

Joint Conference of the



22nd Annual Meetings of the American Society of Mining and Reclamation

June 19-23, 2005 Breckenridge, Colorado

Proceedings of a Joint Conference of American Society of Mining and Reclamation 22nd Annual National Conference

June 19-23, 2005 Breckenridge, Colorado

Richard I. Barnhisel, Editor

Additional copies may be obtained from

ASMR 3134 Montavesta Rd. Lexington, KY 40502

SPONSORS

Sponsorship of the 2005 Joint Conference of the 22nd American Society of Mining and has been provided in the form of financial contributions or as labor-in-kind by the following entities:

Gold Level

Western States Reclamation, Inc. & Chenoweth & Associates, LLC. BSK Environmental Associates & Applied Hydrology International Peabody Coal

Bronze Level

Arkansas Valley Seed U.S. Geological Survey Wells Fargo Bank

Break Sponsor

Granite Seed Company

2005 Organizing Committee Members

Terry Toy Overall Host and Chairperson
Terry Toy, Chair Program and Promotions
Henry Austin, Chair Publications
Dick Barnhisel, Chair Paper Editor and CD Production
Judy Bolis, Chair Special Programs
Sue Brown, Hotel Liaison
Karen Escobar, Chair Financial and Registration
Dave Chenoweth, Chair, Sponsorships
Linda Figueroa, Chair Field Trips
Guy Johnson, Chair Public Education
Bob Postle, Chair Audio-Visual Coordinator
Brenda Schladweiler, Chair On Site Registration
Pete Stahl, Chair Workshops
Rich Vincent, Chair Exhibits

Exhibitors

ACZ Laboratories, Inc. Envirocon, Inc.

Applied Hydrology International Granite Seed Company

Agus fix Systems Inc.

Aquafix Systems, Inc. O'Kane Consultants

Arkansas Valley Seed Co.

Office of Surface Mining – Denver
Office of Surface Mining – Alton, IL

Chenoweth and Associates, LLC Peloton

Colorado Division of Minerals Rain for Rent

And Geology Rain for Rent
Rocky Mountain Bio-Products

Colorado Geologic Survey Truax Company, Inc.

ASMR 2005 National Executive Committee¹

Margaret Dunn President (becomes Past-President mid-conference 2005)

Jeff Skousen Past-President (term ends mid-conference in 2005)

David Chenoweth
Robert Darmody
President-Elect (becomes President mid-conference 2005)
President-Elect (term will begin mid-conference in 2005)

Robert Nairn

Virginia McLemore

Gary Wade

Steve Schroeder

Delegate (term ends mid-conference in 2005)

Delegate (term will end mid-conference in 2006)

Delegate (term ends mid-conference in 2005)

Delegate (term ends mid-conference in 2006)

Marty Sterns Delegate-Elect (term begins mid-conference in 2005)
George Watzlaf Delegate-Elect (term begins mid-conference in 2005)

To be Elected Technical Division Representative (two-term begins at the beginning of the

conference, 2005)

Richard Barnhisel Executive Secretary

ASMR Technical Division Chairpersons

Ecology Richard Vincent

Forestry & Wildlife John Harrington and Fred Brenner

Geotechnical Engineering Suzette R. Burckhard

International Tailings & Reclamation Stuart Bengson and Timothy Richmond

Land Use Planning & Design

Soils & Overburden

Jon Brian Burley
Robert Darmody

Water Management Robert Kleinmann and Jack Nawrot

iv

¹ Terms of office follows the names of each person.

Monday PM Session A - Title: Methods For Toxicity Assessment Of Mine Wastes: Dr. Tom Wildeman, Moderator

	Paper Authors	Page
Comparison of Mine Waste Assessment Methods at the	P. Hageman, K. Smith,	470
Rattler Mine Site, Virginia Canyon, Colorado	T.R. Wildeman and	
Transfer ivinic Site, virginia Carryon, Colorado	J.F. Ranville	
Heavy Metal Assessment of Phosphogypsum Waste	Al-Hwaiti, M., V. Carney,	1
Stockpile Material from Jordan	J. F. Ranville, and	
	P. E. Ross	
Characterization and Leach Test Assessment at the Tip	J. Moehle, S. Fox,	737
Top Mine, A Marginally Impacted Site	J.F. Ranville,	
Top Hime, II Had gillari j Impacted Site	T.R. Wildeman and P. Ross	
Using Enzyme Bioassay as a Rapid Screen for Metal	E.P. Blumenstein,	98
Toxicity	J.F. Ranville, L.M. Choate	
	and P. Ross	
Use of the Biotic Ligand Model to Predict Metal Toxicity	K.S. Smith	1134
to Aquatic Biota in Areas of Differing Geology		
The Toxicity of Binary Metal Mixtures to Ceriodaphnia	K. Kangas, J. Ayers,	599
Dubia in Mining Influenced Waters	J.F. Ranville and P. Ross	

Monday PM Session B - Title: Long-Term Effects of Topsoil Depth on Soil and Plant Systems: Dr. Jerry Schuman, and Dr. Robert Darmody Moderators Paper Authors Page

