

# **Joint Conference of the West Virginia Mine Drainage Task Force, American Society for Mining and Reclamation (ASMR) and Appalachian Regional Reforestation Initiative (ARRI) 2017**

Morgantown, West Virginia, USA  
9 - 13 April 2017

ISBN: 978-1-5108-5171-9

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2017) by American Society of Mining & Reclamation  
All rights reserved.

Printed by Curran Associates, Inc. (2018)

For permission requests, please contact American Society of Mining & Reclamation  
at the address below.

American Society of Mining & Reclamation  
1800 S Oak St. Ste 100  
Champaign, IL 61820-6974  
USA

Phone: 217.333.9489  
Fax: 217.244.3219

[www.asmr.us](http://www.asmr.us)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# 34th Annual Meeting of the ASMR, April 9-13, 2017, Morgantown, West Virginia

2017 Joint Conference of the West Virginia Mine Drainage Task Force, American Society for Mining and Reclamation (ASMR), Appalachian Regional Reforestation Initiative (ARRI)

AMD

[Practical Outfall Mine Water Treatment Applications - Challenges and Solutions](#) ..... 1

B. Riley, D. B. J. Ceslovník

[A Geochemical Kinetics Module for AMD Treat to Estimate the Effects of Aeration on Rates of Decarbonation and Iron Oxidation](#) .....2

C. A. Cravotta III, B. Means, B. Arthur

[The Maelstrom Oxidizer - Astonishing Aeration System](#) ..... 3

J. Hayden, J. Oliver

[High Sulfate Mining Wastewater Treatment by Two-Stage Chemical Precipitation Process](#) .....4

K. Banerjee, H. Kronebusch, S. Muddasani

[A Case Study Evaluating Effluent Quality Following Chemical and Electrochemical Precipitation for Metals Removal from Acid Mine Drainage Water](#).....5

B. J. Lesikar, D. J. Kovalcik, C. J. Villela

[Zinc and Nickel Sorption and Desorption Using a Mixed Algae Community Collected from a Mine Drainage Passive Treatment System](#).....6

E. E. Fielding, R. W. Nairn

[Evolution of Trace Metal Removal Products in Field-scale Vertical Flow Bioreactors](#) ...7

J. A. LaBar, R. W. Nairn

[Metal Reclamation Units \(MRUs Wetlands in a Box\) for AMD and Nutrient Cycling](#) ..8

C. Lennox

[Advancements in Iron Terrace Design for Metal Mine Sites](#).....9

J. Gusek, L. Josselyn, E. Wolaver

[Challenges of Designing and Building a Passive Treatment System with Limited Topography, Hydraulic Head, and Available Land Area](#).....10

R. W. Nairn, T. Danehy, C. Neely, R. Dutnell, B. Page, N. Shepherd, D. Cates, B. Stanila

[Seasonal Storm-induced Metal Transport Dynamics Between Oxidative Passive Treatment Cells.....11](#)

L. R. Oxenford, R. W. Nairn

[Quantifying Hydraulic Conductivity in Mine Drainage Passive Treatment System Vertical Flow Bioreactors.....12](#)

B. J. Page, R. W. Nairn

[Iron Transport and Removal Dynamics in the Oxidative Units of a Passive Treatment System: A Five-year Performance Evaluation.....13](#)

L. R. Oxenford, R. W. Nairn

[A Field Demonstration of an Alternative Coal Waste Disposal Technology - Geochemical Findings.....14](#)

P. T. Behum, L. Lefticariu, Y. P. Chugh

[Sulfate Removal in Biochemical Reactors and Scrubbers Treating Neutral Low-Metal Concentration Mine Influenced Water \(MIW\).....15](#)

G. Fattore, J. Gusek, T. Clark, L. Josselyn

[Passive Treatment of Sulfate from Mine-Influenced Water.....17](#)

