

Water Quality
and
the Animas River Stakeholders Group

Animas River Protection Group

Sept. 22, 2011

- FEDERAL WATER POLLUTION CONTROL ACT
- (CLEAN WATER ACT)

- Goal to make all waters fishable and swimmable
- Do not impair States' ability to allocate water
- State standards can not be more lenient than Federal Standards
- Explicitly excludes irrigation return flows from needing point-source permits
- Implicitly excludes ground water

- COLORADO WATER QUALITY CONTROL ACT

- No material injury to water rights
- Implicitly includes ground water

- WATER QUALITY CONTROL COMMISSION (WQCC)
 - Nine members appointed by the Governor, confirmed by the State Senate
 - Sets Use Classifications, Standards, Regulations and Policy for protecting the state's waters
- WATER QUALITY CONTROL DIVISION (WQCD)
 - Acts as staff to the Commission
 - Implements Commission regulations including issuing discharge permits in order to meet Use Classification and Standards
- IMPLEMENTING AGENCIES
 - Oil and Gas Conservation Commission
 - Division of Reclamation, Mining and Safety
 - Hazardous Materials and Waste Management Division
 - Division of Oil and Public Safety
 - Department of Agriculture
 - State Engineer

- STREAM SEGMENTS

- Determined by topography, geology, water quality, jurisdictional boundaries, stream flow characteristics, temperature , aquatic life, etc.

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- USE CLASSIFICATIONS

- Determined by what uses are present or are expected or anticipated to be present in the future
- Agriculture, Aquatic Life (Class 1 or 2, cold or warm), Recreation, Water Supply, Wetlands

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- STANDARDS

- Designed to protect the Use Classifications
- Standards set to protect the most vulnerable use

Presumption under CWA

- Rivers, streams and lakes can meet the fishable and swimmable goal of the CWA unless there is evidence showing otherwise.

Metal Loading Processes to Rivers and Streams

Natural versus Mining-related

Formation of the Animas River Stakeholders Group (ARSG) in 1994

- Threat of Superfund Designation from EPA
- Threat of Strict Water Quality Standards from Colo. Water Quality Control Commission

Collaborative Process

Federal Agencies: BLM, USFS, USGS, EPA, BOR

State Agencies: DOW, WQCD, HWMD, DRMS, Colo.
Geological Survey

Local Government: San Juan Co, SWCD, Silverton,
Durango, So. Utes

Other Entities: Sunnyside Gold, San Juan RC&D, Silver
Wing Mines, Salem Minerals, TUSCO, Gold King
Mining, San Juan Minerals, Shenandoah Mining,
Mining Remedial Recovery, Trout Unlimited, San Juan
Citizens Alliance, Friends of the Animas River, San
Juan Historical Society, Mountain Studies Institute,
Animas Water Co, River Watch, Trust for Land
Restoration, Anglo-Saxon Properties

Animas River Stakeholders Group

www.animasriverstakeholders.org

&

www.goodsamaritaninfo.org

Natural Geological Acid Rock Drainage



Acid Mine Drainage



Mine Waste Acid Rock Drainage



ARSG Approach

- Characterize abandoned and inactive mine sites (~185 draining mines and ~200 mine waste piles sampled)
- Determine feasibility of remediation of sites and prioritize top sites
- Propose water quality standards based on remediation feasibility
- Remediate sites.

Sunnyside and Gold King Mines

- Permitted mines were excluded from ARSG characterization (considered point sources and regulated in 1995)
- ARSG took no position concerning SGC consent decree

Dept. of Interior Animas AML Program (National Pilot Program)

- Stream characterizations
- Geologic and geomorphologic mapping
- Help ed with mine site characterization
- Stream tracer studies

Characterization Factors

- Quantify Metals leaving site or potential to leave (mine waste leach tests)
- Biological potentials:
 - Distance to receiving stream
 - Slope gradient & aspect
 - Kill zones present
 - Annual precipitation
- Remediation Feasibility:
 - Geology and geomorphology
 - Access
 - Utility availability
 - Potential to divert, bury, etc.
 - Evaluation of treatment methods, cost, and potential reductions anticipated

Remediation Feasibility

(DRMS Feasibility Reports + ARSG Evaluations)

- Mine Drainages
 - *Active treatment (85%) too costly*
 - Source controls (50%)
 - Bulkhead (50%)
 - Passive Treatment (30%)
 - Anoxic limestone drain
 - Oxidic limestone drain
 - Various wetland treatments
 - Bio-reactors
- Mine Wastes
 - Capping (25%)
 - Amending (10%)
 - Removal & cleanup (90%)
 - Hydrological controls (20%)
 - Consolidation (10%)
 - Hydrol. + Amend. = (30%)
 - Hydrol. + Amend. + Cap = (55%)

Use Attainability Analysis

2001

Site Specific Water Quality Standards
Based upon Remediation of 33 Mine Waste
Sites and 32 Draining Mines