	Paper Autnors	Page
Long-term Effects of Cover Soil Depth on Plant	B. Buchanan, M. Owens,	115
Community Development for Reclaimed Mined Lands in	J. Mexal, T. Ramsey, and	
New Mexico	B. Musslewhite	
The Effects of Soil Depth and Other Soil Characteristics	A.F. Wick, S.D. Merrill,	1233
on Plant Community Development in North Dakota	T.J. Toy, J. Hendrickson	
	and M.A. Liebig	
Long-term Plant Community Development in Response	C.K. Bowen, G.E. Schuman	108
to Topsoil Replacement Depth on Mined Land in	and R.A. Olson	
Wyoming		
Long-term Plant Community Development on Topsoil	E.F. Redente and	963
Treatments Overlying A Phytotoxic Growth Medium	R.S. Sydnor	
Rowcrop Response to Topsoil Replacement on High	R.E. Dunker and	302
Traffic vs Low Traffic Soil Reconstruction Systems	R.G. Darmody	
The Effect of Soil Thickness on Crop Yields	R. Barnhisel, J. Powell and	40
•	R.B. Gray	
Effects of Cover Soil Thickness on Revegetation of	W.L. Daniels	255
Acidic Appalachian Coal Refuse		

Monday PM Session C - Title: Effective Public Education Tools We Can All Use Guy Johnson Moderator - Papers were not available for the CD

Monday PM Session C2 - Title: Powder River Basin Water Quality And Use Dr. George Vance, Moderator

Use of Coal Bed Natural Gas (CBNG) Waters: Soil and Plant Responses	L.A. King, G.F. Vance and G.K. Ganjegunte	607
Tracking the Source: Backfill and Backfill Water	P.A. Murphree	750
Quality at A Large Powder River Basin Coal Mine		

Tuesday AM Session A – Forestry: Reclamation and revegetation

Dr. John Harrington, Moderator	Paper Authors	Page
Status of Reforested Mine Sites in Southwestern Indiana	R. Rathfon, S. Fillmore and	945
Reclaimed from 1988 to 1995	J. Groninger	
Developing Ecological Completion Criteria to Measure	O.G. Nichols, C. Grant and	807
the Success of Forest and Woodland Establishment on	L.C. Bell	
Rehabilitated Mines in Australia		
Development of A Forest Site Quality Classification	A.T. Jones, J.M. Galbraith	523
Model for Mine Soils in the Appalachian Coalfield	and J.A. Burger	
Region		
American Chestnut as a Future Resource to Enhance	D.F. Jacobs	512
Mine Reclamation Productivity		
First Year Seedling Response to Three Levels of	C.N. Casselman, T.R. Fox,	191
Silvicultural Input on Post-SMCRA Reclaimed Lands	J.A. Burger, and A.T. Jones	

Tuesday PM Session A - Continued

Dr. Jeffrey Skousen, Moderator	Paper Authors	Page
Lower Grey Cloud Island Forest Patch: A 20 Year	J.B. Burley, C.A. Churchward,	146
Reclamation Monitoring Study	C.J. Burley and W.D. Sanders	
Hardwood Stocking After Five Years on Reclaimed Mined Land in Central Appalachia: A Preliminary Analysis	T. Auch, J.A. Burger and D.O. Mitchem	24
Herbaceous Ground Cover Effects on Native Hardwoods Planted on Mined Land	J.B. Burger, D.O. Mitchem, C.E. Zipper, an R. Williams	136
Influence of Physical, Chemical, and Biological Mine Soil Properties on White Oak Seedling Growth	J. M. Showalter, J.A. Burger, C.E. Zipper and J.M. Galbraith	1029

Tuesday AM Session B - Title: Hydrology and Erosion Characteristics

Dr. Steve Schroeder, Moderator	Paper Authors	Page
Hydrologic Characterization of a Large Underground	J.W. Hawkins, E.F. Perry	487
Mine Pool in Central Pennsylvania	and M. Dunn	
Determining Hydraulic Conductivities in A Vertical	R. Hutchinson and	504
Flow System	R.W. Nairn	
Water Quality Trends in a Flooded 35 Year Old Mine-	E.F. Perry, J.W. Hawkins,	904
Pool	M. Dunn, R.S. Evans, and	
	J.K. Felbinger	
Tracking Organic Substrate Alterations in Passive	D. Place, E. Claveu and	921
Reactive Zones for Planning and Monitoring	L. Figueroa	
Results of Innovative Contracting and Reclamation	H. Williams, E.A. Duvall	1256
Methods Used for the Fondaway Canyon Mine Closure	and H.H. Sauer	
Project, Fallon, Nevada		

Tuesday PM Session B – Continued

Mr. George Watzlaf, Moderator	Paper Authors	Page
Current and Planned Remediation Demonstration	R.W. Nairn, M.J. Calvey	779
Projects of the Oklahoma Plan for Tar Creek	and T.L. Landers	
Pond Rehabilitation and Establishment of A Site-Based	A.E. Koski	645
Environmental Education Curriculum		

