NAAMLP

NATIONAL ASSOCIATION OF ABANDONED MINE LAND PROGRAMS

37th ANNUAL NAAMLP CONFERENCE

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RECLAIM·MONITOR·INNOVATE

37th ANNUAL CONFERENCE

NATIONAL ASSOCIATION OF ABANDONED MINE LAND PROGRAMS

SEPTEMBER 28-30 2015

LA FONDA HOTEL
SANTA FE, NEW MEXICO

HOSTED BY:

NEW MEXICO emnrd Energy, Minerals and Natural Resources Department

NAVAJO ABANDONED MINE LANDS RECLAMATION / UMTRA DEPARTMENT

DIAMOND SPONSOR

Learning from the Past, Envisioning the Future

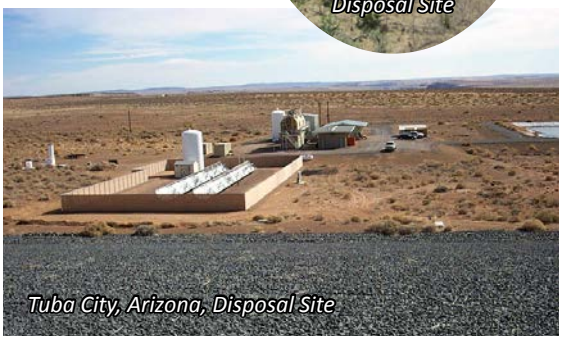
Durango, Colorado, Disposal Cell


L-Bar, New Mexico, Disposal Site

U.S. atomic energy research and production activities began with the Manhattan Project during World War II and continued through the pursuit of nuclear weapons and atomic energy during the Cold War era and beyond. These activities left a legacy of environmental impacts at hundreds of sites across the United States. The U.S. Department of Energy is the government agency responsible for addressing the negative effects of this legacy.

The DOE Office of Legacy Management was created in 2003 to fulfill DOE's commitment to protect public health and the environment at legacy sites. Numerous sites and tens of thousands of acres of land have been, and will be, transferred to the Office of Legacy Management for long-term care after environmental cleanup has been completed under other programs. Although many legacy sites were located near uranium mines, DOE was not responsible for mine-site cleanup.

As of 2015, the Office of Legacy Managent oversees 90 sites in 28 states and Puerto Rico, working with other federal programs, state and local agencies, tribes, interest groups, and citizens.


Tuba City, Arizona, Disposal Site


Rocky Flats, Colorado, Site

U.S. DEPARTMENT OF ENERGY | Legacy Management

Email: lm@hq.doe.gov • Phone: (877) 695-5322

http://energy.gov/lm

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State of New Mexico
Energy, Minerals and Natural Resources Department

Susana Martinez
Governor

David Martin
Cabinet Secretary

Brett F. Woods, Ph.D.
Deputy Cabinet Secretary

Fernando Martinez, Director
Mining and Minerals Division

Welcome to the 37th annual National Association of Abandoned Mine Land Programs Conference.

I am proud to offer the hospitality of the great state of New Mexico and its historic capital city of Santa Fe while you attend this important conference hosted by the New Mexico Abandoned Mine Land Program in association with the Navajo Abandoned Mine Land Program.

You can look forward to an exciting few days of technical education opportunities; networking with colleagues and industry; tours of prehistoric and historic hardrock sites, of award-winning reclamation sites, of an ancient national monument, and of a modern-day national laboratory. Your active participation is appreciated and the collaboration of like-minded partners in this important work will enrich us all and enlighten our continued efforts in our state programs.

New Mexico is well known for its scenic beauty as well as for its mineral resources. The rich history of mining in New Mexico spans more than a millennium, beginning with Native American miners who extracted deposits of turquoise and lead. Now, it is estimated that more than 15,000 abandoned mine features exist in this state alone. Reclaiming and safeguarding these sites is near and dear to our hearts, as it is to you in your own state. The work performed by our respective state programs saves lives and imparts positive environmental effects — a worthy mission.

On behalf of the New Mexico Energy, Minerals and Natural Resources Department's Mining and Minerals Division and its Abandoned Mine Land Program, welcome to New Mexico and to all the opportunities afforded by this conference.

Fernando Martinez, Director
Mining and Minerals Division

THE NAVAJO NATION

RUSSELL BEGAYE PRESIDENT
JONATHAN NEZ VICE PRESIDENT

Dear Attendees,

On behalf of Navajo AML Program, it is my pleasure to welcome you to the 37th National Association of AML Programs conference. We are much excited, as co-host, you are attending the conference scheduled with great presentations, evening/special events, technical sessions, and site tours. The work we do is unique reclaiming AML problems; thus, most sessions are associated with reclamation efforts. Networking is an opportunity to share information and discuss common issues.

Santa Fe is a beautiful place to visit; it will be unforgettable experience. So much is offered such as shopping, hiking, mountain biking, taking advantage of scenic cultural tours, and simply enjoying the historic downtown Santa Fe.

We would like to thank our sponsors for their contributions that enhance what we will accomplish. Thank you AML team members for your efforts that will make our conference enjoyable and memorable. Also, thanks to our exhibitors and attendees who make the conference so exciting.

Madeline Roanhorse
Department Manager III
Navajo AML/UMTRA Department

NATIONAL ASSOCIATION OF ABANDONED MINE LAND PROGRAMS

Dear Conference Attendees:

On Behalf of the 31 States and Tribes that comprise the National Association of Abandoned Mine Lands Programs (NAAMLP), welcome to Santa Fe, New Mexico, and our 37th Annual Conference. The New Mexico and Navajo Nation AML Programs have worked diligently to assemble an excellent technical program, interesting field trips, and an exhibitor's hall that will allow us to share our reclamation successes, learn about new technology, and connect with our fellow members, consultants, students, vendors, and contractors.

For 37 years the NAAMLP member states and tribes have continued to meet national goals for reclaiming and safeguarding the hazards and environmental problems resulting from past mining practices, while working to advance legislation and environmental initiatives to support abandoned mine reclamation throughout the nation.

This past year, NAAMLP began an effort to reauthorize the fee collection authority contained within Title IV of SMCRA along with other related legislative changes that we believe will improve the program. We also continue to advocate for a national hardrock abandoned mine reclamation program that would enable certified states/tribes to continue and expand on the work they have been able to achieve within SMCRA's framework and allow other states with or without historic coal production to address the hazards and environmental problems from unreclaimed legacy hard rock and non-coal mining sites remaining in many regions of the country. To accomplish these ambitious goals, it is critical that we continue to highlight the need for AML funding, share our accomplishments, successes and technological advances, and maintain our dialogue on common issues and problems related to the reclamation of abandoned mine lands. NAAMLP urges all conference participants and members to support reauthorization of the AML fee.

I am honored to have served as President of this association this past year. With work on reauthorization gearing up coupled with the administration's AML Economic Revitalization Proposal, it has been quite a busy year for the association. Over the years our connections and collaborative efforts on legislative, policy, funding and technical issues have built a strong, dedicated organization of friends and colleagues working together to benefit the public, our nation, and the environment. Thanks to each of you for your participation, support, and daily contribution to our cause.

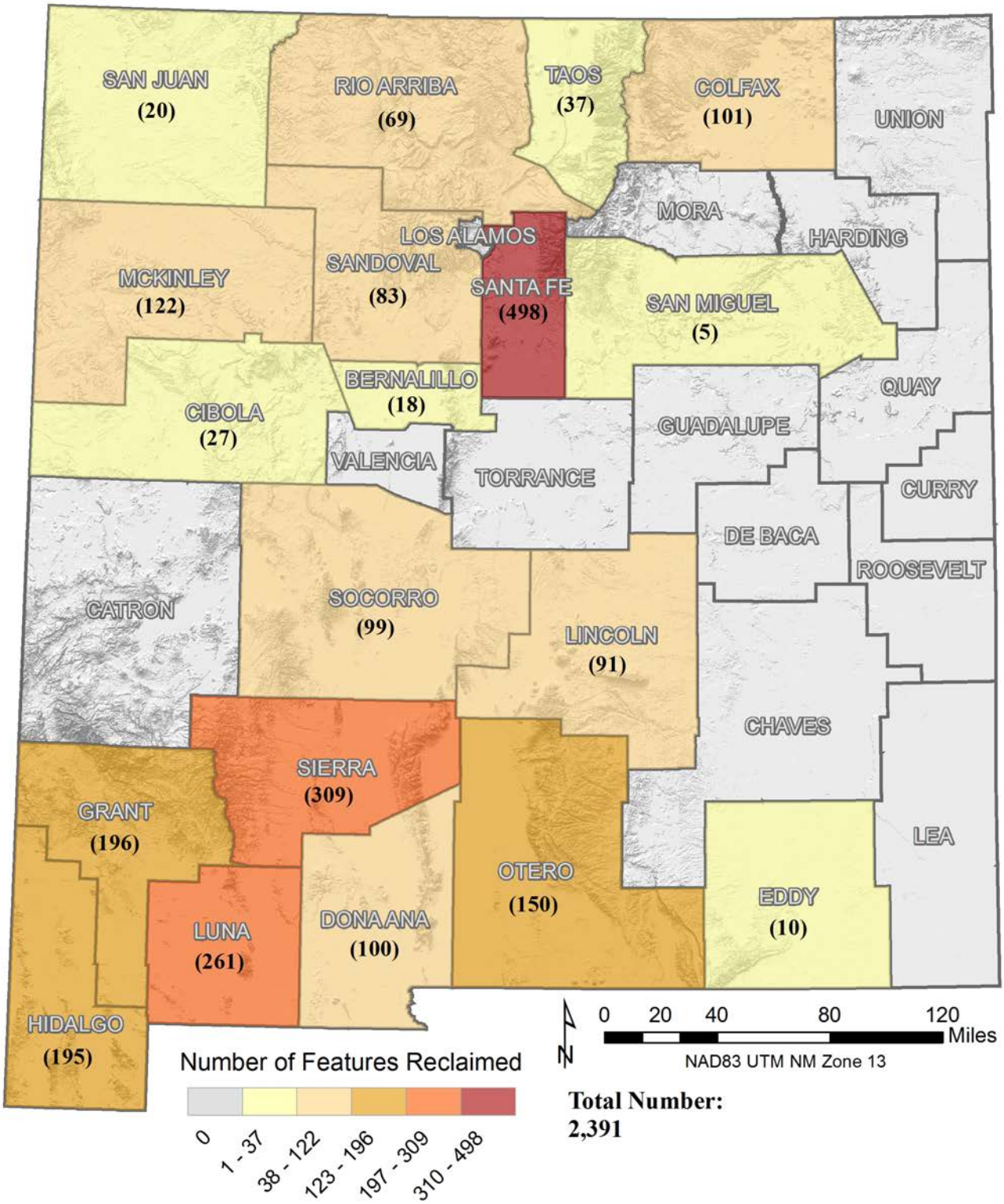
On behalf of NAAMLP, I would like to thank our sponsors, presenters, exhibitors, and all the planners and staff of the New Mexico and Navajo Nation AML Programs who have worked so hard to make this conference successful. Please take this opportunity to connect with conference participants from around the nation (and beyond) and also our scholarship winners. But most of all enjoy your visit to New Mexico and the "Land of Enchantment."

Eric E. Cavazza

President, NAAMLP

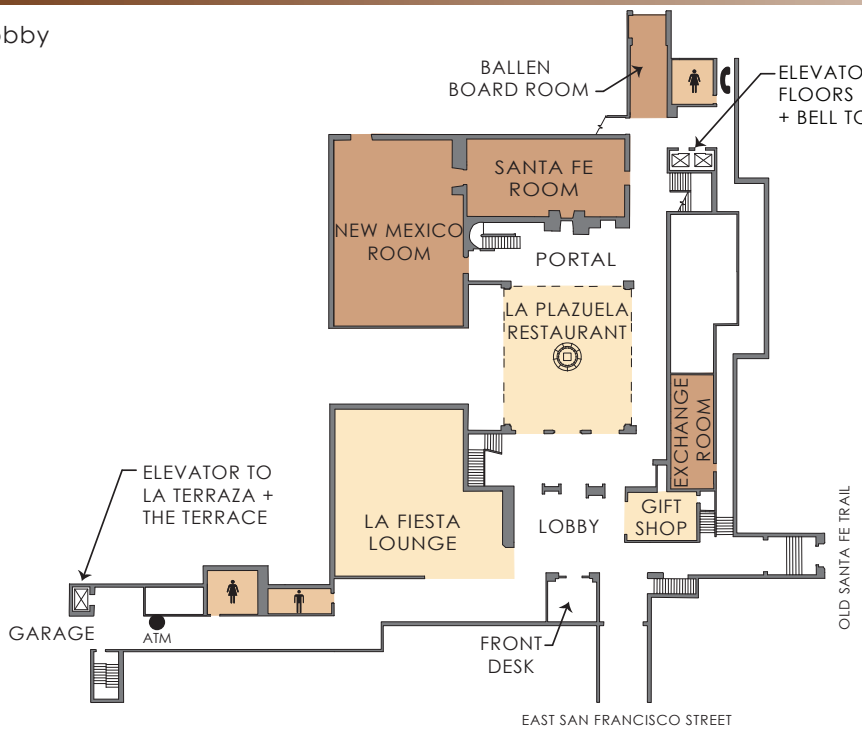
NEW MEXICO

ABANDONED MINE LAND PROGRAM FEATURES RECLAIMED (1981-2015)



First Floor

Lobby

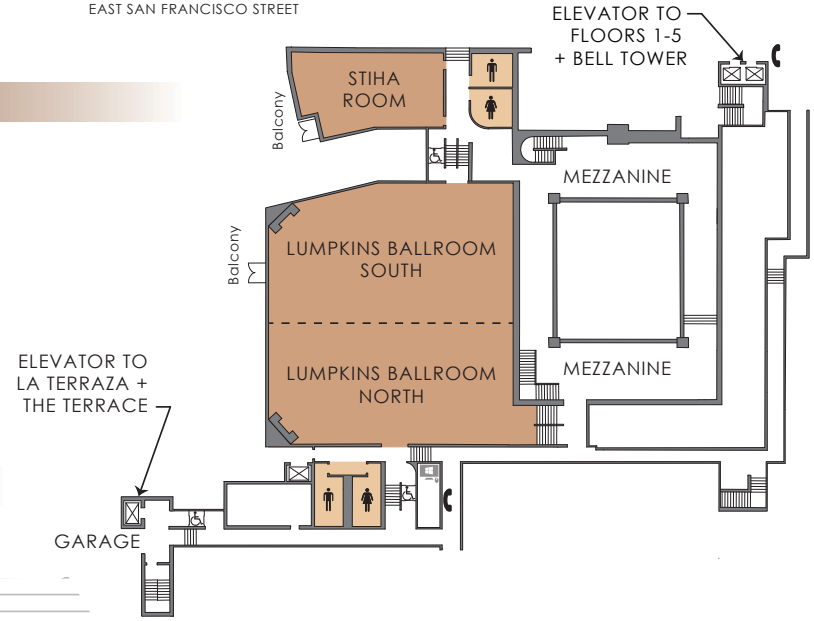


La Fonda On the Plaza™

100 E. San Francisco Street
Santa Fe, New Mexico 87501

Second Floor

Mezzanine & Ballroom



Third Floor

La Terraza

Elevator | Stairs | Lift | Restrooms | House Phone

2015 CONFERENCE AGENDA

Sunday, September 27, 2015

8:00 am - 1:00 pm	Golf Gathering (Black Mesa Golf Course)
1:00 pm - 5:00 pm	Exhibitor Set Up (La Fonda Hotel - Mezzanine)
1:00 pm - 5:00 pm	NAAMLP Committee Meetings (Stiha and Hospitality Rooms)
2:00 pm - 6:30 pm	Registration and Information Desk (La Fonda Hotel - Lobby)
6:30 pm - 8:30 pm	Welcome Reception Meet & Greet with Exhibitors (La Terraza area)
8:30 pm - 11:00 pm	Hospitality Suite Open (Room 501)

Monday, September 28, 2015

6:00 am - 7:30 am	Continental Breakfast with Exhibitors (Lumpkins Ballroom)			
6:30 am - 5:00 pm	Registration and Information Desk (La Fonda Lobby Area)			
7:00 am - 5:00 pm	Speaker Ready Room (Ballen Board Room)			
8:00 am- 10:00 am	Exhibits Open	Plenary Session (Lumpkins Ballroom)		
10:00 am - 10:30 am		Break with Exhibitors (Mezzanine)		
10:30 am - 11:00 am		Technical Session - **Watershed Restoration/Reclamation**	Technical Session - **Bats and Wildlife**	Technical Session - **Water Quality**
11:00 am - 11:30 am		Technical Session - **Watershed Restoration/Reclamation**	Technical Session - **Bats and Wildlife**	Technical Session - **Water Quality**
11:30 am - 12:00 pm		Technical Session - **Watershed Restoration/Reclamation**	Technical Session - **Bats and Wildlife**	Technical Session - **Water Quality**
12:00 pm - 1:30 pm		Lunch on your own		

AGENDA CONT.

