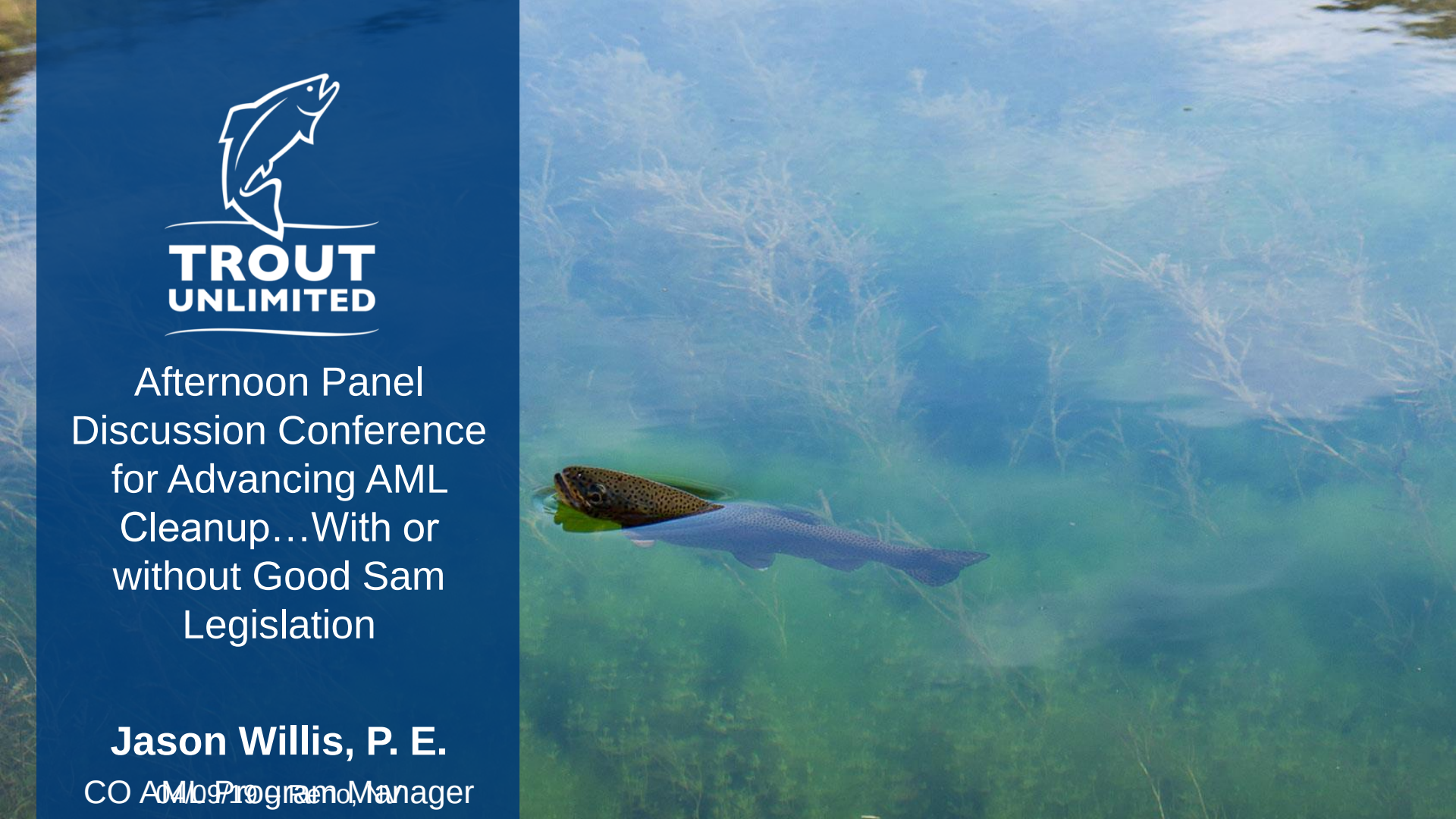


Afternoon Panel Discussion Conference for Advancing AML Cleanup…With or without Good Sam Legislation

Jason Willis, P. E.

CO AML Program Manager

04/19/2019 Denver, CO

What is TU's Role in Mine Reclamation Work?

