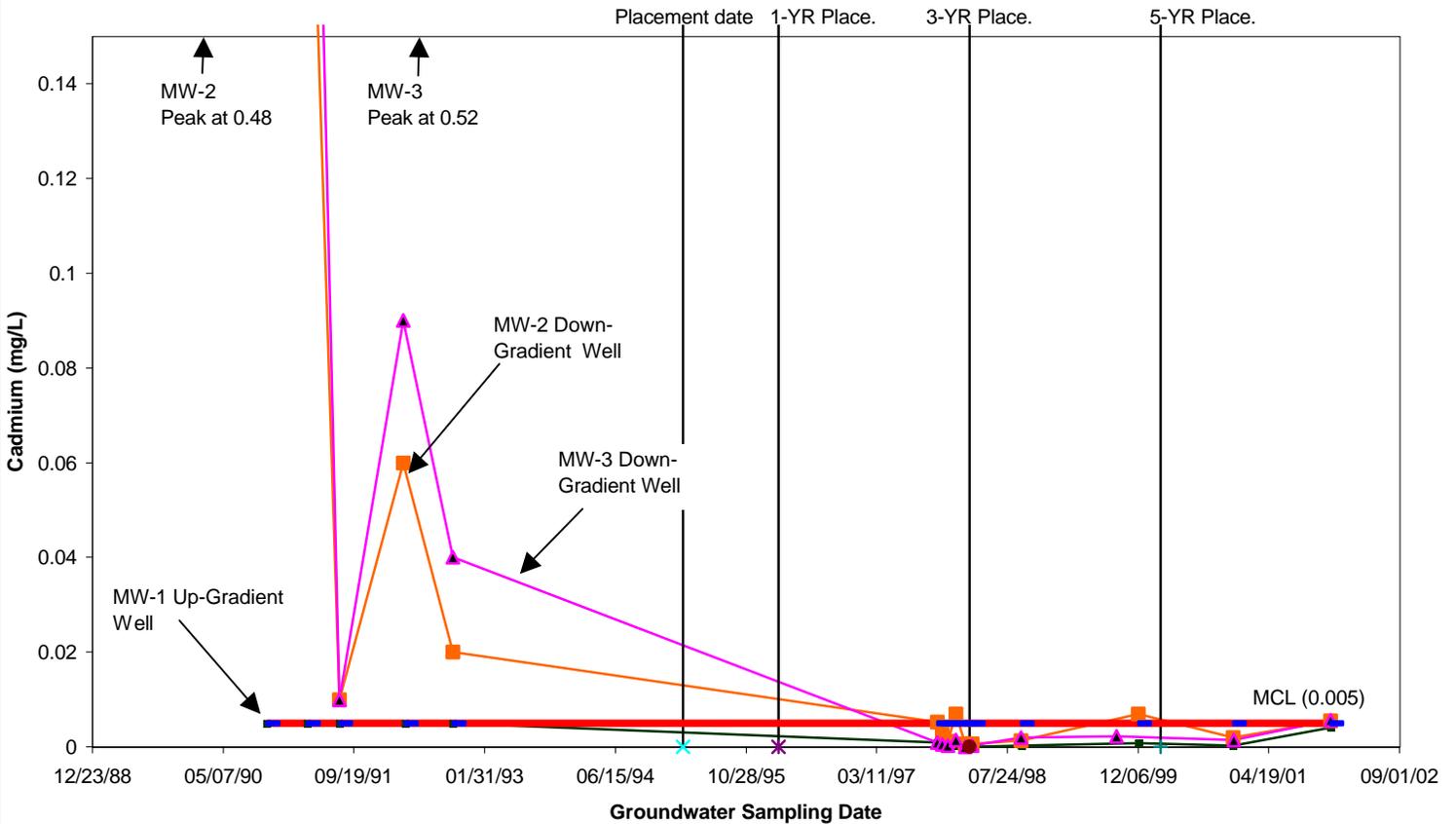
Maple Creek Coal Mine Site: TDS Groundwater Concentrations - Pre and Post CCB Placement