1:30 pm – 2:00 pm	Exhibits Open	Technical Session - **Bats and Wildlife**	Technical Session - **Subsidence**	Technical Session - **Water Quality**
2:00 pm – 2:30 pm		Technical Session - **Bats and Wildlife**	Technical Session - **Subsidence**	Technical Session - **Water Quality**
2:30 pm – 3:00 pm		Technical Session - **Bats and Wildlife**	Technical Session - **Subsidence**	Technical Session - **Water Quality**
3:00 pm – 3:15 pm		**Break with Exhibitors** (Exhibitor Room)		
3:15 pm – 3:45 pm		Technical Session - **Reclamation**	Technical Session - **Inventory**	Technical Session - **Public Participation and Partnerships**
3:45 pm – 4:15 pm		Technical Session - **Reclamation**	Technical Session - **Inventory**	Technical Session - **Public Participation and Partnerships**
4:15 pm – 4:45 pm		Technical Session - **Reclamation**	Technical Session - **Inventory**	Technical Session - **Public Participation and Partnerships**
5:15 pm – 6:15 pm		**Reception – Cash Bar (Mezzanine Exhibitor Area)**		
6:25 pm – 9:20 pm		**Awards Banquet (Lumpkins Ballroom)**		
9:20 pm – 11:00 pm		**Hospitality Suite Open (Room 501)**		

Tuesday, September 29, 2015

6:00 am – 7:30 am	**Continental Breakfast with Exhibitors (TBD)**
7:00 am – 8:00 am	**Registration and Information Desk (La Fonda Lobby Area)**
7:30 am – 5:00 pm	**<u>Technical Tours</u> Tour #1: San Cristobal Pueblo and Petroglyphs Tour #2: Historic Ranchos de Los Luceros, Harding Pegmatite Mine & Santuario de Chimayo Tour #3: Bandelier National Monument & Los Alamos Tour #4: Madrid, Cerrillos Turquoise Mines and Leonora Curtlin Wetland Preserve Tour #5: Puye Cliff Dwellings, Shidoni Bronze Foundry and Tesuque Glassworks, the Palace of the Governors**
6:30 pm – 8:30 pm	**Tuesday Evening BBQ (Santa Fe Farmer's Market Pavilion, cash bar)**
9:00 pm – 11:00 pm	**Hospitality Suite Open (Room 501)**

AGENDA CONT.

Wednesday, September 30, 2015

6:30 am – 8:00 am	**Continental Breakfast with Exhibitors (TBD)**			
7:00 am – 12:00 pm	**Speaker Ready Room (Ballen Board Room)**			
7:30 am – 12:30 pm	**Registration and Information Desk (La Fonda Lobby Area)**			
8:00 am – 5:00 pm	**NAAMLP Business Meeting (Lumpkins Ballroom)**			
8:00 am – 8:30 am	Exhibits Open	Technical Session - **Monitoring and Inventory**	Technical Session - **OSM Award Winner**	Technical Session - **Water Supply Replacement**
8:30 am – 9:00 am		Technical Session - **Monitoring and Inventory**	Technical Session - **OSM Award Winner**	Technical Session - **Water Supply Replacement**
9:00 am – 9:30 am		Technical Session - **Monitoring and Inventory**	Technical Session - **OSM Award Winner**	Technical Session - **Bats and Wildlife**
9:30 am – 10:00 am		Technical Session - **Monitoring and Inventory**	Technical Session - **OSM Award Winner**	Technical Session - **Bats and Wildlife**
10:00 am – 10:30 am		Technical Session - **Emergency Work**	Technical Session - **Reclamation**	Technical Session - **Bats and Wildlife**
10:30 am – 10:45 am		**Break with Exhibitors (Mezzanine Exhibitor Area)**		
10:45 am – 11:15 am		Technical Session - **Reclamation**	Technical Session - **Water Quality**	Technical Session - **Reforestation**
11:15 am – 11:45 am		Technical Session - **Reclamation**	Technical Session - **Water Quality**	Technical Session - **Reforestation**
11:45 am – 12:15 pm		Technical Session - **Reclamation**	Technical Session - **Water Quality**	Technical Session - **Reforestation**
12:15 am – 12:45 pm		Technical Session - **Reclamation**	Technical Session - **Policy**	Technical Session - **Subsidence**
12:45 pm	**Conference Concludes - Lunch on your own Have a Safe Trip Home!**			

SCHOLARSHIP RECIPIENT:

EASTERN REGION

LAURA NUGENT
WEST VIRGINIA UNIVERSITY
BACHELOR OF SCIENCE IN MINING ENGINEERING

The eastern recipient of the 2015 NAAMLP Scholarship is Laura Nugent. Ms. Nugent is entering her senior year at West Virginia University in Morgantown, WV. and will be graduating next spring with a B.S. in Mining Engineering. Previously she completed her coursework in Economics and received a B.A. from Washington and Lee University in Lexington. KY. Presently Ms. Nugent is an intern with Cloud Peak Energy working reclaiming an abandoned mine site in Sequatchie Valley, TN. This mine closed in the 1990's and is creating acid mine drainage (AMD). To complicate the problem the watershed contains additional abandoned mines. To aid in abating the AMD at the Cloud Energy site, she will be conducting in-situ testing of bio-reactors, performing water balance studies, as well as investigating a wetland that should not be, but is, producing manganese. Upon graduating from WVU, Ms. Nugent would like to work on changing the general public's perception of mining by publicizing reclamation projects that show it is possible to mitigate the problems caused by past mining, in addition to showing the public that through good planning and design these problems do not have to be duplicated in the future.

SCHOLARSHIP RECIPIENT:

MID-CONTINENT REGION

KENDRA MINER
COE COLLEGE
BACHELOR OF ARTS IN BIOLOGY AND ENVIRONMENTAL SCIENCE

The mid continent recipient of the 2015 NAAMLP Scholarship is Kendra Miner. Ms. Miner will be a senior at Coe College in Cedar Rapids, Iowa. She is currently studying to complete her degree in Biology and Environmental Science. She will receive a minor in writing and has worked as a writing consultant in the Coe College Writing Center. During the summer of 2014 she worked as a research assistant in the Coe College Water Quality Lab. This entailed taking water samples from several wetlands and streams within the Cedar River Watershed. These samples were tested for nutrients, sediment, and microbial populations in the water. As part of her research history, she has conducted research on the water quality of the ephemeral pools at the Behrens Ponds and Woodlands Preserve near Toddville, Iowa. In conducting her honors research project this summer she studied the population of blue-spotted salamanders at the Behrens Ponds Preserve. This fall she will be writing her honor's thesis on what she found during her course of research on the salamanders. Along with all her other activities, Ms. Miner is a certified water quality monitor for the Iowa Department of Natural Resources as well as a committee member for her local chapter of the National Turkey Federation.

SCHOLARSHIP RECIPIENT:

WESTERN REGION

ABIGAIL TOBIN
NORTHERN ARIZONA UNIVERSITY
MASTER OF SCIENCE IN FORESTRY

The western recipient of the 2015 NAAMLP Scholarship is Abigail Tobin. Ms. Tobin is working on her Masters of Science in Forestry at the Northern Arizona University, in Flagstaff, Arizona. Following receipt of her Bachelor's degree from the University of New Hampshire Durham, she went to work with the Arizona Game and Fish Department in their Wildlife Contracts Branch. This is where she developed her interest in bat ecology and abandoned mine land reclamation. Part of her job with the Wildlife Contracts Branch was conducting bat surveys on abandoned underground mines in northwestern Arizona. The information learned from the bat habitat surveys was given to the land managers to aid them in closing the abandoned underground mines. She continued her work with bats as a crew leader with the Colorado Parks and Wildlife. Her crew was responsible for doing external and internal biological and bat surveys of mines to determine the best closure methods. Doing this she was able to develop her skills with identifying and tracking bats through trapping, videography and telemetry. At this time she would like to further her expertise by obtaining her master's through researching the effects of bat gate design on bat usage and behavior in abandoned mine lands in the Southwest, United States.

OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT AWARDS

NATIONAL AWARD

Lake Valley Mine Safeguard Projects, Lake Valley, Sierra County, New Mexico The judges chose the Lake Valley project for very challenging conditions due to the large number of dangerous mine openings, the presence of weak subsurface soil and rock, and the presence of deteriorated cribbing and near-surface underground workings. The project team utilized creative technical solutions to address the issues on the site. Toroid tire plugs were a very innovative use of new technology utilizing material that would normally be a waste product, and geosynthetically confined soil was an affordable engineering technique that provided a reliable closure solution.

APPALACHIAN REGION AWARD

OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT AWARDS

SIMPSON NORTHEAST COAL REFUSE FIRE FELL TOWNSHIP, LACKAWANNA COUNTY, PENNSYLVANIA

The judges selected the Simpson Northeast project for its involvement in a high-priority site that required a quick turn-around. The design team worked very quickly to start and finish the project and made sure to utilize various engineering methods to control water runoff and work around the freezing temperatures.

The project was high-profile and was well received by the community. The design team utilized OSMRE resources to tackle a problem they didn't have specific experience in.

OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT AWARDS

MID-CONTINENT AWARD

AML SITE 2052 MINNEHAHA SLURRY, SULLIVAN COUNTY, INDIANA

The judges chose to honor the Minnehaha Slurry site for tackling unique engineering challenges to consolidate existing slurry material into a smaller area and stabilization of the project levee through traditional earthwork and non-traditional approaches. The use of a passive bioreactor was a great use of new technologies. Geomorphic design was also included in the project and the post-construction contours very well executed.

SMALL PROJECT AWARD

OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT AWARDS

LIGHTNER/BOSTON COAL MINE EROSION CONTROL PROJECT, DURANGO, COLORADO

The judges chose the Durango, Colorado project for its involvement, cooperation and input between several agencies, particularly Colorado and New Mexico, in order to achieve success. The project included the input of community members and the local college which helps spread the word about AML programs. The project also focused on detailed re-vegetation that was more labor intensive but ultimately created microclimates for vegetation, and therefore wildlife, to thrive.

TOUR 1
SAN CRISTÓBAL PUEBLO

Plaza at San Cristóbal Pueblo
photo by Steven Lakatos

San Cristóbal Pueblo is one of the premier archaeological and rock art sites in the Southwest(http://galisteo.nmarchaeology.org/sites/pueblo-san-cristobal.html). Located on a private ranch a short distance south of Santa Fe, the pueblo was occupied from the 14th century through 1680 when the successful Pueblo Revolt briefly ended Spanish Colonial rule in New Mexico. The pueblo consists of more than 1600 rooms organized around 12 plazas, and the 1620s mission ruins include the convento and some standing walls of the church. The associated rock art is estimated to include more than 10,000 images, much of it reflecting the pre-European religious iconography of the pueblo residents.

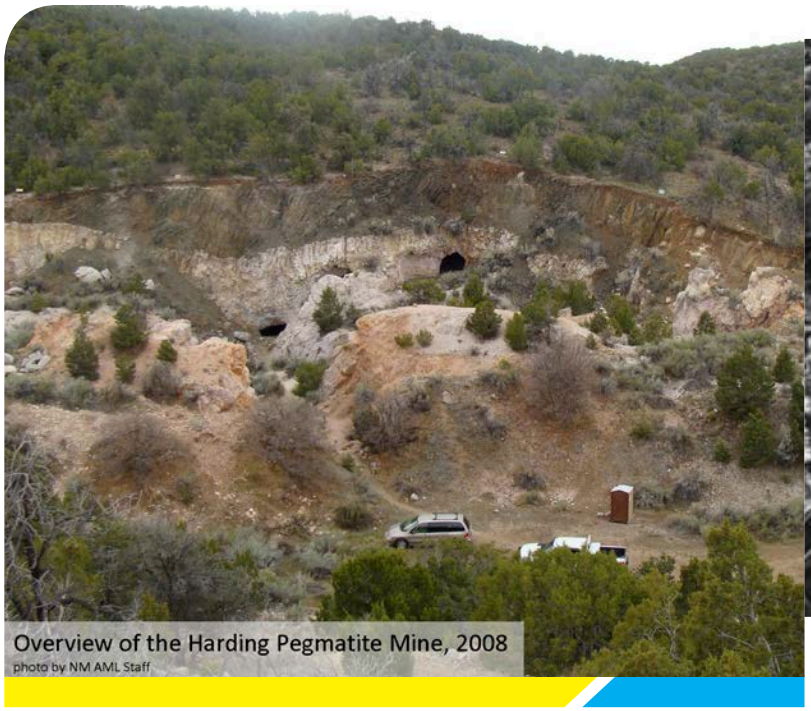
The site is undeveloped, and the all-day tour will involve hiking over rough and uneven terrain with some strenuous ascents. Participants should bring long-sleeve shirts, long pants, sturdy boots or walking shoes, day packs for water, and whatever protective clothing is required by the weather of the day.

Limited to 45 participants, plus support staff (3 OAS tour guides, 3 volunteers, bus and extra vehicles planned). All tours will leave the La Fonda Hotel in the morning and return to La Fonda by 5:00 pm. Box lunches provided on site.

Petroglyphs at San Cristóbal Pueblo
photo by Steven Lakatos

Petroglyphs at San Cristóbal Pueblo
photo by Steven Lakatos

TOUR 2
LOS LUCEROS/HARDING PEGMATITE/ HIGH ROAD TO TAOS



1950's Beryl Mining at the Harding Pegmitite Mine (Photo by Laura Gilpin, 1953; Courtesy of UNM)

HISTORIC RANCHOS DE LOS LUCEROS

The tour will begin at the historic Los Luceros property, a 148-acre ranch located along the Rio Grande. The ranch features an 18th century territorial-style adobe hacienda and an 18th century chapel.

HARDING PEGMATITE MINE NEAR DIXON, NEW MEXICO

This project was the 2013 winner of the NAAMLP Small Construction Project Award. A verbal presentation will be followed by a one-hour site tour, moderate walking.

Mining within this area dates back to the early 1900's to the 1950's. Initial prospecting was for gold. Despite the heavy quartz mineralization, there are no records that gold was found.

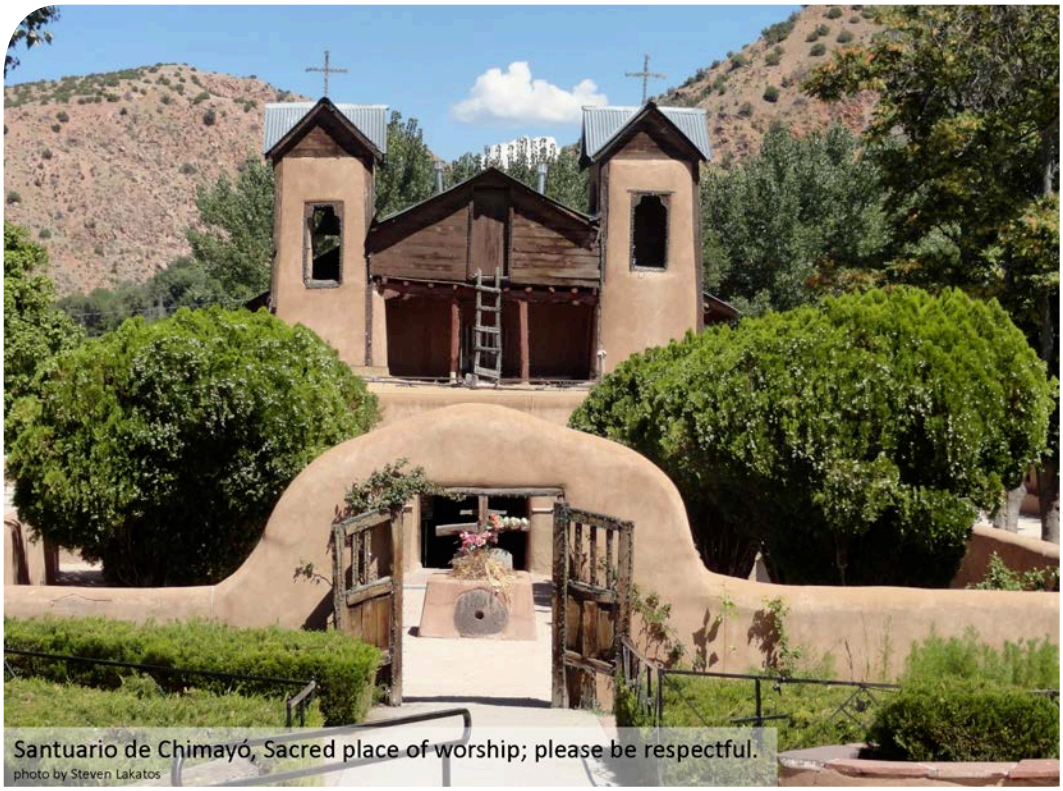
Explorations did lead to three phases of mining activity: lepidolite throughout the 1920's, microlite in the 1940's, and finally beryl mining in the 1950's. This legacy of mining left behind hazardous mine openings and a highwall at a heavily visited abandoned mine site.

In 1978, ownership of the mine was transferred to the University of New Mexico (UNM) with some difficulties. This area is rich in strategic mineralization, hence, the federal government reserves the right to access these minerals when necessary. Three to four thousand people, including school children, visit the site each year. Interpretive signs are placed near the mine entries. The project was completed in August 2011.

