

**SAGUACHE COUNTY BOARD OF COMMISSIONERS**  
**REGULAR SESSION MEETING**  
**9:00 A.M. FEBRUARY 3, 2015**

**MINUTES**

**I. CALL TO ORDER**

The meeting was called to order by Board Chair Ken Anderson at 9:03 a.m., with the following members present:

Ken Anderson, Chair  
Jason Anderson, Vice Chair  
Timothy Lovato, Commissioner  
Wendi Maez, Co-Administrator  
Lyn Lambert, Co-Administrator  
Ben Gibbons, County Attorney

**II. ADDITIONS/DELETIONS TO AGENDA**

1. Add Public Health Director Marcy Gardunio under Attorney Gibbons time.
2. Remove Ed Tauer, Stainable Water Resources at 2:45pm.
3. Move Bear Claw Computers presentation to 2:45pm.

**MOTION BY COMMISSIONER JASON ANDERSON TO APPROVE THE AGENDA AS AMENDED**

**SECOND BY COMMISSIONER KEN ANDERSON**

**VOTES IN FAVOR: 3**

**VOTES AGAINST: 0**

**MOTION CARRIED**

**III. READING AND APPROVAL OF MINUTES – JANUARY 27, 2015**  
**READING AND APPROVAL OF MINUTES – FEBRUARY 3, 2015**

1. Minutes will be reviewed for approval at the February 17, 2015 meeting.

**IV. REVIEW OF MAIL AND OTHER CORRESPONDENCE**

1. **Saguache County Museum** sent a letter of welcome to new commissioner, suggest idea of being placed on tax rolls, and financial data. (1/28/15)
2. **Kevin Larimore** sent a letter notifying of prospecting with documents attached. Prospecting will begin on or after March 1, 2015. (2/2/15)
3. **Town of Crestone**, Crestone Creative Council sent a thank you for your support.

**V. COMMISSIONERS REPORT**

**Commissioner Ken Anderson:**

1. January 28 – Board of Directors Bill in Denver. Registration on seasonal vehicles may change. Exempt water wells, small gardening wells. Beginning farm and rancher tax credit, seller might get a tax credit. Several water bills that need to be kept tact of. Auditor for board, very expensive for forensic audit, usually used for fraud issues, but could do audit for County.
2. February 2 – Attended the UAS meeting in Alamosa. Eight companies, 13 different prototypes in process, none of which spy. Requested a new letter of support for new COAAs to be sent. BoCC agreed to send a second support letter for additional COAAs.

**Commissioner Jason Anderson:**

1. January 28 – Attended teacher conferences.
2. January 29 – Met with Nick Chambers, looking for a location to conduct biodegradable business. Met with Eric Frye who is a machinist and wants to set up a manufacturing business for himself and another machinist. Contacted by Ed Tauer about the Water Plan of Gary Boyce’s’. Also contacted by Trout Unlimited representative Todd Churchill, drafting a support letter and will present to BoCC at a future date. Worked with Eric Bergman at CCI on a Bill concerning a tax on retail marijuana and also a collectable within municipalities.
3. February 2 – Attended the UAS meeting in Alamosa. Industry wants an advisory board created.
4. Read all comments on Strategic Plan, very broad spectrum of comments.

**Commissioner Timothy Lovato**

1. January 29 – Drove to Buena Vista and met with Ed Tower, associated with SWR and discussed the proposed project of exporting 35,000 acre feet of water to the Front Range, via pipe lines. Topics of discussion were where the project would be located, impact to the area and recharge of the aquifer.
2. January 30 – Met with the Court House Security Team, Present were Chief Judge Patty Swift, Christina Gallegos, Brandi Taylor and Richard Sutton. We discussed single point entry, scanning machine, number of cards that are out and cameras blind spots and back fill security. The sheriff was not present at the meeting and Ms. Gallegos is trying to set a meeting with him.
3. February 2 – Met with the Prevention Coordinator Ileen Rivale, discussed the upcoming meeting on February 9, 2015.
4. February 2 – Received a phone call from Gene Hollenbeck. Returned his call this morning and left a message.

**BREAK**

**VI. CO-ADMINISTRATOR REPORT - WENDI MAEZ & LYN LAMBERT**

1. Department Head Payroll presented, reviewed, and signed in approval.
2. Conservation Trust allocation presentation of requests for 2015. BoCC will review requests in March 2015.
3. ScSeed request to change use of approved Sales Tax Grant funds to support VISTA position for 2015. BoCC approved and directed Administration to send a letter to ScSEED.

**MOTION BY COMMISSIONER JASON ANDERSON TO APPROVE THE REQUEST FOR GENERAL OPERATIONS OF SCSEED**

**SECOND BY COMMISSIONER LOVATO**

**VOTES IN FAVOR: 3**

**VOTES AGAINST: 0**

**MOTION CARRIED**

4. Presented newspaper article for Underfunded Courthouse Facility Grants.
5. Lambert received an email from Christy Culp with DOLA, regarding attendance on a quarterly basis for Work Sessions as requested by Jason Anderson. Culp will be at February 10<sup>th</sup> Work Session.
6. Road and Bridge budget Resolution to change amounts to different line items per request of Randy Arredondo.

**MOTION BY COMMISSIONER JASON ANDERSON TO APPROVE THE RESOLUTION OF SUPPLEMENTARY BUDGET A RESOLUTION APPROPRIATING ADDITIONAL SUMS OF MONEY TO DEFRAY EXPENSES OF AMOUNTS BUDGETED FOR THE SAGUACHE COUNTY GOVERNMENT, SAGUACHE COUNTY FOR ROAD AND BRIDGE FUND  
SECOND BY COMMISSIONER LOVATO**

**VOTES IN FAVOR: 3**

**VOTES AGAINST: 0**

**MOTION CARRIED**

**MOTION BY COMMISSIONER LOVATO TO APPOINT COMMISSIONER KEN ANDERSON AND WENDI MAEZ TO THE GUNNISON SAGE GROUSE STRATEGIC COMMITTEE  
SECOND BY COMMISSIONER JASON ANDERSON**

**VOTES IN FAVOR: 3**

**VOTES AGAINST: 0**

**MOTION CARRIED**

**MOTION BY COMMISSIONER JASON ANDERSON TO APPOINT COMMISSIONER LOVATO AS SAGUACHE COUNTY MUSUEM LIASON  
SECOND BY COMMISSIONER KEN ANDERSON**

**VOTES IN FAVOR: 3**

**VOTES AGAINST: 0**

**MOTION CARRIED**

7. General discussion concerning the possibility of changing payroll checking account from Community Banks of Colorado to First Southwest Bank. Administration will gather additional information and present at the next meeting.
8. An update of the Saguache County Tourism Council meeting was given by Maez and Lambert. Board Officers were re-organized. Board is working well together.

**VII. COUNTY ATTORNEY – BEN GIBBONS**

1. Discussion with Randy Arredondo on when to have the County Road 10XX discussion with the Milams' and Mr. Hollenbeck. Placed on the agenda for March 3<sup>rd</sup> at 3pm.

**VIII. LAND USE ADMINISTRATOR – WENDI MAEZ**

1. Requested an Executive Session for legal advice.

**MOTION BY COMMISSIONER JASON ANDERSON TO ENTER INTO EXECUTIVE SESSION FOR LEGAL ADVICE UNDER C.R.S. 24-6-402 (4) (b) AT 11:40AM  
SECOND BY COMMISSIONER LOVATO**

**VOTES IN FAVOR: 3**

**VOTES AGAINST: 0**

**MOTION CARRIED**

**MOTION BY COMMISSIONER JASON ANDERSON TO RETURN TO REGULAR SESSION AT 11:50 AM**

**SECOND BY COMMISSIONER LOVATO**

**VOTES IN FAVOR: 3**

**VOTES AGAINST: 0**

**MOTION CARRIED**

Road and Bridge Supervisor requested an Executive Session for personnel issues.