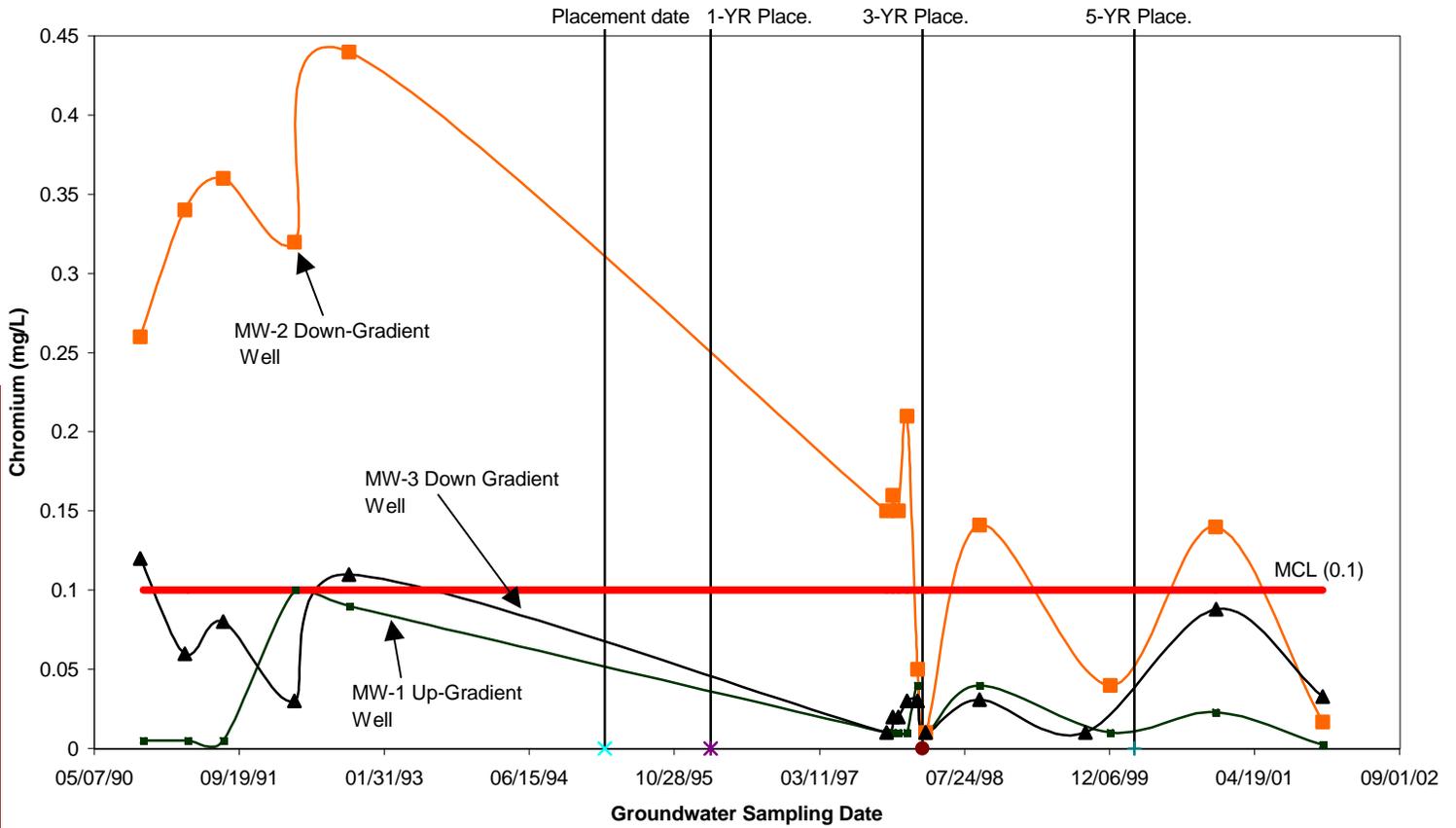
Maple Creek Coal Mine Site: Arsenic Groundwater Concentrations - Pre and Post CCB Placement