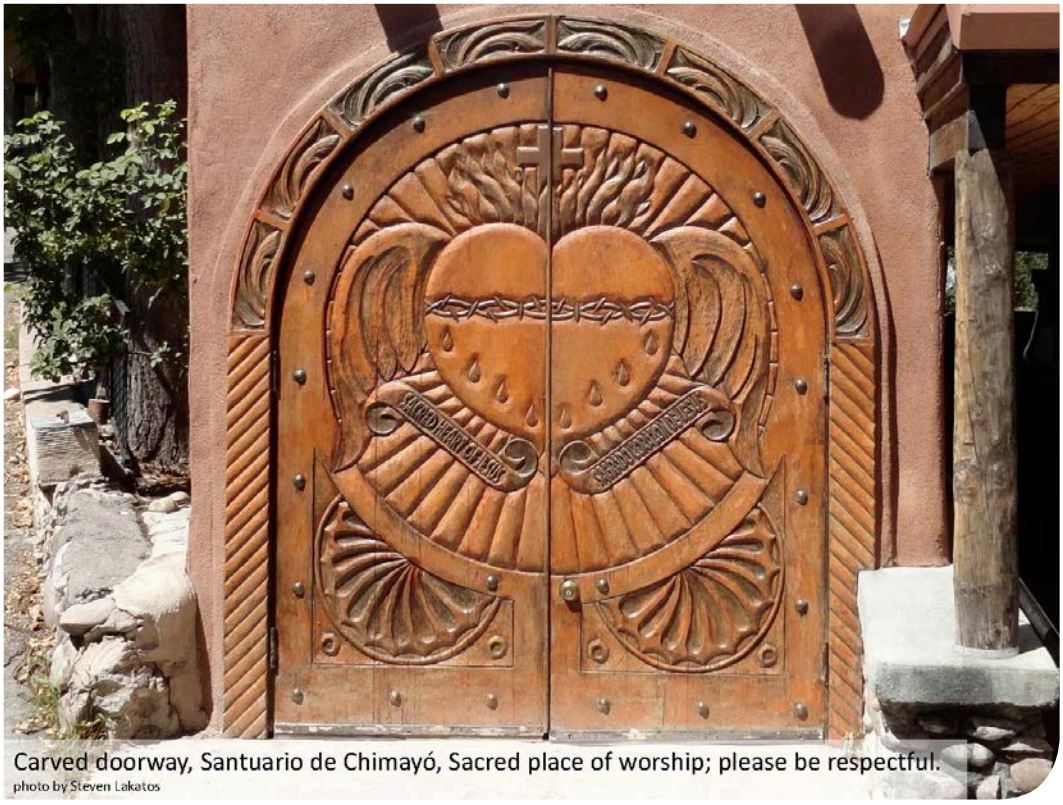
HIGH ROAD DRIVE FROM DIXON, THROUGH PENASCO, DOWN TO CHIMAYO, NEW MEXICO

A scenic 35-mile drive from the high mountains back into the valley floor. See the high mountains, changes in vegetation, overview of the surrounding valley, and back down to the valley floor. There are visual views for hundreds of miles on clear days.

All tours will leave the La Fonda Hotel in the morning and return to La Fonda by 5:00 pm. Box lunches provided on site.



Santuario de Chimayó, Sacred place of worship; please be respectful.
photo by Steven Lakatos



Carved doorway, Santuario de Chimayó, Sacred place of worship; please be respectful.
photo by Steven Lakatos

EL SANTUARIO DE CHIMAYÓ IN CHIMAYO, NEW MEXICO

(Time permitting,http://www.elsantuariodechimayo.us)

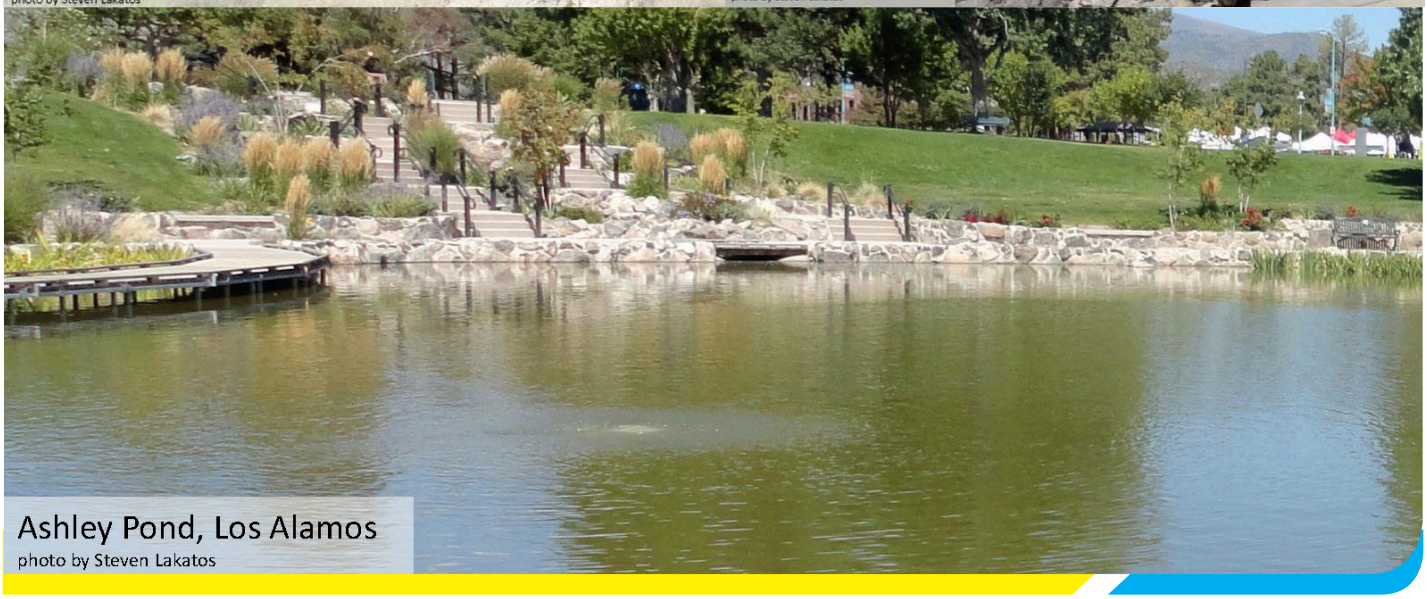
Local Santuario that has historical significance to many people. El Santuario de Chimayó, the tiny shrine that is built on the site of what many believe to be a miracle associated with the crucifix of "Nuestro Señor de Esquipulas" (Our Lord of Esquipulas). El Santuario de Chimayó is also the site of "el pocito" the small pit of Holy Dirt which many people attribute as possessing remarkable curative powers.

All tours will leave the La Fonda Hotel in the morning and return to La Fonda by 5:00 pm. Box lunches provided on site.

TOUR 3
LOS ALAMOS/BANDELIER NATIONAL MONUMENT

Tyuonyi (pronounced Qu-weh-nee) pueblo, Bandelier National Monument
photo by Steven Lakatos

Ashley Pond, Los Alamos
photo by Steven Lakatos



Ashley Pond, Los Alamos
photo by Steven Lakatos

BANDELIER NATIONAL MONUMENT

An Open Book of Human History

Bandelier National Monument protects over 33,000 acres of rugged but beautiful canyon and mesa country as well as evidence of a human presence here going back over 11,000 years. Petroglyphs, dwellings carved into the soft rock cliffs, and standing masonry walls pay tribute to the early days of a culture that still survives in the surrounding communities.

ASHLEY POND

It was named for Ashley Pond II, the founder of the Los Alamos Ranch School, whose students could not resist the geographical pun. Blocks of ice were cut from the pond in the winter and stored in the Ice House. Ashley Pond Park contains a number of sculptures that are part of the county art collection curated by the Art in Public Places Board.

All tours will leave the La Fonda Hotel in the morning and return to La Fonda by 5:00 pm. Box lunches provided on site.

TOUR 4
MADRID, CERRILLOS TURQUOISE MINES, AND LEONORA CURTIN WETLAND PRESERVE

Tiffany Turquoise Mine, Cerrillos Mining District
photo by NM AML Staff

We will begin the day in Turquoise Hills, an area known to have been mined by Native Americans long before the arrival of the Spanish in New Mexico during the mid-1500s. Located at the north end of the Cerrillos Mining District, we will visit the famed Tiffany and Castilian Turquoise Mines, most notable for producing the intense blue turquoise that Charles Lewis Tiffany desired for his jewelry and currently owned by jeweler Douglas Magnus (http://www.douglasmagnus.com/magnus-studios-history).

During the tour, we will hear a presentation by the landowner and view various mine closures completed during a 1997 AML Safeguarding Project, which primarily utilized steel mesh and fencing to safeguard the mine openings, while preserving the integrity of historic mine features, and providing for continued bat habitat.

Along with the presentation, participants will be able view the underground workings of the Tiffany Mine.

After visiting Turquoise Hills, we will have lunch at the Leonora Curtin Wetland Preserve, which is a 35-acre preserve managed by the Santa Fe Botanical Garden (http://www.santafebotanicalgarden.org/visit-us/leonora-curtin-wetland-preserve/).

Tiffany Turquoise Mine, Cerrillos Mining District
photo by NM AML Staff

Historic buildings, Madrid, New Mexico
photo by NM AML Staff

Santa Fe Botanical Garden, Leonora Curtin Wetland Preserve
photo by Steven Lakatos

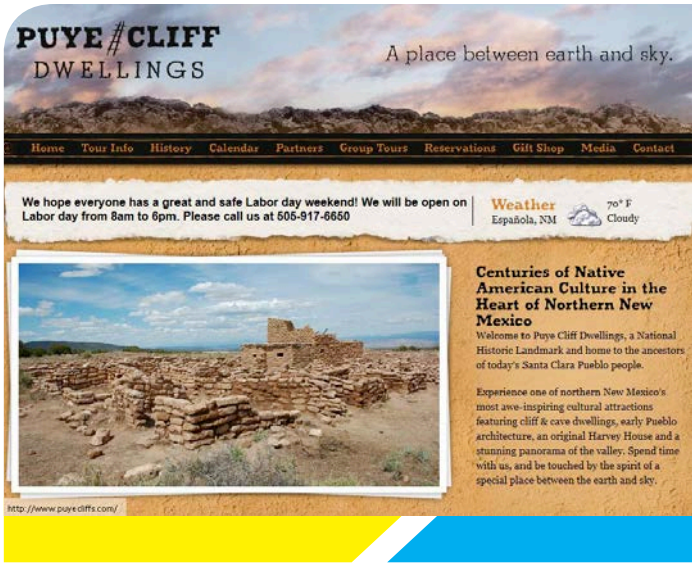
The wetlands are formed by a natural cienega (marsh in Spanish) that hosts a diversity of plants and wildlife. We will walk trails that run through three distinct plant communities: perennial wetland, transitional, and dry upland, view the ponds and discuss the diversity of plants, restoration areas, wildlife, history, and geology throughout the preserve.

Turquoise Trail, Madrid, New Mexico
photo by NM AML Staff

Finally, we will visit the historic coal mining community of Madrid (http://www.visitmadridnm.com/). Located on the Scenic Turquoise Trail between Santa Fe and Albuquerque, Madrid began as one of earliest coal mining communities in New Mexico and has since evolved into a thriving community of merchants and artisans. During this tour we will discuss past AML reclamation projects and visit the newly completed AML Erosion Control and Maintenance project, designed to maintain previously safeguarded mine openings, stabilize reclaimed coal waste piles, rehabilitate mining-era infrastructure, and improve stormwater runoff. After visiting the reclamation project, participants will be able to spend some time visiting the local art galleries and other attractions before heading back to Santa Fe.

All tours will leave the La Fonda Hotel in the morning and return to La Fonda by 5:00 pm. Box lunches provided on site.

TOUR 5
PUYE CLIFF DWELLINGS, SHIDONI BRONZE FOUNDRY AND TESUQUE GLASSWORKS, THE PALACE OF THE GOVERNORS




Shidoni Bronze Foundry, Tesuque, NM
photo by Steven Lakatos


Palace of the Governors, Santa Fe, NM
photo by Steven Lakatos

Puye Cliff Dwellings, National Historic Landmark is the ancestral home of today's Santa Clara Pueblo people. Santa Clara guides will tour us through the largest mesa top pueblo/cavate complex on the Pajarito Plateau and the first of the ancient pueblos of the Rio Grande Valley to be systematically excavated. The tour wanders up moderately steep, unimproved trails and ladders, past ancient dwellings built along cliff face. Prehistoric stairways link the cliff dwellings to the mesa top with stunning panoramic views of the valley.

Shidoni Bronze Foundry rests within an 8-acre foundry complex, which includes a sculpture garden and contemporary art galleries. The adjacent Tesuque Glassworks, founded in 1975 by Charlie Miner, is renowned for encouraging local artists and teaching the public about glass working. The quality of sculpture and artwork produced and exhibited at Shidoni and Tesuque Glassworks is world renowned. Tour the sculpture garden, galleries, and glass facility while enjoying lunch under the trees.

The Palace of the Governors remains the oldest continuously occupied public building in the county. Originally constructed by the Spanish as a government building in 1610, the Palace now accounts the history of New Mexico and Santa Fe. In addition, American Indian artists sell their wares under its historic portal. This adobe structure was designated a Registered National Historic Landmark in 1960 and an American Treasure in 1999.

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Monday 9/28/2015

Time	Session	Lumpkins Ballroom
8:00 - 10:00	Plenary	**Welcoming Remarks/Presentations** - Eric Cavazza, NAAMLP President - Bidtah Becker, Executive Director of Navajo Nation Division of Natural Resources - David Martin, Cabinet Secretary of New Mexico Energy, Minerals and Natural Resources Dept. **Keynote Addresses** - Kathy Benedetto, Legislative Staff, U.S. House Subcommittee on Energy and Mineral Resources - David Berry, Director of the Office of Surface Mining Reclamation and Enforcement Western Regional Office - Roger Sanchez, Cultural Tourism Coordinator and Collections Steward of Raton Museum - Fernando Martinez, Director of New Mexico Mining & Minerals Division
10:00 - 10:30	Break with Exhibitors (Mezzanine)	

Time	Session	New Mexico Room	Santa Fe Room	Stiha Room
		Watershed Restoration/Reclamation	***Bats and Wildlife***	***Water Quality***
10:30 - 11:00	1	Geomorphic Reclamation Design and Construction of the TEACH AML Site; Thompson	Efficacy of Bat Grates for Maintaining Subterranean Roosting Habitat for use by Bats; Sherwin	LTV Clyde Mine Drainage Treatment Plant Optimization Case Study; Beam
11:00 - 11:30	2	Evaluating Sediment Production from Native and Fluvial Geomorphic-Reclamation Watersheds at La Plata Mine and Its Relationship to Local Precipitation Events; Bugosh	Bulldozers, Backfill and Bats: A 5-year review of the importance of comprehensive surveys for bats during AML closures; Corbett	Do Limestone Sands and Limestone Leach Beds Have a Future in AMD Remediation? Maryland's Why, Where, and How Story in the Casselman River; Loucks
11:30 - 12:00	3	Knight-Ideal Loadout Reclamation Project; Withers/Rohrer	Are All Bat Gates Created Equal?; Brown	Long-term Passive Treatment at the LeBosquet Mine discharge; Behum
12:00 - 1:30 PM	Lunch on your own			
		Bats and Wildlife	***Subsidence***	***Water Quality***
1:30 - 2:00	4	Patterns of Use of Abandoned Mines by Leptonycteris Spp. in New Mexico and Arizona: Implications for Management and Conservation; Ekholm	Hydrologic Impacts on the Stability of an Old Abandoned Coal Mine; Marino	Review of Passive Systems for Acid Mine Drainage Treatment; Skousen
2:00 - 2:30	5	Landscape Scale Predictors of the Use of Abandoned Mines by Bats: Implications and Applications for Management; Danielson	Subsidences of Pennsylvania's Anthracite Region; Werner	Mineral Leaching of Waste Rock From the Abandoned Sulitjelma Copper Mines, Northern Norway; Clark
2:30- 3:00	6	Spatial and Temporal Variability in Emergent Counts of Townsend's Big Eared Bats (corynohinus townsendii) During Maternity Season; Sherwin/McTheny	"IS MY HOUSE GONNA SINK?!?!" - Red Lodge, MT Subsidence Investigation; Snoddy	Near Shore Tailings Deposition in Ballangen Fjord, Norway: A Look Into Ni and Other Toxic Element Release Rate in a Shallow Sea Environment; Embile
3:00 - 3:15	Break with Exhibitors (Mezzanine)			
		Reclamation	***Inventory***	***Public Participation and Partnerships***
3:15 - 3:45	7	Soil Contaminant Mapping and Prediction of Sediment Yield at an Abandoned Uranium Mine; Orechwa	Districts, Mines and Geochemistry Databases in New Mexico; McLemore	SMCRA Reauthorization Efforts, Finding the Middle Ground; McAllister
3:45 - 4:15	8	Objectives and Engineering Measures in Reclamation of Radioactively - Contaminated Sites; Kuhn	AML Inventory Field Data Collection Offline with Collector for ArcGIS; Kestner	Understanding Site Conditions and Stakeholder Concerns – Keys to Reclamation Success; Balaz
4:15 - 4:45	9	Pedestrian methane flux and magnetometer surveys to characterize, model, and monitor underground coal fires; Ide	Use of Unmanned Aircraft System for Stream and Coal Waste Reclamation; Cenovich/DeLay	Stories of Youth Engagement in Public Service: Protecting Natural Resources, Partnering for Impact; Pineda