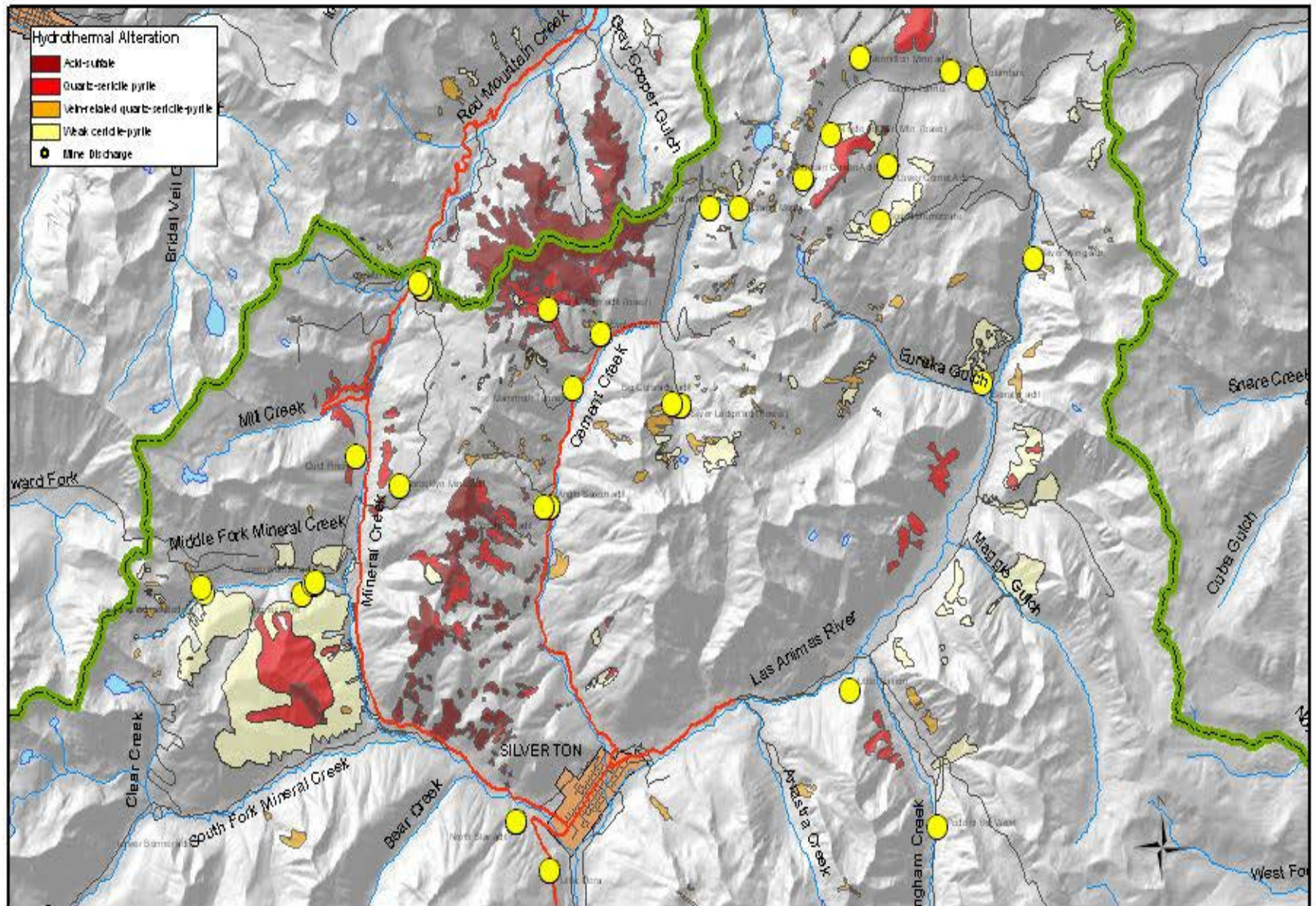
Water Quality Standards Recommendations

Subtract the Feasible Metal Loading Reductions
from the Current Metal Load

Base Standards off of the Remaining Load

Recommendations were Adopted by WQCC in 2001

Hydrothermal Alteration With Mine Discharge Sites



Data Sources: Mine Discharge Data, Animas River Stakeholder's Group; Hydrothermal Alteration Map, Dana Rowe at USGS; DEM, USGS; Streams, Lakes, Roads, Counties & Cities, CDOT.