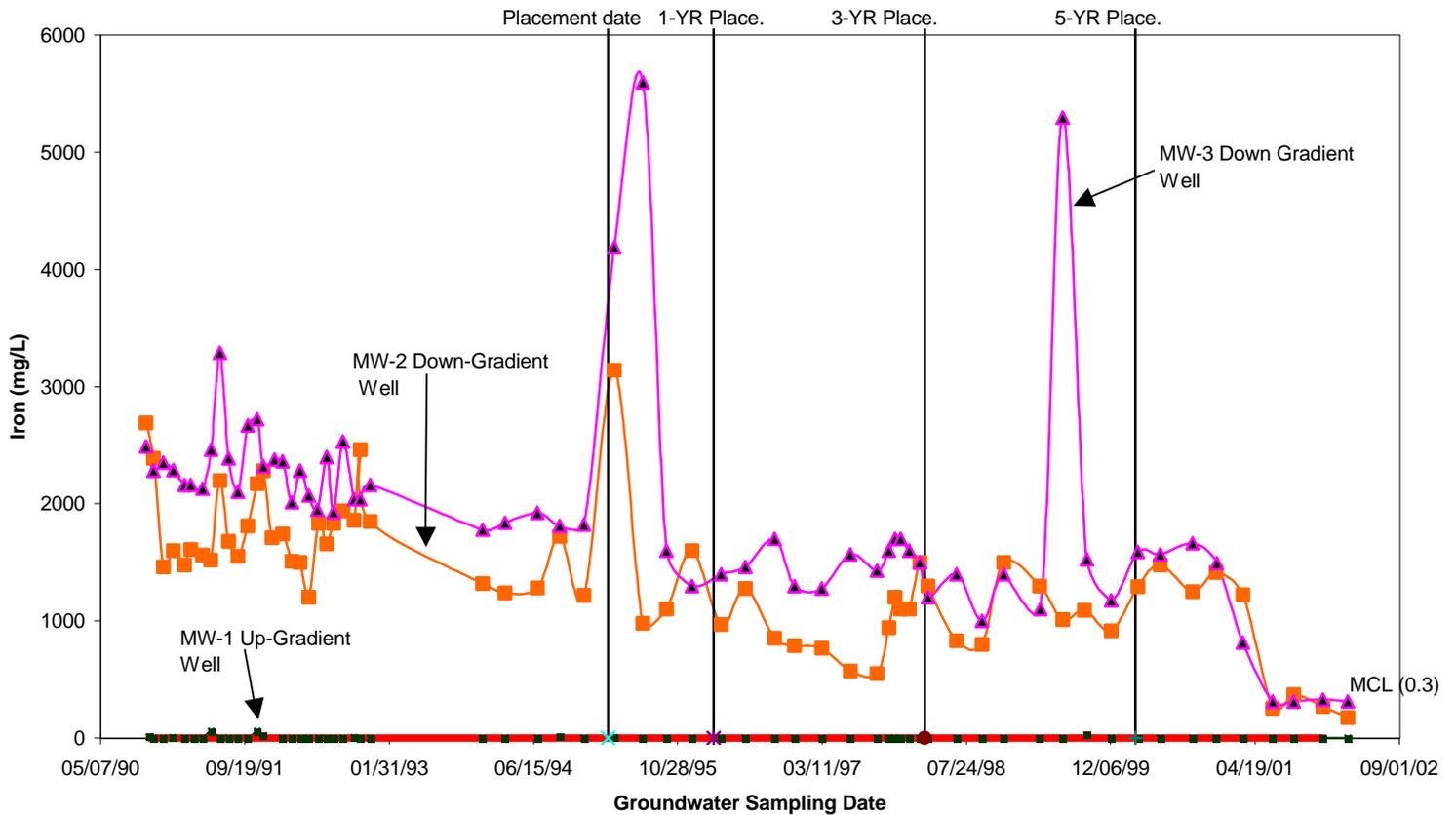
Maple Creek Coal Mine Site: Cadmium Groundwater Concentrations - Pre and Post CCB Placement