- I didn't know that TU did that??!....
- Focus on watersheds that exceed State water quality standards
  - Grant funded projects (CDPHE 319 NPS, NFF, CWCB, CSFS)
  - Private funding for match and construction
    - Freeport McMoRan Mining, Newmont Mining, and Tiffany & Co. Foundation
  - Federally and State funded projects (USFS, BLM, DRMS)
- TU is part of the mixed ownership group in Colorado
- Filling a non-profit, non-governmental organization (NGO) role
  - Brings alternative sources of funding to projects (private partnerships)
  - Flexibility in contracting
  - Engineering experience to assist in project development
  - Collaborative relationships with Federal, State, Private, and Local

Collaboration…Partnerships…define….

- ….A successful project!

- Akron Mine Project – TU, NFF, USFS, EPA, USGS, DRMS, BoR, CDPHE
- Leavenworth Watershed – TU, USFS, Freeport, NFF, DRMS, CDPHE, USGS, EPA, SHPO
- Mountain Pride Mine – TU, CDPHE, EPA, USACOE, USFWS, DRMS, Summit Co., Town of Breck, Freeport, USFS, private landowner, and various partners

Site Characterization - Evans Gulch Water Quality Problem

Month	Avg. Hardness	Zn - D (TVS)	Zn - D, (85th%)	% Reduction
Jan	100	124	27	0%
Feb	115	140	23	0%
Mar	130	156	18	0%
Apr	120	145	18	0%
May	59	79	100	21%
Jun	76	98	66	0%
Jul	82	105	114	8%
Aug	87	110	114	3%
Sep	90	114	15	0%
Oct	94	118	16	0%
Nov	98	122	16	0%
Dec	100	124	15	0%
Annual	93	117	113	0%

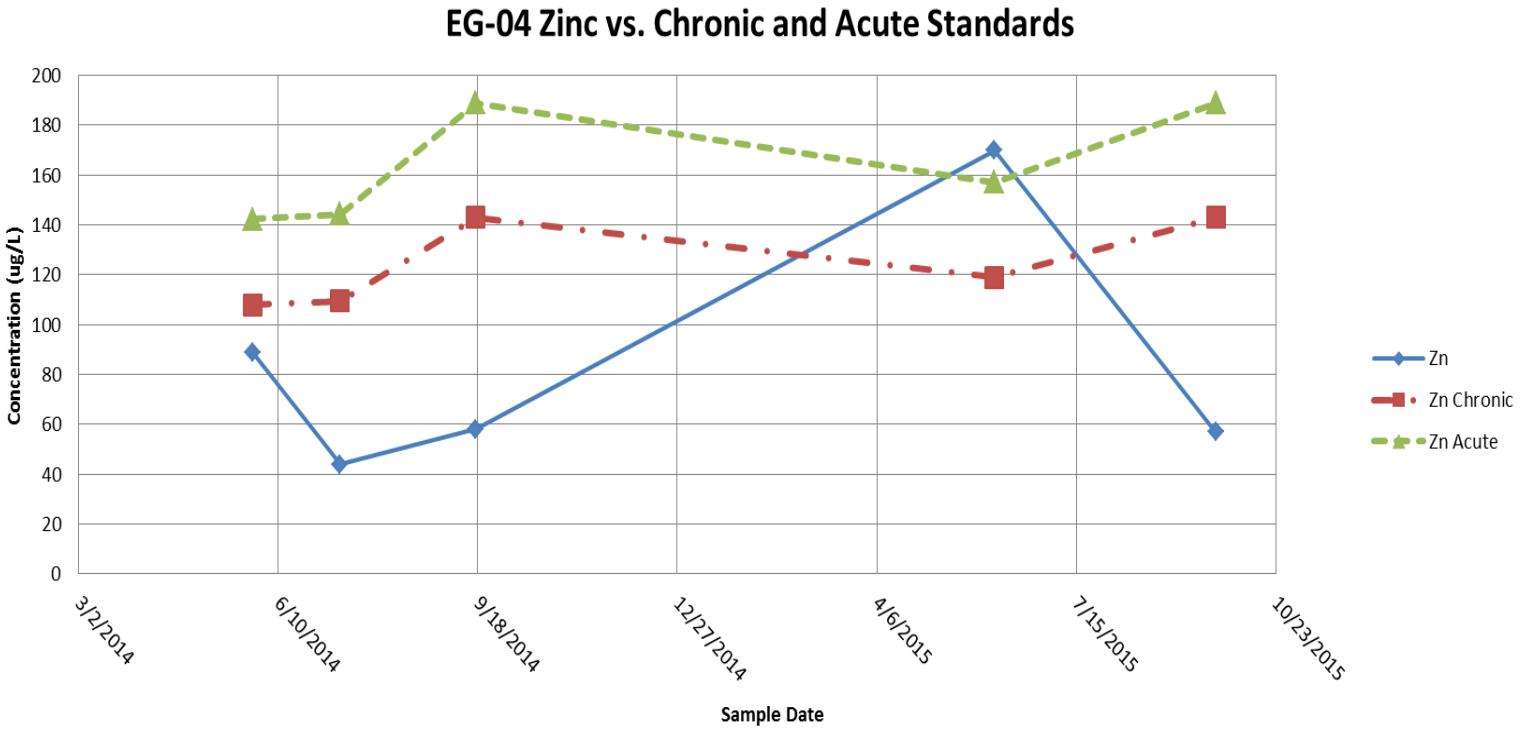
Source: TMDL for Evans Gulch - Segment 7 (CDHPE, 2009)