Tuesday AM Session C1 - Title: Trace Metal Source & Reclamation

Dr. Kathy Smith Moderator	Paper Authors	Page
A Study of Zinc Metal Toxicity on the Cellulolytic	A. Ruhs, J. Excoffon,	985
Bacteria in Anaerobic Passive Treatment Systems	L. Figueroa and	
	T.R. Wildeman	
Use of Ozone to Remediate Manganese from Coal Mine	S.J. Tewalt, M. Sato,	1166
Drainage Waters	F.T. Dulong, S.G. Neuzil,	
Diaming Williams	A. Kolker and O Dennen	
Baseline Laboratory Studies of Sphalerite (ZnS)	M.R. Stanton	1155
Dissolution: Effects on Aqueous Metal Concentrations		
and Solubilization Rates		
Concentration of Arsenic, Selenium, and Other Trace	S.F. Diehl, M.B. Goldhaber,	283
Elements in Pyrite in Appalachian Coals of Alabama	A.E. Koenig, M.L.W. Tuttle	
and Kentucky	and L.F. Ruppert	

Tuesday PM Session C2 - Title: Characterization of Reclaimed Soils

Dr. John Sencindiver, Moderator	Paper Authors	Page
Characterization of Reclaimed Soils in Southwestern	H.R. Sinclair,	1087
Indiana after Surface Mining for Coal, Part II.	K.M. McWilliams,	
8 · · · · · · · · · · · · · · · · · · ·	C.A. Seybold,	
	R.B. Grossman, S.L. Baird	
	and T.G. Reinsch	
Properties and Classification of Mineral Sands Mine	Z.W. Orndorff,	842
Soils in Southeastern Virginia	W.L. Daniels and	
	J.M. Galbraith	
Influence of Reclamation Management Practices on Soil	G. Shrestha, P.D. Stahl and	1042
Bulk Density and Infiltration Rates on surface Coal	L.J. Ingram	
Mine Lands in Wyoming		
The Use of "Enhanced" Moisture Store-And-Release	D. Christensen and	224
Cover Systems over Reactive Mine Waste in Cold and	M. O'Kane	
Warm Semi-Arid Climates		

Poster Session – Presenters Must Be at Their Posters During This Time

	Paper Authors	Page
Improved Methods for the Establishment of Forests on	P. Angel, D. Graves,	23
Surface Mined Lands	C. Barton, R. Warner, and	
	R. Sweigart	
Eight Year Shrub Responses: Reclaimed Terraces, La	B. Buchanan, M. Owens,	135
Plata Mine, New Mexico	T. Ramsey, and	
, ,	B. Musslewhite	
Appalachian Regional Reforestation Initiative and the	V.M. Davis	267
Forestry Reclamation Approach		
Demonstration of Modular Sulfate Reducing Bioreactors	L. Figueroa, M. Zaluski,	360
in the Upper Clear Creek Watershed	J.L. Bolis, A. Miller,	
**	D. Place and A. Ruhs	
Tracking Salt and Sodium Build up Due to Irrigation	G.K. Ganjegunte,	378
with Coalbed Natural Gas Product Water: Soil Solution	G.F. Vance and L.A. King	
Lysimeter and Soil Saturated Paste Extract Studies		
Saline-Sodic Water Impacts to Soils and Vegetation	L.A. King, G.F. Vance, and	623
•	G.K. Ganjeguntel	
Problems with Manganese and Magnesium in Hot	C.S. Kirby and B. Means	626
Acidity Titrations		
Innovative Technology Applications to Mine	C.R. Lee, N.K. Murray,	678
Reclamation Using Neutralized Red Mud and Recycled	P.N. Baldwin, Jr. and	
Soil Manufacturing Technologies	M.D. Farrall	
Oxic Limestone Drains for Metal Mine Drainages	A. Miller, L. Figueroa, and	736
0	J.L. Bolis	
Results of Interseeding on Existing Shrub Populations,	M. Owens, B. Buchanan,	863
La Plata Mine, New Mexico	T. Ramsey and	
·	B. Musslewhite	
Shrub Base Unit Production Sampling Technique	M. Owens, B. Buchanan,	862
	B. Musslewhite and	
	T. Ramsey	
Using Airborne Geophysics to Improve the Management	J. Sams, B. Lipinski,	999
	R. Hammack, G. Veloski,	