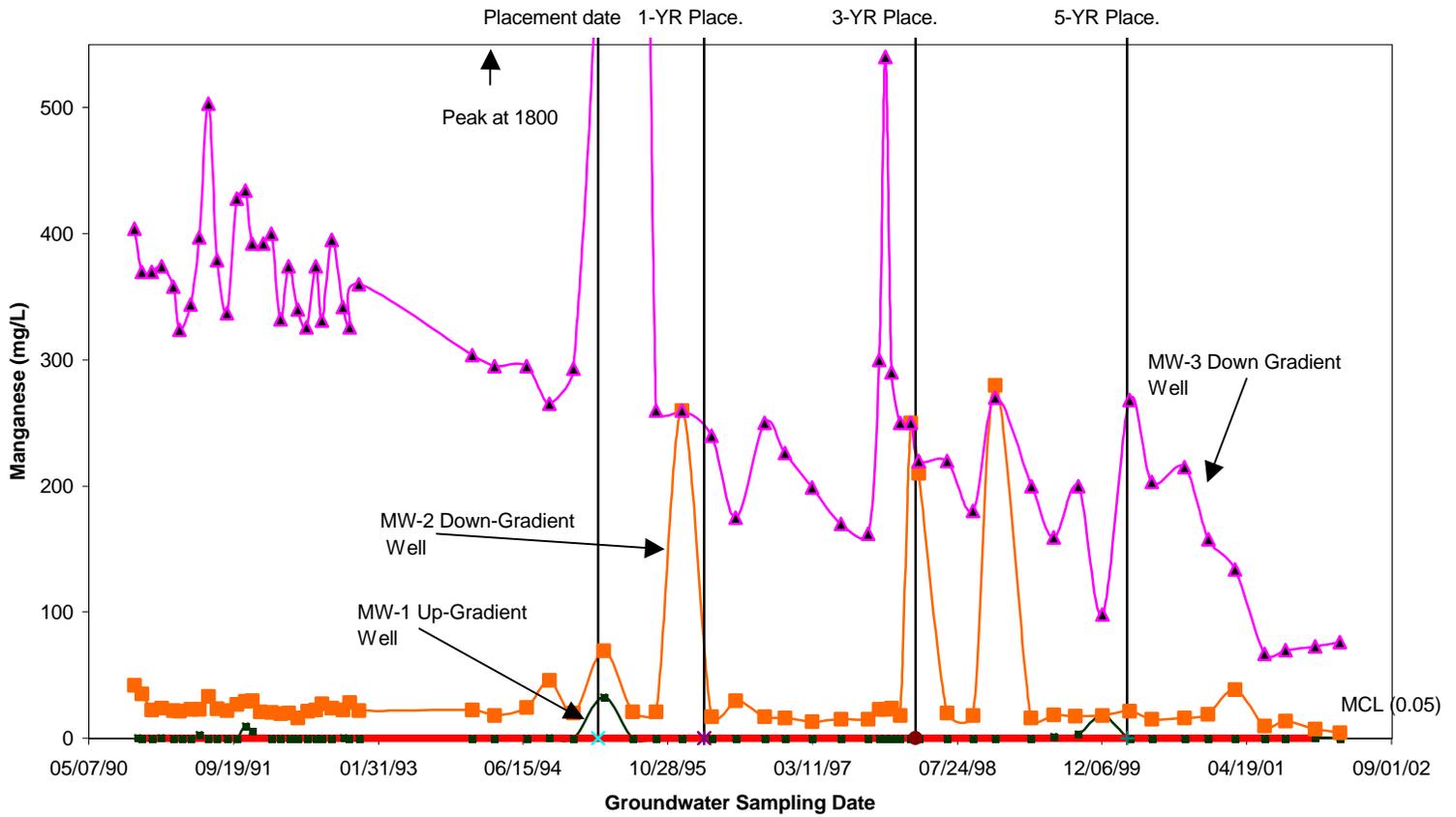
Maple Creek Coal Mine Site: Chromium Groundwater Concentrations - Pre and Post CCB Placement



