



From Four Corners to All Corners: Connecting for Reclamation

the 30th Annual Conference of the
National Association of Abandoned Mine Land Programs

October 26–29, 2008
Durango, Colorado



About the NAAML

The National Association of Abandoned Mine Land Programs (NAAML) brings together state and tribal agencies who reclaim land and water resources adversely affected by past mining and left abandoned or inadequately restored. The NAAML allows member organizations to accomplish common goals and objectives related to the reclamation of abandoned mine lands. This also results in improved cooperation, coordination, and communication between member states and tribes and the federal government.

The Association is dedicated to:

- **Providing a forum** to address current issues, discuss common problems, and share new technologies regarding the reclamation of abandoned mine lands.
- **Fostering positive and productive relationships** between the states and tribes represented by the Association and the federal government.
- **Serving as an effective, unified voice** when presenting states/tribes common viewpoints.
- **Coordinating, cooperating, and communicating** with the Interstate Mining Compact Commission, Western Interstate Energy Board, Bureau of Land Management, U.S. Forest Service, and all other organizations dedicated to the wise use and restoration of our natural resources.

The Association aims to:

- **Maintain** adequate, stable, and predictable funding for state/tribal reclamation programs.
- **Monitor** Office of Surface Mining administration of state and federal reclamation programs.
- **Act** as a clearinghouse on congressional and other federal actions affecting state/tribal programs to maximize the educational awareness and knowledge base of each member.
- **Take an active leadership role** in the development of program and new regulations that benefit the membership.
- **Participate** in and monitor Research and Development programs to assure funding of projects with the greatest value to state/tribal programs.

NAAML

NATIONAL ASSOCIATION OF ABANDONED MINE LAND PROGRAMS

For more information on the conference, **including updated schedules, full abstracts, and tour descriptions and photos**, visit 4toall.org.

Welcome to the Four Corners



The Four Corners consists of southwest Colorado, northwest New Mexico, northeast Arizona and southeast Utah. The name comes from the Four Corners Monument, the only location in the United States where four states' corners come together. The majority of the Four Corners region is part of sovereign indigenous nations. Two of these are the Navajo Nation and the Ute Mountain Ute Indian Reservation which have a boundary at the Four Corners Monument in addition to the four states.

The United States first acquired the area now called Four Corners from Mexico after the Mexican American War in 1848. The area was first surveyed by the U.S. Government in 1868 as part of an effort to form the state of Colorado. The Four Corners was established as the jurisdictional boundary in 1901 when the boundaries of the Arizona Territory were established. A marker was placed at the spot in 1912. The first Navajo tribal government was established in 1923 to regulate an increasing number of oil exploration activities on Navajo lands.

Protected areas in the Four Corners area include Canyon de Chelly National Monument, Hovenweep National Monument, Mesa Verde National Park and Monument Valley. The Sleeping Ute, Abajo, and Chuska Mountain Ranges all run through the area.

Six governments have jurisdictional boundaries at the Four Corners: the states of Arizona, Colorado, New Mexico and Utah, as well as the tribal governments of the Navajo Nation and Ute Mountain Ute Tribe.

The Four Corners region is mostly rural. The economic hub, largest city, and only metropolitan area in the region is Farmington, New Mexico. The populated settlement closest to the center of Four Corners is Teec Nos Pos, Arizona. Other cities in the region include, Cortez and Durango in Colorado, Monticello and Blanding in Utah, Kayenta and Chinle in Arizona and Shiprock, Aztec and Bloomfield in New Mexico.

the 30th Annual NAAML P Conference
Durango, Colorado



From the Hosts

Welcome to the Four Corners!



the 2008 NAAML P Conference Committee

We are pleased to be hosting the 30th Annual National Association of Abandoned Mine Land Programs Conference. "From Four Corners to All Corners: Connecting For Reclamation" brings together AML reclamation specialists from every corner around the country. We have over 30 technical sessions ranging from reforestation and protecting bat habitat to saving historic structures, and watershed restoration.

The Colorado, Navajo, New Mexico, and Utah AML program staff have worked hard to put together a conference that meets the challenges of AML reclamation and acknowledges the accomplishments of the work of many states, tribes, local and federal agencies.

The conference will benefit from everyone's participation and we hope that you take advantage of this opportunity. Please give us your feedback as you participate in this year's conference. The Association is committed to providing a forum that educates and promotes cost effective reclamation of AML problems.



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Greetings Conference Attendees:

Welcome to Durango, Colorado and the National Association of Abandoned Mine Land Programs' 30th Annual Conference!

The conference theme "From Four Corners to all Corners: Connecting for Reclamation" offers a variety of opportunities for all of us to "connect" and learn about new technological advances in the area of abandoned mine reclamation, foster new work relationships, connect with friends and visit the Southwest. It has been my pleasure to work with

my colleagues in New Mexico, Utah and Navajo to coordinate this conference. We have connected to bring you the best of the Four Corners area. I want to thank our sponsors and exhibitors for coming forward and joining us in making this event a success.

The NAAML is committed in its goals in reclaiming the safety and environmental problems presented by abandoned mining across the United States. We have many new challenges as we move forward to fulfill our promise to make sure that public safety hazards are eliminated and abandoned mined land reclaimed for beneficial use. The reauthorization of the Abandoned Mine Land Program has added new life and funding which will allow states and tribes to meet those challenges and holds great promise for the future.

I have been honored this year to serve as president of this Association. Our connection has built a strong and resilient organization that I have been proud to be a part of. Many thanks to all of you for the support that you have given to me and to the conference committee. Enjoy the conference and our connection.

Loretta E. Pineda
President, NAAML

the 30th Annual NAAML Conference
Durango, Colorado



About the Speaker

JEFF BRAME

Geologic Diversity and Mining Activity
in the Four Corners Region, Southwestern United States



Jeff Brame is president and chief geoscientist of Brame GeoScience, LLC in Durango, Colorado. He has BS and MS degrees in geology and has been a working geologist for more than 32 years. Most of his career has involved petroleum exploration in various basins within North America including 28 years in all parts of the Gulf of Mexico Basin from north Florida to east central Mexico. During the past five years, Jeff has redirected his petroleum work to the western United States in the San Juan, Paradox, Piceance, Uinta, and Basin and Range Basins.

Since moving to Durango five years ago, Jeff has parlayed his long standing interest in southwest US geology into other non-petroleum geology ventures. He teaches several courses on Four Corners and Durango area geology in the Fort Lewis College Continuing Education Department. He teaches a course on uranium mining in western Colorado and leads various field trips associated with all these courses. Jeff also conducts geologic hazard surveys in several western Colorado counties.