R. C. Thomas, J. S. Bays

[Three Year Performance Evaluation of a Sulfate Reducing BioReactor for Mine Water Treatment in PA: Sulfate Removal, Sulfide Control, and TDS Reduction .....18](#)

W. J. Walker

**Water Related**

[A Feasibility Study for the Automated Monitoring and Control of Mine Water Discharges.....19](#)

C. Vass, A. Noble

[Understanding Storm Response of AMD Impacted Streams.....20](#)

Z. I. Martin, N. Kruse

[Hydrological and Geophysical Methods to Investigate Streamflow Losses and Restoration Strategies in Abandoned Mine Lands of Schuylkill River Watershed, Pennsylvania, USA, 2012-2015.....21](#)

C. A. Cravotta, L. Sherrod, D. G. Galeone, W. G. Lehman, T. E. Ackman, A. Kramer

[Mine Reclamation Applications of a New Water Budget Model: Wetbud.....22](#)

W. L. Daniels, G. R. Whittecar, T. Thompson, Z. Agioutantis, S. Stone

[Assessing How Hydrologic Isolation of Coal Mine Spoils Affects Streamflow Mechanisms and Water Chemistry Using Open Source Wireless Technology.....23](#)

S. G. Fulton, J. Dowd, A. Thompson, C. R. Jackson

- [Seasonal Recovery of an Appalachian Stream Affected by Acid Mine Drainage and Municipal Waste Water.....24](#)  
M. Whited, J. Gaughan, S. Rensel, J. Hugo, W. H. J. Strosnidier, P. M. Smyntek
- [Field Predictors for TDS Generation Potential from Appalachian Mine Spoils.....25](#)  
D. K. Johnson, W. L. Daniels, C. E. Zipper
- [Relationship Between Aqueous and Sediment Chemistry and Biological Recovery Across a Gradient of Acid Mine Drainage Impairment.....26](#)  
N. A. Kruse, S. Damdinbal, D. L. Lopez
- [The Appalachian Stream Syndrome: Complex Local Conditions and Regional Metacommunity Degradation Caused by the Accumulation of Multiple Stressors.....27](#)  
E. R. Merriam, J. T. Petty
- [The Impacts of Acid Mine Drainage Remediation Projects on Water Quality, Aquatic Macroinvertebrate, and Fish Populations in the Deckers Creek Watershed, Monongalia and Preston Counties, West Virginia.....28](#)  
N. P. Revetta
- [Water Quality and Biotic Condition in Mining-influenced Appalachian Headwater Streams: An Overview of a Long-term Study.....29](#)  
S. H. Schoenholtz, E. A. Boehme, D. Drover, R. A. Pence, D. J. Soucek, A. J. Timpano, R. V. Vorste, K. M. Whitmore, C. E. Zipper
- [Effects of Longwall Mining on Aquatic Resources at the Bailey Mine in Southwestern Pennsylvania .....30](#)  
M. L. Shema, J. M. Silvis, M. R. Haibach
- [Selenium Dynamics in Mining-Influenced Headwater Streams of Central Appalachia.....31](#)  
K. M. Whitmore, S. H. Schoenholtz, C. E. Zipper, D. J. Soucek
- [Water Quality and Freshwater Mussel Status in Mining-Influenced Virginia-Tennessee Rivers.....32](#)  
C. E. Zipper, B. Beaty, J. W. Jones, C. Lott, R. Stewart
- [Groundwater Modeling Used to Design of a Tailings Impoundment Removal near Yellowstone National Park.....33](#)  
T. H. Henderson, M. W. Borduin
- [Seasonal Recharge and Groundwater Storage in a Below Drainage Mine-pool.....34](#)  
E. Perry, T. Gray, H. Trexler, S. Poborsky
- [North Branch Potomac River Mine Pool Assessment Study.....35](#)  
N. D. Pointon, J. Felbinger

[Groundwater Tracing in Mine Pools Above the Cabin Creek Oilfield in Kanawha County, West Virginia.....36](#)