2015 NAAMLP CONFERENCE
SANTA FE, NEW MEXICO
TECHNICAL SESSION SCHEDULE

Wednesday 9/30/15

Time	Session	New Mexico Room	Santa Fe Room	Stiha Room
		Monitoring and Inventory	***OSM Award Winners***	***Water Supply Replacement***
8:00 - 8:30	10	Site Characterization and Adapted Monitoring of a Flood-disturbed Reclamation Area, Swastika/Dillon Canyon Reclamation Project - Raton, New Mexico; Caddis	Appalachian Region - Simpson Northeast Coal Refuse Fire Fell Township, Lackawanna County, Pennsylvania; Curley/Barkawi/Gazella	Kentucky AML's Waterline Program; Meade
8:30 - 9:00	11	Mobile GIS for Ohio's Abandoned Mine Land Inventory; Freidhof	Mid-Continent Region - AML Site 2052 Minnehaha Slurry, Sullivan County, Indiana; Flachskam	Pennsylvania's Approach to AML Impacted Water Supply Replacement Projects; Webb
9:00 - 9:30	12	Abandoned Mine Land Inventory Study for BLM-Managed Lands in California, Nevada, and Utah: Site and Feature Analysis; Frels	Small Project - Lightner/Boston Coal Mine Erosion Control Project, Durango, Colorado; Brown	***Bats and Wildlife*** Mine Reclamation and Monarch Butterfly Habitat; Korb
9:30 - 10:00	13	Using LIDAR to Inventory Dangerous Highwalls; Flachskam	National Award - Lake Valley Mine Safeguard Projects, Lake Valley, Sierra Country, New Mexico; Smith	The Effects of Gate Design on Bat Use and Behavior at Abandoned Mines; Tobin
10:00 - 10:30	14	***Emergency Work*** Every Time It Rains: The evolving role of AML as a community member in a mining dependent region; Adams	***Reclamation*** The Coal Authority: Mining Legacy Management in Britain; Reed	Abandoned Mine Land Wildlife Surveys - A Cost Analysis; Williams
10:30 - 10:45		Break with Exhibitors (Mezzanine)		
		Reclamation	***Water Quality***	***Reforestation***
10:45 - 11:15	15	Clark Fork River Operable Unit (CFROU) Reach A Phase 1 Engineering Design and Construction Warm Springs, Montana; Garcin	Passive Water Treatment Systems for a High Altitude Mine; Bamberg	Deep-Till / Tree Seeding for Forest Restoration / Wildlife Habitat on AML Projects in Northeast Pennsylvania; Korb
11:15 - 11:45	16	Characterization of the South Canyon Coal Mine Fire, Garfield County, Colorado; Nuttall	The Challenges of Chemistry, Physics and Economics in Managing Mine Water and Acid Rock Drainage; Thorn	Review of Reforestation Efforts of the Bituminous District for Abandoned Mine Land Reclamation of Pennsylvania; Baker
11:45 - 12:15	17	Anvil Points Remediation: A Case Study for AML Revegetation and Consideration of Waste Repository Covers; O'Shea- Stone	Implementing Source Control at the Pennsylvania Mine, Summit County, Colorado; Graves	A Study of Modified Forestry Reclamation Approach Techniques on Abandoned Mine Lands in Pennsylvania; Varano
12:15 - 12:45	18	Using Innovative Geohazard Mitigation to Stabilize Slopes, Provide Erosion Control and Reduce Risk; Lobato	***Policy*** Abandoned Mine Land Program: A Policy Analysis for Central Appalachia and the Nation; Dixon	***Subsidence*** Geotechnical - Geophysical Void Mapping and Foamed - Sand Backfilling of Rapson Coal Mine, Colorado Springs, Colorado - Case Study; Hanna
End of Conference - Safe travels home				

SESSION 1 MONDAY 9.28.15

10:30-11:00 (3 OPTIONS)

NEW MEXICO ROOM • WATERSHED RESTORATION / RECLAMATION

Geomorphic Reclamation Design and Construction at the TEACH AML Site

Derrick Thompson, P.E. • Civil Engineer • Trihydro Corporation

Geomorphically stable design concepts or landform grading techniques have gained wide acceptance and have been implemented by Abandoned Mine Land (AML) programs and mining companies to reclaim sites. When applied correctly, geomorphic or landform grading techniques result in diverse reclamation landscapes that blend with the native terrain to alleviate physical site hazards while also improving long-term site stability. The Iowa Department of Agriculture and Land Stewardship, Division of Soil Conservation and Water Quality, Mines and Minerals Bureau (Bureau) became interested in applying the landform grading technique on an AML site to determine if there were advantages to reclaiming the site using this technique over the traditional terrace and down drain technique prevalent in Iowa.

The Teach AML Reclamation Project, completed during the summer of 2014, is one of the first sites in Iowa to be designed and reclaimed completely using a landform grading approach. The site is a former 1960's coal strip mine area consisting of impacted water, a pit lake, remnant highwall, spoil/overburden piles, and clogged streams that were left in place following mining activities. The site was largely devoid of vegetation and had acid generating conditions. The Project Team developed a reclamation landform design that reduced remnant highwalls, backfilled the pit lake, addressed unsuitable spoils and coal fines, re-established stream channels, and re-established grazing lands for the landowner's livestock. The pit lake was neutralized from a pH of 3.4 using hydrated lime and de-watered prior to placing backfill. Through the course of the project, approximately 215,000 cubic yards of overburden and mine spoils was moved and neutralized to backfill the pit lake, reduce the highwall, construct stream channels, and mitigate the acid generating conditions. The end result is a reclamation project that alleviates legacy hazards, returns disturbed lands to productive uses, and that blends in with adjacent undisturbed areas.

SANTA FE ROOM • BATS AND WILDLIFE

Efficacy of Bat Gates for Maintaining Subterranean Roosting Habitat for use by Bats

Richard E. Sherwin • Associate Professor of Biology

There has been growing concern regarding the long-term viability of bat colonies and even species that habitually roost in abandoned mines. Initially, managers were concerned that the concentration of large numbers of individuals in the same location leaves them susceptible to vandalism, abandoned mine reclamation, and/or stochastic perturbations. The simplest solution to this problem has been to install bat compatible closures over entrances of biologically important features, while sealing those which are biologically insignificant or cannot be safely secured. To date, thousands of bat compatible closures have been installed in the western United States and tens of thousands of dangerous abandoned mines have been permanently sealed. Despite the apparent success of these efforts, there is increasing debate regarding the acceptability by bats of different gate designs, construction materials, and structural enhancements. In recent years anecdotal observations that bats reject gates which include culverts (installed to maintain the integrity of the portal and structural support for the gate) and will not be used by bats. In this study we will present data from our long term monitoring of colonies of Townsend's big-eared bats in abandoned mines in California, Nevada, Utah, New Mexico, and Idaho. These data include data from over 800 abandoned mines with a minimum of 1 year of pre-gating data, and at least 2 years of post-gating data. Response variables include types of use (pre and post closure), numerical and/or behavioral changes, and spatio-temporal changes in dynamics of roost use. We compare sites closed with traditional bat gates and gates which include culverts in areas impacted by large scale abandoned mine reclamation programs (i.e., all mines either gated or closed), and in areas where the only treatments are the gates (i.e., no concurrent closures of other mines in the landscape).

STIHA ROOM • WATER QUALITY

LTV Clyde Mine Drainage Treatment Plant Optimization Case Study's

Richard L. Beam, Brent Means, and Don Charlton • AMD Industries, Inc.

Over the past five years, a Pennsylvania Department of Environmental Protection (DEP), Bureau of Abandoned Mine Reclamation (BAMR) and a United States Department of Interior, Office of Surface Mining Reclamation and Enforcement (OSMRE) team have performed treatment cost-reduction evaluations at a number of mine drainage treatments facilities operated by the Commonwealth of Pennsylvania. To date, the efforts have resulted in savings to the commonwealth in excess of $700,000 annually in system operations. Recently, the team evaluated the former LTV Steel Corporation's Clyde Treatment Plant located near Clarksville, PA.

Constructed in 1996, the Clyde facility provides treatment and mine pool control by pumping 2,000 gallons per minute of drainage to a hydrated lime facility that incorporated a dense sludge recirculation process, polymer addition and liquid/solid separation by a 90-foot diameter clarifier. Precipitated solids are returned to the mine complex by injection boreholes. Initially, the mine pool water quality was net acidic with highly elevated dissolved metal concentrations which necessitated a pH adjustment treatment strategy. The mine pool has since evolved to net alkaline conditions where the primary pollutant is now dissolved iron. This new condition prompted the team to characterize the current treatment efficiency and evaluate alternative cost-effective strategies that avoid costly pH adjustment.

This presentation provides the results of the cost-reduction evaluation. First, the history and treatment configuration for the Clyde site is presented. Second, the methodology used to perform the cost-reduction evaluation is presented and lastly, the results of cost-reduction evaluation are presented. The presentation also focuses upon some unique challenges that the team encountered at this particular site.

11:00-11:30 (3 OPTIONS)

NEW MEXICO ROOM • WATERSHED RESTORATION / RECLAMATION

Evaluating Sediment Production from Native and Fluvial Geomorphic-Reclamation Watersheds at La Plata Mine and Its Relationship to Local Precipitation Events

Nicholas Bugosh • Owner-President • GeoFluv

San Juan Coal Company (SJCC) reclaimed 1,835 acres at its La Plata Mine using the GeoFluvTM fluvial geomorphic reclamation design method from 1999 (Bugosh, 2000) through 2008. Fluvial geomorphic reclamation was used to achieve long-term stability against erosion (no major slope blowouts and rill and gully formation), reduced maintenance, and increased biodiversity as compared to traditional reclamation methods (e.g. terrace, berm, and downdrain designs) (Bugosh, 2003). Qualitative inspections of the completed reclamation confirmed the fluvial geomorphic reclamation method benefits. In the fall of 2011, SJCC began implementing a research study to quantify the sediment production rates as tons/acre/year (T/ac/yr) from these geomorphic landforms and surrounding undisturbed native lands.

Data were acquired from sub-watersheds differentiated as native (undisturbed by mining), geomorphic design with topdressing and poorly established vegetation, and geomorphic design with topdressing and significant vegetation establishment. The three sub-watersheds were selected to ensure similar size, aspect, and slope and were located as close as possible together to minimize storm variation effects. Temporary check-dam-type sediment control structure designed to impound runoff from a 2-year, 1-hour storm were installed at each subwatershed outlet. Erosion pins in the impounded area facilitated sediment deposition measurement. Precipitation was recorded by the La Plata Mine Meteorological Station and supplemental site-specific precipitation gauges.

Precipitation sufficient to cause sediment transport provided data for the end of the 2012, all of the 2013, and the beginning of the 2014 water years. The site data did not show a strong direct relationship between precipitation and sediment production. The results showed the greatest sediment production came from the undisturbed native site (4.79 T/ac/yr), with the geomorphic design with topdressing and poorly established vegetation site averaging 25 percent lower (3.58 T/ac/yr) and the geomorphic design with topdressing and significant vegetation establishment averaging 37 percent lower sediment production (3.02 T/ac/yr).

SANTA FE ROOM • BATS AND WILDLIFE

Bulldozers, Backfill and Bats

Jason Corbett • Director • Subterranean Program • Bat Conservation International

Bats have long used mines in the United States in some cases moving into mines as they were still active, using areas that received reduced work traffic. Hundreds of thousands of abandoned mines now dot the landscape of the US and many of them are actively used by bats during some part of their life cycle. These roosts are critical for long term survival of individuals, colonies, and populations across the US. Rigorous, efficient, science-driven, and safe internal assessments have been developed and used to help numerous state and federal agencies create and run wildlife friendly abandoned mine land programs. Bat Conservation International's Subterranean Program was created in 2008 and has been building on previous efforts by the organization and many other folks who helped establish some of the methods now used. Each year we safely survey thousands of abandoned mines across the US and help many AML programs meet their full potential. We'll discuss the importance of internal surveys and share some of the latest information on bat usage of abandoned mines in order to help AML managers make the best decisions possible.

STIHA ROOM • WATER QUALITY

Do Limestone Sands and Limestone Leach Beds Have a Future in AMD Remediation? Maryland's Why, Where, and How Story in the Casselman River

Constance Lyons Loucks • Environmental Program Manager • Maryland Department of the Environment

Acid mine drainage remediation can have high initial costs and ongoing long-term maintenance and operation costs. Many remediation programs and watershed groups are looking for ways to restore the quality of streams and improve brook trout and other native fish populations by eliminating or decreasing the impact of acid mine drainage. In 2008, Maryland Abandoned Mine Land Division (AMLD) submitted a proposal to Maryland's EPA 319 program for funding of a watershed wide, low technology, and low maintenance project. The proposed project would utilize multiple limestone sand dumping sites along with several limestone leachbed sites in designated TMDL pH and biological impaired headwater streams of the Casselman River Watershed in Maryland. It was the goal of AMLD to restore the stream water quality to State pH standards and improve water quality for native brook trout and other fish populations.

In Maryland, the Casselman River flows about 20 miles from Savage River State Forest into Pennsylvania. The watershed area is 66 square miles and is part of the Mississippi River drainage. AMLD's Phase 1 implementation of this project completed construction at eleven sites on Maryland public lands in 2013. By 2014, early in-stream pH results showed significant pH improvements at all Phase 1 sites. Maryland's EPA 319(h) Grant program contributed over $614,000 for this first phase of the project. Currently, another $480,000 is budgeted from two additional 319(h) Grants to implement a Phase 2 effort on private lands and for the development of a GIS database tool to track progress, results, costs and efficiencies for these projects.

This presentation will describe the project goals, the results to date, photographs of limestone sands dump sites and leach beds, and report on the comparative results of pre-construction and post-construction water quality and biological monitoring. Overall, the project has been very successful and offers an alternative low cost, low maintenance technology for watershed groups and overworked programs to address AMD in less impaired locations, leaving monies and energy for addressing the larger more severe sites.

SESSION 3

TECHNICAL ABSTRACTS

11:30-12:00 (3 OPTIONS)

NEW MEXICO ROOM • WATERSHED RESTORATION / RECLAMATION

Knight-Ideal Loadout Reclamation Project

Amber Withers • Project Manager • AECOM
J. Chris Rohrer • Senior Reclamation Specialist • Utah Div. of Oil, Gas & Mining, Abandoned Mine Reclamation Program

The Utah Abandoned Mine Program (AMRP) reclaimed an abandoned coal loading facility (Knight-Ideal Loadout) in the town of Wellington, Carbon County, Utah, with the objective of accommodating future development as a public park. Constrained by funding, the AMRP partially reclaimed the site in 1983-84 to address only immediate public safety hazards. Reclamation efforts were renewed in 2010 with a site investigation to characterize the location and quantities of materials on the site. Reclamation construction began in October, 2012, and was completed in December, 2014, for a total cost of $2.4M. The project excavated and disposed of approximately 31,500 cy of coal refuse, 2,500 cy of structural debris, and 650 tons of other debris. Approximately 10,500 cy of contaminated soil discovered during site construction were excavated and removed to an offsite landfill. Nineteen acres of disturbed land were restored to beneficial use. The AMRP secured third-party funding for construction of a community fishing pond to supplement its usual SMCRA funding. The project shows how multiple funding sources can be leveraged to transform a useless eyesore into an amenity for the community.

SANTA FE ROOM • BATS AND WILDLIFE

Are All Bat Gates Created Equal?

Patricia Brown, Ph.D. • Director • Bat Biologist

Bat-compatible closures have been installed in thousands of mines across North America to prevent human entry to mines for safety and resource protection, while allowing smaller wildlife access. As White Nose Syndrome (WNS) progresses westward across the continent, protecting bat roosting habitat is a means of slowing the spread via human transport of the deadly fungus. Human entry into maternity colonies (notably Townsend's big-eared bats) may cause roost abandonment, sometimes with females deserting their non-volant pups. During hibernation, human disturbance can cause bats to arouse and expend stored fat necessary for winter survival.

The timing of surveys and methods influence the ability to detect seasonal bat use of a mine feature. Many bat species use a variety of roosts throughout their annual cycle as dictated by physiological and behavioral needs. The goal is to identify and protect the most important bat mine roosts, and to avoid installation of incompatible closures that may cause roost abandonment. Not all types of mine closures are acceptable to all species of bats at all times of year, and suitability may depend on colony size as well as closure size and design. Some colonies do not accept some culverts (or even gates). Corrugated culverts may deter bat entry due to the acoustic properties of the spaced "rings", as will be shown in videos of laboratory experiments conducted by Dr. Jim Simmons at Brown University. The interpulse-interval patterns of the bats' sonar signals reveal that the bats consider the task to be very difficult with regard to perceptual ambiguity associated with acoustic clutter. Following installation of any "bat-compatible" closure, a monitoring program should be implemented to assess its effects. The availability of a shared database of closure design effectiveness for various bat species could guide the installation of bat-acceptable closures.