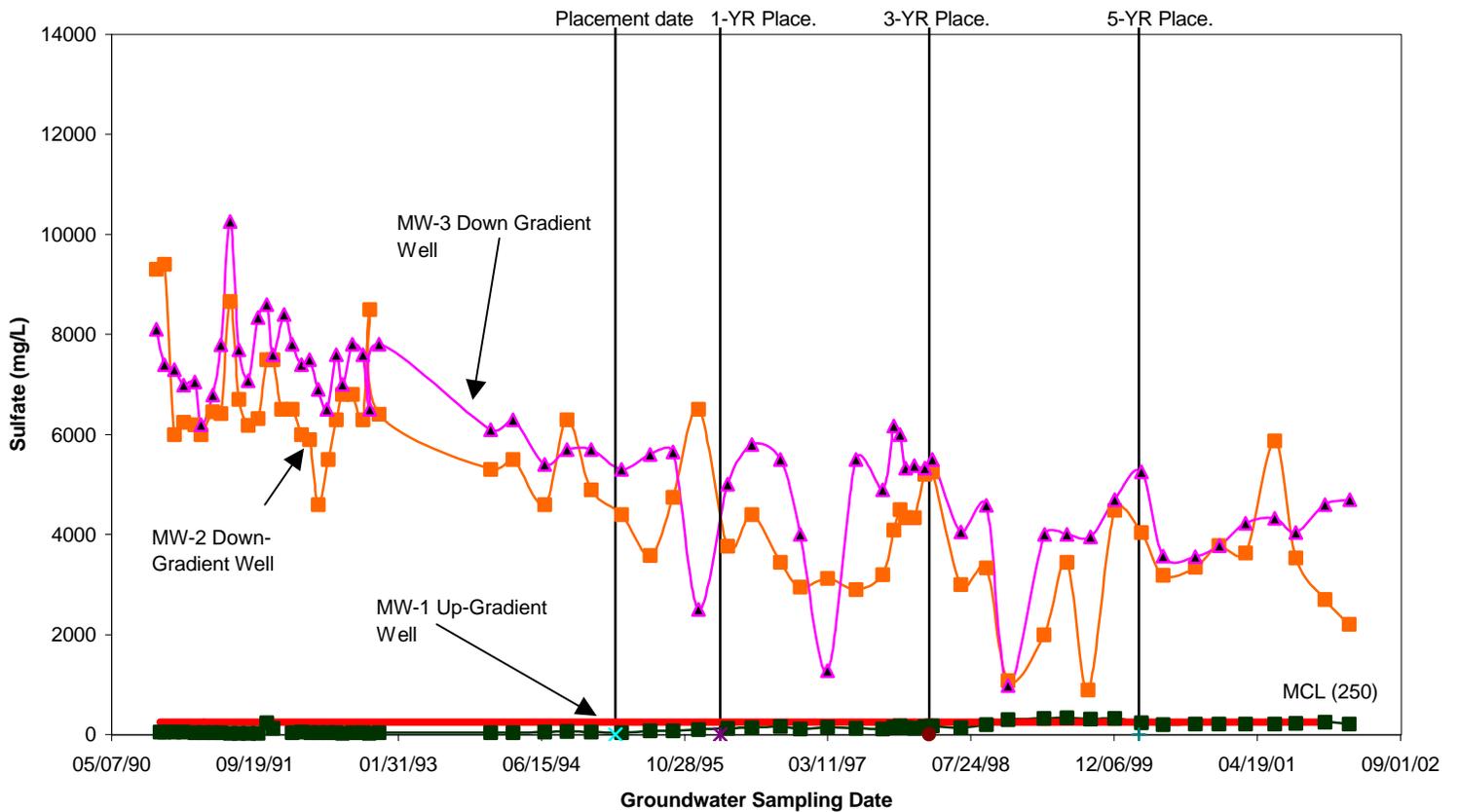
Maple Creek Coal Mine Site: Iron Groundwater Concentrations - Pre and Post CCB Placement