**MOTION BY COMMISSIONER JASON ANDERSON TO ENTER INTO EXECUTIVE SESSION FOR PERSONNEL ISSUES UNDER C.R.S 24-6-402 (4) (f) (I) AT 11:51 AM**

**SECOND BY COMMISSIONER LOVATO**

**VOTES IN FAVOR: 3**

**VOTES AGAINST: 0**

**MOTION CARRIED**

**MOTION BY COMMISSIONER JASON ANDERSON TO RETURN TO REGULAR SESSION AT 12:00 PM**

**SECOND BY COMMISSIONER LOVATO**

**VOTES IN FAVOR: 3**

**VOTES AGAINST: 0**

**MOTION CARRIED**

**LUNCH**

**IX. ROAD & BRIDGE SUPERVISOR – RANDY ARREDONDO**

1. Joseph Harrington from Alexco made a presentation for the use/purchase of Saguache County Landfill and mining waste clean- up. Alexco Environmental Group offers environmental services and mine, waste, water remediation technology solutions. Expertise providing environmental solutions and site management that minimizes or eliminates long term liabilities and unlocks unrealized property value. Technologies in waste management and water treatment associated with mining and industrial sites. Patented remediation technologies; 50+ scientists and engineers; Northern expertise in mine permitting and environmental consulting. Waste repository/processing center concept in Saguache County, selectively permit and then transport from various locations to a lined area near existing County Landfill. Segregate based on chemical characteristics and market conditions. Operations and closure with best available technology and under State oversight. Opportunity for 2 tons per square foot storage capacity under existing height limitations (County) ~3 million tons per 40 acres. Why Saguache County? Ideal climate for Colorado mine materials (less than 10 inches per year). Central location for Colorado mineral belt. Sources of agricultural byproducts (potato, canola) located in San Luis Valley for backhaul to treat wastes that can or must be left in place. Presentation documents attached.
2. Snow Removal Policy was presented at the January 27<sup>th</sup> meeting for review of proposed changes; existing 4in. for asphalt and 2in. for dirt for snow removal to 3in. for asphalt and 1in. for dirt.

**MOTION BY COMMISSIONER JASON ANDERSON TO ADOPT THE NEW SNOW REMOVAL POLICY DATED JANUARY 27<sup>TH</sup> 2015**  
**SECOND BY COMMISSIONER LOVATO**  
**VOTES IN FAVOR: 3** **VOTES AGAINST: 0**  
**MOTION CARRIED**

- 3. Arredondo presented a Lease/Purchase Agreement between Saguache County and CAT to lease a 120 CAT Motor-grader.

**MOTION BY COMMISSIONER JASON ANDERSON TO APPROVE THE LEASE/PURCHASE AGREEMENT BETWEEN SAGUACHE COUNTY AND CAT**  
**SECOND BY COMMISSIONER LOVATO**  
**VOTES IN FAVOR: 3** **VOTES AGAINST: 0**  
**MOTION CARRIED**

**MOTION BY COMMISSIONER JASON ANDERSON TO CONVENE AS THE SAGUACHE COUNTY BOARD OF HEALTH AT 1:30 PM**  
**SECOND BY COMMISSIONER KEN ANDERSON**  
**VOTES IN FAVOR: 3** **VOTES AGAINST: 0**  
**MOTION CARRIED**

**X. PUBLIC HEALTH DIRECTOR – MARCY GARDUNIO**

- 1. Core Services updates:
  - a. Assessment, Planning, and Communication:
    - 1. Marcy, Alyssa, and Gloria attended a flu pandemic tabletop exercise with the region in Alamosa last Thursday. Determined that we need to update our plans for communications and pandemics. Assessed a need to get the entire county to pull together to plan or at least familiarize with the plan. In Western Slope region last week and talked with the Emergency Preparedness staff and they are willing to share their approved plans with Saguache County. Director attended a training/exercise for Public Information Officer in Delta with a type 1 team instructor. Will be attending a state training on TB in Denver soon. Asked the state to fund accommodations and training, agreed so no cost to County. Hep C testing training in March. Head Start health fair in Center. Will be applying for extra funds from the state for our TB work. Will get \$5,000.00 more above the billing amount. Support for LARC bill.
  - b. Vital Records and Statistics: Nothing significant to report.
  - c. Communicable Disease Prevention, Investigation, and Control:
    - 1. Death from Hanta virus in Chafee County in December.
    - 2. 102 cases of measles in the United States; 1 case in Colorado.
    - 3. Work will be dedicated to TB case for next nine months.
  - d. Prevention and Population Health Promotion:
    - 1. Plan to get word out for MMR vaccinations.
  - e. Administration and Governance:
    - 1. Billing will start for TB work.
  - f. PCP Program:
    - Medicaid Patients – 48
    - Private Pay – 0
    - PCPs - 26

**MOTION BY COMMISSIONER KEN ANDERSON TO ADJOURN AS SAGUACHE COUNTY BOARD OF HEALTH AT 2:00P.M.  
SECOND BY COMMISSIONER JASON ANDERSON  
VOTES IN FAVOR: 3 VOTES AGAINST: 0  
MOTION CARRIED**

**XI. PUBLIC LANDS**

**Jim Pitts – USFS**

1. USFS would like a letter of support for the Kerber Creek Minie Lynch Mine mitigation project. This project will mitigate the removal of the minerals and acids, about 9 piles, of active water full of heavy metals. The Lime Stone will be used to neutralize before it gets to private lands, limestone based.

**Karen Hilstrom & Ron Garcia – USFWS**

2. Presentation of Baca National Wildlife Refuge proposed land (road) exchange with Saguache County, east boundary road. Arredondo will meet with Ron Garcia and the new Director of the Baca Grande Water and Sanitation District to travel the road and review the exchange property.

**XII. EMERGENCY MANAGER REPORT – JIM FELMLEE**

1. Dr. Thompson, the Ambulance Director for the 3 ambulance districts within Saguache County gave a presentation on trainings for the ambulance districts for upgraded services.

December 2014

1. 12/2 - Participated in the State DTR MAC Drill
2. 12/3 - Participated in the SLV DTR Drill
3. 12/9 - Met with Commissioners
4. 12/11 - Met with Jeff Babcock of homeland security
5. 12/16 - Met with regional filed officer regarding EMPG Grants
6. 12/17 - Met with John Drake of Farm Service Center regarding a short tabletop presentation for the January LEPC (Local Emergency Planning committee) meeting.
7. 12/18 - Attended The San Luis Valley West Health Care Coalition meeting
8. 12/22 - Met with RETAC Coordinator

January 2015

1. 01/03 - Participated in the TB (Tuberculosis case)conference call
2. 01/05 - Participated in the TB (Tuberculosis case)conference call
3. 01/06 - Participated in the State DTR MAC Drill
4. 01/07 - Participated in the SLV DTR Drill
5. 01/08 - Participated in the TB (Tuberculosis case)conference call
6. 01/08 - Attended SEMTAC quarterly meeting
7. 01/13 - Attended Citizens CORP meeting
8. 01/14 - Attended Sanford schools active shooter planning meeting
9. 01/15 - Met with Mountain Valley Schools' superintendent for a training on the DTR radios, also discussed having an exercise in the fall.
10. 01/15 - Participated in the TB (Tuberculosis case)conference call
11. 01/26 - Attended The regional THIRA (Threat Hazard Identification Risk Assessment) meeting
12. 01/26 - Chaired LEPC Meeting

13. 01/26 - Chaired SLV All Hazards meeting
14. 01/29 - Participated in the regional Health Care Coalition Pandemic tabletop exercise
15. 01/30 - Participated in Sanford Schools Active Shooter tabletop Exercise as an evaluator

GRANTS

EMPG - \$6,000.0

EMS Provider Grant in process

**XIII. BILL PAYING**

**XIV. ADJOURN**

**MOTION BY COMMISSIONER KEN ANDERSON TO ADJOURN AT 4:00 P. M.**

**SECOND BY COMMISSIONER JASON ANDERSON**

**VOTES IN FAVOR: 3**

**VOTES AGAINST: 0**

**MOTION CARRIED**

**BoCC moved to a Work Session at the Saguache Town Hall for a general discussion with the Town of Saguache Board members.**