STIHA ROOM • WATER QUALITY

Long-term Passive Treatment of the Acid Mine Drainage at the LeBosquet No. 1 Mine, LeFlore County Oklahoma

Paul T. Behum • Sr. Hydrologist • Office of Surface Mining Reclamation and Enforcement
Robert W. Nairn • Viersen Presidential Professor • The University of Oklahoma School of Civil Eng. & Env. Science
Michael Sharp • Assistant Director • Abandoned Mine Land Program, Oklahoma Conservation Commission

The LeBosquet No. 1 was an abandoned mine located 4 miles west of Fanshawe in LeFlore County, Oklahoma. The small operation began in 1902 and operated several years at a production rate of about 35,000 tons per year for local consumption. The LeBosquet Coal and Mining Company extracted high volatile bituminous coal from the 4.3-foot thick Lower Hartshorne Coal Bed of the Pennsylvanian age Hartshorne Formation by underground methods. A slope entry extended from the outcrop down the seam's 27-30 degree dip for 600 feet with a well at the base for dewatered of the workings. However, following mine closure this well became artesian and acid mine drainage (AMD) now discharges at a rate of about 14,400 gallons per day (10.1 GPM). The raw AMD has a pH = 5.4 dissolved iron = 38.4 mg/L, dissolved aluminum = 0.1 mg/L, dissolved manganese = 1.56 mg/L, sulfate = 116.5 mg/L, and total acidity = 82.4 mg/L calcium carbonate equivalent (CCE; median values). The Oklahoma Conservation Commission (OCC) constructed a passive treatment system in 2004 using funding from the former Clean Streams program to abate the LeBosquet No. 1 discharge. AMD is collected in a wet seal and channeled through a 195-ton anoxic limestone drain (ALD). Over the last 11 years the ALD added an average 157 mg/L CCE alkalinity to the AMD. Metal removal is completed in a small (0.2 acre) oxidation pond and a 1,324 CY anaerobic wetland. The water quality of the discharge has a pH = 6.8, dissolved iron = 0.58 mg/L, dissolved aluminum = <0.05 mg/L, dissolved manganese = 0.87 mg/L, sulfate = 94.3 mg/L, and a net acidity of = -125.7 mg/L CCE; median values). Approximately 98.5% of the dissolved iron is removed along with virtually all of the aluminum. Cumulative iron removal to date has been 8.5 tons based on 93% of the total Fe removed. Although the system was not designed to significantly remove manganese and sulfate, 44.5% and 19%, respectively, was removed during the last 11 years of operation. This system demonstrates that when AMD of the appropriate water quality (aluminum and dissolved oxygen < 1 mg/L, net acidity < 100-150 mg/L CCE) is treated with an ALD-based system then long-term passive treatment may be possible with minimal maintenance.

12:00-1:30 PM / LUNCH ON YOUR OWN

SESSION 4

1:30-2:00 (3 OPTIONS)

NEW MEXICO ROOM • BATS AND WILDLIFE

Patterns of use of abandoned mines by Leptonycteris spp in New Mexico and Arizona: implications for management and conservation.

Kelsey Ekholm • Graduate Student • Dept. of Organismal & Environmental Biology, Christopher Newport Univ.

In a three year study of the roosting affinities of long-nosed bats (Leptonycteris spp) we discovered a tremendous amount of variability in their roosting habits. While many mines were utilized in a relatively predictable way throughout the study, the majority of abandoned mines were occupied unpredictably, but often included large numbers of individuals flowing among mines, with resultant roost use appearing both eruptive and highly ephemeral. We found key differences between the more stable "core" roosts, and the biologically important, but less predictably used abandoned mines in the surrounding landscapes. This presentation will describe these patterns, the revealed scales of management that might be necessary for maintaining local colonies, and the key variables that help identify roosts.

SANTA FE ROOM • SUBSIDENCE

Hydrological Impacts on the Stability of an Old Abandoned Coal Mine

Gennaro G. Marino, Ph.D., P.E., D.GE • Marino Engineering Associates, Inc.

This presentation concerns an investigation of a room and pillar mine complex which operated from about 1925 to 1950 in Madisonville, Kentucky. The mined-out coal seam was the No. 11. After the mine was abandoned the coal was stripped from the up dip side and reached these old works in the 1970's. Flooding of these works ensued as runoff flowed down dip through these exposed openings. The flooding was coincident with a number of surface subsidence events.

After the strip mining operation was complete, and reclaimed, the flooded pit next to the high wall created by the past stripping was dewatered in order to access the underlying unmined No.9 seam. The coal was accessed by driving a slope down to the seam from the pit bottom. However, in order to alleviate the hydrostatic pressure on the highwall the nearby flooded old works were dewatered. By the time of this dewatering, the old works had essentially reached equilibrium with the shallow groundwater table. During these dewatering operations an increase in the number of surface subsidence events occurred.

The presentation will discuss the chronology of important events through time and the effect of these hydrological impacts on mine stability.

STIHA ROOM • WATER QUALITY

Review of Passive Systems for Acid Mine Drainage Treatment

Jeff Skousen • West Virginia University
Carl Zipper • Virginia Tech
Arthur Rose • Penn State University
Louis McDonald • West Virginia University
Robert Nairn • University of Oklahoma
Paul Ziemkiewicz • West Virginia University

Acid mine drainage (AMD) is polluted water from coal and metal mines that has impaired water resources throughout the world. Water treatment must be effective, cost-efficient, and in many cases meet mandated standards before discharge. Treatment technologies are generally divided into "active" and "passive" types. Active chemical treatment employs the constant application of industrial chemicals, which is often expensive and involves long-term liability. Passive treatment uses naturally occurring chemical and biological processes. Passive treatment technologies can be separated into organic and inorganic types. Passive treatment technologies include aerobic and anaerobic constructed wetlands, vertical flow wetlands, bioreactors, anoxic limestone drains, limestone and steel slag ponds, open limestone channels, limestone sand, and low-pH Fe oxidation channels. Before selecting an appropriate passive treatment technology, water must be characterized for flow, acidity and alkalinity, metal, and dissolved oxygen concentrations. This paper reviews the current state of passive system technology development, provides results for the various system types, and provides guidance for sizing and effective operation.

SESSION 5

2:00-2:30 (3 OPTIONS)

NEW MEXICO ROOM • BATS AND WILDLIFE

Landscape scale predictors of the use of abandoned mines by bats: implications and applications for management

Joseph Danielson • Graduate Student • Dept. of Organismal & Environmental Biology, Christopher Newport Univ.

Abandoned mines are used by many species of bats, however the degree of individual and even specific dependency varies widely across habitats and even within and among populations. Data collected from throughout the western United States, with particular focus in the desert southwest, reveals that key abiotic and biotic variables can be used as predictors of the degree of fidelity and dependency of many species of bats. This presentation will explain these predictors, the reliability of their a priori application for parsing generic and specific use of abandoned mines by bats and how this can help identify and allocate resources to landscapes that include abandoned mines of highest conservation value.

SANTA FE ROOM • SUBSIDENCE

Subsidences of Pensylvania's Anthractie Region

Dan Werner, P.E. • PA Department of Environmental Protection

Pennsylvania is home to one of the few anthracite coal fields in the world. Divided into four distinct fields (Northern, Eastern Middle, Western Middle, and Southern), the unique geology and expansive abandoned underground mine networks of the Anthracite region often leads to sudden mine subsidence occurrences. With a large collection of historical mine maps and a thorough inspection of each site, engineers and investigators can gain a clear understanding as to the cause of each collapse. That information is then used to design a satisfactory reclamation plan in an expedited manner.

This presentation will describe and discuss several recent mine subsidence instances, the underlying coal seam and historical mining related to the occurrence, and the response time and reclamation plan put in place.

STIHA ROOM • WATER QUALITY

Mineral Leaching of Waste Rock from the Abandoned Sulitjelma Copper Mines, Northern Norway

Clark, A. • Earth and Environmental Science Department, New Mexico Tech
Walder, I.F. • Earth and Environmental Science Department, New Mexico Tech • Kjeoy Research & Education Center
Embile, R. • Earth and Environmental Science Department, New Mexico Tech
Winton, A. • Earth and Environmental Science Department, New Mexico Tech

The Sulitjelma mining district, Northern Norway, is the location of numerous abandoned mines. The ore deposits are massive volcanic-hosted sulphide deposits and mined primarily for the copper and zinc in the period (1860 till 1991). These mines were once very important to the industrial development of Norway. As owner of the mining operation for the last 20 years of the operation, the Norwegian government performed some simple mitigation work primarily consisting of redirecting heavily contaminated water into the deeper underground mine-workings and a thin soil cover on the shoreline deposited tailings. A research project has been initiated this summer in order to evaluate sources of contamination and the potential long-term drainage from the abandoned mining operations within the Sulitjelma mining distract. Tailings samples, (discharged during operation onto the shoreline and into the lake Langavaten) were collected from near the flotation plant, and waste rocks were collected from Furuhaugen, Giken, Jakobsbakken, and a section just south of the area between Mons Petter and Charlotta 1 & 2 mines. In addition, water samples will be collected from several of the creeks draining the different mining areas. The purpose of the investigation is to determine the presence of constituents leaching the tailings and waste rocks after more than 20 years of oxidizing and reacting to the environment. Tailings and waste rocks were placed in humidity cell tests for several months. For this test, each column of 3-4kg of tailings and waste rocks is run through a seasonal simulation for weather, by having early heavy rainfall to an extended humid season environment. Humid air is pumped through the columns. Initially for the first beginning sample one liter of deionized water is sprinkled like rain atop the waste material, and over time (3-4 hours) leachate is collected in bottles, and there after analyzed. After the leachate is collected, the tailings go back to a week's length of humidity, before having another heavy rainfall event. The water samples collected are immediately analyzed for pH, redox potential, electric conductivity then filtered split with half being acidified with NHO_3. The non-acidified samples are analyzed by Ion Chromatography for major cations (Ca, Mg, Na, K, and Li; acidified sample) and anions (SO_4, F, Cl, and NO_3: non-acidified sample) are measured for each weakly sample. Further on, trace elements that are measured Pb, Zn, Cu, Ni, Ag, Fe, Co, and Cd. Results from the humidity cell tests and runoff water / creek water samples and conclusions the investigation will be presented together with suggestions for mitigation.

2:30-3:00 (3 OPTIONS)

NEW MEXICO ROOM • BATS AND WILDLIFE

Spatial and temporal variability in emergent counts of Townsend's big-eared bat (Corynorhinus *townsendii*) during the maternity season

Ryan McTheny • Graduate Student • Dept. of Organismal & Environmental Biology, Christopher Newport Univ.

In 10 years of research studying the patterns of emergence of Townsend's big-eared bats from maternity roosts, we have found a tremendous amount of variability in patterns of emergence both within and among years. This inherent variability makes it extremely difficult to develop reliable estimates of colony size, conduct biologically meaningful monitoring, and infer any biological response to the installation of bat gates or efficacy of various gate designs. In an effort to better understand these patterns and develop recommendations for post gating monitoring we collected intensive data at a maternity roost in Nevada. We installed a closed circuit camera system with cameras located inside and outside of the mine. Video was recorded continuously from May-September 2013 and 2014. Resultant data reveals a tremendous amount of nightly variation in activity during emergence. In fact, variation is so high, and patterns of emergence so chaotic that it is virtually impossible to develop accurate, precise and repeatable counts that are a true reflection of colony size. Patterns of emergence are so chaotic that tremendous care should be taken when developing monitoring plans or attempting to infer colony-scale response to treatments (ex. Bat gates) based on count data. Understanding the tremendous amount of variation in patterns of emergence is essential for identifying true biological responses to AML treatments such as impacts of varying gates designs and construction materials.

SANTA FE ROOM • SUBSIDENCE

"IS MY HOUSE GONNA SINK?!?!"

Red Lodge, MT Subsidence Investigation

Bill Snoddy • MT Dept. of Environmental Quality

Coal Mining in Red Lodge began in the early 1880's and continued for 50 years with the last coal being shipped in the mid 1930's. Coal was produced from 7 levels beneath Red Lodge to a depth of over 700 feet. After the mines were abandoned in the 1930's buildings were gradually torn down and much of the infrastructure was removed.

The Montana AML Program has conducted multiple past remediation projects in the Red Lodge area including the removal of coal slack, closing of portals, filling subsidence features, and pressure grouting historic workings.

Beginning in 2011 Montana AML received multiple inquiries from property owners in Red Lodge concerned that their homes were being negatively impacted by mine related subsidence. In response, AML conducted physical inspections of the properties of interest which were inconclusive in determining if there were any impacts to the property that could have been caused by mining. In 2013 AML contracted with Pioneer Technical Services (Pioneer) and initiated a two-phased approach to determine what effects, if any, the historic mines were having.

The first phase included: 1) A review of previous subsidence studies in Red Lodge; 2) Original mine maps were scanned and digitally rectified to match surface features; 3) A quarterly survey monitoring program was established to detect surface movement - surveyors with Pioneer installed and surveyed 98 monitoring points in the area of interest; and 4) The homes of interest were inspected by a structural engineering firm to establish the baseline conditions.

The second phase involved a core drilling program at 8 locations around Red Lodge. Drill sites were selected based on the proximity to potentially affected homes, historically mined locations and areas identified in previous reports as having potential for subsidence. Core was initially drilled at PQ (3.35") size then reduced to HQ (2.5") when workings were encountered. Information obtained from the drilling program and historic research was used to: 1) Evaluate existing bedrock and mine conditions; and 2) Predict the possibility of past and future surface subsidence that might be caused by mine collapse.

The final report was published in May of 2015.

STIHA ROOM • WATER QUALITY

Near-shore tailings deposition in Ballangen Fjord, Norway: A look into Ni and other toxic element release rate in a shallow sea environment

Rodrigo F. Embile Jr. • Kjeoy Research and Education Ctr, New Mexico Institute of Mining and Technology

Ingar Walder • Kjeoy Research and Education Ctr, New Mexico Institute of Mining and Technology

In Råna, Norway, mine tailings from the closed Råna Nickel mine were dumped in the nearby Ballangen Fjord. The leaching of metals especially Ni and other toxic elements into the fjord is the main threat to shallow sea and bottom dwelling organisms in the area. To determine the rate of release of Ni and other potential toxic elements into the surrounding ecosystem, column experiments using the old tailings obtained from a depth of 8 to 40 cm from different locations within the dumpsite, beach sand, and stream bed sample from a nearby creek were conducted for 25 weeks. Initial results show that the beach sediment have the highest and almost constant TDS followed by the middle portion of the dumpsite and the stream sediment sample. Tailings closer to the beach showed higher pH that is in the range of 5 to 7 while those farther are more acidic with pH of 3 to 4. All the metals analysed (Ni, Cu, Fe, Co, Mn and Cr) decrease in concentration in time. Current data suggests Cu and Mn are highest in the stream sediment, while the middle part of the dumpsite close to the stream has elevated Ni, Co and Fe. The spatial variation, mineralogy of the material and groundwater movement play a significant role in the resulting leachate chemistry.

3:00-3:15 / BREAK WITH EXHIBITORS (MEZZANINE)

3:15-3:45 (3 OPTIONS)

NEW MEXICO ROOM • RECLAMATION

Soil Contaminant Mapping and Prediction of Sediment Yield at an Abandoned Uranium Mine

Aaron Orechwa P.E. • Environmental Engineer • Tetra Tech Inc.

Mining activities occurred during the Cold War era uranium boom at the Riley Pass Abandoned Uranium Mine in the Custer National Forest located in Harding County, South Dakota, are a significant part of South Dakota's legacy uranium mining history. Under the historic general mining laws of that era, unrestricted strip mining took place at this site with no requirements for reclamation. Ten mine-affected study areas within the Riley Pass site are approved by the USEPA as non-time critical removal action under CERCLA. Site specific risk-based surface soil cleanup action levels are established for select heavy metals and radionuclides of concern. This case study presents innovative soil contaminant monitoring and mapping techniques to predict the spatial extent of concentrations of these contaminants within surface soils at the site. Statistical evaluations used in sizing sampling grids, evaluation of the feasibility of utilizing double sampling methods versus simple random sampling, geostatistical mapping to establish cleanup boundaries, and an economic evaluation of the final methods selected are presented in this paper.

The degradation of land caused by strip mining is a multi-faceted phenomena, where the effects seen are caused by deterioration of the land surface by accelerated removal of soil, progressive alteration of soil properties, and the loss of vegetative cover of the soil. Drainages from the site have been subject to severe erosion and sedimentation since mining operations seized in the early 1960s. The second objective of this paper is to predict the soil losses and associated sediment yields of the five primary watersheds at the largest study area of the site. This paper presents the results of a soil erosion analysis using a GIS application of the Revised Universal Soil Loss Equation (RUSLE) to predict sediment yield and specific degradation rates within mining impacted watersheds. Pond sediment removal data from existing sediment pond cleanout construction activities were used to validate the model results. Using available soil contaminant data a GIS analysis approach was performed to estimate contaminant load and predict the resultant sediment concentrations of arsenic, radium-226, and uranium at downstream locations of each watershed. Sediment data collected during previous studies at the site were used to validate the estimated sediment contaminant concentrations. Results of the study showed the RUSLE model produced accurate estimates of sediment yield, specific degradation, and sediment contaminant concentrations when compared to available site data. The information presented in this case study can be used to assess priority cleanup action areas and as an engineering application for sizing of future sediment containment facilities at the study area.