Maple Creek Coal Mine Site: Manganese Groundwater Concentrations - Pre and Post CCB Placement



Maple Creek Coal Mine Site: Sulfate Groundwater Concentrations - Pre and Post CCB Placement



REVLOC REFUSE SITE, CAMBRIA COUNTY, PENNSYLVANIA

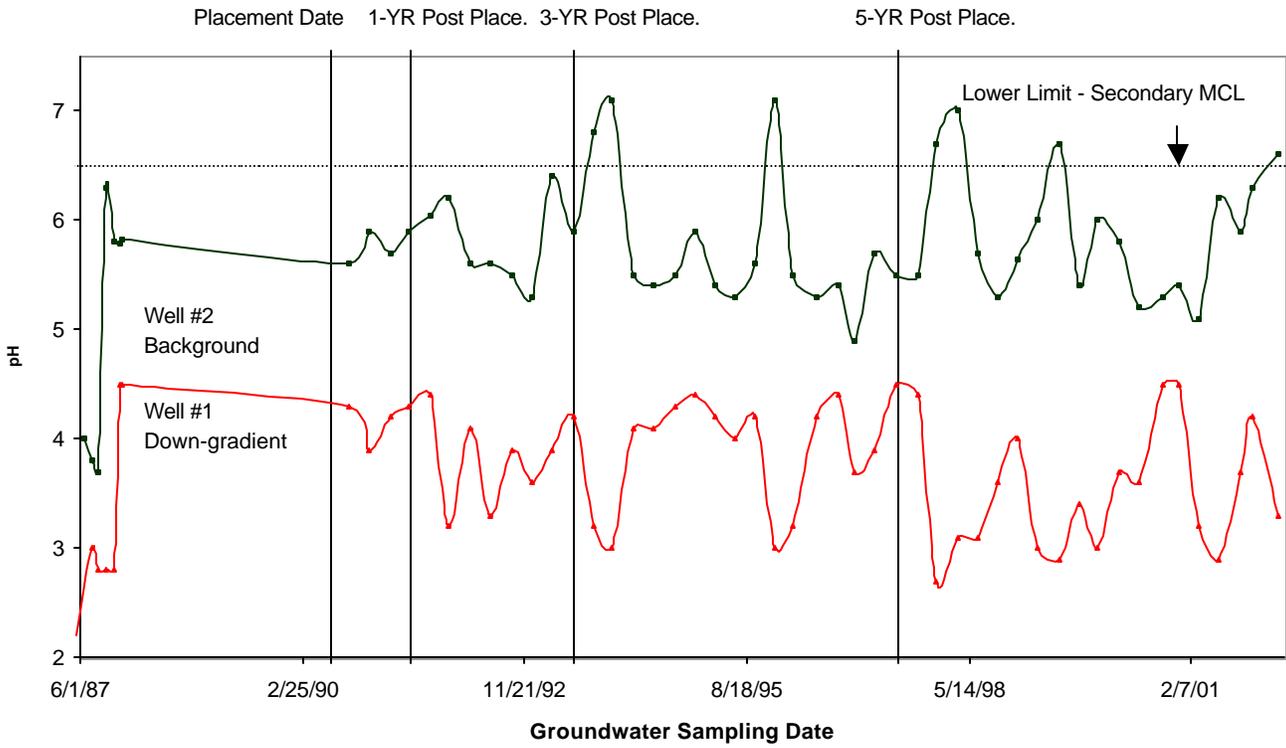
Site Information

- Inactive surface bituminous mine, temperate to humid climate
- Site reclamation and reduction of AMD
- Refuse (spoils) pile used as fuel source for Edensburg Power
- FBC ash from Edensburg Power
- FBC ash placed below the water table in monofill layers
- FBC ash blended with rejected material from refuse pile and placed above the water table