From Four Corners to All Corners:
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Friday October 24–Sunday October 26

Pre-Conference Tour through the Four Corners Area

Sunday October 26

7:30–2:00	Durango to Silverton Train Tour
8:00–7:00	Registration Open, Exhibit Setup
11:00–1:00	Mountain Biking
11:00–4:00	Golf
12:00–3:00	Microbrewery Tour
2:00–5:00	Committee Meeting, Animas Room
5:30–9:00	Opening Reception, Exhibits Open
9:00–11:00	Hospitality, Doubletree Hotel

Monday October 27

7:00–8:30	Continental Breakfast
7:00–8:30	NAAML P Members' Breakfast, Doubletree Hotel
7:00–5:00	Registration, Exhibits Open
9:00–10:15	Plenary Session with Guest Speaker(s) Break
10:30–12:00	Technical Sessions and Workshop
12:00–1:30	NAAML P Members' Lunch , Strater Hotel Lunch on Your Own
1:30–3:00	Technical Sessions and Panel Discussions Break
3:15–5:15	Technical Sessions
5:30–6:30	Buses to Awards Banquet
6:30–9:00	Awards Banquet, the Lodge at Tamarron
9:00–11:00	Hospitality, Doubletree Hotel

Tuesday, October 28

6:30–8:00	Continental Breakfast, Exhibits Open
7:00–4:30	Tours
5:30–6:30	Buses to Ft. Lewis College
6:30–9:00	Multicultural Night, Center of Southwest Studies
9:00–11:00	Hospitality, Doubletree Hotel

Wednesday October 29

6:30–8:00	Continental Breakfast
8:00–10:00	Technical Sessions
8:00–12:00	Registration, Exhibits Open
10:30–12:00	Technical Sessions
10:30–5:00	NAAML P Business Meeting
5:00–6:00	Hospitality, Doubletree Hotel

See pages 6–9 for more detailed listings of events and sessions.

Agenda subject to change; visit 4toall.org for updated schedules and event descriptions.

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Tuesday Tours

Tours

Chaco Canyon Departs 7:00 AM

Chaco is noted for its monumental public and ceremonial buildings, and distinctive architecture. We will visit some of the highlights of the Park including Pueblo Bonito, Chetro Ketl, Pueblo Alto, and/or other sites as time allows.

Navajo AML and PFP Departs 7:00 AM

This tour will include Navajo AML reclamation and Public Facility Projects (PFPs). As a bonus, you will also witness the beautiful landscapes and geology unique to this part of America. Highlights are the famous Shiprock pinnacle and the Chuska Mountain Range. Reclamation and PFP projects will include stops at Shiprock, Red Valley (Oaksprings), and Cove areas.

Mesa Verde National Park Departs 8:00 AM

Mesa Verde offers a spectacular look into the lives of the Ancestral Pueblo people who made this high desert mesa their home for over 700 years. We will have an opportunity to explore some of the cliff dwellings to get an up-close perspective into the lives of the Ancestral Pueblo people on Mesa Verde. A presentation on an AML coal outcrop fire abatement project at the park is included.

Cottonwood Wash and the Edge of the Cedars Museum Departs 8:00 AM

The Museum features an outstanding collection of Anasazi pottery and artifacts; a behind-the-scenes tour of the museum will allow you to see things not normally open to the public. Nearby, the Utah AML project at Cottonwood Wash addressed high radiation waste in Cottonwood Creek, closed scores of openings, removed mine dumps from the stream bed, and reclaimed 73 miles of mine roads. You will also visit the Wash's unexcavated Great House and Kiva.

La Plata Mine and Aztec Ruins National Monument Departs 9:00 AM

Visit a 2,000-acre coal mine reclamation site where fluvial geomorphic principles have been put into practice. These landforms persist in nature because they are the most erosionally stable. Follow up with a visit to Aztec Ruins National Monument, for an adventure into the past. Highlights will include a Chacoan Great House, West Ruin, a center of ancestral Pueblo society, and a reconstructed "Great Kiva."

Local Durango Scene Tour Departs 10:00 AM

Take an historic walking tour of Main Avenue with a local historian. This historical Durango tour will last approximately one hour. This gives you ample time to shop before or after the tour, and discover Durango on your own.

From Four Corners to All Corners: Connecting for Reclamation



Evening Events

Sunday: Opening Reception

The Reception will be held in the Doubletree Hotel Ballroom from five-thirty to nine PM. Listen to the music of Mariachi Buena Ventura. Visit the exhibits to see what's new. Come join your friends, associates, and exhibitors to catch up with old acquaintances and meet new friends.

Monday: Awards Banquet

The Awards Banquet will be held at the Lodge at Tamarron, upvalley from Durango. There will be a cash bar as well as a first-rate southwestern meal, and lots of fun. The Office of Surface Mining (OSM) will present its annual National and Regional Awards for 2008. The awards' objective is to give public recognition to those responsible for the nation's most outstanding achievement in environmentally sound mined land reclamation, and to encourage the exchange and transfer of successful reclamation technology. The Stan Barnard Memorial Award, recognizing exemplary service, integrity and commitment to AML, will be awarded. The David Bucknam Instructor Award will be presented to an outstanding instructor in OSM's National Technical Training Program.

Tuesday: Multicultural Night

The Center for Southwest Studies at Ft. Lewis College will host this entertaining evening, complete with Native American dancers and singers. Barbecue dinner will be provided. The Center serves as a museum and research facility, whose goal is to provide a variety of educational and research opportunities for students, residents, scholars and visitors.

Hospitality Suite

Join your fellow AMLers each night after these events at our Hospitality Suite at the Hotel.

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Session Schedule for Monday

10/27	Room A	Room B	Room C
9:00–10:15	Plenary Session in the Doubletree Hotel Ballroom		
10:30–12:00	1 Geomorphic Restoration	2 National Interest	W orkshop
10:30–11:00	D. Greenfield Fluvial Geomorphology Projects	P. Butler Good Samaritan/ Animas Watershed	E. Cavazza Mine Pool Management
11:00–11:30	N. Bugosh Fluvial Geomorphology Land Forms	F. Meilinger Stay Out Stay Alive Campaign	
11:30–12:00	D. Clark La Plata Mine Geomorphic Reclamation	G. Stone AML Web Portal	
1:30–3:00	3 Watershed Restoration	4 Cultural Resources	P anel Discussions
1:30–2:00	T. Busiahn, pres. by J. Kosa National Fish Habitat Action Plan	B. Rich Old 100 Boarding House Preservation	M. Mesch FAST Campaign
2:00–2:30	R. Knox Western Trout Initiative	N. Frantel Further Historic Preservation	
2:30–3:00	K. Alexander Watershed Collaboration Approaches	Y. Oakes Archeology and AML	M. Garner & L. Malin AMLIS Modernization: Project Status
3:15–4:15	5 Mine Fires & Mine Gas	6 Cultural Resources & GIS	7 Bats & AML
3:15–3:45	W. Ehler Problems with Carbon Dioxide at AML	C. Ross Nevada Safeguarding and Cultural Preservation	R. Sherwin Determining Significant Bat Habitat
3:45–4:15	J. Mack Dolph Mine Fire Abatement	S. LucasKamat Uranium GIS	J. Kretzmann, pres. by J. Tribe Toroid Tire Plugs and Bat Habitat
4:15–5:15	8 Geotechnical Evaluation	9 Unusual Techniques	10 Partnerships/Techniques
4:15–4:45	B. am Ende Thermal Imagery for AML	B. Masloff, pres. by R. Palladino Using Foam as a Transport Medium	A. Amundson Millsap Creek Restoration
4:45–5:15	B. Hallman Subsidence Evaluation and Control	M. Snyder Utilization of Native Landslide Material	J. Holliday Forestry Reclamation on AML Lands

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Session Schedule for Wednesday