SANTA FE ROOM • INVENTORY

District, Mines, and Geochemistry Databases in New Mexico

Virginia T. McLemore and Maureen Wilks • Senior Economic Geologist • New Mexico Bureau of Geology and Mineral Resources • New Mexico Institute of Mining and Technology

The New Mexico Bureau of Geology and Mineral Resources (NMBGMR) has been collecting data on mining districts since it was created in 1927. The NMBGMR has been slowly converting years of historical data into electronic format, as funding becomes available, into several databases that will be eventually linked together and available on the Web. These databases include mining districts, mines and mills, geochemistry, photographs (both recent and historic), and bibliography and are in various stages of development. The purpose of these databases is to provide data on districts, mines, and mills in New Mexico to federal, state, and local agencies, public organizations, private industry, and individual citizens to make informed decisions about abandoned mines, resource development and management, water supplies, environmental impacts, natural hazard assessment, and waste disposal. The available data includes location, production, reserves, geologic, geochemical, historical and recent photographs, resource potential, mining, ownership, and other data. Once the data are entered into appropriate databases with locations, the data can easily be converted to GIS format for display on maps. These datasets allow us to address the specific safety and environmental concerns detailed knowledge of the underground mine workings and location of mine openings, shafts, and adits are needed by regulatory agencies, developers and concerned citizens. One project has focused on the coal mines of the San Juan coal fields bringing together all the known coal geology maps, coal reports, and coal mine photographs in this area, georeferencing the mine maps and scans of the maps from the 1980 Abandoned Mine Land Survey.

Session Technology: Digital Collection of AML data

STIHA ROOM • PUBLIC PARTICIPATION AND PARTNERSHIPS

SMCRA Reauthorization Efforts, Finding the Middle Ground

Andy McAllister and Anne Daymut • Western Pennsylvania Coalition for Abandoned Mine Reclamation

With the end of the current Title IV fee collection slated for 2021, the non-profit community in Pennsylvania is gearing up for reauthorization efforts. NGOs working on AMD/AML issues in Pennsylvania have a long history of working cooperatively with government and industry and our current campaign to reauthorize SMCRA is one example of partnerships for the common good. We will explore how our partnerships work, specifically regarding our latest efforts in reauthorizing SMCRA Title IV fee collection, and other efforts regarding maintaining existing AMD treatment systems.

3:45-4:15 (3 OPTIONS)

NEW MEXICO ROOM • RECLAMATION

Objectives and Engineering Measures in Reclamation of Radioactively-Contaminated Mine Sites

Alan Kuhn, PhD, PE, RG, D.GE, F.ASCE • Principal • Alan Kuhn Associates LLC

Radioactive elements, primarily uranium and radium, have been mined by conventional underground and open pit methods in a number of states. Radioactive elements are often associated with other mineral commodities such as phosphate, copper and rare earth minerals. Although the concentrations of radioactive elements are typically relatively low in waste rock and impacted soils at these mine sites, they often exceed regulatory limits. This presentation describes objectives of reclamation of radioactively-contaminated (RC) mine sites and the engineering measures to achieve those objectives.

The primary reclamation objective is to provide long-term separation of radioactive elements from the accessible environment, specifically separation from direct human contact, the biosphere and the hydrosphere. Secondary objectives include enablement of a post-mining land use and restoration of a self-sustaining ecosystem.

The engineering measures to achieve reclamation objectives have much in common with those used successfully on non-radioactively contaminated mine sites; e.g., concentration of wastes, structural and erosional stabilization, placement of covers. For RC mine sites, isolation from the accessible environment means that radiological exposure at ground surface must meet standards set by the state or the USEPA. In addition to direct shielding from ionizing radiation (alpha and beta particles, gamma radiation), a cover must attenuate radon, a gaseous decay product of radium and the primary mechanism for release of radioactivity from a waste pile. Although ARD is usually not a problem with uranium mine waste, radium and some uranium minerals are soluble, so the cover has the additional function of controlling infiltration so that the water balance of the cover can support vegetation but minimize both radon flux and the potential for leaching of contaminants. The most effective cover consists of layers that include, at a minimum, a lower well-compacted clay-rich layer (radon and moisture barrier) and upper layer of lightly-compacted sandy soil (vegetation medium).

SANTA FE ROOM • INVENTORY

AML Inventory Field Data Collection Offline with Collector for ArcGIS

Daniel E. Kestner • Geographic Information Supervisor • Virginia Dept. of Mines, Minerals and Energy

This past field season Virginia began collecting AML features using Collector for ArcGIS and an ArcGIS Online organization account. This allowed field data collectors to use standard smartphones, Android or IOS (iPhone) operating systems, to capture important information about the features and synchronize the data back into our enterprise GIS.

One important component to this method was the use of offline capabilities. Many areas visited in the coalfield lack cell phone coverage or have very limited mobile data capability. This challenge was met by integrating web feature services into our ArcGIS online account to allow an "AML Collector" group to access the content for offline use. Development of ArcGIS Server Security and creation of a secured group allowed us to establish a workflow for "check-out" & "check-in" of data collection sessions. The enterprise GIS infrastructure was setup to allow viewing of these newly collected features through an interactive web application, direct use in ArcMap and other applications within seconds of synchronization of the newly collected field data.

There are many advantages to using smartphones for field data collection. Most users are already familiar with the applications on their phones and require very little training. A majority of the "heavy lifting" tasks to process the data are being completed on the server-side and are not dependent on the field collection staff to perform these tasks. The GPS chips and camera quality are sufficient for most tasks for collection. Collectors do not have to come into the office to synchronize the data. Data synchronization can be accomplished with suitable mobile data connections or via Wi-Fi when either becomes available.

STIHA ROOM • PUBLIC PARTICIPATION AND PARTNERSHIPS

Understanding Site Conditions and Stakeholder Concerns – Keys to Reclamation Success

William P. Balaz Jr. PE, P. Eng. • Senior Mining and Civil Engineer • Tetra Tech
Mikael Dieckhaus • Environmental Scientist • Tetra Tech

Understanding site conditions, stakeholder objectives and regulatory requirements is critical for successful mine closure and reclamation. This paper will discuss critical factors that contribute to successful reclamation including:

- Identification of key project drivers, critical site characteristics and stakeholder objectives and concerns;
- Development and integration of material handling, site grading and water management strategies;
- Hazard mitigation;
- Incorporating and addressing the key factors of the project drivers, critical site characteristics, stakeholder objectives, hazards, and various mitigation approaches into the final reclamation plan, design and strategies prior to implementation; and
- Revegetation and erosion and sediment controls.

Example reclamation projects will be used to illustrate the importance of these factors and concepts.

4:15-4:45 (3 OPTIONS)

NEW MEXICO ROOM • RECLAMATION

Pedestrian methane flux and magnetometer surveys to characterize, model, and monitor underground coal fires

S. Taku Ide • Chief Executive Officer • Koveva Ltd.

Pedestrian methane flux and magnetometer surveys are effective and economical techniques to deploy at underground coal fires. They can be used to characterize the current state of a coal fire, help improve numerical models of coal fires, and monitor yearly fire advancement or retreat.

Methane flux surveys can distinguish whether methane that is present near a coal fire is a byproduct of coal combustion or methane that naturally flows through the coal seam, independently of the fire. Where there is no naturally flowing methane, and methane is caused solely by combustion reactions, its presence defines the boundary of an active coal fire. When naturally flowing methane is present, the surveys can show how it interacts with the existing fire.

Magnetometer surveys can differentiate between parts of the coal seam that have already been consumed by the fire, areas that are currently being consumed, and areas that have not yet been consumed. By combining magnetometer and methane flux surveys, state personnel can develop a holistic view of the current state of the fire, and its propagation direction.

We provide examples where pedestrian methane flux and magnetometer surveys were conducted in Colorado, New Mexico, and on the Navajo Reservation. In one example, methane flux and magnetometer data helped define the boundary of an active underground coal fire on the Navajo Reservation, which led to a successful fire mitigation. In another example, methane flux data showed that a fire near Farmington, NM was exacerbated by a naturally occurring flow of methane near the coal fire. A successful mitigation effort there will involve capturing or diverting the methane that is currently feeding the fire.

A discussion of the applicability and limitations of these surveys follows. A list of coal fires in the U.S. that may benefit from these survey techniques are presented.

SANTA FE ROOM • INVENTORY

Unmanned Aircraft Systems and Case Study at Stream and Coal Waste Reclamation Project in New Mexico

Eric Cenovich, RLS, CP, CFedS • Principal • Wilson & Company, Inc.

The State of New Mexico Abandoned Mine Land Program (N.M. AMLP) is exploring remote sensing techniques to monitor change in land cover and stream morphology at reclamation projects. Unmanned aircraft systems (UAS) promise high resolution imagery, flexible deployment, and relatively low cost at focused areas. The presentation introduces some of the available UAS options, data acquisition, accuracy assessments, and derived products. As a case study, we examined the utility of an UAS to supplement revegetation and stream channel morphology monitoring at the Dillon and Dutchman Canyons, once part of a larger coal mining site, of Vermejo Park Ranch in northern New Mexico and a N.M. AMLP geomorphic reclamation project.

A Trimble UX5 Aerial Imaging Rover, fixed wing UAS with 1 meter wing span and electric pusher propeller, was deployed at the geomorphic reclamation in August 2014. A 16.1 MP compact camera with custom 15 mm lens was used to take high-resolution images along a programmed flight-path over the 0.16 square mile reclamation site in approximately 30 minutes. The large number of overlapping imagery taken by the UX5 was used to generate a point cloud of XYZ values after photogrammetric processing.

The point cloud data and imagery was acquired to assist in topographic modeling of the post-construction reclamation as well as assist in revegetation mapping and planning. The cost/benefits of using a UAS compared to traditional aerial photogrammetry to add value to reclamation monitoring are discussed.

STIHA ROOM • PUBLIC PARTICIPATION AND PARTNERSHIPS

Stories of Youth Engagement in Public Service: Protecting Natural Resources, Partnering for Impact

Loretta Pineda
Schuylkill Headwaters, Alexa Kramer; Hasbidito , Mario Atencio • OSMRE/VISTA Team Members

The national dialogue among educators, health professionals, parents, politicians and conservationists around youth engagement in the outdoors has reached a crescendo. State, tribal and federal agencies are challenged to find opportunities to engage young people in authentic meaningful work in natural resource management. This session will take a look at a program and projects that serve to address several of these challenges.

In 2002, an innovative partnership between the Office of Surface Mining Reclamation and Enforcement (OSMRE) and AmeriCorps VISTA created the first OSMRE VISTA Team, called the Appalachian Coal CountryWatershed Team, which was formed to assist watershed groups in addressing the environmental impacts of legacy mining. In 2009 the success of this team led to an invitation to create a second team in Colorado and New Mexico, called the Western Hardrock Watershed Team. Since then, the positive community contributions of the OSMRE VISTA Team has led to the development of the Department of the Interior (DOI) and Tribal Colleges and Universities (TCU) VISTA Teams in 2014, placing VISTAs in urban and rural communities supporting the work of five DOI bureaus: BIA, BLM, FWS, NPS, and USGS.

Today the Appalachian Coal Country Team (ACCT) and Western HardrockWatershed Team (WHWT) assist rural communities facing the environmental and economic impacts of legacy mining, with the goal of building thriving healthy communities. From 2002 to 2015 386 young professionals have served rural mining communities by building local capacity, fostering environmental stewardship, promoting economic development and conducting outreach and education. Additionally these men and women gain invaluable professional skills that contribute to their success in economic development and natural resource management careers following their terms of service.

We will examine two projects, one in Appalachia and one in the West supported by OSMRE VISTA's.

- Schuylkill Headwaters Association is an OSMRE VISTA project in Pottsville, Pennsylvania focused on the Silver Creek Environmental Education Trail an Recreation (SCEETR) Park, which serves as a passive AMD treatment facility and education center. VISTA service has been crucial to the grant writing, community partnerships, and curriculum development that have made SCEETR possible.
- Hasbidito is an OSMRE VISTA project in Cuba, NM serving the Eastern Navajo Nation in an area heavily affected by both the economic and environmental impacts of uranium mining. The project works to increase the health of the land and improve the economic opportunities and health of the Navajo people. VISTA service has built the capacity of the Mobile Farmer'sMarket Project and a gardening program which focuses on traditional crop and diverse yields in the existing food desert.

SESSION 10 WEDNESDAY 9.30.15

8:00-8:30 (3 OPTIONS)

NEW MEXICO ROOM • MONITORING AND INVENTORY

Site Characterization and Adapted Monitoring of a Flood-disturbed Reclamation Area, Swastika/Dillon Canyon Reclamation Project – Raton, New Mexico

Karen Caddis • Senior Project Manager/Environmental Specialist • Ecosphere Environmental Services

The New Mexico Energy, Minerals, and Natural Resources Department, Abandoned Mine Lands Program (AMLP) completed reclamation work on historic coal mine sites on the Vermejo Park Ranch outside of Raton, New Mexico, in 2012. Restoration work incorporated geomorphic reclamation principals to relocate a straightened stream channel away from coal waste piles to its historic location and included re-incorporating appropriate channel sinuosity, re-contouring and capping coal waste piles, and revegetating the disturbance footprint. Ecosphere Environmental Services was originally contracted by AMLP to complete wetland mitigation monitoring tasks for restoration work completed under the project's U.S Army Corps of Engineers (USACE) Nationwide 27 Permit. However, flash floods in 2013 resulted in significant damage to the reclamation areas, requiring development of new monitoring methodologies and characterization strategies for determining reclamation success in the flooded areas, baseline characterization, and future monitoring protocols. This included establishing new monitoring transects, re-evaluation of the realigned stream channel, and collection of baseline inventory data to reflect post-flood conditions.

The baseline data was used as a metric for future vegetation monitoring and to assist the AMLP and USACE in modifying the wetland mitigation and monitoring plan and preparation of an Adapted Mitigation/Maintenance plan to serve as the guiding document for future monitoring. AMLP's and Ecosphere's goals, which were accomplished, included:

- completing an initial survey of the reclamation area to characterize conditions following the flash flood events of 2013;
- determining the current quality and general stage of recovery of jurisdictional wetlands within the reconfigured stream channel;
- identifying areas where supplemental planting could increase the recovery success of jurisdictional wetlands;
- identifying areas damaged by flooding that required in-channel stabilization or grade control work to ensure protection of buried gob piles, connection to the water table, and long-term stability of the channel; and
- preparing a report that outlined field study findings and provided planting and stabilization recommendations.

SANTA FE ROOM • OSM AWARD WINNERS

APPALACHIAN REGION: Simpson Northeast Coal Refuse Fire Fell Township, Lackawanna County, Pennsylvania

Pennsylvania Bureau of Abandoned Mine Reclamation

The Simpson Northeast project was selected for the Appalachian Region Award for its involvement in a high-priority site that required a quick turn-around. The design team worked very quickly to start and finish the project and made sure to utilize various engineering methods to control water runoff and work around the freezing temperatures. The project was high-profile and was well received by the community. The design team utilized OSMRE resources to tackle a problem they didn't have specific experience in.

STIHA ROOM • WATER SUPPLY REPLACEMENT

Kentucky AML's Waterline Program

Mark A. Meade • Assistant Director • Kentucky Abandoned Mine Lands

Mr. Meade will present a Power Point show that will highlight how the water replacement program works in the Commonwealth. The show will begin with the geology of coal in KY and the problems that occur with groundwater after mining.

We will discuss how a county, municipality, or water district applies for funding followed by the steps the KY program takes to determine if AML funding is a possibility. When a given area is deemed AML eligible the steps will be shown as to how these projects are approved by OSM, funded, and administered. To date over $136 million construction dollars have been expended to get safe reliable municipal water to over 16,500 households.

SESSION 11

8:30-9:00 (3 OPTIONS)

NEW MEXICO ROOM • MONITORING AND INVENTORY

Mobile GIS for Ohio's Abandoned Mine Land Inventory

Chris W. Freidhof • GIMS Specialist II • Ohio Department of Natural Resources

Ohio's AML program maintains an inventory of abandoned mine land features that are eligible for reclamation under the Surface Mining Control and Reclamation Act of 1977 (SMCRA).

Ohio's AML GIS section developed a Mobile GIS using Trimble Juno series data collectors and a customized ArcPAD suite that allows staff members to be more effective and efficient while collecting data and information in the field. This project leveraged the field work of over a dozen non-GIS staff members and the divisions GIS section. The goal of this project was to ease the process in submitting eligible problems to the federal government registry for reclamation when they are discovered.

I will discuss the Abandoned Mine Land reclamation process, how we designed the Mobile GIS, hardware and software evaluations & decisions, as well as the workflows utilized to manage this system.

SANTA FE ROOM • OSM AWARD WINNERS

MID-CONTINENT REGION: Mid-Continent Region: AML Site 2052 Minnehaha Slurry, Sullivan County, Indiana

Indiana Division of Reclamation

The Minnehaha Slurry site was selected for the Mid-Continent Region Award for tackling unique engineering challenges to consolidate existing slurry material into a smaller area and stabilization of the project levee through traditional earthwork and non-traditional approaches. The use of a passive bioreactor was a great use of new technologies. Geomorphic design was also included in the project and the post-construction contours very well executed.

STIHA ROOM • WATER SUPPLY REPLACEMENT

Pennsylvania's Approach to AML Impacted Water Supply Replacement Projects

Patrick M. Webb P.E. • Engineer • BAMR
Martin J. Hughes P.E. • Engineer • BAMR
Richard L. Beam, P.G. • Geologist • BAMR

A significant percentage of Pennsylvania's coal field population does not currently have access to public water supply. Pennsylvania's legacy of over 200 years of coal extraction has resulted in many instances where available groundwater resources have been diminished and/or degraded, rendering them unsuitable for use as a domestic source. Since the late 1980s, in accordance with the Surface Mining Control and Reclamation Act (SMCRA), the Pennsylvania Department of Environmental Protection (DEP), Bureau of Abandoned Mine Reclamation (BAMR) has utilized part of its annual Abandoned Mine Land (AML) Grant to fund waterline extension projects in situations where it has been clearly documented that pre-SMCRA mining activities were the predominate impact upon available supply and water quality.