Remediation

About 50 Mine Remediation Projects Have Been Completed

Most of the Mine Waste Sites Have been Completed

Only about 5 Draining Mines Have Been Addressed

Liability Concerns – Lack of Good Samaritan Provision

Draining Mine Liability

- Draining Mines Are Considered Point Sources
- Good Samaritan Provision
- ARSG Has Had Its Own Legislation Introduced Twice



Waiting For a Good Samaritan Provision

Results

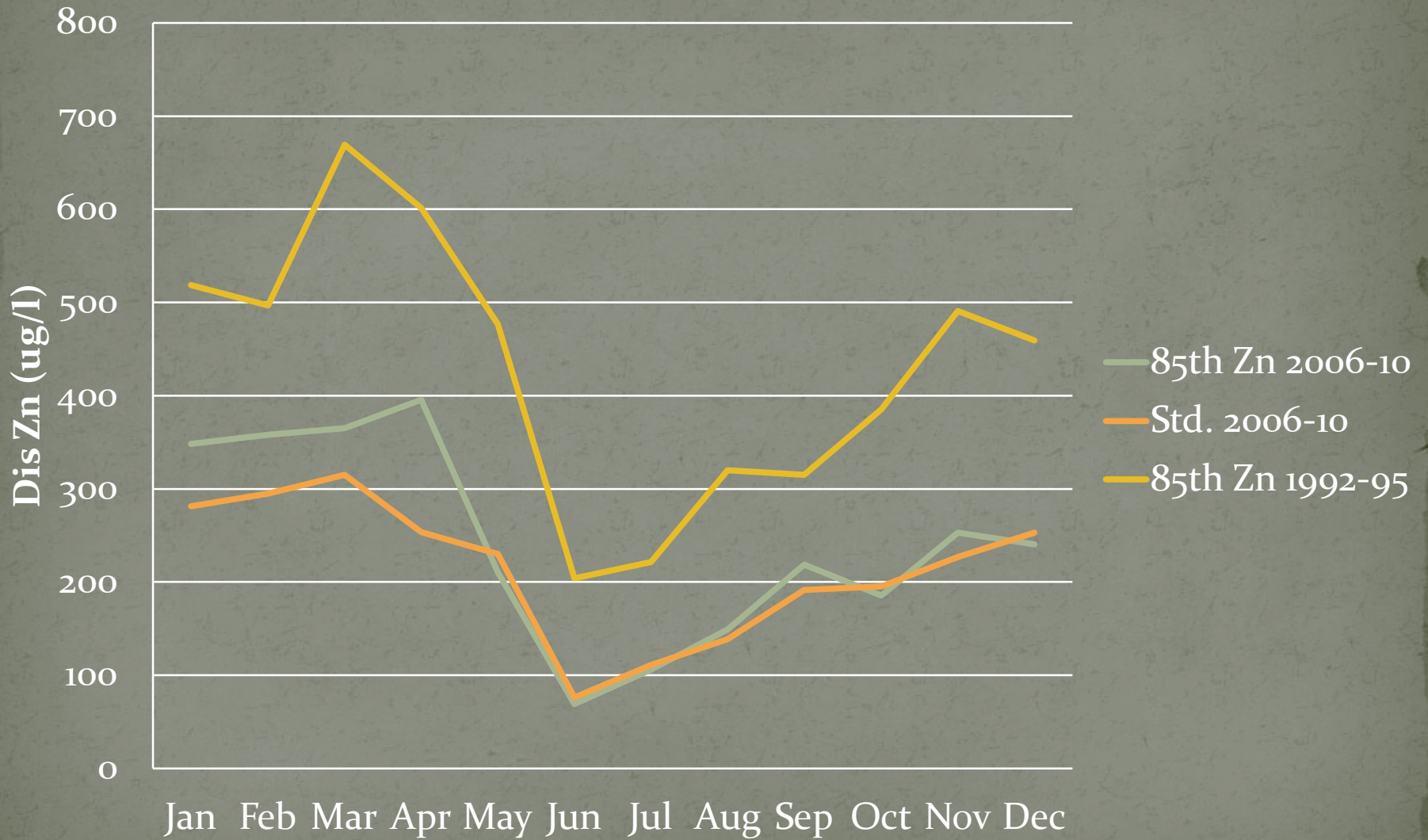
Mineral Creek – Improvements in Water Quality