10/29	Room A	Room B	Room C	
8:00–10:00	11 OSM AML Award Presentations	12 Acid Mine Drainage		
8:00–8:30	Presentations from National, Eastern, Mid-Continent, and Western Regions	T. Coffelt Soils and Stabilizing Acidic Sites	NAAML Business Meeting	
8:30–9:00		L. Lewis AMD at a Complex Site		
9:00–9:30		C. Lyons Loucks AMD Treatment Maryland		
9:30–10:00		K. Ford Stabilizing Tailings in a Floodplain		
10:30–12:00	13 Lessons Learned	14 Water Quality Improvements		
10:30–11:00	A. Jones Remote Reclamation Issues	K. Brown, pres. by B. Stover Roy Pray–Mine Water Quality Improvement		
11:00–11:30	A. Gallegos Project Experience	K. Dee Tiger Tunnel–Hydrologic Controls		
11:30–12:00	M. Thomson New Mexico Experience	M. Stacey Groundwater Redirection		
1:00–2:00				
2:00–3:00				
3:00–4:00				
4:00–5:00				

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MONDAY, OCTOBER 27

TECHNICAL SESSION 1: GEOMORPHIC RESTORATION – 10:30–12:00

**Geomorphic Restoration: Successful And Not So Successful Projects
Assessment Of Fluvial Geomorphology Projects At Abandoned Mine Sites**

David A. Greenfield, Bureau of Abandoned Mine Reclamation, Wilkes-Barre, PA

Some watersheds have been so severely impacted by mining that the streams do not support aquatic life and can no longer accommodate flows or transport sediment. To fully recover the environmental resource of these scarred landscapes the land must be reclaimed and the streams reconstructed. As abandoned mine sites are reclaimed to their approximate original contours, the hydrology of the watersheds will return to pre-mining conditions. A stable system must be designed to transport the flows and sediment while preventing erosion and flooding.

In an attempt to reclaim the watersheds to a natural state, the application of Fluvial Geomorphologic (FGM) techniques has been embraced at several sites in the Anthracite Region of Pennsylvania. These sites have had various degrees of success. All of the sites were immediately successful in creating habitat for a wide variety of life. Some sites remained stable until damaged due to extreme discharge events. Other sites were not damaged at all even though they were hit by a severe storm. The cause of much of the damage has been determined, and further use of FGM will reveal the solutions.

**The Importance of Fluvial Geomorphic Landform Characteristics To Ensuring Stability
Against Erosion (and how they can be incorporated into a landform design)**

Nicholas Bugosh, Carlson Software, Loveland, CO

The fluvial geomorphic approach to designing landforms that are stable against erosion, and which promote sustainable land development, requires that essential landform characteristics are incorporated into the landform and that the characteristics are correctly inter-related for proper function. The GeoFluv™ approach to landform design uses measurements of these essential landform characteristics of upland areas and ephemeral, intermittent, and perennial stream channels as input values and integrates them to design a functioning landform. The incorporation of the GeoFluv™ approach into the Natural Regrade computer software greatly simplifies the calculations needed to integrate these input values into a cohesive landform design. As with any computer program, the quality of the input information determines the quality of the output result. This virtual field tour will explore the expression of these GeoFluv™ input values in various locations, discuss their relevance to a stable landform design, and demonstrate how they are used in making a design for a stable landform according to fluvial geomorphic principles.

**Geomorphic Restoration: Case Studies Of Success Over Time:
Geomorphic Reclamation At The La Plata Mine, New Mexico**

Dave Clark, Mining & Minerals Division, New Mexico Energy, Minerals & Natural Resources Department, Santa Fe, NM

Northwest New Mexico's La Plata Mine contained steeply dipping, multiple coal seams, which were mined by open pit methods. While SMCRA includes specific exceptions to the requirement to regrade to approximate original contour, these exceptions do not apply to the La Plata Mine, despite their application to similar mines located elsewhere. The New Mexico Mining and Minerals Division (MMD) accepted that the preexisting, structurally-controlled trellis drainage pattern would have to be replaced with a dendritic drainage pattern on reclamation where the structurally controlling overburden had been pulverized. The operator proposed a drainage density standard that exceeded the pre-mine drainage density because of the loss of bedrock control in stream channels. The MMD accepted a narrative, conceptual permit commitment to construct drainages, rather than requiring certified designs and as-builts for each feature. Calculations conducted on the earlier permitted post mine topography designs demonstrated that post mine erosion rates and sediment yields wouldn't exceed the pre-mine condition. When geofluvial designs were draped over the basic watershed designs due to shortened slopes. The proof was provided when large storm events on freshly top soiled reclamation produced runoff that met NPDES standards before reaching sediment ponds.

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Annotated Abstracts

TECHNICAL SESSION 2: NATIONAL INTEREST – 10:30–12:00

Good Samaritan Legislation: Protecting Third Parties Working On Draining Mines

Peter Butler, Ph.D., Animas River Stakeholders Group, Durango, CO

Under the Clean Water Act, draining mines are considered point-sources. As such a number of different organizations that want to improve water quality are reluctant to work on draining mine sites for fear of incurring liability beyond their project work. As a result, few discharges from inactive and abandoned mines are being addressed.

The presentation will describe the liability issues associated with remediating draining mines under the Clean Water Act and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, also known as Superfund). Legislative efforts to address these issues have been on-going since 1994 without success. The important issues revolving around those legislative efforts and as well as current legislation will be discussed.

Stay Out-Stay Alive: A National Perspective On The Public Dangers Of Abandoned Mines

Frank Meilinger, U.S. Mine Safety & Health Administration (MSHA), Arlington, VA

Each year, dozens of people are seriously injured in recreational accidents at mine operations in the U.S. Over the past five years, 148 fatal accidents occurred in accidents on mine property; approximately 85% on non active mine property. In 1999, MSHA launched "Stay Out—Stay Alive" (SOSA), a national public awareness campaign to warn outdoor enthusiasts, especially children, about the dangers of playing on mine property. This year's campaign will balance the agency's traditional SOSA outreach efforts with an attempt to broaden the program's audience by placing a special emphasis on the high school and college age segment of the American public. By targeting non-traditional outlets such as high school, college, and local newspapers, we have a greater chance of reaching this critical audience.

The presentation includes a detailed analysis on the state of public safety at abandoned and active operations across the nation, including an examination of the primary causes of recreational mining accidents; an overview of current and past accidents; a post campaign analysis of media coverage and reaction to MSHA's 2008 SOSA program; and recommendations on how local, state, and federal agencies can work with the public to prevent and minimize future tragedies.

Abandoned Mine Lands Portal: www.abandonedmines.gov

George Stone, Div. of Environmental Quality & Protection, Bureau of Land Management, Washington, DC

This presentation follows up on prior commitments discussed at NAAMLTP workshops concerning development of a national Abandoned Mine Lands Web Portal. The purpose of the portal is to foster improved communication to the public about AML-related problems, what's being done about them, progress to date, and links to additional resources (e.g., agency-specific web sites). The initial phase was developed collaboratively by the Federal Mining Dialogue partners within the Department of Agriculture, the Department of the Interior, the U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers and the Mine Safety & Health Administration. The portal was launched on July 3, 2008. The next phase seeks to broaden content through emphasis on State and Tribal programs. The presentation will provide an overview of the current content, discuss portal management and budget, content updating, and discuss possible ways to collaborate effectively with the NAAMLTP members (as well as non-member States and Tribes) on the next phase.