**RESPECTFULLY SUBMITTED,**

**STACI BURKHART ACTING SECRETARY TO THE BOARD OF COUNTY COMMISSIONERS**

**MINUTES APPROVED FEBRUARY 17, 2015**

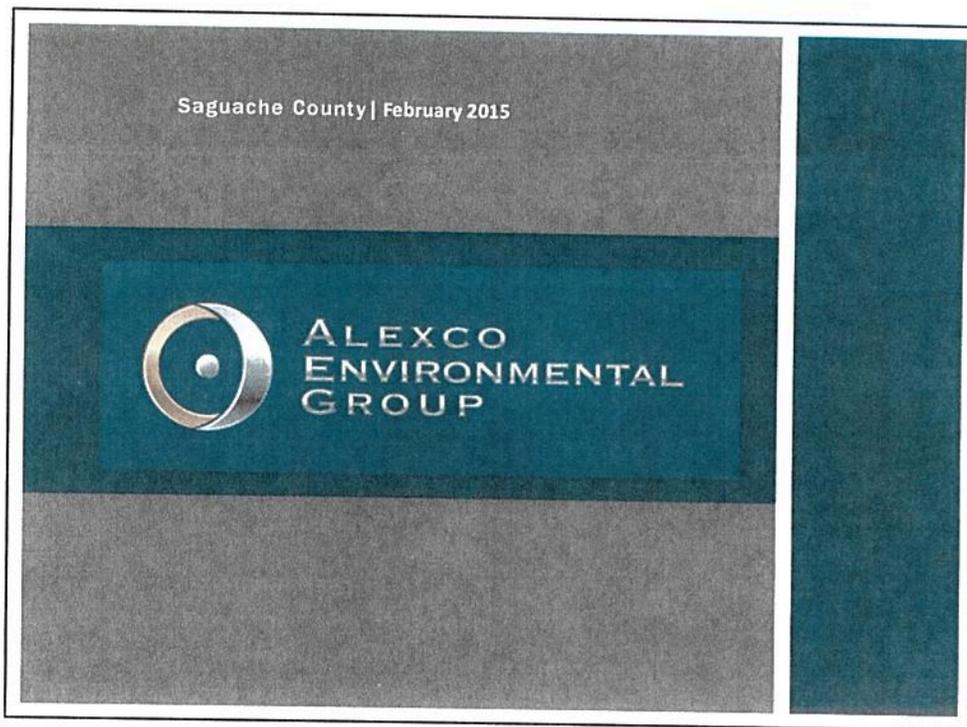


*Ron Anderson*  
\_\_\_\_\_  
CHAIRMAN OF THE BOARD

*Carla Gomez*  
\_\_\_\_\_  
ATTEST  
CLERK & RECORDER  
CARLA GOMEZ

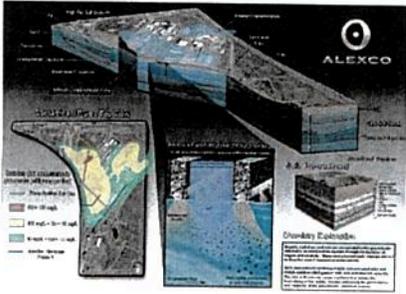
*Jim Lewis*  
\_\_\_\_\_  
COMMISSIONER

*Jason Anderson*  
\_\_\_\_\_  
COMMISSIONER




Who We Are

- Environmental services and mine/waste/water remediation technology solutions provider
- Demonstrated expertise providing environmental solutions and site management that minimizes or eliminates long term liabilities and unlocks unrealized property value
- Technologies in waste management and water treatment associated with mining and industrial sites
- Patented remediation technologies;
- 50+ scientists and engineers;
- Northern expertise in mine permitting and environmental consulting;
- Offices in Vancouver, Whitehorse, Denver and Toronto

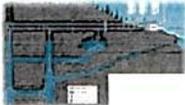


**ALEXCO ENVIRONMENTAL GROUP** **AEG Core Business Areas**

**Contaminated Mine/Brownfield Sites Remediation**



**Patented and Innovative Technologies – Mine/Water/Waste Management**

**Mine Permitting, Environmental Assessment and Consulting Services – Northern Expertise**

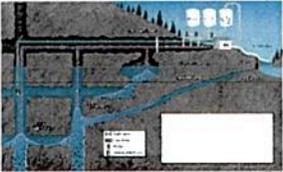


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**ALEXCO ENVIRONMENTAL GROUP** **Innovative and Proven Technology Applications**

Mine/Waste/Water Remediation Technology Solutions Provider

- Contaminated underground mine pools and open pit lakes
- Metals in groundwater
- Soil Remediation-heavy metals
- Conventional water treatment coupled with innovative technology – sludge management
- US Patents that cover Alexco Technology:
  - 5,632,715 Immobilization of heavy metals in waste stacks and affected zones
  - 5,710,361 Immobilization of heavy metals in groundwater
  - 6,196,765 Inhibiting acid mine drainage in underground mines
  - 6,350,380 Mine pool biochemical treatment
  - 6,435,769 Gas phase modification of mines and mine wastes
  - 7,011,756 Pit lake biochemical treatment





ALEXCO ENVIRONMENTAL GROUP

## Keno Hill Closure Planning and Implementation

- Keno Hill closure planning and future implementation remains a significant backlog and value driver for AEG – 15+ years and ~\$80M
- A “Win-Win” partnership between Alexco/Canada/Yukon/First Nations through a cooperative District Closure Plan
- 99.5% reduction of zinc release to the environment from the historical Galkeno 300 mine, reduced the concentration of zinc in Christal Creek by 75%
- Taxpayer liability reduced
- AEG technologies are a key component of final closure options selected for Keno Hill
  - Bioreactors
  - In-mine pool treatment
  - Conventional HDS water treatment



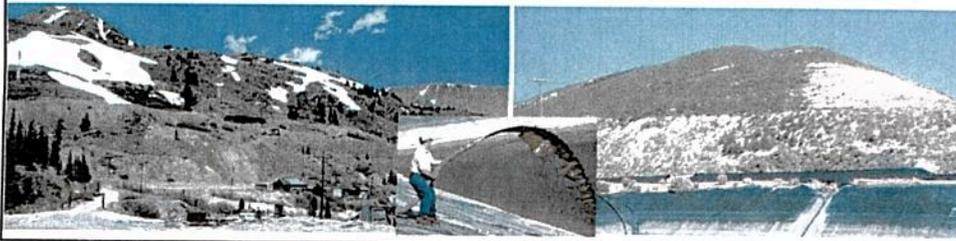
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ALEXCO ENVIRONMENTAL GROUP

## Waste Repository/Processing Center Concept in Saguache County

- Selectively permit and then transport from various locations to a lined area near existing County Landfill
- Segregate based on chemical characteristics and market conditions
- Operations and closure with best available technology and under State oversight (DRMS, DPHE)
- Opportunity for 2 tons per square foot storage capacity under existing height limitations (County)~3 million tons per 40 acres



 **ALEXCO ENVIRONMENTAL GROUP**

## Why Saguache County?

- Ideal climate for Colorado mine materials (less than 10 inches per year)
- Central location for Colorado mineral belt
- Sources of agricultural byproducts (potato, canola) located in San Luis Valley for backhaul to treat wastes that can or must be left in place

 **ALEXCO**

## WATER TREATMENT CASE STUDIES: BENEFITS OF IN SITU TREATMENT AND REGULATORY ADVANCES IN WATER TREATMENT WASTE RECYCLE

Joe Harrington, Alexco Environmental Group



## Electron Donors and Acceptors in Mine Wastes

### Acceptors:

- Oxygen
- Nitrate/ Nitrite
- Manganate
- Uranium VI
- Iron III
- Selenate, Arsenate
- Cadmium, Zinc
- Sulfate

### Donors:

- Organic Carbon
- Ammonia
- Sulfides

=> In general, mine residuals are electron donor-poor and electron acceptor-rich.



## Electron Donors, Electron Acceptors



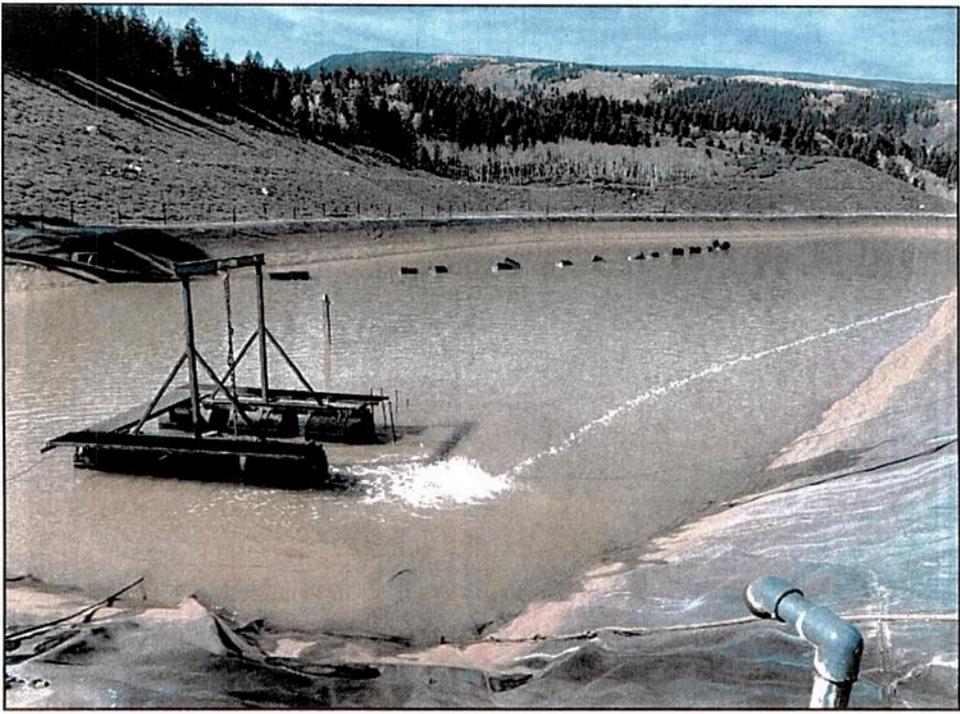
 Alexco Metals Treatment Technology:

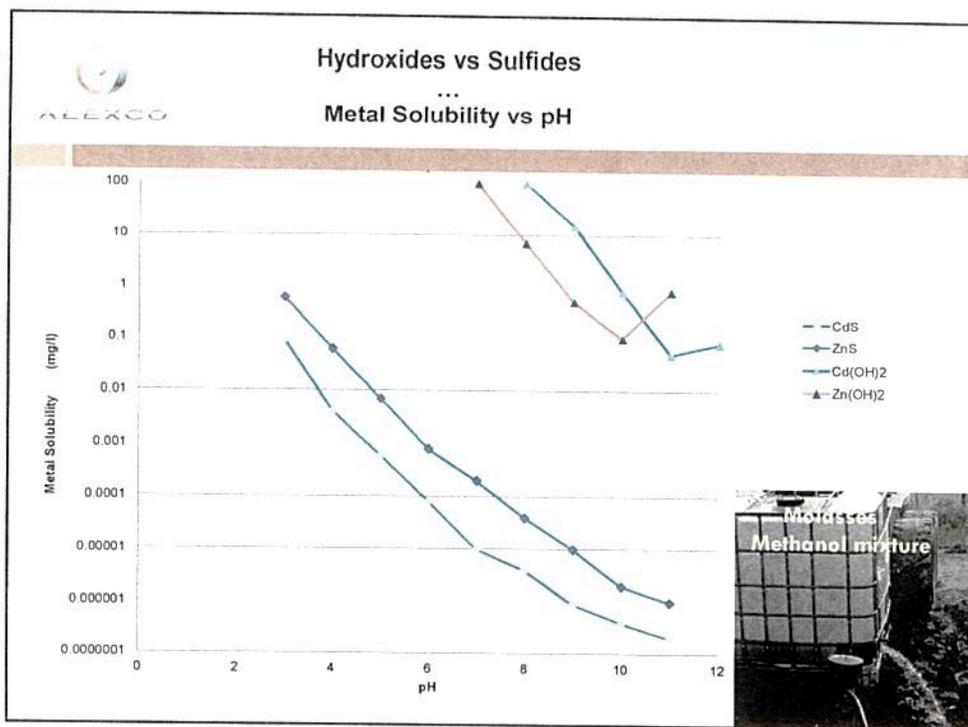
**Approach:**

- use microbes to transform metals to a chemically stable form as it is found in natural ore bodies, utilizing a reduced carbon source as microbial food
- additionally deposit minerals that will maintain these conditions in situ to stabilize the newly formed minerals over geological timescales
- Form or maintain conditions that provide for enhanced mineral stability or reduce/eliminate sources of leachable metals

**Why treat in place?**

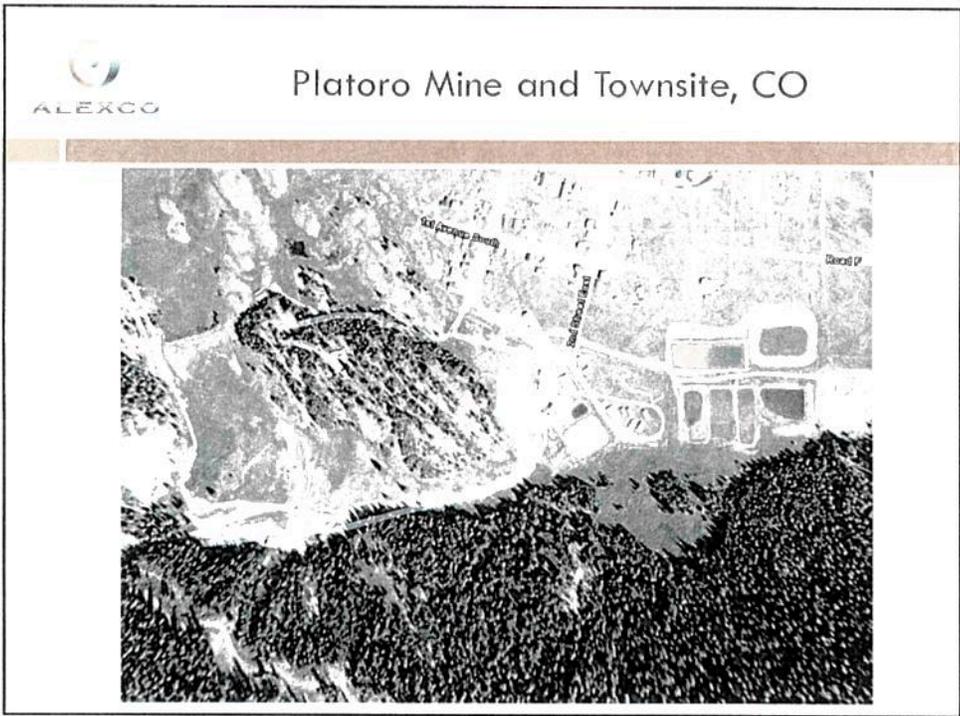
- The biggest reason is charge balance / charge separation
- Sulfate tends to be more mobile than the metals that were bonded with it (as sulfur) in the pre-mining mineralized orebody
- Mining and milling processes often result in a disconnection between the sulfur and the metals that occurred with it in the ore





## CASE STUDY

Platoro Mine, Platoro Colorado



**Platoro Mine Water Quality Issues**

- Acidic mine drainage pH 2.7, elevated sulfate, arsenic, iron, manganese, and zinc
- ~40 gpm annual average mine water collection
- Seasonal access
- ~10,000 feet elevation
- Treatment by lime treatment, iron coagulation, green sand filtration

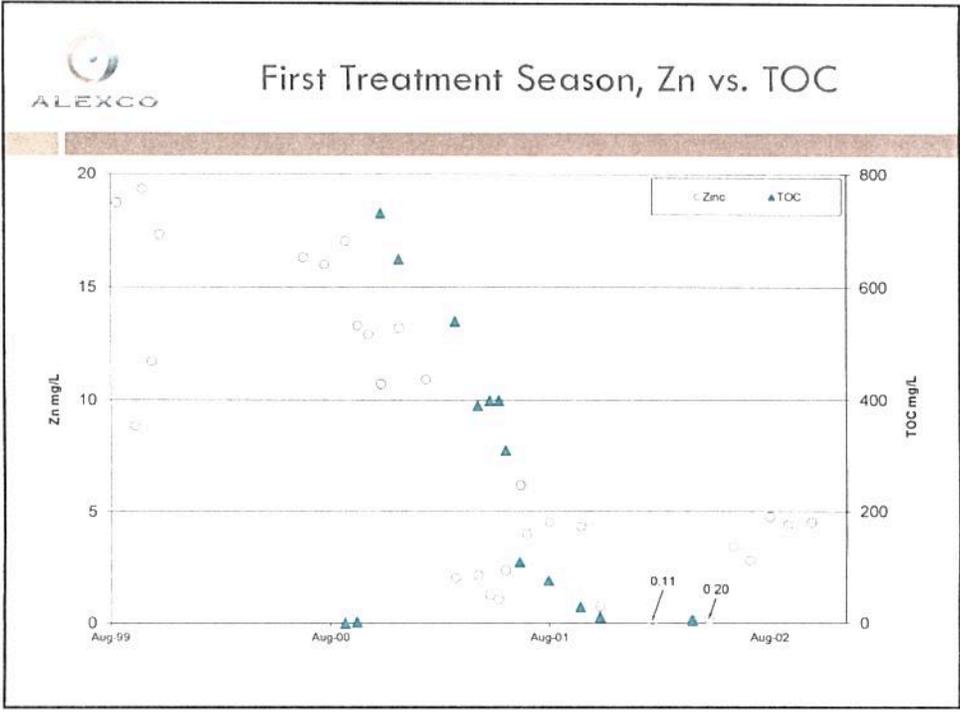
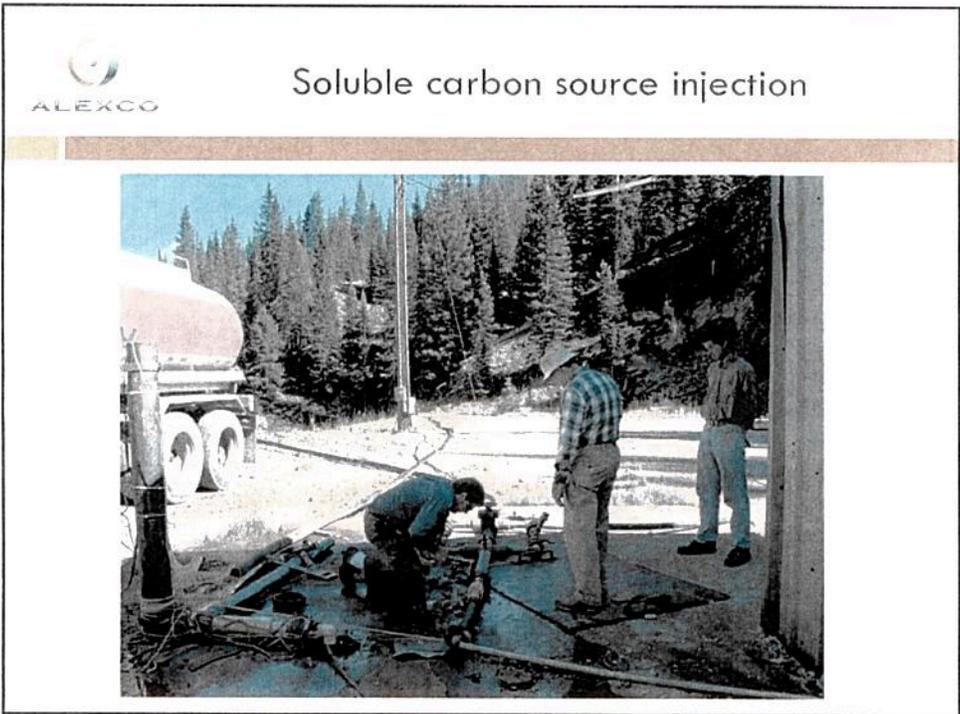
|  | As    | Mn    | Fe     | Zn    | Sulfate |
|--|-------|-------|--------|-------|---------|
| <b>Before Pretreatment (1999-2000)</b> | 39.53 | 40.44 | 539.33 | 14.60 | 2,499   |