- Exceeds TVS for dissolved Zinc during spring runoff and summer storm season
- % reduction ranges from 3-21%
- Not attaining Aquatic Life Cold 1 Classification
- Non-point source run-on/run-off control
- Watershed Plan finalization and source identification

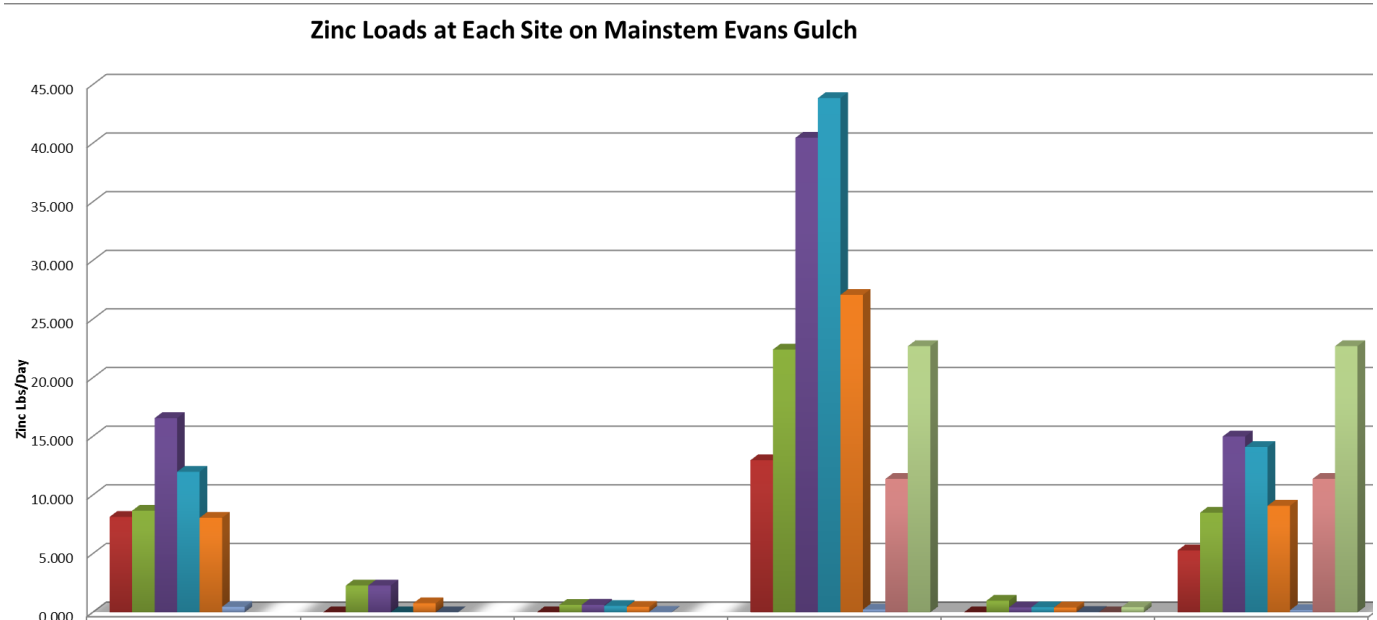
Water Quality Sampling Locations – Suspected Source Bracketing

2014/2015 Water Quality – Measuring Results

- Evans Gulch Sites



2014/2015 Loading Evaluation – Measuring Results – Site ID



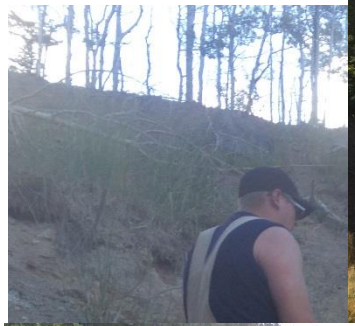
	High Flow 2014	Mid-Summer flow 2014	Low Flow 2014	High Flow 2015	Low Flow 2015	Average
EG-02	8.138	0.000	0.000	12.966	0.000	5.276
EG-04	8.665	2.276	0.632	22.405	0.991	8.495
EG-12	16.558	2.279	0.638	40.461	0.418	14.984
EG-13	11.980	0.000	0.534	43.846	0.432	14.090
EG-14	8.055	0.763	0.458	27.059	0.406	9.084
EG-15	0.459	0.000	0.038	0.225	0.021	0.180
EG-16				11.371	0.000	11.371
EG-14A				22.693	0.431	22.693