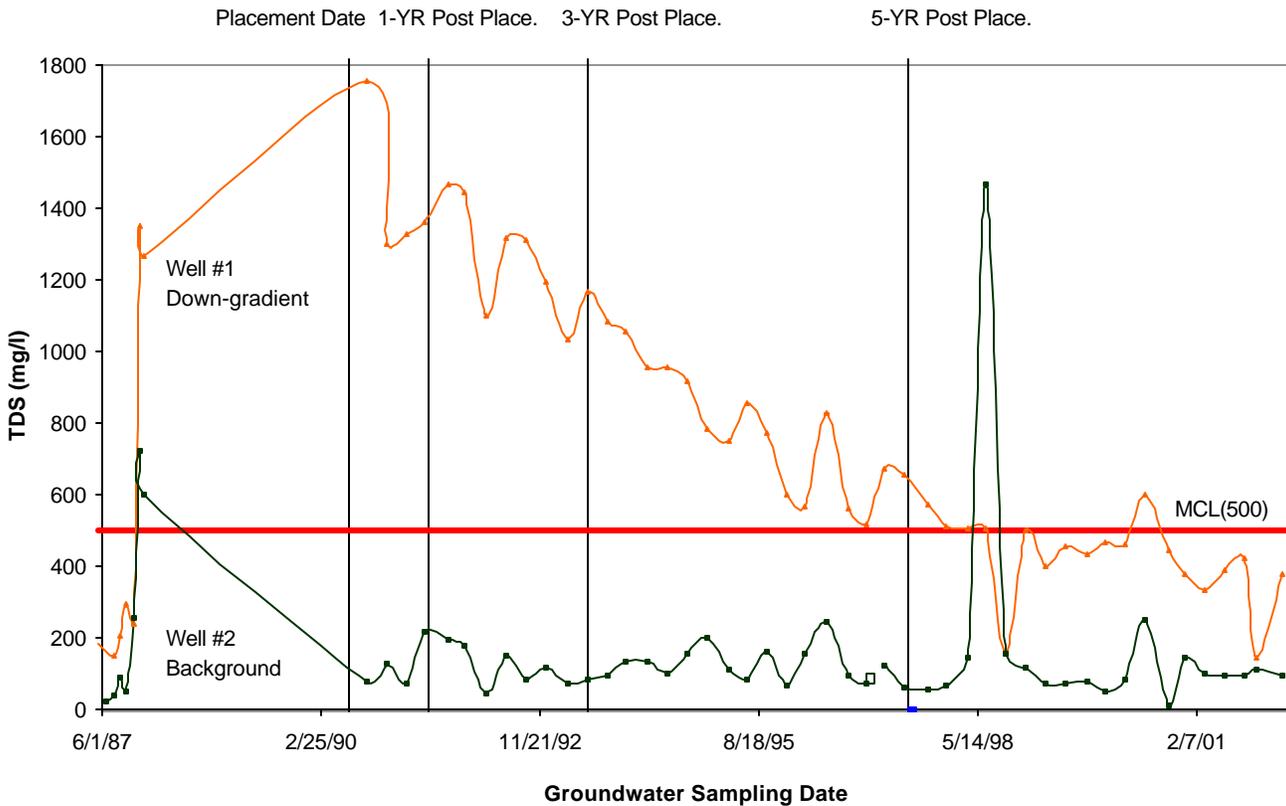
Groundwater Information

- Groundwater sampling data available 3 years pre-placement and 12 years post-placement.
- TDS before placement above MCL; since placement below MCL and close to background level
- Arsenic before placement above MCL; approximately 5 years after placement below MCL and close to background level
- Iron before placement above MCL; spiked during placement; reduced in time to close to MCL, but still above background
- pH during mining very acidic; pre- and post-placement the pH has not greatly changed.