Animas above Cement Creek – Mixed Results

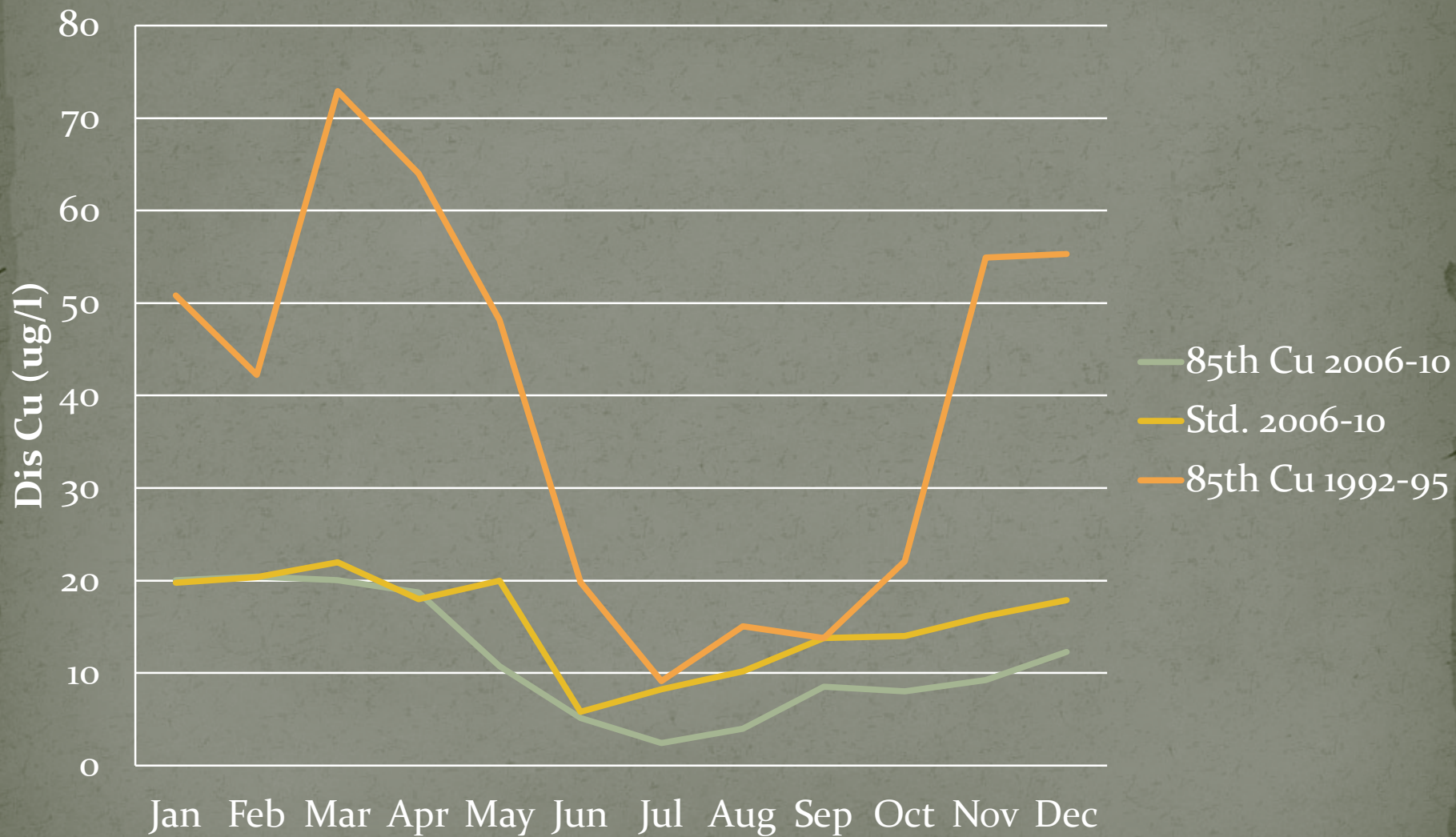
Cement Creek – Water Quality Substantially Worse

Animas below Silverton – Water Quality Worse
(Baker's Bridge Data)