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WORKSHOP – 10:30–12:00

MANAGEMENT AND CONTROL OF ABANDONED MINE POOL DISCHARGES: PENNSYLVANIA CASE STUDIES WORKSHOP, PART 2

Eric E. Cavazza, P.E., and Richard L. Beam, PG; Pennsylvania Department of Environmental Protection, Ebensburg, PA

Several Pennsylvania mine pool case studies were presented at the 29th Annual NAAML P Conference in Bloomington, Indiana in October of 2007. The workshop was well attended and well received. This workshop will follow-up and build upon the discussions from that workshop by presenting several additional Pennsylvania case studies.

Abandoned underground mine pools and associated Acid Mine Drainage (AMD) discharges in Pennsylvania frequently present challenges in terms of both mitigation of environmental damage and alleviating health and safety impacts to residents and public infrastructure. Mine blow-outs are a constant concern in many areas. Over the years, the Pennsylvania Department of Environmental Protection's, Bureau of Abandoned Mine Reclamation has employed a variety of methods to address these problems. This workshop will present a series of Pennsylvania case studies that highlight various approaches including vertical and horizontal (directional) drilling technology for controlling mine pool hydraulic head and/or relocating discharges, conveyance structures to combine and/or redirect discharges, hydrogeologic investigations of mine pool response, and public/private partnership arrangements for treatment and reuse of mine pool waters.

TECHNICAL SESSION 3: WATERSHED RESTORATION – 1:30–3:00

The National Fish Habitat Action Plan: A Partnership To Restore Native Fish To Mined Watersheds

Thomas R. Busiahn, U.S. Fish & Wildlife Service, Arlington, VA; presented by J. Kosa

The National Fish Habitat Action Plan (NFHAP) is an unprecedented attempt to address the nationwide crisis of fish habitat loss and degradation through a nationally focused fisheries conservation effort.

NFHAP is a State-led, voluntary partnership that will address large-scale habitat problems and coordinate local activities. This science-based investment strategy was designed to prioritize and achieve measurable outcomes by focusing resources and funding through public-private partnerships, and to monitor and disseminate results.

Fish habitat restoration projects are accomplished through regional Fish Habitat Partnerships, including six partnerships currently operating throughout the nation. Of particular note to the Abandoned Mine Land Reclamation community are the Western Native Trout Initiative and the Eastern Brook Trout Joint Venture (EBTJV). The historic eastern range of brook trout (*Salvelinus fontinalis*) overlaps large parts of the central Appalachian coalfields and abandoned mines are among the factors in the decline of the species. Through the EBTJV, the U.S. Fish and Wildlife Service has provided financial and technical assistance to numerous acid mine drainage neutralization projects with a goal of restoring native brook trout in the affected watersheds.

The Western Native Trout Initiative: An Opportunity For Cooperation

Robin Knox, Western Native Trout Initiative, Lakewood, CO

With few exceptions, native trout populations have declined across the West, usually due to two general factors: habitat alteration and introduced non-native fish. Remaining populations are often isolated from one another and exposed to increased predation, competition, and hybridization. The 15 native trout addressed in the Western Native Trout Initiative (WNTI) have long been considered as biologically, recreationally and culturally important. Progress has been mixed. Human population pressures and habitat damage from a warming climate has increased the urgency of securing and improving the status of western native trout. The WNTI provides a new perspective and impetus to improve the return on investment of the resources dedicated to native trout conservation over the next decade. The WNTI's collaborative approach addresses trout habitat degradation, non-native species impacts, and emerging range-wide concerns of climate change, energy development, and urbanization by: cooperative planning, successful past actions; scientific assessment; inspired public partnerships; participating as a partner in the National Fish Habitat Action Plan (NFHAP); and capitalizing on growing public and private interest to acquire additional funding to support conservation actions.

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Annotated Abstracts

Water Quality, Watersheds And Western State: A Collaborative Approach To Watershed Analysis Utilizing Multidisciplinary Undergraduate Students

Kevin Alexander, Dept. of Natural & Environmental Sciences, & Environmental Studies Council, Western State College of Colorado, Gunnison, CO

A comprehensive watershed analysis of Henson Creek, a tributary of the Lake Fork of Gunnison that drains the San Juan Mountains of southwestern Colorado, was conducted to describe the water quality, hydrology, stream channel, erosion, and human processes along and within Henson Creek and its watershed. Additionally, the report was to identify and evaluate anomalies and unknown impacts revealed by the data and to report on the 303(d) listed contaminants. The U.S. EPA funded the watershed analysis and the Lake Fork Watershed Stakeholders contracted with Western State College of Colorado to host an undergraduate course to conduct the analysis. Nine advanced undergraduates from multiple disciplines including biology, environmental studies, geology, mathematics, and recreation collaborated with stakeholders over the course of one year to conduct the watershed analysis. The result of this process, believed to be the first of its kind, was a 179 page document that addressed the criteria, provided a rich, educational experience for the students and created a valuable reference for watershed planning. Recommendations for future efforts to model this process include utilizing a copy editor/technical writer, adding more students to cover the topics including more social science majors, or reducing the focus of the analysis.

TECHNICAL SESSION 4: CULTURAL RESOURCES – 1:30–3:00

Castle In The Clouds, The Saving Of The Old 100 Boardinghouse

Beverly Rich, Chairman, San Juan County Historical Society; & William Tookey, Administrator, San Juan County, Silverton, CO
In 1999, the San Juan County Historical Society, in collaboration with the Bureau of Land Management, The Colorado Division of Minerals and Geology, and the Colorado Historical Society, stabilized the Old 100 Boardinghouse, a unique structure built on a cliff 3000 feet above the floor of Cunningham Gulch at an elevation of 12,500 feet, just north of Silverton, Colorado. Inaccessible except by foot, the project used helicopters to take materials to the project site. The Historical Society received grant funding to make a documentary film about this “extreme” preservation project. The presenters will talk about the partnerships that were formed to complete this project and the effects of historic preservation in a post-mining economy.

A Step Further Into Historic Preservation

Nancy Frantel, Midlothian, VA

Trying to reclaim abandoned mine sites with historical significance can present unique challenges. Aside from the physical remnants of the past, the cultural preservation perspective is also important to consider. The reclamation also becomes more complicated with the involvement of county government and other interested parties

The history of a unique abandoned mine site in Virginia is offered as a case study. As part of the discussion, the public safety question will also be raised. Due to the involvement of local government and others parties, the suggested reclamation did not take place. The law did not allow state government to have a jurisdictional role. Local interests created a unique set of circumstances surrounding the reclamation. These factors prevented further involvement by the state agency that offered assistance.

The decision to preserve the abandoned mine site still remains questionable. Issues outside of the physical makeup of the site will be reviewed. The facts may lead in a direction that may not be as obvious as initially anticipated.