of Produced Water from Coal Bed Natural Gas	T. Ackman, and B Harbert	
Extraction in the Powder River Basin		
Near Surface Geophysics for the Structural Analysis of a	R. Van Dam,	1178
Mine Rock Pile, Northern New Mexico	L.A. Gutierrez,	
Willie Rock I he, from their frew Mexico	V.T. McLemore,	
	G.W. Wilson,	
	J.M.H. Hendrickx and	
	B.M. Walker	
First Year Transplant Response on Constructed Test	A. Wagner, M. Owens,	1229
Plots, Questa Mine, Questa, New Mexico	B. Buchanan and	
, , , , , , , , , , , , , , , , , , , ,	E. Redente	
Utilizing Global Positioning System to Evaluate	A.K. Waitkus	1230
Reclamation Results at a Coal Mime in Wyoming		
Using Raw Chat in Hot Mix Asphalt for Pavement	N.M. Wasiuddin,	1231
Applications	W.B. Hamid, M.M. Zaman,	
11ppileutions	R. Nairn, and T. Landers	
Semi-Passive Treatment of Mine Drainage with a Water	G.R. Watzlaf	1232
Powered Dry Chemical Feed System Using Pebble Lime		
10 Years of Testing Indigenous Plant Material on	S.R. Winslow,	1269
Drastically Disturbed Mineland in Western Montana	M.E. Majerus, L.Marty,	
Diastically Disturbed Miniciand in Western Montana	and S. Majerus	
Infiltration Through a Mine-waste Dump and Transport	L. Wirt, D.L. Fey, and	1270
of Metals to a Nearby Stream, Clear Creek County,	R.R. McDougal	
Colorado		

Wednesday AM Session A1 - Title: Revegetation: Establishment, Design, and Evaluation Moderator Page Page

, Moderator	Paper Authors	Page
The Adaptation of High Elevation Plants to Low	R.A. Dunne	328
Elevation Growth		
High Altitude Relegation on Experiments on the	L. Payson, R. Trenholme	875
Beartooth Plateau Park County, Montana and Park	and J. Corwin	
County, Wyoming		
Assessing Visual Preference for Aggregate Pit	E. Paddle, G. Antoniuk and	864
Rehabilitation Designs Using Computer Animated	R. Corry	
Landscape Models		
Relating Soil Properties to Native Plant Establishment	C. Venable and J. Skousen	1202
along West Virginia Highways		
Reclaiming coarse taconite tailings – Is it all just BS?	P. Eger	338
(Biosolids)		

Wednesday PM Session A2 – Revegetating Tailings: Establishment, Design, and Evalution.

, Moderator	Paper Authors	Page
Plant Establishment on Reclaimed Molybdenum	B. Buchanan, M. Owens,	127
Tailings, Questa Tailings Facility, Questa, New Mexico	A. Wagner and E. Redente	
Phytostabilization of Acid Metalliferous Mine Tailings at	D.R. Neuman,	791
the Keating Site in Montana	G.S. Vandeberg,	
the freating blee in Montana	P.B. Blicker, J.D. Goering,	
	S.R. Jennings, and K. Ford	
The Affect of Tailings Characteristics on Mine	M. Milczarek, T.M. Yao	734
Reclamation and Closure	and T.L. Thompson	

Wednesday PM Session A3 - Title: Revegetation and Soils: Depth, **Productivity, and Carbon**

Dr. Lee Daniels, Moderator	Paper Authors	Page
Ongoing Evaluation of Effects from Variable Topsoil	B.K. Schladweiler,	1000
Depths at a Coal Mine in Northeastern Wyoming	G.F. Vance, D.L. Legg and	
Depths at a countrine in restriction of your	S. Belden	
Productivity of Reclaimed Soil at the Red Hills Lignite	D.J. Lang, G. Hawkey and	667
Mine in Ackerman, MS	B. Chow	
Variability of Soil Organic Carbon in two Reclaimed	M.K. Shukla and R. Lal	1057
Sites in Southeastern Ohio		

Wednesday AM Session B1 - Title: Microbiological Studies of Mine Materials

Mr. Jim Gusek, Moderator	Paper Authors	Page
Microbial Characterization of Sulfate-Reducing	A. Pruden, H. Hong,	935
Columns Remediating Acid Mine Drainage	L. Inman, M. Logan,	
Columns Remediating Field Willie Diamage	C. Sans, D. Ahmanna,	
	L. Figueroa and	
	K. Reardon	
Comparison of Inocula Applied in the Remediation of	L.P. Pereyra, R. Hanson,	894
Acid Mine Drainage by Sulfate Reduction	A. Pruden and	
Tiena minic Diamage by banate Reduction	K.F. Reardon	
Mosses and Other Early Colonizers: Pioneers for	R.P. Buxton, J. Stanley,	170
Revegetating Mine Waste Rock Dumps and Rock Walls	P. Alspach, C. Morgan and	
Revegetating withe waste Rock Dumps and Rock wans	C. Ross	

Wednesday AM Session B2 - Title: Salinity: Weathering and Movement Paper Authors

Dr. George Vance, Moderator	Paper Authors	Page
Weathering Characteristics of Saline and Sodic Minesoils in the Southwestern United States	B.D. Musslewhite, T.H. Brown, G.W. Wendt and C. Johnston	765
Using spreadsheets to Predict Stream Salinities in the Yampa River Basin Coal Fields, Northwestern Colorado	T. Kaldenbach	554