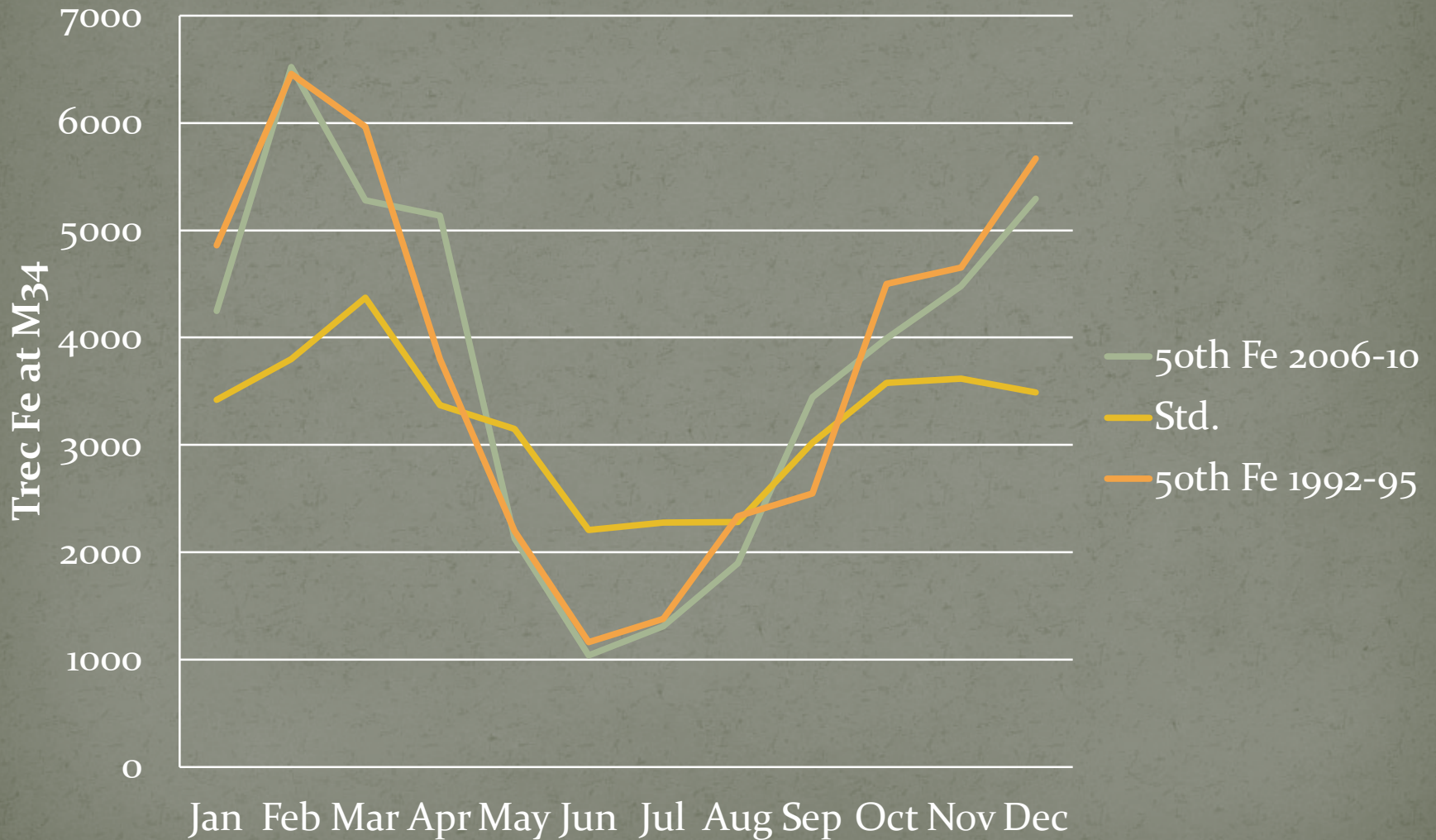
Dis Zn at M34



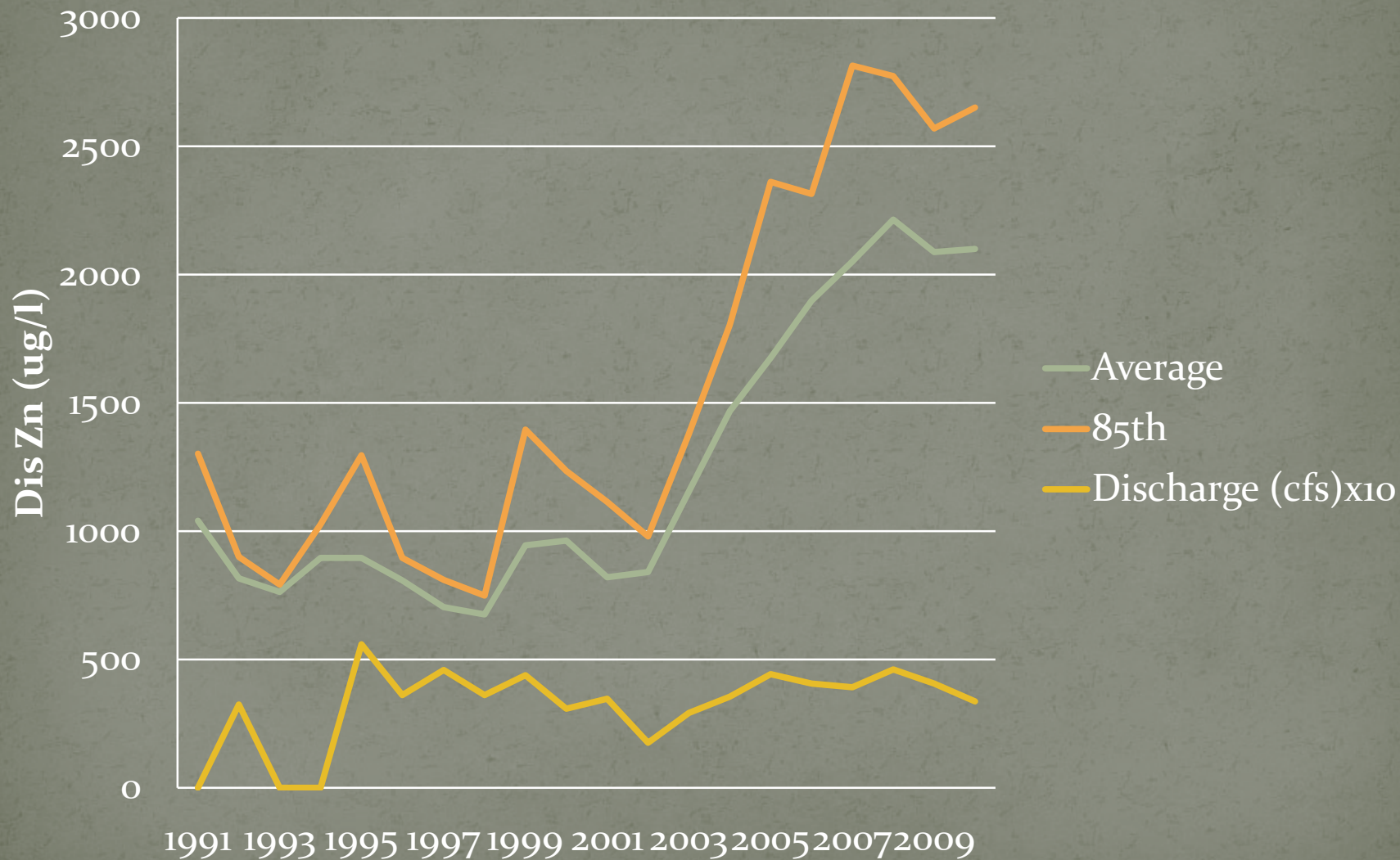
Dis Cu at M34



Trec Fe at M34



Annual Dis Zn Conc and Flow at CC48



Sunnyside Consent Decree

1995

Place Bulkheads in the Mine and Eventually Stop Treatment

Monitor Zinc Concentrations below Silverton

Treat Remaining Drainage from American Tunnel

Treat N. Fork of Cement Creek

Remediate Other Sites in the Basin

Outcome of Consent Decree

- Water Table in the Sunnyside Mine was Raised ~ 1,000 Vertical Ft
- Millions of Dollars Were Spent on Remediation
- Consent Decree Ends in Jan. 2003, Treatment Plant Turned over to a Small Mining Co.