Archaeological Investigations At Five Abandoned Coal Mine Camps On The Vermejo Park Ranch

Yvonne R. Oakes, Museum of New Mexico, Office of Archaeological Studies, Santa Fe, NM

The Museum of New Mexico, Office of Archaeological Studies, has been involved in the documentation of several large, late 19th and early 20th century mining camps in New Mexico for the New Mexico Abandoned Mine Lands Program. The recording of these sites has led to a rich database from which we have extracted unprecedented socioeconomic, demographic, and political patterns. The data have derived from recording every structure (domestic and mine-related), gob pile and adit, and every item in trash piles. This presentation discusses the findings from our intensive survey in the Raton Coal Field within the mining camps of Brilliant, Swastika, Blossburg, Gardiner, and Koehler, which are located on the Vermejo Park Ranch in northeastern New Mexico.

From Four Corners to All Corners: Connecting for Reclamation



PANEL DISCUSSIONS – 1:30–3:00

Unique Partnerships Provide Proactive Approach To Sealing Dangerous Hardrock Shafts: A Panel Discussion Of The BLM's FAST! Campaign

Mark Mesch, SRA International, Salt Lake City UT

Abandoned hardrock mine shafts on and near public lands pose serious hazards to outdoor enthusiasts. States in the southwest have experienced an unsettling increase in Off Highway Vehicles (OHV) deaths and accidents associated with open abandoned hardrock mine shafts. Through unique partnerships the FAST! Campaign (Fix A Shaft Today!) quickly and effectively addresses dangerous mine shafts before accidents happen. Modeled after successes achieved by the Bureau of Land Management (BLM) in Nevada, the FAST! Campaign encourages stakeholders, volunteers, industry, and state and local governments to partner with the BLM in Arizona, California, Utah, Colorado, and New Mexico, through the donation of time, labor, and equipment necessary to address the National Environmental Policy Act issues, claimant rights, and construction needed to close dangerous mine shafts on public lands. The FAST! Campaign relies strongly on a commitment from public land users to report dangerous mine shafts encountered while recreating on public land.

The panel, comprised of agency leads, contractors, and industry representatives, will discuss the lessons learned from pilot projects and share the tools, techniques, and best practices available to quickly address the complex issues associated with closing dangerous hardrock mine shafts.

AMLIS Modernization: Project Status

Mike Garner, Dept. of Environment, Bureau of Mines Div., MD; and Luci Malin, Dept. of Natural Resources, Oil, Gas & Mining Div., UT
Are you an AMLIS (Abandoned Mine Land Inventory System) user? Mike Garner and Luci Malin, state representatives on the OSM AMLIS revitalization team, will lead a discussion about the current contract to bring AMLIS into the 21st century. OSM will present information and demonstrate a prototype AMLIS product which is going to the States/Tribes for beta testing by November 2008.

TECHNICAL SESSION 5: MINE FIRES & MINE GAS – 3:15–4:15

Has That New Home Taken Your Breath Away? Problems With Carbon Dioxide Infiltration Into Residences Constructed Upon Reclaimed Surface Mines

William C. Ehler, P.G., Office of Surface Mining, Federal Reclamation Program, Appalachian Region, Pittsburgh, PA

Over the past ten years, the Office of Surface Mining has received more reports of mine gases associated with abandoned surface coal mines, suddenly infiltrating residences with severe adverse effects. Dangerously high levels of carbon dioxide that deplete oxygen have caused residents to rush to the hospital or temporarily evacuate their homes.

Reclaimed abandoned and active mine sites have become attractive home sites as rural development and growing communities change historic land use. Residential construction using traditional methods upon these sites allows the opportunity for gas infiltration to occur. Three brief case studies of homes recently built on mine backfill will be presented to document the potential severity of the problem, how problems are diagnosed and construction techniques for mitigation. The best current mitigation practices are to seal and ventilate the homes. As this issue becomes more widespread it may be beneficial to consider alternatives to modifying existing dwellings. Control of this problem may include evaluating aspects of the mine permit, modifications of the reclamation process or through zoning by land use planners.



Annotated Abstracts

A Case Study Of The Emergency Abatement Of The Dolph Colliery Coal Waste And Underground Coalbed Mine Fire

John F. Mack, Office of Surface Mining, Wilkes-Barre, PA

In 2004, a rubbish fire ignited an anthracite refuse fire that quickly spread into the underground workings of the abandoned Dolph and Underwood Collieries near Olyphant, Lackawanna County, PA. By autumn of 2005, the fire had advanced beneath a recently installed Jefferson Township Sewer Line which serves over 750 families.

Fire control work involved relocation of a 6,500-foot long section of the Jefferson Township Sewer Line on a gravity flow route, excavation of a 3,400-foot long containment trench that reached depths of 165 feet, and the installation of a 1.25 mile long pipeline from the Marshwood Reservoir to provide water to the site. Boreholes on the outside perimeter of the isolation trench will continue to be monitored for temperature to insure that the underground fire does not breach the trench. Remote sensing was employed before and during abatement work and will continue afterwards.

This presentation provides a chronology and overview of the sewer line relocation and fire abatement efforts. The narrative illustrates the magnitude of the project regarding the manpower, equipment, blasting, and remote sensing techniques that were utilized to contain the fire.

TECHNICAL SESSION 6: CULTURAL RESOURCES & GIS – 3:15–4:15

Preserving The Culture While Closing The Holes: Abandoned Mine Remediation In Nevada

Christopher Ross, Ph.D., BLM Nevada State Office, Reno, NV

Nevada has an estimated 300,000 abandoned mine features, of which at least 50,000 are a serious threat to humans and wildlife. In recent years, the BLM in Nevada has typically closed more hazards than have been done in the other western states combined. Many sites are important to wildlife, especially bats, and may also be important elements in the cultural/historic record of the region. A key element in our success has been improvement both in the documentation of such sites, but also in the employment of closure methods which preserve and stabilize historic features.

Cooperation with historical archaeologists, field personnel, and the State Historic Preservation Office (SHPO) allows efficient and effective permanent closure on a large scale while actually improving the preservation and survival of cultural and wildlife values. Sites are now cleared by field office archaeologists and contractors who make recommendations for preservation. Following closure, documentation, including before and after photography, is submitted annually to the SHPO.

Prioritizing Abandoned Uranium Mine Land Reclamation Using GIS

Susan A. LucasKamat, Linda S. Delay, James R. Smith, New Mexico Mining & Minerals Division, Santa Fe, NM

Abandoned uranium mines (AUMs) left a legacy of probable contamination in New Mexico. Mining activities, such as mine water discharge and the crushing, transportation and stockpiling of ore, dispersed the contamination. The New Mexico Mining and Minerals Division is collaborating with other agencies to inventory and prioritize the remediation of AUMs. Using available GIS tools, we can model contamination pathways and prioritize remediation—especially important when cleanup money is scarce.

As a pilot project, the New Mexico Abandoned Mine Land Program sampled data from 38 AUM sites. Mine feature attributes, including radiation readings, mine disturbance areas, waste pile volumes, shaft and adit dimensions, roads and cultural features, were collected, in addition to radiation measurements. The various feature types were integrated into a geodatabase. We used ESRI ArcGIS Spatial Analyst to build a model to prioritize AUMs for remedial action. AUMs were ranked by exposure of populations to potential health risks.