Wednesday PM Session B3 - Title: Waste Utilization

, Moderator	Paper Authors	Page
Reclamation of Waste Rock Stockpiles Utilizing Paper	A.E. Koski	627
Mill Residuals at Cliffs Michigan Mining Company		
Environmental Analyses of Hot Mix Asphalt Made with	C.F. Gause, R.W. Nairn	398
Mining Waste Materials	and M. Zaman	
Thermal Camera Imaging of Rock Piles at the Questa	H. Shannon, R. Van Dam,	1015
Molybdenum Mine, Questa, New Mexico	J.M.H. Hendrickx and	
1) (1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	V.T. McLemore	

Wednesday PM Session B4 - Title: Development and Reclamation of Disturbed Environments

Dr. Virginia McLemore, Moderator	Paper Authors	Page
Linking Physical and Social Systems for Improving	J.J. Griffith and T.J. Toy	433
Disturbed-Land Reclamation		
Reclamation of Prime Farmland after Surface Mining	H.R. Sinclair, Jr.	1082
for Coal and Farmland Protection Policy Act		
Sustainable Development in Appalachia – A New Way of	J.S. Gardner and P.	388
Looking at Mountaintop Mining	Sainato	

Wednesday AM Session C1- Title: Mine Water Monitoring and Treatment Dr. Robert Kleinmann, Moderator Paper Authors Page

Comparison Between Observed and Model Predicted Particulate Metal Transport in a Mining-Impacted	B.A. Butler, J.F. Ranville and P.E. Ross	154
Stream (North Fork Clear Creek, Colorado)		
Sources of Acid and Metals from the Weathering of the Dinero Waste Pile, Lake Fork Watershed, Leadville, Colorado	S.F. Diehl, P. Hageman, K.S. Smith, J.T. Herron, and G.A. Desboroufg	268
Naturally Occurring Acid Rock Drainage in Colorado's Lake Creek Watershed	D.A. Bird, M.A. Sares, D.C. Peters, P.L. Hauff, D.W. Coulter and F.B. Henderson III	98
Rate of Manganese Removal in Limestone Bed Systems	B. Means and A.W. Rose	702

Wednesday PM Session C2 - Title: Treatment of Acid Mine Materials

, Moderator **Paper Authors** Page J. Gusek and K. Clarke-Where Does the Recovery of Metal Resources from 454 Whistler **Passive Treatment Systems Fit in Sustainable Development Initiatives Associated with Large Mining Projects? Demonstration of A Pulsed Limestone Bed Process for** P.L. Sibrell, 1068 T.R. Wildeman, the Treatment of Acid Mine Drainage at the Argo M. Frienmuth. Tunnel Site, Idaho Springs, Colorado M. Chambers and D. Bess M. Kalin, A. Fyson and W.N. Wheeler The Chemistry of Conventional and Alternative M. Kalin, A. Fyson and 568 W.N. Wheeler **Treatment Systems for the Neutralization of Acid Mine Drainage Acid Rock Drainage Prevention and Treatment with** G.J. Olson, T.R. Clark and 831 T.I. Mudder **Thiocyanate and Phosphate-Containing Materials** Performance of 116 Passive Treatment Systems for Acid J. Skousen and 1100 P. Ziemkiewicz **Mine Drainage** Overcoming Access Issues at A Remote Passive J. Gusek, B. Shipley, and 443 D. Lindsay Treatment Site Near Lake Shasta, CA

Thursday AM Session A - Title: Aquatic Communities: Biology, Chemistry, and Economic Impacts

Dr. Anne Wagner, Moderator	Paper Authors	Page
The Importance of Identifying Natural Variation in	S.P. Canton,	181
Aquatic Communities: The Thompson Creek	L.C. Bergstedt,	
Molybdenum Mine Example	J.W. Chadwick, and	
	D.J. Conklin	
Determining Sources of Water Quality Impacts Using	J.W. Chadwick,	211
Biological Monitoring: The Molycorp Questa	S.P. Canton,	
Molybdenum Mine Example	D.J. Conklin, Jr. and	
	L.C. Bergstedt	
Improvements in Brown Trout and Invertebrate	L.C. Bergstedt,	54
Population in the Arkansas River during Reclamation	J.W. Chadwick,	
Efforts on California Gulch	D.J. Conklin, Jr. and	
C. A. W. M. D. L. D. L. M. M.	S.P. Canton	220
Controlling Mine Drainage Problems in Minnesota –	P. Eger and P. Eger	339
Are All the Wetland Treatment Systems Really Above		
Average?		
The Acidic Lignite Pit-Lakes of Germany-Microcosm	A. Fyson and B. Nixdorf	361
Experiments on Acidity Removal Through Controlled		
Eutrophication		

Thursday AM Session B - Title: Methods and Technologies for Mine Sites and Materials $\,$