Initially, efforts were focused on in-house project design and construction of waterline extensions. These projects included indentured agreements obligating willing public water supply providers to assume operations of the completed extension. More recently, BAMR has employed a two-fold methodology which still utilizes the initial approach and also offers an optional method where pass-through funds are provided to non-profit water supply providers. This option provides pass-through funds for materials such as piping, stone and appurtenances and allows the provider to leverage other state or federal funding sources to fully fund and construct the extension project. The less expensive pass-through option has allowed BAMR to partner in many more replacement projects than could have been constructed under the initial approach. In all cases, as part of the project development process prior to obtaining an Authorization to Proceed from the Office of Surface Mining, BAMR conducts a thorough hydrologic investigation aimed at determining the degree of impact and the predominate cause of impact to existing water supplies in the project area.

This presentation provides a synopsis of Pennsylvania's AML water supply replacement approach. First, a history and program summary are provided. Second, typical examples of in-house and pass-through projects are presented. The presentation concludes with a discussion of the methods employed to evaluate and document impacts as part of a typical hydrologic investigation.

SESSION 12

9:00-9:30 (3 OPTIONS)

NEW MEXICO ROOM • MONITORING AND INVENTORY

Abandoned Mine Land Inventory Study for BLM-Managed Lands in California, Nevada, and Utah: Site and Feature Analysis

Jason Frels • Physical Scientist • Bureau of Land Management, National Operations Center

The Bureau of Land Management (BLM) is developing a nationwide approach to estimate the total number of Abandoned Mine Land (AML) sites and related features, or single manmade disturbances associated with mining activity, that remain to be inventoried on BLM-managed land. The approach used by the BLM expands a method developed by the California Abandoned Mine Lands Unit that uses a digital dataset of topographically occurring mine symbols from USGS topographic maps to estimate the number of AML sites and features that exist.

By geographically filtering mine symbol datasets to only the symbols occurring on or near BLM-managed land and subtracting known and inventoried sites and features, the BLM has developed estimates of the number of AMLs that remain to be inventoried in three states: California, Nevada, and Utah.

A total of approximately 93,000 sites containing approximately 368,000 features have not yet been inventoried in these three states. Based on these estimates, the BLM estimates that it will require 10 years of work for 10 two-person field crews to complete the inventory in these three states. The BLM also estimates that it will require approximately $212 million to complete the field validation of these estimated sites in California, Nevada, and Utah.

SANTA FE ROOM • OSM AWARD WINNERS

SMALL PROJECT AWARD: Lightner/Boston Coal Mine Erosion Control Project, Durango, Colorado

Colorado Inactive Mines Reclamation Program

The Lightner/Boston Coal Mine Erosion Control Project was selected for the Small Project Award for its involvement, cooperation and input between several agencies, particularly Colorado and New Mexico, in order to achieve success. The project included the input of community members and the local college which helps spread the word about AML programs. The project also focused on detailed re-vegetation that was more labor intensive but ultimately created microclimates for vegetation, and therefore wildlife, to thrive.

STIHA ROOM • BATS AND WILDLIFE

Mine Reclamation and Monarch Butterfly Habitat

Michael C. Korb, P.E. • Environmental Program Manager • Pennsylvania Department of Environmental Protection

Monarch Butterflies are one of the most recognized animals of North America, and are renowned for their long-distance seasonal migration and spectacular winter gatherings in Mexico and California. However, researchers and citizen scientists estimate that the Monarch population has declined more than 80% during the past 20 years.

Monarch Butterflies' habitat is anywhere milkweed grows. Milkweeds are required host plants for Monarch Butterfly caterpillars and therefore are a critical component in the Monarch's life cycle. Larvae feed only on milkweed.

The loss of milkweed plants in the Monarch's spring and summer breeding areas across the United States appears to be a significant factor contributing to the reduced number of Monarchs recorded in overwintering sites. Loss of milkweed due to roadside management practices, suburbanization of rural lands (subdivisions, factories, shopping centers, etc.), intensive agriculture and the extensive use of herbicides are certainly factors in this decline. Sustaining the Monarch population will require extensive restoration of milkweeds as well as efforts to protect existing Monarch habitats.

There is no doubt that our landscapes are becoming more fragmented and that there is less and less habitat for Monarchs, pollinators and the wildlife that share the same habitat. This trend will surely continue…unless we step up and do something about it.

This presentation will describe and discuss an opportunity for the Abandoned Mine Land Reclamation community to enhance Monarch Butterfly habitat.

SESSION 13

9:30-10:00 (3 OPTIONS)

NEW MEXICO ROOM • MONITORING AND INVENTORY

Using LiDAR to Inventory Dangerous Highwalls

Jill Flachskam • GIS Inventory Specialist • Indiana Department of Natural Resources

Indiana collected LiDAR data in the state's coal region in March 2013. This high-resolution topographical data provided an opportunity to perform a complete inventory of abandoned highwalls without the necessity of field investigation.

A LiDAR-derived Digital Elevation Model was analyzed using the ESRI ArcGIS Spatial Analyst Slope tool, creating a raster of slope values. This layer was displayed with a classified symbology using break values that correspond to the specifications on the Dangerous Highwall Priority Documentation. This symbology greatly facilitates visual identification of highwalls.

The coal region was searched systematically using section and quadrangle boundaries as guides. The highwalls were digitized as lines along the top of the slope, at the original unmined elevation. Aerial photography was used to determine the proximity of roads and structures, which qualify a highwall for Priority 2 status.

Cost estimates were calculated from the amount of material needed to backfill highwalls to a 4:1 slope. The ESRI 3D Analyst Add Surface Information tool was used to determine average height, subtracting the elevation of the adjacent pit. Because pit depths cannot be measured remotely, this calculation underestimates the volume needed for backfill, but other features of the model compensate for it.

While some highwalls were located completely within existing Problem Areas, others were only partially contained and the boundaries were expanded to accommodate them. New Problem Areas were created for the remainder, with multiple highwalls sharing one boundary when they were less than 1500 feet apart. Problem Areas were drawn to include the entire mine pit with an approximate 100-foot buffer.

The Electronic Abandoned Mine Land Inventory System (e-AMLIS) requires new features to be submitted with Priority Documentation, cost estimates, and Problem Area maps. The LiDAR-identified highwalls will be submitted to e-AMLIS when the supporting documents are complete.

SANTA FE ROOM • OSM AWARD WINNERS

NATIONAL AWARD: Lake Valley Mine Safeguard Projects, Lake Valley, Sierra County, New Mexico

New Mexico Abandoned Mine Land Program

The Lake Valley project was selected for the National Award for very challenging conditions due to the large number of dangerous mine openings, the presence of weak subsurface soil and rock, and the presence of deteriorated cribbing and near-surface underground workings. The project team utilized creative technical solutions to address the issues on the site. Toroid tire plugs were a very innovative use of new technology utilizing material that would normally be a waste product, and geosynthetically confined soil was an affordable engineering technique that provided a reliable closure solution.

STIHA ROOM • BATS AND WILDLIFE

Effects of gate design on bat use and behavior at abandoned mines in the southwestern U.S.

Abigail Tobin and Carol L. Chambers • School of Forestry, Northern Arizona University,

Abandoned mines provide important roosting habitat for bats but can also pose risks to humans. Often, gates are installed at entrances of abandoned mines to protect humans and bats, but gates may negatively affect bat use. Previous studies found positive and negative responses of bats to gates, thus providing somewhat contradictory direction for management. Using three short- to long-term studies, we evaluate how gate design affects bats in the southwestern U.S. by examining use (e.g., activity level, type [maternity, night, day]) and behavior (e.g., circling, fly retreat) of bats as they encounter gates. Our short-term project uses an in-situ mock gate experiment to see bats' one week behavioral response to culvert mock gates. The second project uses internal and external surveys in a before-after-control-impact (BACI) study to monitor changes up to a year following gate installation. Our third study utilizes a new genetic procedure that identifies species from guano. We collected guano at mines that have been gated between 4 and 20 years to identify species richness at sites with different gate designs. We will complete these three projects in October 2015. Our preliminary observations show that bats have a negative short-term behavioral response to culvert gates, causing them to increase circling and fly-retreat behaviors and decrease passing directly through the gate, which may affect their fitness and energy reserves. In the BACI study, we have not seen any changes in activity levels, but a decrease of maternity use at gated mines. The genetic results are still pending. The multi- temporal scale of our research shows varying responses from bats to gates which could explain contradictory results in previous studies. Our research will offer support for mine closure designs that minimize impacts on bat use of the sites, which will provide Abandoned Mine Land managers with the tools for improving bat habitat availability.

SESSION 14

10:00-10:30 (3 OPTIONS)

NEW MEXICO ROOM • EMERGENCY WORK

Every Time It Rains: The evolving role of AML as a community member in a mining dependent region

Justin Adams • Environmental Scientist • Kentucky Division of Abandoned Mine Lands

A historically wet summer and fall 2014 combined with a snow melt and series of heavy rain events in 2015, created a disastrous situation for rural counties across eastern Kentucky. Many of the counties impacted were declared part of a federal disaster area. As a result of this event, Regional AML offices were inundated with pleas for assistance.

The presentation will briefly analyze data related to citizen's inquiries gathered by AML inspectors, regional weather trends, and local economic statistics; specifically comparing previous year's results to the Spring of 2015. Data comparisons will evaluate evident trends in inquiry volume, precipitation amounts, geographical factors, and problem area classifications. Also included will be a broad discussion of some of the more hazardous sites and resultant projects. The presented data and site examples will provide insight into the growing interaction with citizens, regional organizations, and local governments.

SANTA FE ROOM • RECLAMATION

The Coal Authority: Mining Legacy Management in Britain

Simon Reed • Chief Operating Officer • The Coal Authority

In 1994, the state-owned British coal industry was privatised. The Government required a specialist body to regulate the industry and to manage its long term impacts on people, property and the environment. The Coal Authority was established as the public body with this responsibility.

With around £1 billion ($1.5bn) of mining-related liabilities on its balance sheet, the Coal Authority protects people property and the environment through; robust regulation and management of mineral estates; managing, interpreting and delivering mining data to predict and inform on hazard impacts; proactive inspection and reactive intervention programmes; physical interventions to stabilise mining features so protecting public safety and property; and interventions to improve water quality and biodiversity, so delivering environmental and economic benefits.

Increasing efficiencies and creating value from our liabilities has involved a step change in how we think. We are seeking to transform our liabilities into assets. Innovation, collaboration and changes to culture leading to a greater commercial focus have been driven through the business in order to deliver on these challenges. The long term liabilities of mine water are most challenging and these changes are enabling us to provide more economical and effective mine water management.

STIHA ROOM • BATS AND WILDLIFE

Abandoned Mine Land Wildlife Surveys – A Cost Analysis

Jason Williams • Wildlife Biologist • Nevada Department of Wildlife
Richard Sherwin • Associate Professor • Christopher Newport University
John Callan • AML Coordinator • Bureau of Land Management

Surveys of abandoned mines for wildlife use are performed regularly in many western states as part of AML reclamation programs. These surveys are typically performed in-house with cooperating governmental agencies, or contracted to outside professionals. From a cost:benefit analysis, generally the greater the closure program, the more efficient the pre-closure wildlife survey effort. We present data from AML wildlife survey and closure recommendation programs from more than 20 years of survey effort for federal and state land managers, and discuss what land managers should expect for their cost associated with these efforts.

10:30-10:45 / BREAK WITH EXHIBITORS (MEZZANINE)

SESSION 15

10:45-11:15 (3 OPTIONS)

NEW MEXICO ROOM • RECLAMATION

Clark Fork River Operable Unit (CFROU) Reach A Phase 1 Engineering Design and Construction, Warm Springs, Montana

Katie Garcin • Upper Clark Fork River Project Manager • Montana Department of Environmental Quality

Reach A, Phase 1 of the Clark Fork River Operable Unit is located in Deer Lodge County, Montana, with the upstream boundary located at the confluence of the old Silver Bow Creek channel and the reconstructed lower Mill-Willow Bypass, just downstream of the Warm Springs Ponds. Heavy metals originating from historic mining activities, milling, and smelting processes in Butte and Anaconda have accumulated on Clark Fork River stream banks and floodplain over a period of at least 100 years. Primary sources of contamination in the streambank and floodplain consist of tailings and contaminated sediments mixed with soils, which erode into river and other surface waters during high flow events.

Project design included definition of the meander corridor, establishing an appropriate level of floodplain connection, determining appropriate bank treatments, minimizing risk of avulsion through geomorphically appropriate methods, integrating wetlands and secondary channels, and accommodating revegetation requirements. Although the stream channel was generally not reconstructed, bank designs were developed using bioengineering techniques to minimize bank erosion while allowing deformation of the banks as the channel evolves. In addition to floodplain removal and remediation design, supporting design elements including floodplain groundwater dewatering, haul roads/routes, stream and utility crossings, traffic control, and mine waste repository placement played an integral part in the overall project design.

Montana Department of Environmental Quality (DEQ), as lead agency, is overseeing, managing, coordinating, designing, and implementing the Remedial Action for the Clark Fork Site in consultation with the Environmental Protection Agency (EPA).

SANTA FE ROOM • WATER QUALITY

Passive Water Treatment Systems for a High Altitude Mine

Samuel A. Bamberg, PhD • Senior Ecologist

This paper presents a plan for designing and implementing passive water treatment systems for mine water discharge for a gold mine in a high mountain area. The mine is located in the Andes Mountains of South America at an altitude between 4700 and 4900 m.s.n.m. The passive systems will allow the mine effluent discharges to comply with requirements for local and federal regulations limits for end of pipe limits for mining projects.

There are several active effluent discharge points operating at the mine. The effluent water is acidic, and may contain heavy metals. These effluent points have treatment before discharge consisting of primary settling and adjusting pH using lime. The overall objective of this plan is to reduce the number of compliance points and develop a treatment system that allows the mine to meet discharge requirements prior to and after closure.

This plan presents data and information to support the systems design. These include specific site environmental conditions including but not limited to available flow data, meteorological data, water quality data and other information to aid in the design of the wetland treatment system. The design of the channels, wetland and retention basins, and drop structures will be based on the existing topography and a calculated 25 yr- 24 hour storm event. During normal flow events the effluent flow will be designed to give maximum retention time. The design of normal passive systems will be based on a two year event.

The following specific topics are presented:

1. Description of existing environmental conditions.
2. Descriptions and design of passive water treatment systems of constructed passive systems proposed for this mine.
3. A design of a passive treatment system at one point of compliance.
4. Estimated Costs.

STIHA ROOM • REFORESTATION

Deep-Till/Tree Seeding for Forest Restoration/Wildlife Habitat on AML Projects in Northeast PA

Michael C. Korb, P.E. • Environmental Program Manager • Pennsylvania Department of Environmental Protection

The Pennsylvania Department of Environmental Protection (PADEP) Bureau of Abandoned Mine Reclamation Wilkes-Barre District Office has been using a "deep-till/tree seeding" technique for establishing wildlife habitat and accomplishing forest restoration on several abandoned mine land projects since 2009. This technique incorporates the District's standard construction methods and equipment used for the reclamation of these sites. Deep-till tree seeding (utilizing early-successional and some later-successional tree seeds) can be completed at any time during the reclamation project, usually concurrent with other seeding, aiding construction management.

In these projects, natural native growth surrounding the AML features is retained. Native trees from the clearing and grubbing of the grading area create stock for brush barriers, which are placed to create wildlife habitat corridors across the reclaimed meadowlands. The brush barriers are built 10 feet wide and 6 feet high to the designated length. Generally the deep-till/tree seeding area is constructed outward from the brush barriers for 50 feet in all directions, ripped with a dozer or other equipment which the contractor has available to accomplish the reclamation, to a minimum depth of 2 feet. Ripping is started next to the brush barrier and proceeds in ever-expanding ovals outward to the nominal 50 foot limit. After ripping is completed, the smaller type tree seeds are hydro-seeded onto the tree-seed area. Larger tree seed is broadcast manually to prevent damage to the seed. When seed planting is completed, the area is mulched to hold seed in place and provide moisture retention.

Projects have been monitored since 2011. The Deep-till/Tree Seeding "method" has been a success. Growth has varied on the projects, and the presentation includes a discussion of possible reasons for this, as well as results and details of the design and construction of the deep-till/tree-seed plots.

SESSION 16

11:15-11:45 (3 OPTIONS)

NEW MEXICO ROOM • RECLAMATION

Characterization of the South Canyon Coal Mine Fire, Garfield County, Colorado

Jeff Nuttall • Tetra Tech, Inc.

The South Canyon coal mine fire is located along South Canyon Road, about one mile south of the Garfield County Landfill, west of Glenwood Springs, Colorado. Mining was active in South Canyon from the mid-1880's until 1953 extracting coal from multiple seams. The mine fire has been burning since at least 1906 when it is mentioned in a USGS report. The fire actually consists of two separate fires, east and west, located on either side of South Canyon Creek and separated by mine workings which are now flooded.

The fires on both sides of the canyon continue to burn vigorously with the smoke occasionally visible from Interstate 70. The fire sites are accessible from a heavily-used public roadway, and create on-going public health and safety concerns.