- Source Verification
- 22.69 lb/day spike between EG15 and EG14A
- 16.7 lb/day spike between EG14 and EG13
- Slight decrease in EG13-12 load

Contamination Sources – Site ID & Ranking for Cleanup

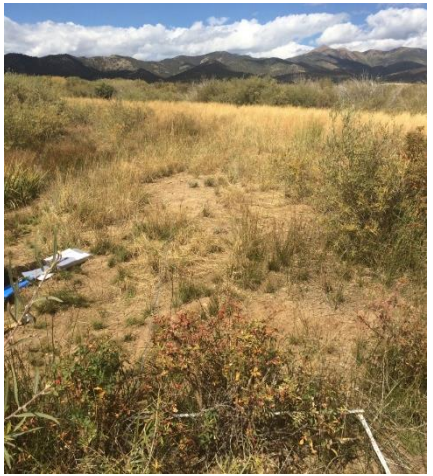
- Identified Non-point source mine tailings/waste piles
  - EG13 North – Streamside tailings (0.24 acres)
  - EG13 South – Valley Mine dump (1.10 acres)
  - South Evans Gulch - Piles and pond outflow (1.23 acres)
  - EG14.5 - Famous Mine Pile

Measuring Potential Releases – Site Characterization

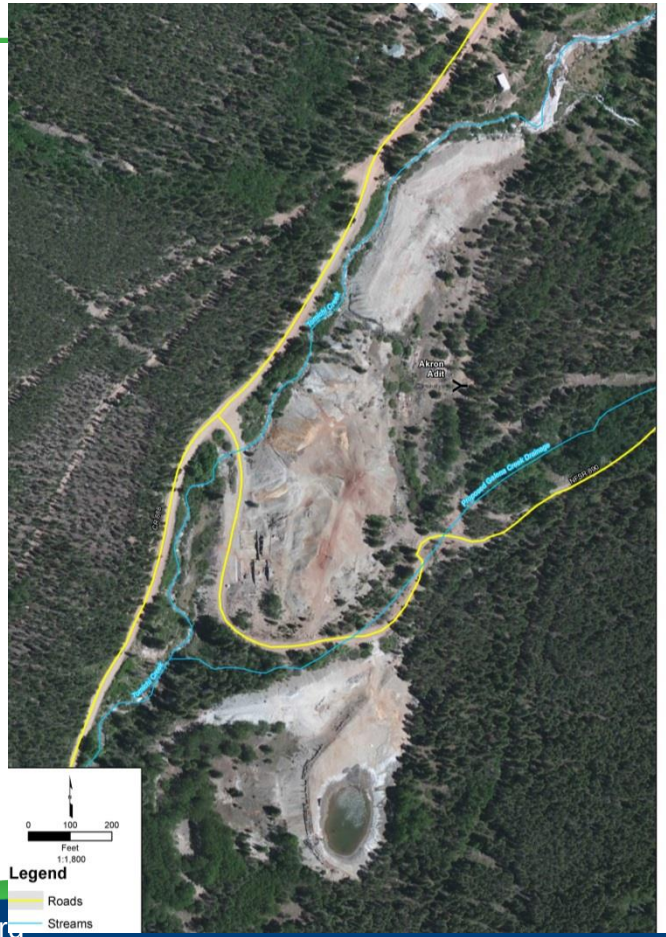


- Minnie Lynch Mine
- Initial Design: adit stabilization
- 2nd step: Gather groundwater data behind adit through fabricated wells
  - 2 wells showed 12-14’ of head behind collapse
- Final Design: French drain outside of collapse to collect surface and ground water.
- Replaced dysfunctional sediment pond with wetland

Post Project - Photo Point Monitoring



Post Project – Drone flyover – Before and After



Questions/Comments?

- Monitoring and site characterization essential for project success
- Thank You! – Jason Willis – CO AML Program Manager – jwillis@tu.org
- www.tu.org/aml
- Sam says…..our AML work is clean-enough for your dog…..