A. Schaer

Forestry, Wildlife

[Upland Forest Development in a Reconstructed Watershed After Oil Sands Mining in Northern Alberta, Canada.....37](#)

B. Pinno, F. Leishman, R. Errington, M. Merlin, S. Landh\u00E4usser

[Reclamation Experiments on the Allegheny Front: The Push for Bio-Energy, Habitat, and Timber .....38](#)

B. Caterino, J. Schuler, S. Grushecky, J. Skousen

[Surface and Subsurface Tillage Effects on Soil Properties and Tree Growth at an East Texas Lignite Surface Mine .....39](#)

H. Z. Angel, H. M. Williams, J. P. Stovall

[Survival and Growth of Woody Plants on Four Reclaimed Mine Sites.....40](#)

A. Monteleone, J. Skousen, L. McDonald, J. Shuler, R. Williams

[The Effects of \*Castor canadensis\* \(North American Beaver\) Repopulation on a Mine Drainage Impacted Stream.....41](#)

N. L. Shepherd, R. W. Nairn

[Effect of Grading on Productivity of High-Value Tree Species in Appalachian Surface Mines.....42](#)

W. T. Dement, J. M. Lhotka, C. D. Barton, J. W. Stringer

[Flight 93 National Memorial Reforestation Project.....43](#)

M. C. Tyree, J. Larkin, S. Eggerud, P. Angel, M. French

[Some Thoughts on Planting Native Tree Species in Mineland Reforestation.....44](#)

M. B. Adams

[Regeneration Dynamics of Seedling Origin Aspen: Working Towards Resiliency in Forest Restoration.....45](#)

C. M. King, S. M. Landh\u00E4usser

[Tree Seedling Survival After Planting Under Varying Treatments on Reclaimed Mine Land.....46](#)

P. J. Boleman, R. M. Swab

[Growth Rates of Hardwood Trees Nine Years after Reclamation in Response to Substrates and Amendments.....47](#)

K. Dallaire, L. Wilson-Kokes, P. Emerson, C. Delong, C. Thomas, J. Skousen

[Establishment of Hybrid Poplar on a Reclaimed Mine Site in Southern West Virginia.....48](#)

A. Hass, R. S. Zalesny Jr., D. Patel

Loblolly Pine Survival and Growth on a Reclaimed Mineral Sands Mine in Southeastern Virginia

S. Klopf

[Ecological Restoration on the Mower Tract within the Monongahela National Forest, WV.....49](#)

C. Barton, S. Jones, S. Eggerud, T. Kuntz, A. Branduzzi, P. Angel

[Conservation of Northern Long-eared Bat Habitat at an Aggregate Mine in Westmoreland County, Pennsylvania.....50](#)

C. D. Rockey

[Natural Processes for the Restoration of Large Mines.....51](#)

D. Polster

[Cost-effective Strategies for the Restoration of Large Disturbances.....52](#)

D. Polster

Reclamation

[Woods-run Chips as a Filter Sock Matrixl.....53](#)

S. T. Grushecky, L. McDonald

[A Pathway to Walk-Away? – 30 Year Old Technology to Suppress Acid Rock Drainage Revisited.....54](#)

J. Gusek

[New Soil Reconstruction Method for Reclaiming Subsided Land with Yellow River Sediments.....55](#)

Z. Hu

[Utilization of Extractable Soil Test Sulfate as an Indicator for Acid Producing Pyritic Sulfur.....56](#)

D. J. Lang, K. K. Crouse

[Effects of Alternative Liming Strategies on Leachate Quality and Soil Morphology of Acid-Forming Dredge Materials.....57](#)

Z. Orndorff, W. L. Daniels, S. Klopf, A. Wick

[Pollution Loading Tracking to Characterize Success of an Anoxic Limestone Drain Installation on Lambert's Run, Southwestern Pennsylvania.....58](#)

H. E. Patton, L. G. Mignogna, K. Tomkowski, J. Vinglish, K. J. Palmer, M. C. Whited, M. Crittenden, G. Shustrick, W. H. J. Strosnider