- Treatment Continued for Approx. One Year and Then Stopped
- Discharge Increases from Mogul, Gold King #7, and Red & Bonita before or around the End of the Consent Decree

Discharges Around Gladstone

Sunnyside Gold Treated 1200 – 1600 gpm from American Tunnel

Current Untreated Discharges:

American Tunnel: 80-140 gpm

Mogul: 50-115 gpm

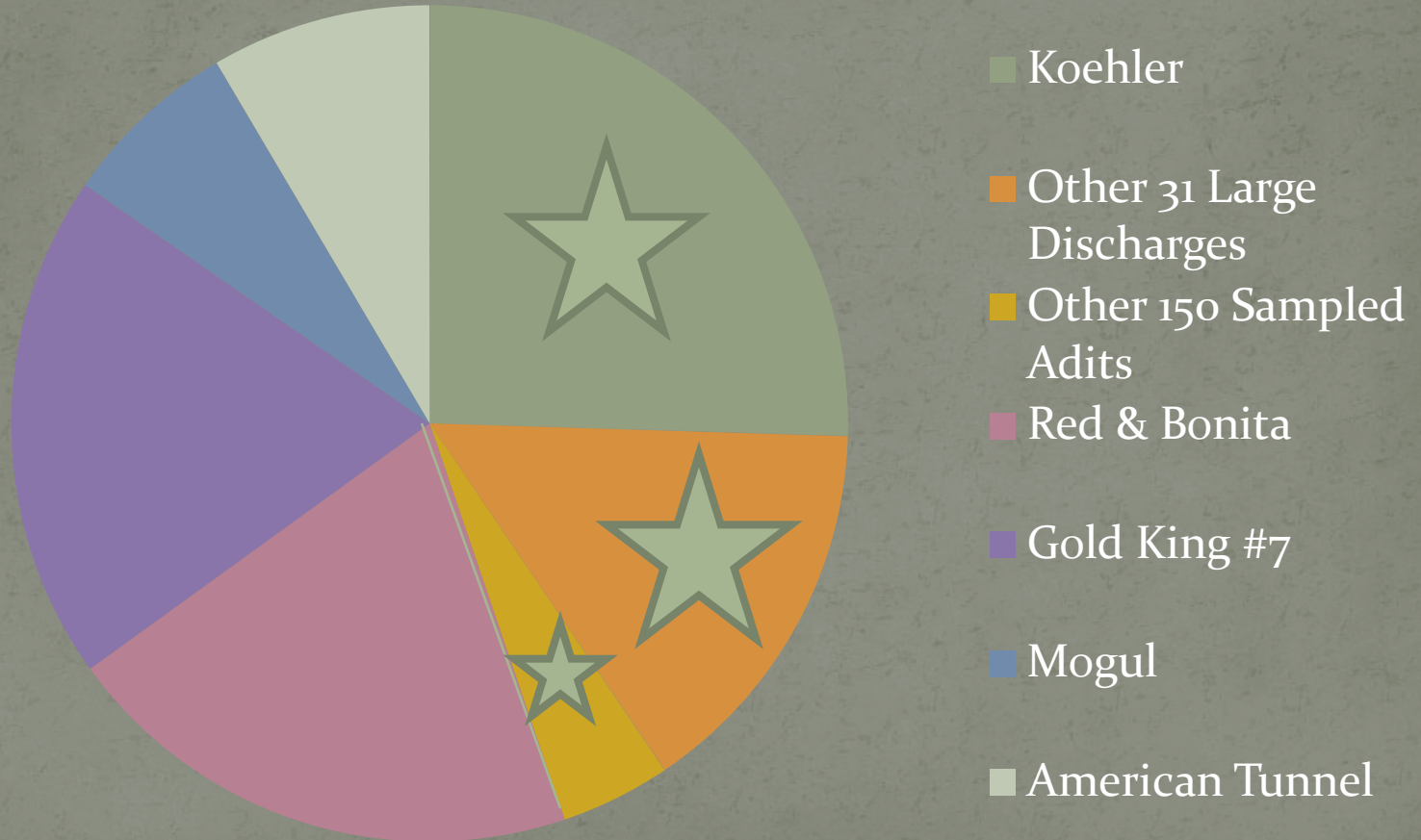
Gold King #7: 160-250 gpm

Red & Bonita: 220-340 gpm

+ Some other new small drainages

Total: New Untreated Drainage: 510 – 845+ gpm

Dissolved Zinc Discharge from Adits (Low Flow)