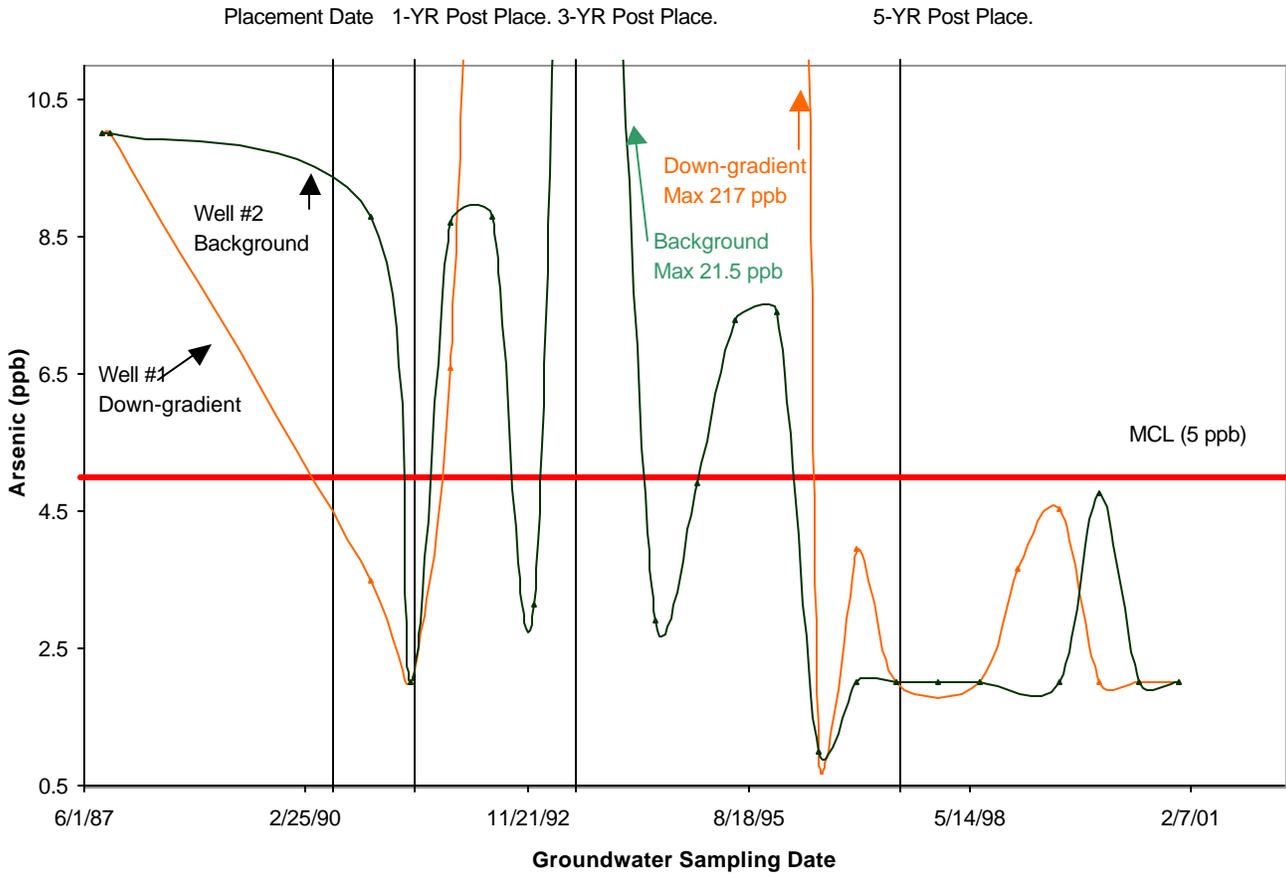
Revloc Mine Site: Groundwater pH - Pre and Post CCB Placement -



Revloc Mine: Groundwater Total Dissolved Solids (TDS) Levels - Pre and Post CCB Placement



Revloc Mine: Groundwater Arsenic Concentrations - Pre and Post CCB Placement



Revloc Mine Site: Groundwater Iron Concentrations - Pre and Post CCB Placement