Dr. Keith Lindbeck, Moderator	Paper Authors	Page
Reclaiming A Gold Mine	R.K. Will	1244
Analysis of Multi-Temporal Geospatial Data Sets to	D.B. Gesch	415
Assess the Landscape Effects of Surface Mining		
Tracking Sludge Disposal Using Electrical Conductivity	M. Coleman, K. Butler, and	236
Mapping	T.A. Al	
Evaluation of the TerreSIM© Model for Cover Design	R.J. Bilodeau	70
Analysis		
Preliminary Status Report on Molycorp Goathill North	V.T. McLemore, P. Walsh,	679
Trenches, Questa, New Mexico	K.M. Donahue,	
Tremenes, Questa, Iven interned	L.A.F. Guitierrez,	
	S. Tachie-Menson,	
	H.R. Shannon, and	
	G.W. Wilson	

Thursday AM Session C - Title: Mine Regulations, Remediation and Economic Applications

Dr. Jon Burley, Moderator	Paper Authors	Page
Co-operative Partnership and Innovation in the	H. Lacy and M. Slight	654
Planning and Execution of the Decommissioning of the		
Mt McClure Gold Project		
Abandoned Mine Safety Remediation: Closing the Holes	C. Ross	976
in Nevada		
Mine Waste Technology Program: Historical	H.O. Joyce, D. Bless and	540
Perspectives, Current Highlights, Future Opportunities	G. Ashby	
Use of Performance Standards and Adaptive	D.L. Mengel and	717
Management to Guide Remediation at the Bunker Hill	T.A. White	
Site, Idaho		
Placement of Coal Combustion By-Products at Surface	K.C. Vories	1215
Mining Control and Reclamation Act (SMCRA) Mines:		
A Short History of OSM Technical Efforts and		
Responses to Environmental Concerns		

Author index begins on the next page.

FIRST AUTHO	OR PAPER TITLE	PAGE
Al-Hwaiti, M	Heavy Metal Assessment of Phosphogypsum Waste Stockpile Material from Jordan	1
Angel, P,	Improved Methods for the Establishment of Forests on Surfa Mined Lands	23
Auch, T.	Hardwood Stocking After Five Years on Reclaimed Mined Land in Central Appalachia: A Preliminary Analysis	24
Barnhisel, R.I.	The Effect of Soil Thickness on Crop Yields	40
Bergstedt, L. C.	Improvements in Brown Trout and Invertebrate Population the Arkansas River during Reclamation Efforts on California Gulch	
Bilodeau, R.J.	Evaluation of the TerreSIM© Model for Cover Design Analysis	70
Bird, D.A.	Naturally Occurring Acid Rock Drainage in Colorado's Lake Cree Watershed	ek 71
Blumenstein, E.P.	Using Enzyme Bioassay as a Rapid Screen for Metal Toxicity	98
Bowen, C. K.	Long-term Plant Community Development in Response to Topsoil Replacement Depth on Mined Land in Wyoming	108
Buchanan, B.	Long-term Effects of Cover Soil Depth on Plant Community Development for Reclaimed Mined Lands in New Mexico	115
Buchanan, B.	Plant Establishment on Reclaimed Molybdenum Tailings, Questa Tailings Facility, Questa, New Mexico	127
Buchanan, B.	Eight Year Shrub Responses: Reclaimed Terraces, La Plata Mine, New Mexico	135
Burger, J.A.	Herbaceous Ground Cover Effects on Native Hardwoods Planted on Mined Land	136
Burley, J.B.	Lower Grey Cloud Island Forest Patch: A 20 Year Reclamation Monitoring Study	146
Butler, B.A.	Comparison Between Observed and Model Predicted Particulate Metal Transport in a Mining-Impacted Stream (North Fork Clear Creek, Colorado)	154
Buxton, R.P.	Mosses and Other Early Colonizers: Pioneers for Revegetation Mine Waste Rock Dumps and Rock Walls	ng 170
Canton, S.P.	The Importance of Identifying Natural Variation in Aquatic Communities: The Thompson Creek Molybdenum Mine Example	181

Casselman, C.N.	First Year Seedling Response to Three Levels of Silvicultural Input on Post-SMCRA Reclaimed Lands	191
Chadwick, J.W.	Determining Sources of Water Quality Impacts Using Biological Monitoring: The Molycorp Questa Molybdenum Mine Example	211
Christensen, D.	The Use of "Enhanced" Moisture Store-And-Release Cover Systems over Reactive Mine Waste in Cold and Warm Semi- Arid Climates	224
Coleman, M.M.	Tracking Sludge Disposal Using Electrical Conductivity Mapping	236
Daniels, W.L.	Effects of Cover Soil Thickness on Revegetation of Acidic Appalachian Coal Refuse	255
Davis, V.	Appalachian Regional Reforestation Initiative and the Forestry Reclamation Approach	267
Diehl, S.F.	Sources of Acid and Metals from the Weathering of the Dinero Waste Pile, Lake Fork Watershed, Leadville, Colorado	268
Diehl, S.F.	Concentration of Arsenic, Selenium, and Other Trace Elements in Pyrite in Appalachian Coals of Alabama and Kentucky	283
Dunker, R.E.	Rowcrop Response to Topsoil Replacement on High Traffic vs Low Traffic Soil Reconstruction Systems	302
Dunne, R.	The Adaptation of High Elevation Plants to Low Elevation Growth	328
Eger, P.	Reclaiming coarse taconite tailings – Is it all just BS? (Biosolids)	338
Eger, P.	Controlling Mine Drainage Problems in Minnesota – Are All the Wetland Treatment Systems Really Above Average?	339
Figueroa, L.	Demonstration of Modular Sulfate Reducing Bioreactors in the Upper Clear Creek Watershed	360
Fyson, A.	The Acidic Lignite Pit-Lakes of Germany-Microcosm Experiments on Acidity Removal Through Controlled Eutrophication	361
Ganjegunte, G.K.	Tracking Salt and Sodium Build up Due to Irrigation with Coalbed Natural Gas Product Water: Soil Solution Lysimeter and Soil Saturated Paste Extract Studies	378
Gardner, J.S.	Sustainable Development in Appalachia – A New Way of Looking at Mountaintop Mining	388
Gause, C.F.	Environmental Analyses of Hot Mix Asphalt Made with Mining Waste Materials	398