Conditions at the sites are complicated by rugged terrain, steeply dipping strata with collapsed, rubblized mine workings, ash from burned out zones, and actively burning areas. Surface characteristics at the sites include elevated ground surface temperatures, hot venting combustion gases, subsidence features, fissures and fractures, and unstable ground conditions.

Characterization studies are being conducted in order to evaluate and design fire abatement measures. Recent activities at the site have included intake and exhaust vent mapping, subsurface drilling and thermocouple installation for temperature profiling. Three dimensional modeling of these data coupled with historic mine maps, subsidence feature mapping, a digital terrain model and aerial photography is being used to define the extent of the active fire and complex geometrical relationships that exist between these features to aid in their understanding, and ultimately an abatement design. This paper presents an overview of these characterization efforts and the 3D model of the South Canyon East mine fire.

SANTA FE ROOM • WATER QUALITY

The Challenge of Chemistry, Physics and Economics in Managing Mine Water and Acid Rock Drainage

Peter Thorn • Principal Manager • The Coal Authority

As many public bodies, the Coal Authority has to do more for less. With over 70 coal and metal mine treatment schemes this means innovating to ensure the cost of mine water and acid rock drainage interventions provide value for money over their whole life costs. To minimise energy and chemical costs we operate passive reducing and alkalinity producing systems (RAPS) for coal mine drainage and vertical flow bioreactors for removing metals such as zinc, cadmium and lead from metal mine drainage.

However, passive systems often need significant land areas, which for many of our sites are not practicable. Therefore, for particularly important aquifer or other major watercourse protection schemes, active treatment plants are necessary. Even with these schemes, improvements and efficiencies can be found from innovations in treatment and degassing.

We have developed composite schemes to limit the footprint of a full passive scheme without the expense of an active treatment plant.

Examples are given of each case together with challenges for further innovation and development of future schemes to improve water quality and the environment whilst providing value for money and protecting public finances.

STIHA ROOM • REFORESTATION

Review of Reforestation Efforts of the Bituminous District for Abandoned Mine Land Reclamamtion of Pennsylvania

Dean R. Baker, P.E. • Engineer & Environmental Program Manager • BAMR
Thomas C. Malesky, P.E. • Engineer and Mining Engineer Manager • BAMR

Since reclamation efforts began in 1977, Pennsylvania has rehabilitated more than 55,000 acres of abandoned mine lands. Long-term success of these projects has been primarily compelled by post-reclamation land use and erosion control. Because of this, the Pennsylvania Department of Environmental Protection (DEP) has incorporated tree planting into many of its final mine reclamation plans, recognizing the value of reforestation.

Since 1977, DEP has realized many successes and many failures. However, by revisiting these sites to monitor survival rates, DEP has determined the overall success or failure of its reforestation effort.

For years, final stabilization of reclaimed abandoned mines included an effort to plant heavy grasses for erosion control, usually some mix of trefoil and fescue. These seed mixes worked well for erosion control but they have limited the survival rate of DEP's tree planting effort.

DEP's main goal in any reclamation effort is to eliminate as many hazards as possible. In order to do this, DEP seeks to keep reclamation costs low to address as many hazards as possible. In the process, there has been little focus on making alternative reclamation efforts, such as reforestation, a priority.

Recently, DEP's reforestation effort has modernized. Enhancing its hazard abatement effort by redefining final grading and seeding procedures has led to cost-effective reclamation projects with an emphasis on reforestation.

This presentation provides examples of the results of the reforestation efforts by the Bureau of Abandoned Mine Reclamation's (BAMR's) Cambria District Office over the past 25 years. First, a history and summary of methods of tree planting methods are presented. During a PowerPoint presentation, typical examples of the reforestation efforts will be discussed. The presentation concludes with a cost evaluation of the efforts.

SESSION 17

11:45-12:15 (3 OPTIONS)

NEW MEXICO ROOM • RECLAMATION

Anvil Points Facility Remediation: A Case Study for AML Revegetation and Consideration of Waste Repository Covers

Maureen O'Shea-Stone • Plant Ecologist • Ecology and Environment, Inc.

Experimental retorting of oil shale was conducted for 30 years at the Anvil Points facility (APF), near Rifle, Garfield County, Colorado. The APF included an oil shale mine in the Roan Plateau cliffs, a town site, storage and disposal yards, explosive bunkers, a water treatment plant along the Colorado River, an experimental retort facility, and a spent shale disposal pile. All APF locations were constructed on lands currently managed by Bureau of Land Management (BLM), who funded and oversaw the site characterization and clean-up. Remediation of the site included removal of structures and equipment and revegetation of sites with native plant species. Approximately 100,000 yard3 of spent shale (containing hydrocarbons and metals, particularly arsenic) originally placed along a steep slope above West Sharrard Creek, a tributary to the Colorado River, was removed to three on-site repositories with vegetated covers.

We have conducted five years of quantitative monitoring of remediation disturbance areas against specific success-criteria. We will present these results as a case-study, with specific focus on revegetation of the repository surfaces. Particular revegetation challenges include an unpredictable and arid precipitation regime; lack of control regarding soil cover; soil and mulch seed contaminants; re-disturbance by adjacent activities; and surface water drainage erosion control issues. We will conclude with general discussion of site-specific environmental and ecological site conditions when considering remediation design of waste repositories with vegetated covers versus other structural covers.

SANTA FE ROOM • WATER QUALITY

Implementing Source Control at the Pennsylvania Mine, Summit County, Colorado

Jeff T. Graves • Senior Project Manager/Geological Engineer • Colorado Division of Reclamation, Mining & Safety

The Pennsylvania Mine is located east of the town of Keystone in the upper reaches of the Peru Creek/Snake River Watershed, and was the site of significant silver production during the turn of the 20th century. The mine is developed on at least six different levels and currently discharges metal laden water into Peru Creek, resulting in significant downstream impacts to aquatic life. The mine site has been the location of numerous attempts to address discharge through passive and semi-passive methods dating back to the early '80s, but all efforts failed due to various technical challenges and liability complications. In an effort to avoid potential Superfund listing of the site and the prohibitive costs associated with long term water treatment, numerous stakeholder agencies partnered together to investigate the possibility of addressing discharge through source control methods. Understanding the underground hydrology within the mine workings was critical to ascertaining the feasibility of source control options, but was complicated due to collapses blocking entry into the mine. Isotope analysis, dye tracing, drilling and well installation were all used to help develop a better hydrologic model of the mine, and led to a decision to re-open the lower portal and conduct underground investigations. Following portal re-establishment and significant underground rehabilitation, the collected data indicated that construction of one or more hydrualic seal bulkheads could provide an effective source control remedy. During the summer of 2014 the first bulkhead was constructed and began impounding water. A second bulkhead will be constructed during the summer of 2015, along with extensive water sampling and monitoring to determine post bulkhead effects.

STIHA ROOM • REFORESTATION

A study of modified forestry reclamation approach techniques on abandoned min lands in Pennsylvania

Carol M. Varano, P.E. • Project Engineer • Pennsylvania Department of Environmental Protection

Hundreds of years ago, Pennsylvania was heavily forested with valuable mixed hardwoods. Many acres were cleared to provide timber, agricultural land, energy for industrial growth and to reach and process the mineral resources lying below the surface. When early coal mines closed, the sites were frequently unreclaimed and hazards associated with vertical highwalls, steeply sloping spoil piles, and abandoned buildings and equipment remained. Though acid mine drainage, landslides, and increased runoff persisted, forests began to repopulate many of these sites. In Pennsylvania, the abandoned mine land (AML) reclamation methods developed under the Surface Mining Control and Reclamation Act (SMCRA) (PL 95-87, as amended) to address public safety hazards, erosion, and slope instability have typically involved heavy compaction of spoil material and establishment of thick stands of grasses. Occasionally, tree seeds or seedlings were planted on the grassy slopes, but the survival and growth rates have been low and forest succession has been slow. The Appalachian Regional Reforestation Initiative (ARRI) published Forestry Reclamation Approach (FRA) techniques to establish productive timber or mixed hardwood forests on previously mined lands. The FRA enhances tree growth by creating a suitable rooting medium that is no less than 4 feet deep and is comprised of topsoil, weathered sandstone, or the best material available. Material is loosely graded in order to avoid compaction.

The Pennsylvania Department of Environmental Protection's Bureau of Abandoned Mine Reclamation (BAMR) selects sites from a federal inventory of AML sites with features that correspond to SMCRA's established priorities and problem types. BAMR used modified FRA techniques to meet the property owners' requests for reforestation on the Orviston and Pine City AML sites.. The techniques used, successes, lessons learned and considerations for future reclamation projects are presented herein.

SESSION 18

12:15-12:45 (3 OPTIONS)

NEW MEXICO ROOM • RECLAMATION

Using Innovative Geohazard Mitigation Technologies to Stabilize Slopes, Provide Erosion Control and Reduce Risk

Cameron Lobato, PE • Western Operations Director • Geostabilization International

There are several recognized hazards associated with abandoned mine lands including clogged streams and stream lands, impoundments, waste piles & embankments, highwalls, slides, and portals. The resulting conditions, unstable slopes and landslides, scour and erosion, and rockfall, may not only pose an immediate threat to existing structures and facilities (such as trails and roadways, or channel sidewalls and dams), but if left unrepaired, may ultimately present a threat to the general public's safety. However, the timely mitigation of these conditions can sometimes be hampered by personnel availability and budget challenges. Investigation and design can take time and these costs can sometimes exceed actual construction costs. Utilizing innovative design-build methods and technologies can be an effective way to successfully overcome all of these challenges.

Before selecting what type of mitigation is most appropriate for a particular condition, it is necessary to distinguish between surficial problems or deeper instability. Surface instability is typically characterized by material (including soil, mud and debris, rocks and boulders, or mine refuse) moving under the influence of gravity and erosional forces. Deeper instability (landsliding) usually consists of movement of a much larger mass along planes of weakness. Recognizing the type of failed condition is a key component to selecting, designing, and implementing an effective solution.

This presentation will focus on the variety of mitigation measures available to address these stability and erosion concerns. Surficial problems can be addressed by use of slope matting material (geotextiles, wire mesh, etc.), shotcrete facing, and/or other methods. Deeper instability typically necessitates more extensive mitigation measures such as pattern anchoring both with and without a facing material (mesh, shotcrete, etc.). Innovative techniques will be explained and recent projects where these techniques have been successfully utilized for emergency repairs to protect occupied structures on abandoned mine lands will also be presented.

SANTA FE ROOM • POLICY

Abandoned Mine Land Program: A Policy Analysis for Central Appalachia and the Nation

Eric L. Dixon and Kendall Bilbrey

This paper seeks to educate the public on the Abandoned Mine Land (AML) program and provide an analysis of the policy, economic, environmental, and financial repercussions of the program. This paper is ambitious in its scope—never before has a research project provided such a far-reaching and thorough analysis of the AML program. Relevant analyses are based on previously unreleased AML funding data and on data collected through a survey of state and tribal AML officials. In addition to its educational purpose, the paper also provides a set of policy recommendations that, according to our research findings, are necessary for the AML program to achieve its core purpose of reclaiming America's abandoned mines.

STIHA ROOM • SUBSIDENCE

Geotechnical-Geophysical Void Mapping and Foamed-Sand Backfilling of the Rapson Coal Mine, Colorado Springs, Colorado – Case Study

Reclamation of Reclaimed Reclamationists in the West

Kanaan Hanna • Mining Engineer (formerly with Zapata Incorporated)

The presence of mined-out areas or voids underlying residential areas represents a significant risk to public safety and infrastructure. The Country Club Circle (CCC) Colorado Springs neighborhood is underlain by the abandoned Rapson Coal mine, which was worked from 1900 to 1915 prior to residential development. The room-and-pillar related mine workings lie at shallow depths ranging from 50 to 100 feet (ft) below ground surface (bgs). Through the years, numerous subsidence-sinkhole events have repeatedly occurred, causing serious safety hazards and damaging structures, streets, and utilities. Accurately imaging old mine workings and focused underground exploration are critical in evaluating the presence of the void conditions and determining void volume in order to develop cost-effective mitigation or ground stabilization measures. The Colorado Division of Reclamation, Mining and Safety (DRMS) and Zapata Incorporated developed a comprehensive mine subsidence reclamation program through a proactive method for delineating and mapping mines that exist beneath the residential area of the CCC.

A multi-phase geotechnical-geophysical program was implemented using a variety of high-resolution geophysical technologies, focused exploratory drilling, and imaging of existing mine workings. Based on the results of these studies, CDRMS initiated the mine reclamation plan to stabilize the remaining voids and caved areas beneath the neighborhood using two ground stabilization techniques; foamed-sand slurry, and low mobility grouting. This paper describes the methodology and significant results of the geotechnical-geophysical study with emphasis on subsurface characterization, mine workings and voids delineation, and evaluation of the ground stabilization techniques. Also, this paper describes the collaboration between DRMS, Zapata Incorporated, Aerix Industries, and Hayward Baker Inc. to facilitate the completion of the geotechnical-geophysical investigation and ground stabilization work.

Safe Travels Home!!

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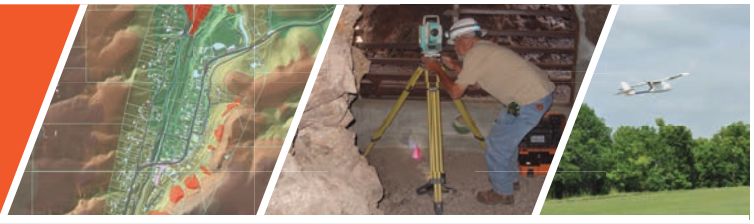

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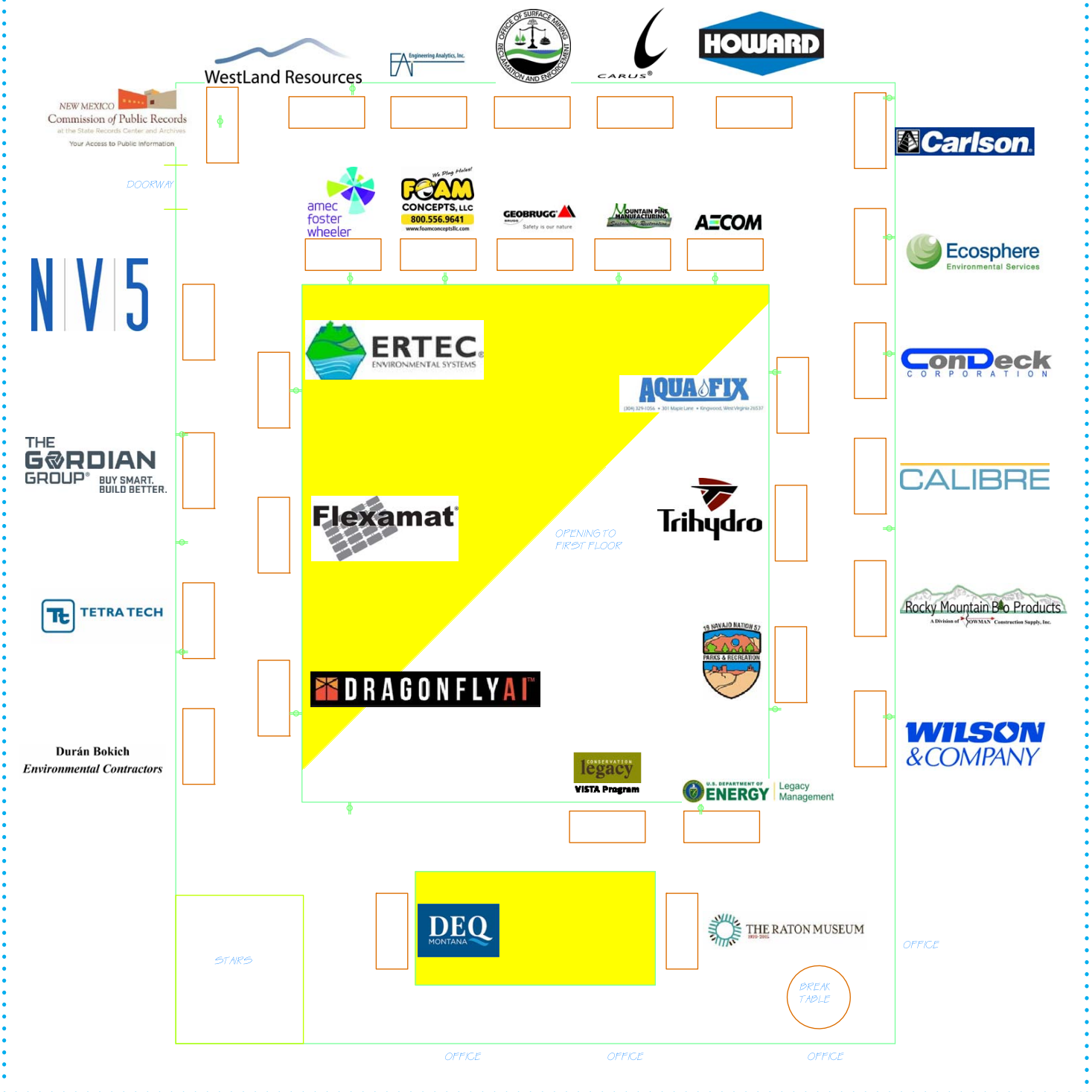

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