From Four Corners to All Corners: Connecting for Reclamation



TECHNICAL SESSION 7: BATS & AML – 3:15–4:15

Bats and Abandoned Mines: Determining The Significance of Individual Abandoned Mines Within A Landscape of Complexity

Richard E. Sherwin, Dept. of Biology, Chemistry & Environmental Science, Christopher Newport University, Newport News, VA

While it is generally understood that organisms have clear associations with specific habitat features, the degree of expression of these associations varies across spatial and temporal scales. The potential for spatio-temporal scale dependency makes it extremely difficult to assign biological significance to site occupancy or biological phenomenon collected at small spatial scales or over short temporal periods.

While patterns of landscape level use in bats have slowly become apparent, it is only recently that we have begun to understand how local patterns reflect emergent properties of entire systems. While abandoned mines provide tremendous ecological gravity within landscapes, individual bats and colonies flow among groups and features in dynamic, yet stable patterns. These findings suggest that the relationship between bats and abandoned mines is much more plastic than has been previously supposed and that current assumptions regarding habitat and roosting associations are not entirely accurate. Appropriate management models for abandoned mine reclamation must include a framework that facilitates the identification and protection of critical roosting habitat of bats. It is within this framework of uncertainty then that land managers must make critical decisions regarding the permanent elimination of non-renewable subterranean features from landscapes.

Toroid Tire Plugs For Mine Closures And Bat Habitat Preservation

L. John Tribe, P.E., N.L. Tribe & Associates, Ltd., Kelowna, B.C.; & John A. Kretzmann, P.E.,

New Mexico Abandoned Mine Land Program, Santa Fe, NM

Some of the abandoned mine openings at the New Mexico AML Program's Lake Valley site presented significant challenges for safeguarding including large decline stope openings with poor rock conditions, and bat habitat and historic features associated with the mine openings that needed to be preserved.

Following an alternatives analysis, New Mexico AML decided to try a new toroid tire plug technology. N.L. Tribe and Associates, a geological, mining and reclamation consulting firm, has developed this technique for plugging abandoned mine openings. Spent tires from large earthmoving equipment are used in engineered closures at mine openings, along with geotextile cloth, geogrid and cabled tire mats made from spent highway truck tires.

Bat compatible closures were constructed using corrugated steel pipe culverts placed through the tire plugs, with bat gates built into the ends of the pipes. In this project, toroid tire plugs also proved to be a viable, and in some cases lower cost, alternative to polyurethane foam and concrete for plugging shafts.

Toroid tire plugs offer an abandoned mine closure technique useful for both difficult and routine openings, as well as offering the environmental benefits associated with putting a waste product, with a relatively large supply, to beneficial reuse.

TECHNICAL SESSION 8: GEOTECHNICAL EVALUATION – 3:15–4:15

Thermal Imagery As A Tool For Locating Abandoned Mines

Barbara Anne am Ende, Engineering Specialist, The Aerospace Corporation, Chantilly, VA

Mines have an interior temperature comparable to the average annual temperature of the geographic region where they are located. The temperature of the rock at the mine entrance has the potential of being discriminated from the surface conditions via thermal imaging in the long wave infrared.

It is important to collect the imagery when insolation does not differentially heat rocks, soil, and vegetation, causing clutter in the thermal imagery. The best time to identify mine entrances in winter is at night after sunset through the morning until dawn. It may be difficult to predict the temperature profile of a particular night, but if the air temperature is predicted to be significantly below the average annual temperature, mine entrances should be detectable. Work is shown to characterize the conditions under which mine entrances can be detected through thermal imaging.



Annotated Abstracts

Reclamation Issues: Subsidence Evaluation And Control Technologies, State-Of-The-Art Mine Subsidence Evaluations

Kanaan Hanna, Jim Pfeiffer, & Steve Hodges, ZAPATA, Blackhawk Division, Golden, CO; Dave Hallman & Jeffrey Nuttall, Tetra Tech MM, Inc., Golden, CO; & Bill Locke & Vicky Zimmerman, Wyoming DEQ, Abandoned Mine Lands Division, Lander, WY

The current state-of-practice for subsidence mitigation is based on traditional drilling and grouting backfill programs, i.e., drill and fill, using a rule-of-thumb approach to assess risk. This generally blind approach is largely unproductive in determining the true conditions of the workings and subsidence risk. The unknown factors inherent in abandoned underground mines represent a significant challenge in to evaluating hazards and developing mitigation measures.

The use of state-of-the-art geophysical imaging techniques integrated with other engineering disciplines can be applied to allow subsidence hazards to be more accurately defined. This enables targeted, cost-effective mitigation efforts to be employed in a proactive rather than reactive manner.

Currently, we are applying a variety of high-resolution state-of-the-art geophysical technologies to characterize subsurface geology, delineate coal mine workings, and determine subsidence mechanisms in both developed and undeveloped residential areas within the City of Rock Springs. The City is largely undermined by historic coal mining operations that represent a significant subsidence hazard. This session will use this project as an example of the success achieved by our integrated approach in subsidence evaluations.

TECHNICAL SESSION 9: UNUSUAL RECLAMATION TECHNIQUES – 4:15–5:15 **Using Foam as a Transport Medium: A Kansas City Mine Backfill Project**

Brian Masloff, Cellular Concrete LLC, Allentown, PA

A limestone mine, located beneath an active landfill in Kansas City, Kansas, was required to be filled to prevent collapse. The mine void had a height of 5 to 25 feet with a volume of 150,000 cubic yards, consisting of 25% water. Due to the amount of water within the mine, using conventional fill materials would be very difficult. Crusher fines that could be used as an inexpensive backfill material were available locally, but lack of accessible water made hydraulic placement methods impractical. A cost effective placement process for the crusher fines was necessary, so foam was chosen.

An auger mixer was used to mix the foam into the crusher fines and the foam was gravity fed into injection holes. The foam was engineered to have a working life of seven days allowing for lateral movement, which maximized the amount of area filled from one injection hole, and reduced the number of drill holes required. Mechanical pumps were not required and resulted in less equipment and manpower being used than any other conventional method. This process resulted in a cost savings of about 60% compared to traditional methods.

Utilization Of Native Landslide Material As Cost Effective Alternative Stabilizing Abatement Medium In Eastern Kentucky

Mark E. Snyder, Natural Resource Specialist, Office of Surface Mines, Ashland, KY

Abatement of landslides resulting from pre-law mining practices is expensive and time consuming. To accomplish the intended design remedial measures, large quantities of off-site materials are needed for the projects. In addition, a tremendous amount of waste material (spoil) is generated that must be removed from the landslide construction site and permanently stored. Permanent waste areas are difficult to obtain and transportation of the landslide spoil to these facilities drives up the cost of abatement.

Native soils comprising typical landslides in Eastern Kentucky can be utilized as alternative, cost effective, materials for stabilization and abatement medium. Several designs are available that utilize native soil as the bulk of retaining medium. Such designs include reinforced soil slope walls, gabion faced walls utilizing Geogrid® and compacted soil backfills, gabion walls utilizing pre cast facing blocks filled with compacted soils and other variations or combinations.

By utilizing the native landslide material as the bulk of the stabilizing medium, dependency on outside materials is significantly reduced, transportation of materials from the project site is typically eliminated, adverse impacts are minimized and costs to the funding agencies are reduced.

From Four Corners to All Corners: Connecting for Reclamation



TECHNICAL SESSION 10: PARTNERSHIPS & TECHNIQUES – 4:15–5:15

Millsap Mill Tailings Re-Grading Project

Al Amundson, Colorado Div. of Reclamation, Mining & Safety, Denver CO

The Millsap Mill Tailings are located just south of Victor, Colorado in the Cripple Creek Gold Mining District, in a remote and arid environment. Local waterways are stressed due to the impacts of past mining.