Suggested Solutions

Remove Some Bulkheads in American Tunnel to Draw Down Water Table & Treat Drainage

Pipe Discharges from the Four Big Discharges to a Treatment Plant

Treat Part of Cement Creek near the Mouth near Silverton

Bulkhead the Four Big Drainages

Some Combination of the Above

Suggestions to Make Solutions Happen

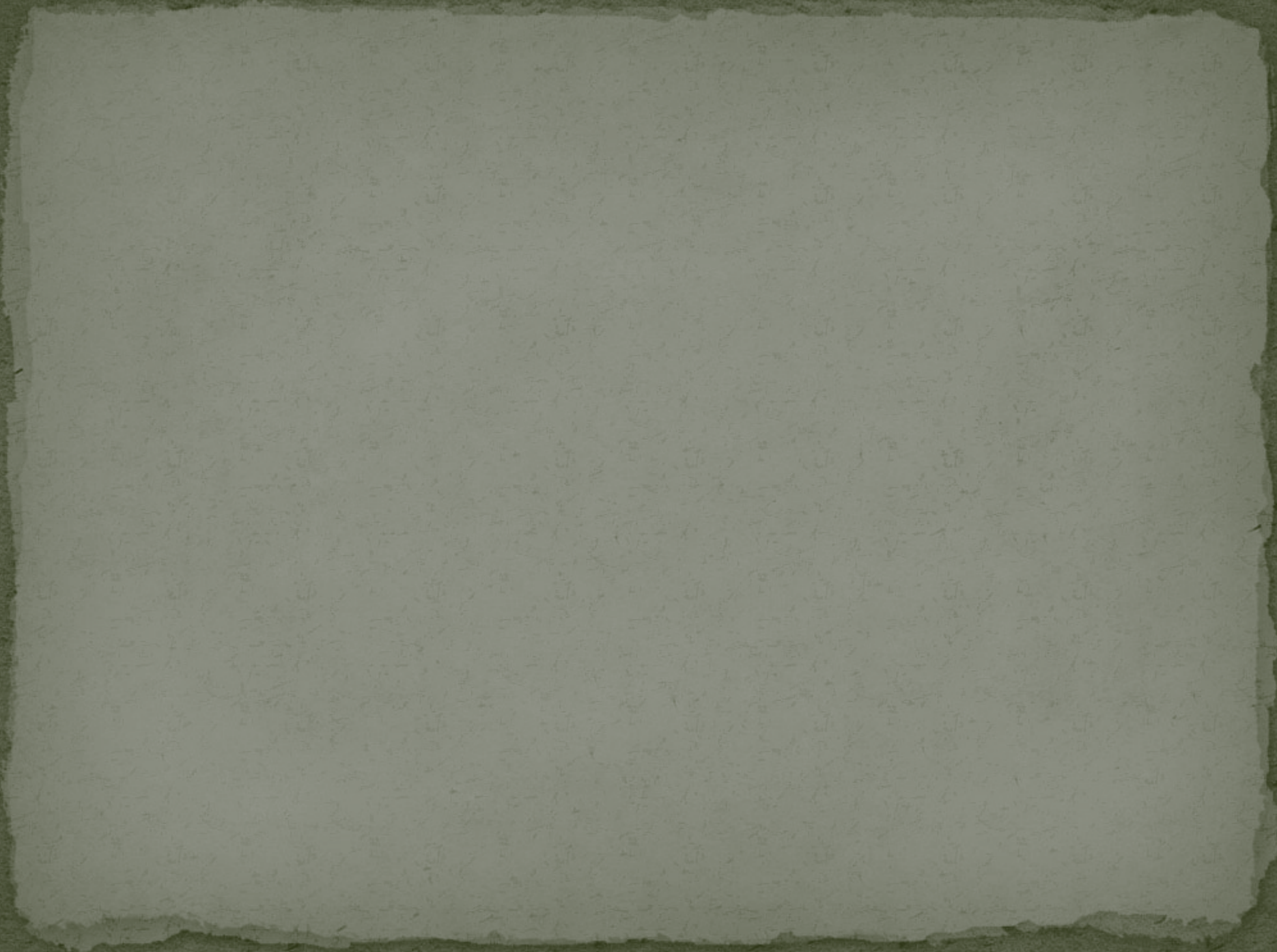
Sue Sunnyside Gold's Parent Company

Bring in a Major Mining Company to Mine
and Take Over All Treatment

Incremental Approach: Start Treatment with a Technology
Demonstration Facility (possibly thru BLM?)