 Platoro Mine Water Management Overview

- Mine workings developed in 1980s
- Mine pool serves as water collection system for upper mine workings and pump back collections systems from waste rock storage areas

 In Situ Treatment Objectives for Platoro

- Reduce metal load to water treatment facility
- Improve Fe:As ratio in mine water (reduced need for Fe addition to water treatment facility)
- Source control
  - Reduced pyrite leaching in anoxic conditions
  - Avoid ferric leaching by cutting off ferric regeneration

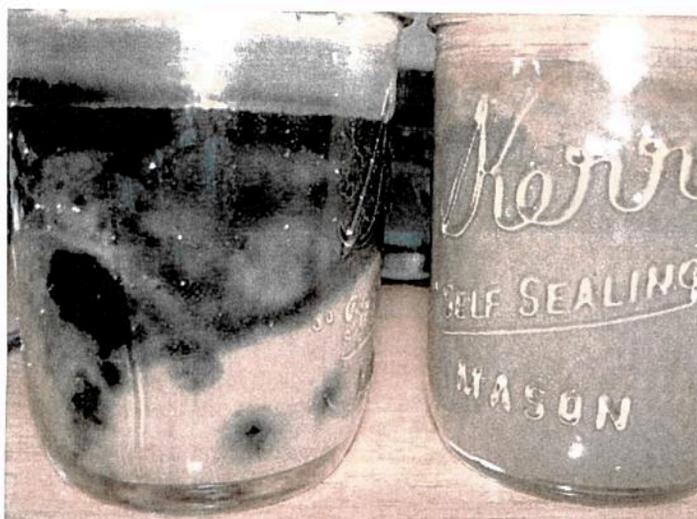




## Water Treatment Sludge Management



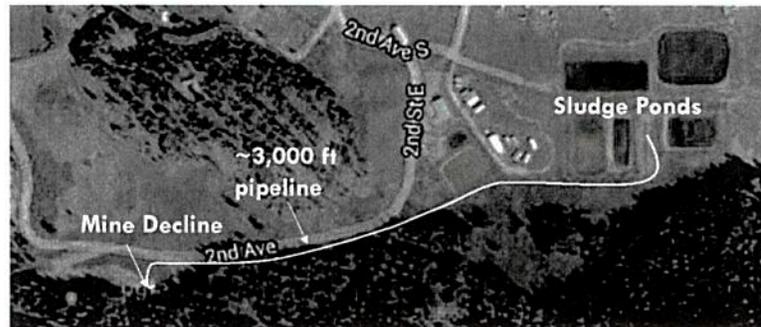
## Lime Sludge plus Potato Starch + Molasses



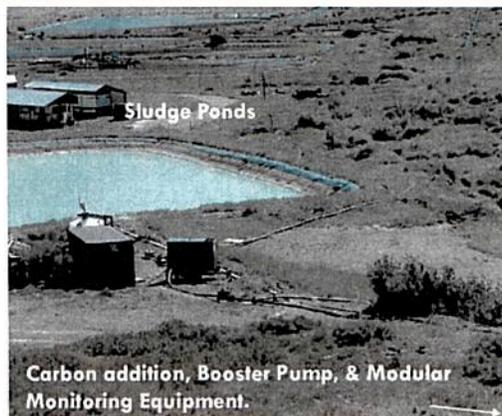


## Platoro Mine Layout: Sludge Transfer

- Sludge transfer 2009-2011
- System rated to 250 CY/day: 3,000 ft. pipeline, 400 feet head
- Four ponds emptied of 20 yrs of sludge



## Sludge Transfer and Injection



Three summer campaigns to transfer 20 yrs of water treatment sludge back into mine workings



## Fluidizing 25 year old sludge

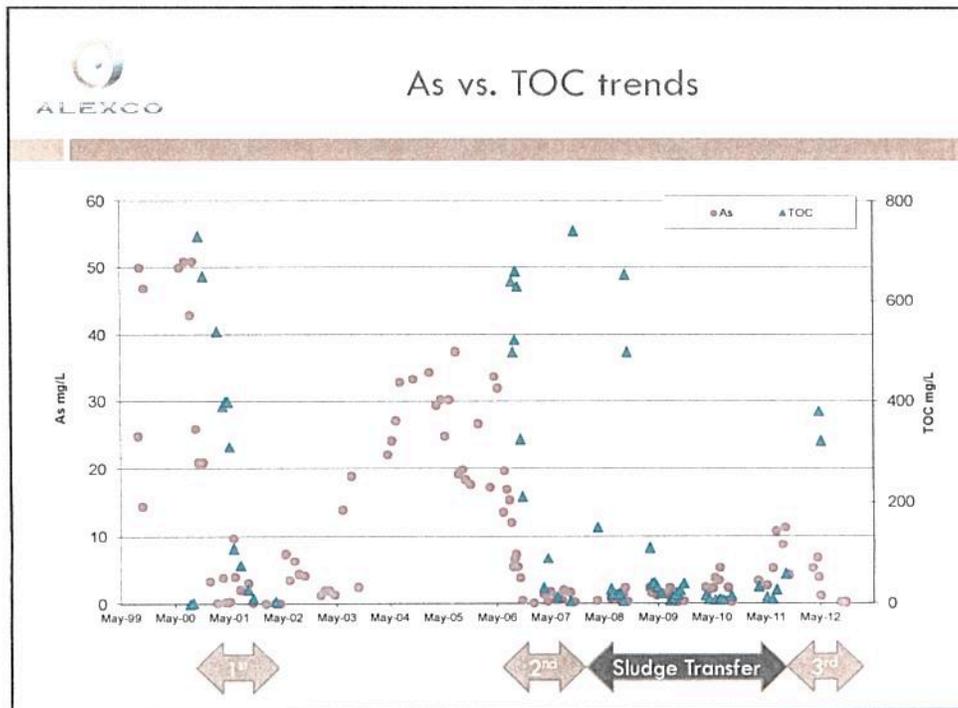


## Pumping Lime Sludge + Potato Starch




**14 year In Situ Treatment Evaluation**

|   | As    | Mn    | Fe     | Zn    | Sulfate |
|---|-------|-------|--------|-------|---------|
| <b>Before Pretreatment (2 years)</b>    | 39.53 | 40.44 | 539.33 | 14.60 | 2,499   |
| <b>First Treatment (2 years)</b>        | 1.97  | 37.59 | 638.50 | 2.86  | 2,385   |
| <b>Interim (4 years)</b>                | 16.74 | 28.85 | 457.20 | 6.42  | 2,126   |
| <b>Second Treatment (2 years)</b>       | 1.15  | 23.44 | 333.00 | 1.09  | 1,826   |
| <b>During Sludge Transfer (3 years)</b> | 2.68  | 29.14 | 197.31 | 1.27  | 1,471   |
| <b>After Sludge Transfer (1 year)</b>   | 0.20  | 20.80 | 52.15  | 0.09  | 496     |