The Millsap tailings ponds were created in the early 20th century to hold tailings from the Independence Gold Mill. The original dams held nearly two million cubic yards of tailings. Breaches allowed the tailings to erode downstream during storms, causing degraded wild trout habitat downstream. This project's goal was to stop the massive erosion, reestablish native vegetation, and improve and protect downstream wild trout habitat.

This project brought together over 20 government agencies, land owners, water rights holders, and nonprofit organizations. More than a reclamation partnership; this project was a cooperative effort which included the Department of Corrections Vocational Training Program. Inmates became skilled in operating heavy construction equipment, construction management, and in interpersonal relationships. The program helps to develop life-long skills which greatly reduce recidivism, easing the burden on the prison system. It also provides jobs to the inmates upon release, with employment opportunities for over 95% of the participants upon release.

The Forestry Reclamation Approach On Abandoned Mine Lands

Jim Holliday, London, KY; Patrick Angel, Morgantown, WV; Brad Edwards, & Vic Davis, Knoxville, TN

The Appalachian Regional Reforestation Initiative (ARRI) is a broad-based citizen/industry/government program working to encourage the planting of productive trees on abandoned and active coal mine lands. Private and governmental resources are combined to facilitate and coordinate citizen groups, university researchers, the coal industry, corporations, the environmental community, and government agencies that have an interest in creating productive forest land on reclaimed mined lands. Forestry research conducted by various academic institutions has confirmed that highly productive forestland can be created on reclaimed mine land by using a Forestry Reclamation Approach (FRA). The FRA has five fundamental parts: create a suitable rooting medium for good tree growth; loosely grade the topsoil or topsoil substitutes to create a non-compacted soil growth medium; use native and noncompetitive ground covers that are compatible with growing trees; plant two types of trees—early succession species for wildlife and soil improvement, and commercially valuable crop trees; and use proper tree planting techniques.

WEDNESDAY, OCTOBER 29

TECHNICAL SESSION 11: OSM AML AWARD PRESENTATIONS – 8:00–10:00

Since 1986, the Office of Surface Mining has presented awards to abandoned mine land programs for exemplary work in the reclamation of abandoned mined lands. The objective is to give public recognition to those responsible for the nation's most outstanding achievement in environmentally sound mined land reclamation and to encourage the exchange and transfer of successful reclamation technology. This session highlights the 2008 award winners from around the country.

TECHNICAL SESSION 12: ACID MINE DRAINAGE – 8:00–10:00

Soils and Stabilizing Acidic Sites on Reclaimed Mine Lands in Iowa

Todd Coffelt, Mines & Minerals Bureau, Div. of Soil Conservation, Dept. of Agriculture & Land Stewardship, Des Moines, IA

An objective of abandoned mine land reclamation is to increase the Soil Organic Matter (SOM) content of the soil, which is indicative of soil health and productivity. Grazing, forage, and habitat land uses are the predominant management practices utilized by landowners on reclaimed mine land in Southeastern Iowa. Soil samples from these three management practices will be compared to undisturbed samples taken from land enrolled in the Conservation Reserve Program to identify which practice has the greatest capability of increasing soil organic matter content and improving the soil's overall productivity. The results will show the effects of each practice in regard to building and maintaining soil health after the reclamation has been completed and how each practice has influenced soil development. With appropriate selection of management practices, the SOM content of reclaimed mine land can approach that of undisturbed soil.

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Addressing Acid Mine Drainage From Complex Conditions At The Tab Simco Mine

Lawrence L. Lewis, P.E., Illinois Dept. of Natural Resources, AMLR Div. of the Office of Mines & Minerals, Springfield, IL

Tab Simco is an abandoned coal mine site located near Carbondale in Jackson County of Southern Illinois. Underground coal mining occurred on the site intermittently from the 1890's to 1955 followed by surface mining in the 1960's and 1970's. The surface mining left a hazardous high-wall and created numerous avenues for surface run-off to enter the workings. Drainage flows continuously from the mine works through spoil material and enters Sycamore Creek with pH ranging from 2.6 to 3.0. This AMD has destroyed over 6.5 acres of forested area and severely impacted over two miles of Sycamore Creek. Since 1990, site investigation and hydrology studies were done to try and identify sources of inflow into the workings and determine a way to mitigate the AMD problem. These studies raised more questions and yielded no feasible solutions.

In the fall of 2003, the Illinois Abandoned Mined Lands Reclamation Division and the Office of Surface Mining formed a team of technical professionals to review the previously-collected data, supplement it with additional investigation, and seek practical ways to mitigate the AMD problem with current technology. This session reports how this was accomplished.

The Long-Term Problem Of Funding AMD Treatment: A Look At The Cost To Provide Environmental Benefits In Maryland

Constance Lyons Loucks, Maryland Dept. of the Environment, Bureau of Mines, Frostburg, MD; and Royden L. Loucks, CTL Engineering of West Virginia, Inc., Morgantown, WV

From 1992 through 2006, the Maryland Department of the Environment (MDE), Bureau of Mines, through multi-agency partnering, invested \$7.2 million to install 28 acid mine drainage (AMD) control systems that treat over 81 miles of streams impaired by pre-law coal mining. 47 of these miles have become a prime destination for fishing and recreational activities. The economic benefit derived from a trout stream is calculated at \$30,835/ mile in western Maryland, resulting in a return of \$1.5M annually from this reclamation. This economic value may hold the key to funding the burdensome long-term operational cost of AMD cleanup. At the current rate of expenditure, a crisis looms for Maryland after 2014, when operation funds are exhausted. With exhausted funds leading to the reversion of treated streams back to historic acidic conditions, it became clear that an analysis of the program's current and future costs and benefits was needed to adequately plan for the future. The final cost/benefit analysis provided hard data to MDE management and Maryland legislative decision makers to find a State funding mechanism for the operational costs and continuance of the program.

Phytostabilization Of Kerber Creek Floodplain Tailings

Karl Ford, Diann Gese, & Steve Sanchez, Bureau of Land Management; Denver, Del Norte, & Saguache, CO

The Kerber Creek tailings are associated with the Bonanza Mining District located near Villa Grove, Colorado. Kerber Creek is a Colorado 303(d)-impaired stream. In the 2003, ASARCO and others completed a remediation of the tailings located in the upper watershed area, however, more than 100 acres of floodplain tailings remain dispersed downstream in the Kerber Creek watershed. The tailings are acidic with moderate to high concentrations of arsenic, copper, lead and zinc. In 2007, BLM performed site characterization on 16 BLM parcels and developed a remediation plan that involves 130 stream restoration and bank shaping projects, consolidation and capping of higher concentration tailings and phytostabilization of lower concentration tailings. Phytostabilization employs amendments such as lime, limestone and compost to amend and revegetate the tailings in-situ. This type of remediation precipitates the metals in-place and enables metals-tolerant grasses and forbs to successfully grow in amended tailings. In 2008, BLM enlisted other partners to demonstrate phytostabilization on private land with the use of test plots. Final construction should take place in 2009.