Gesch, D.B.	Analysis of Multi-Temporal Geospatial Data Sets to Assess the Landscape Effects of Surface Mining	415
Griffith, J.J.	Linking Physical and Social Systems for Improving Disturbed- Land Reclamation	433
Gusek, J.	Overcoming Access Issues at A Remote Passive Treatment Site Near Lake Shasta, CA	443
Gusek, J.	Where Does the Recovery of Metal Resources from Passive Treatment Systems Fit in Sustainable Development Initiatives Associated with Large Mining Projects?	454
Hageman, P.L.	Comparison of Mine Waste Assessment Methods at the Rattler Mine Site, Virginia Canyon, Colorado	470
Hawkins, J.W.	Hydrologic Characterization of a Large Underground Mine Pool in Central Pennsylvania	487
Hutchinson, R.	Determining Hydraulic Conductivities in A Vertical Flow System	504
Jacobs, D.F.	American Chestnut as a Future Resource to Enhance Mine Reclamation Productivity	512
Jones, A.T.	Development of A Forest Site Quality Classification Model for Mine Soils in the Appalachian Coalfield Region	523
Joyce, H.	Mine Waste Technology Program: Historical Perspectives, Current Highlights, Future Opportunities	540
Kaldenbach, T.	Using spreadsheets to Predict Stream Salinities in the Yampa River Basin Coal Fields, Northwestern Colorado	554
Kalin, M.	The Chemistry of Conventional and Alternative Treatment Systems for the Neutralization of Acid Mine Drainage	568
Kangas, K.	The Toxicity of Binary Metal Mixtures to <i>Ceriodaphnia Dubia</i> in Mining Influenced Waters	599
King, L.A.	Use of Coal Bed Natural Gas (CBNG) Waters: Soil and Plant Responses	607
King, L.A.	Saline-Sodic Water Impacts to Soils and Vegetation	623
Kirby, C.S.	Problems with Manganese and Magnesium in Hot Acidity Titrations	626
Koski, A.E.	Reclamation of Waste Rock Stockpiles Utilizing Paper Mill Residuals at Cliffs Michigan Mining Company	627
Koski, A.E.	Pond Rehabilitation and Establishment of A Site-Based Environmental Education Curriculum	645
Lacy, H.	Co-operative Partnership and Innovation in the Planning and Execution of the Decommissioning of the Mt McClure Gold Project	654

Lang, D.J.	Productivity of Reclaimed Soil at the Red Hills Lignite Mine in Ackerman, MS	667
Lee, C.R.	Innovative Technology Applications to Mine Reclamation Using Neutralized Red Mud and Recycled Soil Manufacturing Technologies	678
McLemore, V.T.	Preliminary Status Report on Molycorp Goathill North Trenches, Questa, New Mexico	679
Means, B.	Rate of Manganese Removal in Limestone Bed Systems	702
Mengel, D.L.	Use of Performance Standards and Adaptive Management to Guide Remediation at the Bunker Hill Site, Idaho	717
Milczarek, M.	The Affect of Tailings Characteristics on Mine Reclamation and Closure	734
Miller, A	Oxic Limestone Drains for Metal Mine Drainages	736
Moehle, J.	Characterization and Leach Test Assessment at the Tip Top Mine, A Marginally Impacted Site	737
Murphree, P.A.,	Tracking the Source: Backfill and Backfill Water Quality at A Large Powder River Basin Coal Mine	750
Musslewhite, B.D.	Weathering Characteristics of Saline and Sodic Minesoils in the Southwestern United States	765
Nairn, R.W.,	Current and Planned Remediation Demonstration Projects of the Oklahoma Plan for Tar Creek	779
Neuman, D.R.	Phytostabilization of Acid Metalliferous Mine Tailings at the Keating Site in Montana	791
Nichols, O.G.	Developing Ecological Completion Criteria to Measure the Success of Forest and Woodland Establishment on Rehabilitated Mines in Australia	807
Olson, G.J.	Acid Rock Drainage Prevention and Treatment with Thiocyanate and Phosphate-Containing Materials	831
Orndorff, Z.W.	Properties and Classification of Mineral Sands Mine Soils in Southeastern Virginia	842
Owens, M.	Shrub Base Unit Production Sampling Technique	862
Owens, M.	Results of Interseeding on Existing Shrub Populations, La Plata Mine, New Mexico	863
Paddle, E.	Assessing Visual Preference for Aggregate Pit Rehabilitation Designs Using Computer Animated Landscape Models	864
Payson, L.	High Altitude Relegation on Experiments on the Beartooth Plateau Park County, Montana and Park County, Wyoming	875