Designate Gladstone Area as a Targeted Superfund Site

Some Type of Collaborative Combination of the Above



Koehler Tunnel

Before



After





Before Remediation

Longfellow Mine

After



NPS 319 Infiltration Control Project Carbon Lakes Ditch (2003)



Mine Workings Below Ditch

San Antonio Mine Dump



Carbon Lakes Trans-basin ditch

Before



After



San Antonio Mine



Before

After remediation



Before



Pride of West Stope Infiltration Control Project

Stream

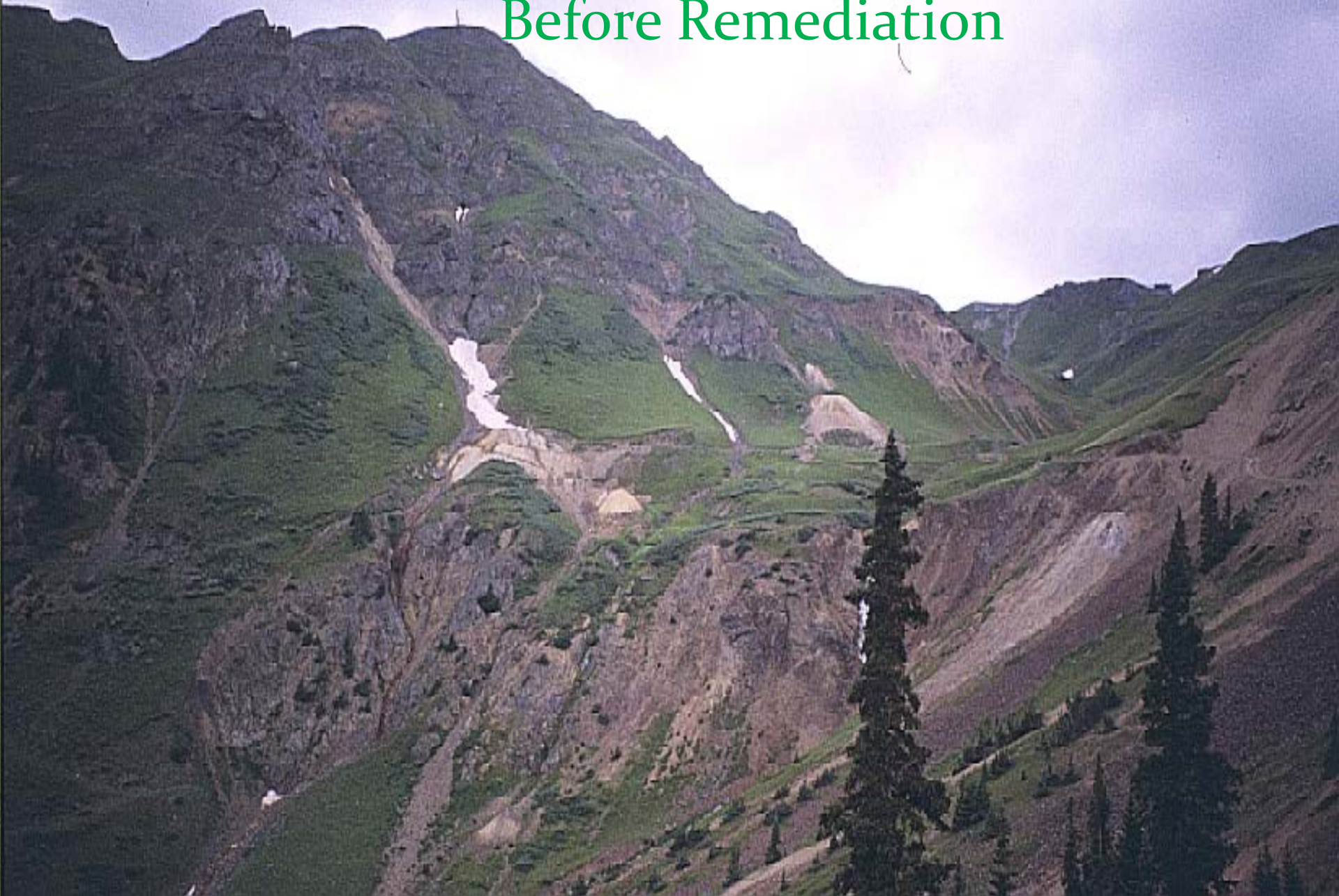
Avalanche Path

Constructing



Finished

Kansas City Group Before Remediation



Fullmer Construction:
Terry Rodes operating
on very steep slope!



Kansas City Group
Following Remediation



Vegetative Cover Moving in Kansas City Group, 2010



Elk Tunnel (BLM)

Oxic Limestone
Drain & Settling
Ponds



Lucky Jack Mine Wastes



Aerial View

Before Remediation



Lucky Jack Mine Wastes



6 months later

After Remediation

12 months later