## In Situ Treatment Objectives for Platoro

- Reduce metal load to water treatment facility
  - As 99+%, Fe 90+%, Zn 99+%, Mn 50%, Sulfate 80%
- Improve Fe:As ratio in mine water (reduced need for Fe addition to water treatment facility)
  - In acidic pH FeS remains more soluble than As sulfides
- Source control:
  - Positive results

|                            | As    | Mn    | Fe     | Zn    | Sulfate |
|----------------------------|-------|-------|--------|-------|---------|
| <b>Before Pretreatment</b> | 39.53 | 40.44 | 539.33 | 14.60 | 2,499   |
| <b>2012 data</b>           | 0.20  | 20.80 | 52.15  | 0.09  | 496     |



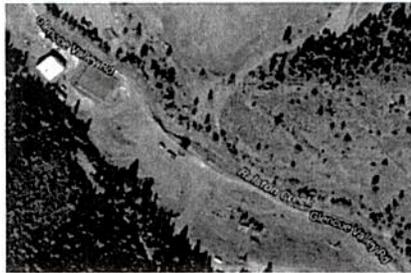
## CASE STUDY

Schwartzwalder Mine, Golden Colorado



## Schwartzwalder Mine, Golden, CO

- To enable control of groundwater seepage from Schwartzwalder Mine which was threatening Ralston Creek reservoir (Denver CO water supply) Alexco designed, permitted, built, and has operated a combined reverse osmosis and in situ brine disposal and mine water treatment facility (installed April-August 2013)



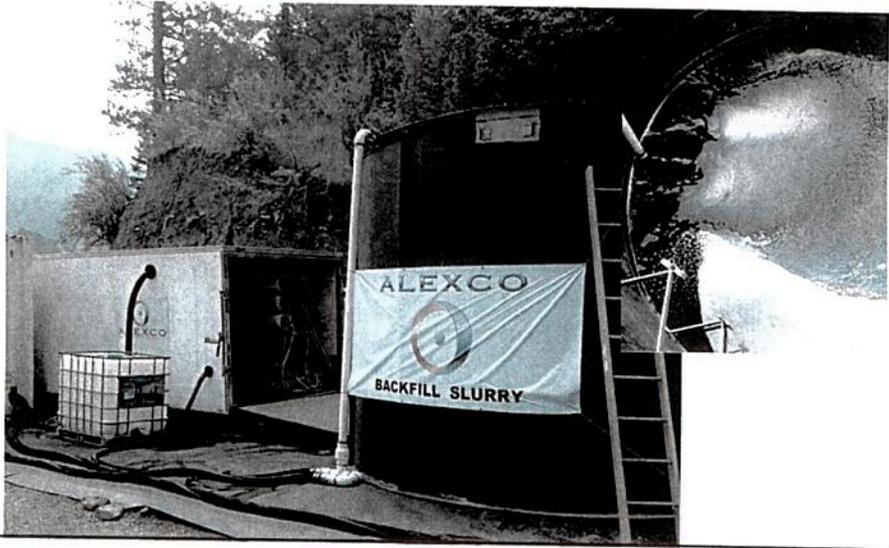
## Water Treatment System Features

### Key Features:

- 20hp Mine water pump installed over 300 feet deep in mine shaft
- Reverse Osmosis system (parallel or in series) rated to 160 gpm
- Brine amended with biochemical reagents and re-injected over 1,100 feet deep (UIC Permit)
- Discharge through licensed discharge location 30 ppb discharge standard
- In situ treatment goals to avoid long term dewatering requirements and allow passive outflow: >90% reduction of Se and U, >50% reduction of Mo



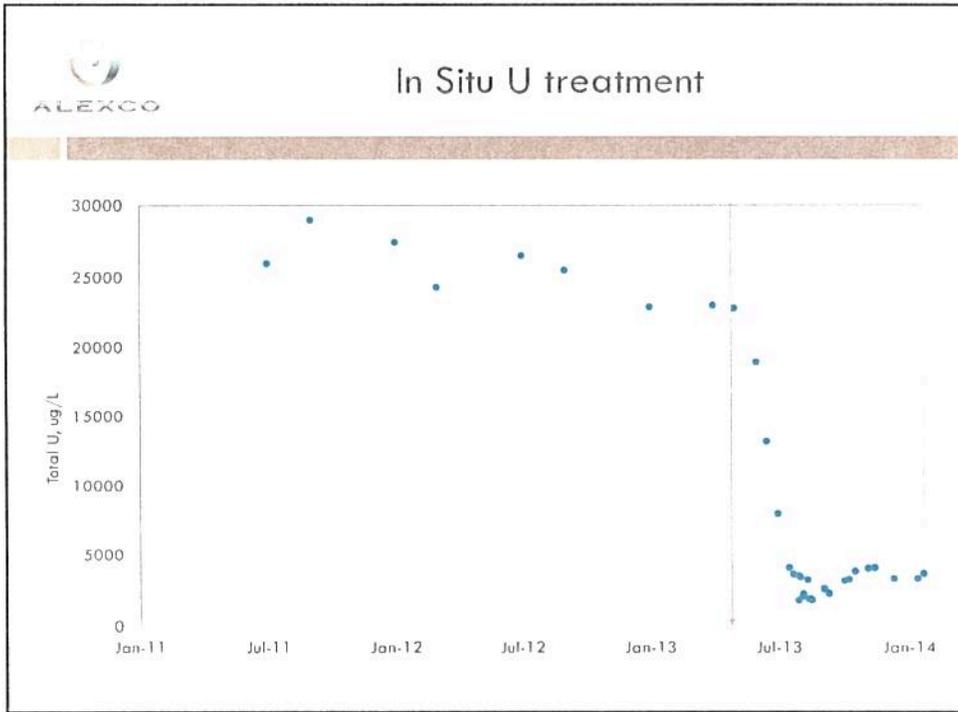
Average intake: 24,000 ppb  
Average discharge: less than 5 ppb



### Schwartzwalder Mine WWTP Injection System

- Combined mine dewatering and in situ treatment system achieved hydraulic control in mine workings in 3 months
- Mine pool metals reduction goals achieved in 6 months
  - U: 24,000 ug/L vs. 2,110 before flood, 3,650 after flood
  - Se: 190 ug/L vs. 7 ug/L to non-detect
  - Mo: 1400 ug/L vs. 224 ug/L