From Four Corners to All Corners: Connecting for Reclamation



TECHNICAL SESSION 13: LESSONS LEARNED – 10:30–12:00

Lessons Learned From Small, Remote Projects Exemplified By A Reclamation Project Near Bison, South Dakota

Allen Jones, PE, PhD, South Dakota State University, Brookings, SD; Ginger Kaldenbach, Office of Surface Mining, Denver, CO

Small, remote projects pose a particular challenge in mining reclamation, from both reclamation design and contracting and construction standpoints. Factors that can affect project reclamation options include site and local construction materials access, and construction season. Small projects also affect how consultants are contracted and how contract documents are developed. Small, local construction companies may not be familiar with agency contracting methods and requirements for project execution. Costs and overhead/profit will likely be higher for small, remote projects. These higher costs can result in a high cost/benefit ratio that results in reclamation deferral. One such project that faced these issues was completed near Bison, South Dakota.

The Bison project consists of a highwall traversing near a highway embankment that is a major collector servicing agriculture traffic. The highwall encroaches on the highway embankment, resulting in erosion that could affect public safety as well as roadway stability. The project was developed to stabilize the embankment by flattening the slope of the highwall and installing a guard rail. The primary design conclusion from this project is that reclamation options will be driven by the availability of local materials and equipment. Other conclusions are that bid prices are driven by economic conditions at the time of construction and the local contractor's ability to perform the construction.

How Much Experience Can You Get From One Project?

Anthony A. Gallegos, Utah Abandoned Mine Reclamation Program, Salt Lake City, UT

The Utah AMRP began inventory and engineering work on the Star District Project in December of 2001. The closure construction was completed six years later in December of 2007, with additional construction in the spring of 2008.

When a process goes smoothly, we believe everything was done correctly and this reinforces our belief in the process that brought us success. When a process fails we try to figure out what went wrong. We try a different approach. We try something new. We learn NEW things. This session discusses why this project took nearly six years to complete, and assesses the experience gained. Issues affecting this project covered several areas. The consulting firm was performing their first abandoned mine inventory under a fairly new project manager. The larger than anticipated number of abandoned mine openings ate through the budget before the entire project area could be inventoried. More than half of the openings were shafts requiring additional resources to complete bat surveys. Initial construction bids were twice the budgeted amount requiring a second bid offering. Patented claim owners withdrew their rights of entry. The local Mayor and City Council passed a resolution opposing the project work. And more.

Safeguarding New Mexico Mine Openings in a Challenging Environment

Michael W. Tompson, New Mexico Abandoned Mine Land Program, Santa Fe, NM

There are thousands of abandoned mines throughout New Mexico, dating back to before the arrival of the Spanish. The New Mexico Abandoned Mine Land (AML) Program safeguards many of these abandoned mines each year using a variety of techniques. In the fall of 2006, the AML Program concentrated its efforts on one mountain in the southwestern corner of New Mexico. Numerous mine features and waste piles covered the mountain and could be seen from an adjacent road, possibly attracting curious travelers. While the mines were a threat to human safety, they provided significant bat habitat for a variety of bat species. Due to the steepness of the terrain, many of the mine features were not reachable with mechanized equipment. In addition to difficult terrain, historical preservation, nesting barn owls, and angry Africanized honey bees all provided challenges for the design and construction of the project. The contractor hired by the AML Program opted to use a helicopter to get the materials to the mine sites. In total, 18 mine features were closed by backfilling and 21 were safeguarded utilizing bat-friendly structures.

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TECHNICAL SESSION 14: WATER QUALITY IMPROVEMENTS – 10:30–12:00

Water Quality Improvements At The Remote Roy Pray Mine Site In Southwestern Colorado

Kirstin Brown, Colorado Division of Reclamation, Mining & Safety; Denver, CO;

Barbara Hite, Bureau of Land Management Lakewood, CO; presented by B. Stover

The remote Roy Pray Mine is located in the San Juan Mountains of southwestern Colorado at an elevation of 12,600'. The portal discharge from this abandoned silver mine was one of the largest loaders of metals to Palmetto Gulch, a sub-watershed of the Lake Fork of the Gunnison River. In 2004, Palmetto Gulch was placed on the state's 303(d) list for cadmium and zinc impairments.

To eliminate the acid mine discharge, the U.S. Bureau of Land Management and the Colorado Division of Reclamation, Mining & Safety constructed a watertight concrete bulkhead 137 feet underground in the mine adit. Additional reclamation activities included excavating the acid-generating mine waste located adjacent to the stream and building an on-site repository. The best management practices used to remediate the mine drainage and waste are low maintenance, and thus suited to this remote location.

Post-reclamation sampling following bulkhead construction and waste removal indicates that cadmium and zinc concentrations at the mouth of Palmetto Gulch were reduced by 30%. The Roy Pray Mine water quality improvement project is an example of low maintenance reclamation techniques that can be applied to many other remote hardrock mine sites.

Tiger Mine Complex Reclamation, Lake County, Colorado

Kato Tsosie Dee, Colorado Mountain College Natural Resource Management Student Internship Program, Leadville, CO

The Tiger Mine Complex is one of many abandoned mine lands in the Sugarloaf Mining District, located in west Lake County, Colorado. After combining data from several sources and studies, it was determined that the Tiger Mine Complex is the highest priority site in the Colorado Gulch watershed for reclamation. The Complex's tunnel, mine waste, and adits are located in the upper reach of the East Fork of Little Frying Pan Gulch, which is an intermittent drainage of Colorado Gulch; the Gulch contributes approximately 80% of the zinc load to the Lake Fork of the Arkansas River during high flow periods. Drainage from the Complex contributes approximately 23% of the zinc load to Colorado Gulch during high flow. Through a collaborative effort that involves the Lake Fork Watershed Working Group, US Bureau of Land Management, Colorado Division of Reclamation, Mining, and Safety, Colorado Mountain College, and Trout Unlimited, the Tiger Mine Complex will undergo remedial and reclamation activities that began in the summer of 2008. Anticipated mitigation includes the relocation of mine waste piles, hydrologic controls, passive treatment, and the installation of a sulfate-reducing bioreactor to improve water quality originating from the Tiger Mine Complex.

An Experimental Groundwater Redirection Project In The South Fork Patoka River Watershed

Mark Stacy, CEP, Indiana Dept. of Natural Resources, Jasonville, IN

The South Fork Patoka River Watershed in southwestern Indiana was once considered the most heavily impacted stream in the state, due to acid mine drainage (AMD) from past coal mining activities. The Indiana Div. of Reclamation's Abandoned Mine Lands (AML) Program has reclaimed 1,500 acres within the watershed. The Durham Ditch sub-watershed has been identified as the last major source of AMD contamination. Located in the headwaters of this sub-watershed is a large, perennially draining acid mine seep that consists of two distinct types of water quality. It is believed that these seeps are passing through two distinct groundwater zones; one with typical acid spoils, the other with net alkaline spoils. The plan consists of forcing the acid seep to flow through the net alkaline spoil zone to "pre-treat" the acid seep so that the discharge is less acidic and treatable using passive treatment technologies. If this is successful, the next phase will be to build a passive treatment system to treat the remaining seeps. The Indiana Geological Survey reviewed the project in the summer of 2008, and the results of the review will be presented.

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Notes

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