Pereyra, L.P.	Comparison of Inocula Applied in the Remediation of Acid Mine Drainage by Sulfate Reduction	894
Perry, E.F.	Water Quality Trends in a Flooded 35 Year Old Mine-Pool	904
Place, D.L.	Tracking Organic Substrate Alterations in Passive Reactive Zones for Planning and Monitoring	921
Pruden, A.	Microbial Characterization of Sulfate-Reducing Columns Remediating Acid Mine Drainage	935
Rathfon, R.	Status of Reforested Mine Sites in Southwestern Indiana Reclaimed from 1988 to 1995	945
Redente, E.F.	Long-term Plant Community Development on Topsoil Treatments Overlying A Phytotoxic Growth Medium	963
Ross, C.	Abandoned Mine Safety Remediation: Closing the Holes in Nevada	976
Ruhs, A.	A Study of Zinc Metal Toxicity on the Cellulolytic Bacteria in Anaerobic Passive Treatment Systems	985
Sams, J.	Using Airborne Geophysics to Improve the Management of Produced Water from Coal Bed Natural Gas Extraction in the Powder River Basin	999
Schladweiler, B.K.	Ongoing Evaluation of Effects from Variable Topsoil Depths at a Coal Mine in Northeastern Wyoming	1000
Shannon, H.R.	Thermal Camera Imaging of Rock Piles at the Questa Molybdenum Mine, Questa, New Mexico	1015
Showalter, J.M.	Influence of Physical, Chemical, and Biological Mine Soil Properties on White Oak Seedling Growth	1029
Shrestha, G.	Influence of Reclamation Management Practices on Soil Bulk Density and Infiltration Rates on surface Coal Mine Lands in Wyoming	1042
Shukla, M.K.	Variability of Soil Organic Carbon in two Reclaimed Sites in Southeastern Ohio	1057
Sibrell, P.L.	Demonstration of A Pulsed Limestone Bed Process for the Treatment of Acid Mine Drainage at the Argo Tunnel Site, Idaho Springs, Colorado	1068
Sinclair, H.R.	Reclamation of Prime Farmland after Surface Mining for Coal and Farmland Protection Policy Act	1082
Sinclair, H.R.	Characterization of Reclaimed Soils in Southwestern Indiana after Surface Mining for Coal, Part II.	1087
Skousen, J.	Performance of 116 Passive Treatment Systems for Acid Mine Drainage	1100

Smith, K.S.	Use of the Biotic Ligand Model to Predict Metal Toxicity to Aquatic Biota in Areas of Differing Geology	1134
Stanton, M.R.	Baseline Laboratory Studies of Sphalerite (ZnS) Dissolution: Effects on Aqueous Metal Concentrations and Solubilization Rates	1155
Tewalt, S.J.	Use of Ozone to Remediate Manganese from Coal Mine Drainage Waters	1166
Van Dam, R.L.	Near Surface Geophysics for the Structural Analysis of a Mine Rock Pile, Northern New Mexico	1178
Venable, C.	Relating Soil Properties to Native Plant Establishment along West Virginia Highways	1202
Vories, K.C.	Placement of Coal Combustion By-Products at Surface Mining Control and Reclamation Act (SMCRA) Mines: A Short History of OSM Technical Efforts and Responses to Environmental Concerns	1215
Wagner, A.	First Year Transplant Response on Constructed Test Plots, Questa Mine, Questa, New Mexico	1229
Krzyszowska-		
Waitkus, A	Utilizing Global Positioning System to Evaluate Reclamation Results at a Coal Mime in Wyoming	1230
Wasiuddin, N.M.	Using Raw Chat in Hot Mix Asphalt for Pavement Applications	1231
Watzlaf, G.R.	Semi-Passive Treatment of Mine Drainage with a Water Powered Dry Chemical Feed System Using Pebble Lime	1232
Wick, A.F.	The Effects of Soil Depth and Other Soil Characteristics on Plant Community Development in North Dakota	1233
WILL, R.K.	Reclaiming A Gold Mine	1244
Williams, H.T.	Results of Innovative Contracting and Reclamation Methods Used for the Fondaway Canyon Mine Closure Project, Fallon, Nevada	1256
WINSLOW, S.R.	10 Years of Testing Indigenous Plant Material on Drastically Disturbed Mineland in Western Montana	1269
Wirt, L	Infiltration Through a Mine-waste Dump and Transport of Metals to a Nearby Stream, Clear Creek County, Colorado	1270