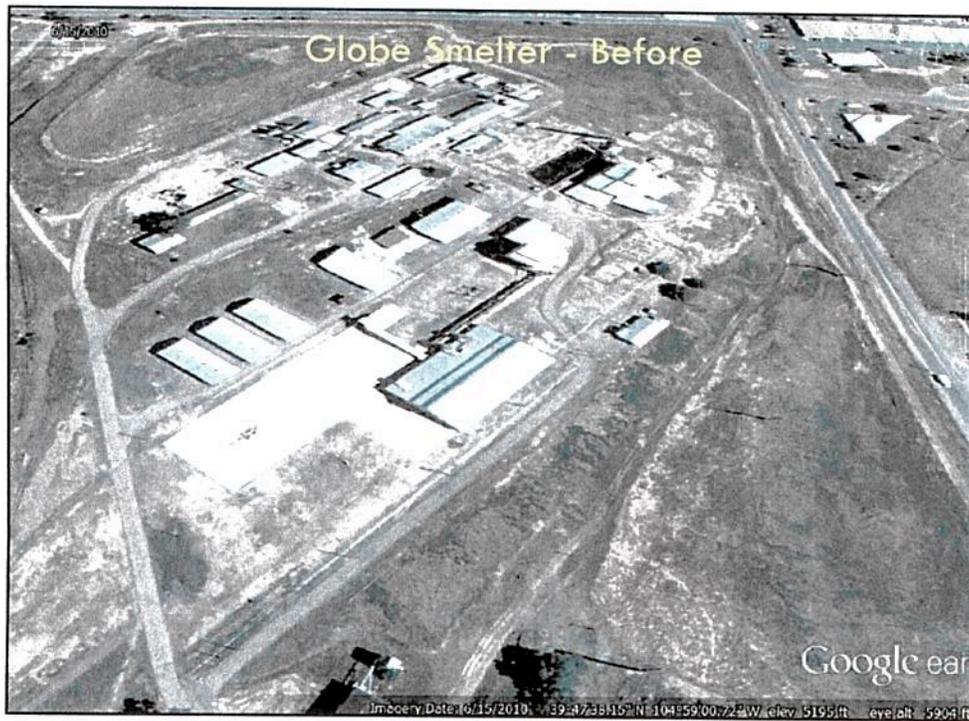
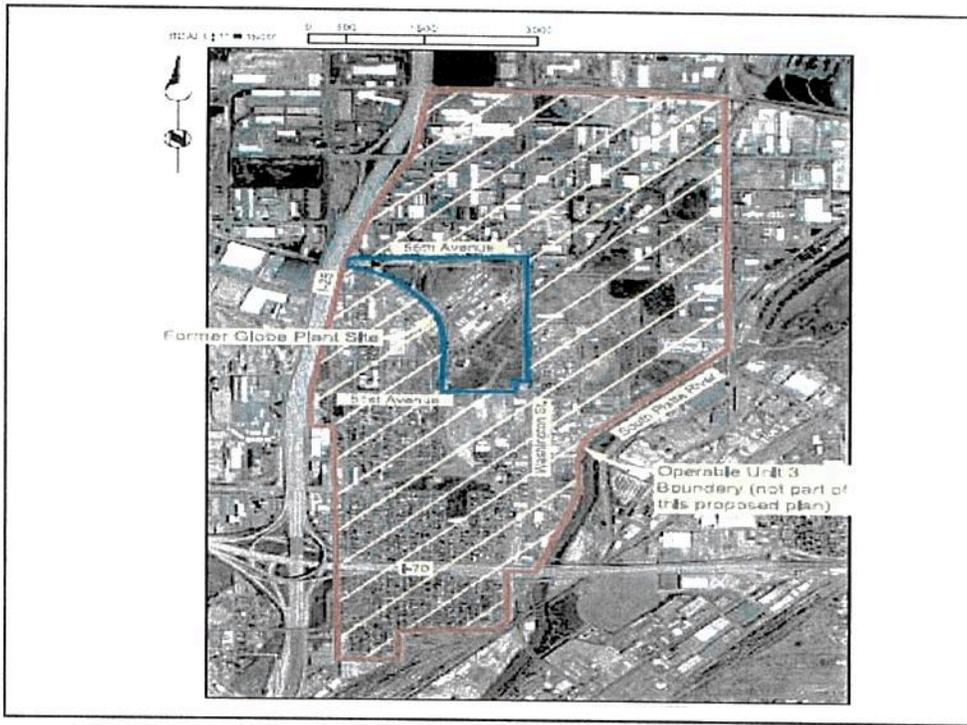


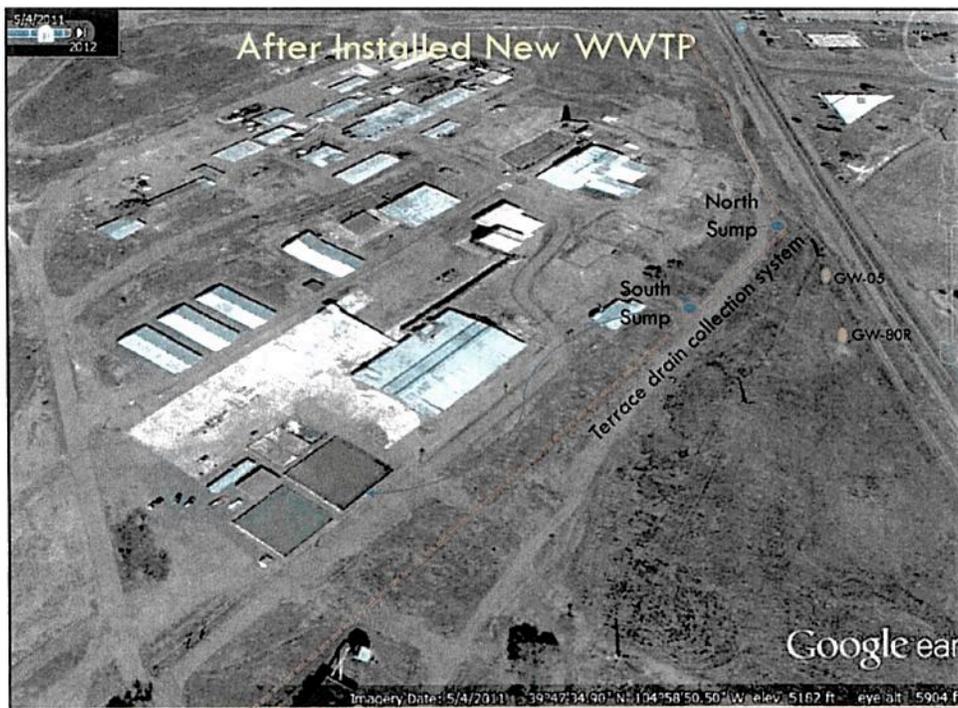
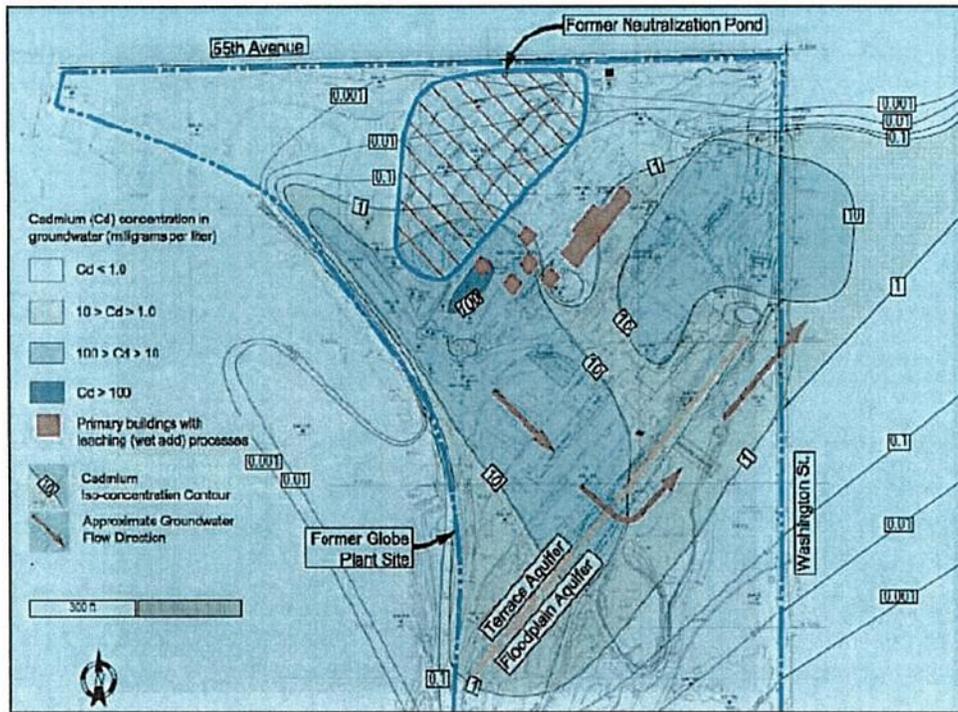


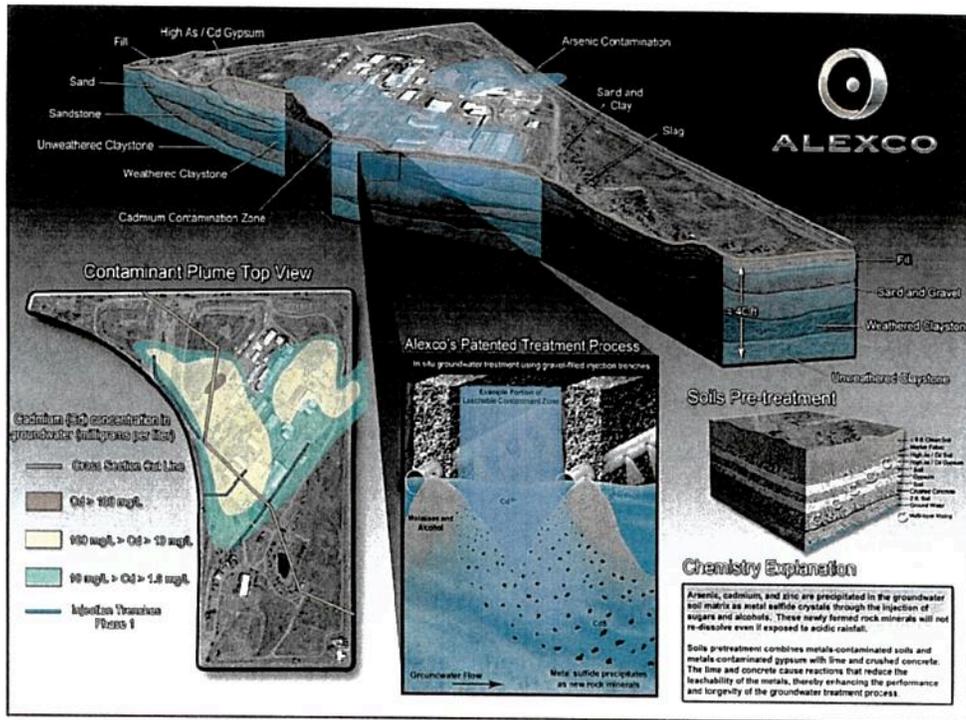
**ALEXCO**

## CASE STUDY

Globe Smelter, Denver Colorado

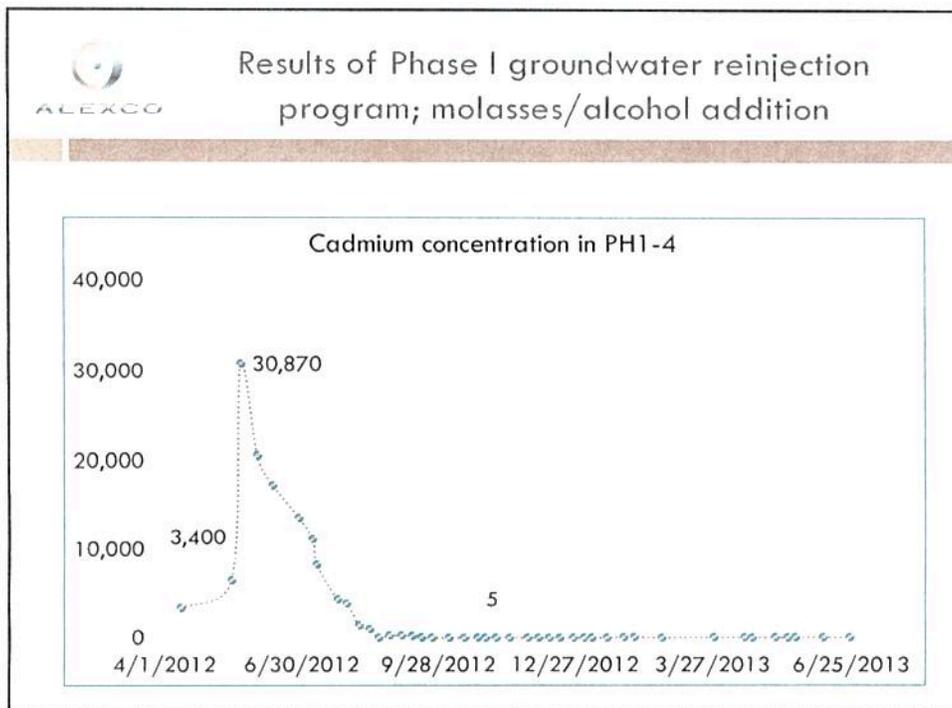


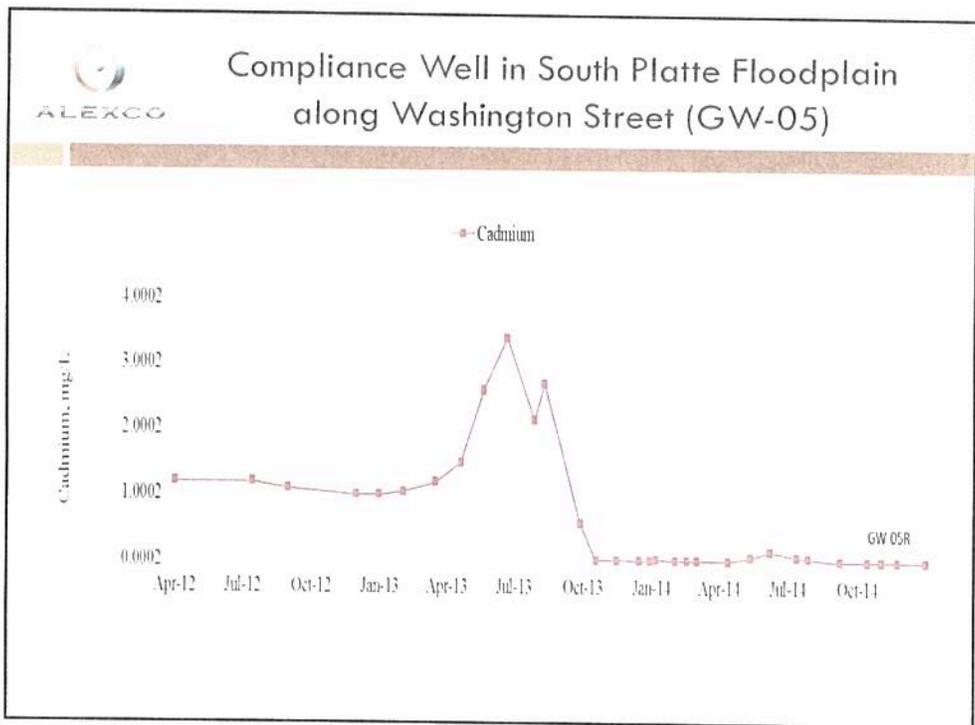




**ALEXCO** Remediation synergies with Demolition

- Demolition generated 42,000 CY of concrete and 6,000 CY brick impacted with heavy metals
- All durable building materials were recycled on-site except for asbestos-containing materials
- Wet decontamination utilized molasses – based wash solutions which allowed for dust minimization without impact to groundwater; benefits to groundwater included selenium reduction throughout the site GW wells





**Treatment of arsenic trioxide with the slag that the As was boiled out of ...**

- Slag resulted from lead blast furnaces (1880s – 1920s); heating iron – rich concentrates to 1300 °C; contains 50% metal oxides (Fe, Al, Mn)
- Alexco invested in a crushing/screening plant and generated 25,000 tons of crushed slag to avoid purchasing iron salts; saving \$300K; oversize was utilized in construction of injection trenches

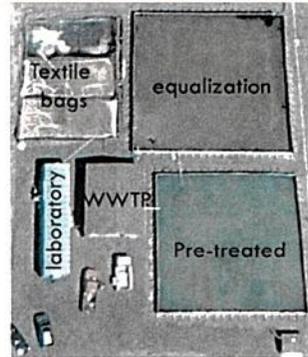





## WWTP sludge residuals

WWTP sludge is 60% + metal hydroxides which sorb arsenic very effectively.

These sludges were accumulated in textile bags and are being mixed into the arsenic impacted soils along with the crushed slag; binding As and attaining SPLP target concentrations for the required geochemical stability and protection of groundwater



## Redevelopment of the Globe Smelter

- Alexco/GWS invested in a technology demonstration pilot program 5 years ahead of the regulatory process
- Alexco demonstrated that metals can be precipitated in-place to prevent the need for perpetual pump & treat of contaminated groundwater
- Developed a proactive strategy to address sources of contamination with extremely high levels of arsenic (12% + As) and pH 1.0 cadmium electrolyte muds
- With demonstrated technology successes, our teaming partners leveraged the bankruptcy financing to attract public funding for infrastructure development around the Site



## Globe project summary

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|--|---|
| <ul style="list-style-type: none"> <li>• Alexco patented technology             <ul style="list-style-type: none"> <li>• Eliminated perpetual groundwater pump &amp; treat project</li> <li>• Enabled 5-year closure program</li> <li>• Facilitated 80-acre redevelopment in north Denver</li> <li>• opportunities for hundreds of new jobs</li> </ul> </li> </ul> | <p>Savings of more than \$20MM over previous estimates</p> <p>Support from</p> <ul style="list-style-type: none"> <li>• US DOJ</li> <li>• US EPA</li> <li>• US HUD</li> <li>• Colorado new law</li> <li>• CDPHE</li> <li>• Adams County</li> <li>• Denver – DURA</li> </ul> |
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## Regulatory Approvals for in situ sulfate reducing and wastewater reinjection source treatment

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|---|---|
| <ul style="list-style-type: none"> <li>• Platoro Mine             <ul style="list-style-type: none"> <li>• UIC permit for wastewater reinjection with molasses and alcohol addition (one time)</li> <li>• UIC permit for wastewater reinjection with molasses and alcohol addition (annual maintenance)</li> <li>• UIC permit for disposal of treatment sludge into acidic mine pool</li> </ul> </li> <li>• San Luis Mine             <ul style="list-style-type: none"> <li>• UIC permit for treatment of the Pink Gneiss pit backfill area and mine pool</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Golden Sunlight tailings plume</li> <li>• Mike Horse U/G mine</li> <li>• Gilt Edge mine pit lake</li> <li>• Sweetwater Uranium pit lake</li> <li>• Globe smelter (3 times)</li> <li>• London U/G mine pool</li> <li>• Cotter Schwartzwalder U/G mine pool</li> <li>• Barite Hill pit lake</li> </ul> |
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