[Geochemical Controls on Limestone Utilization in Abandoned Mine Land Reclamation.....59](#)

P. A. Giri, B. Tracy, G. A. Olyphant

[Effective Modifications to the Design and Application of Constructed Wetlands and Limestone Beds.....60](#)

B. Means, M, Crittenden

[Objectives and Design Solutions of a 1000-year Evapotranspiration-Capillary Surface Barrier System .....61](#)

Z. F. Zhang, D. M. Wellman

[Revegetation success at several Montana sites using soil amendments .....62](#)

S. R. Jennings

[Restoration Techniques to Increase Survival and Vigor of Wyoming Big Sagebrush Seedlings .....63](#)

A. P. Jacobs, P. D. Stahl

[Soil Changes During Stockpiling and After Reclamation at Three Wyoming Natural Gas Production Areas.....64](#)

J. B. Norton, C. F. Strom

[Sludge Impact on the Stabilization of the Fire Road Mine in New Brunswick.....65](#)

M. Coleman, K. D. Phinney

[Reclamation of Refuse Piles using Fluidized Bed Combustion Ash in the Blacklick Creek Watershed, Pennsylvania.....66](#)

R. Martin, G. L. Aaron, G. Greenfield

[Transforming Abandoned Mine Lands into a Botanic Garden.....67](#)

G. R. Watzlaf, R. S. Hedin, B. C. Hedin, K. Kaiser, R. L. Beam

[Metals got you Down? A Look at Effective Mining-Influenced Water Treatments.....68](#)

P. J. Dugan, D. M. Hartsough, H. Schuster

[Preventing Acid Rock Drainage Can Source Control Really Be Successful?.....69](#)

P. Eger

[What Happens to a Mine after Mining? Making Mine Land Reclamation More of a Community Asset.....70](#)

M. C. Korb

[Production of an Iron Oxide Product from Mine Water: 15 Year Report.....71](#)

R. S. Hedin



[Yields and Ethanol Production Potential of Switchgrass and Miscanthus on Reclaimed Mine Lands.....72](#)

S. Scagline, J. Skousen, T. Griggs

[Native Vegetation in Reclamation: Improving Habitat and Ecosystem Function Through Using Prairie Species in Mine Land Reclamation.....73](#)

R. M. Swab, N. Lorenz, S. Byrd, R. Dick

[Passive Treatment of Highly Contaminated Iron-Rich Acid Mine Drainage.....74](#)

C. M. Neculita, T. V. Rakotonimaro, B. Bussière, T. Genty, G. J. Zagury

[The Complicated Role of CO<sub>2</sub> in Mine Drainage Treatment.....75](#)

R. S. Hedin, B. C. Hedin

**Other, Social, Imaging, Economics**

[Governing Unconventional Legacies: Lessons from the Coalbed Methane Boom in Wyoming.....76](#)

K. B. Walsh, J. H. Haggerty

[Bond Release Verification Requirements for Successful Reclamation at Wyoming Surface Coal Mines.....77](#)

A. K. Waitkus

[Assessing the Benefits of at Source vs. in Stream AMD Treatment: Implications for Managing Water Liabilities Under the WVDEP's Bond Forfeiture Program.....78](#)

M. P. Sheehan, P. F. Ziemkiewicz

[Water Treatment: Planning for Forever, New Options.....79](#)

D. T. Eyde, D. A. Baker

[Local Government Entities in Improving AMD Impaired Waters.....80](#)

D. Wagner, D. Thomas, E. Fuller, D. Hedge

[Geocoding Locations of Historic Reclamation Research Sites using Google Earth.....81](#)

R. Li

[Georeferencing of American Society of Mining and Reclamation Proceedings: A New Tool and Patterns in Reclamation Research.....82](#)

A. Rovder, Z. Shoff, D. Madl, S. Wolfe, S. Long, W. Strosnider, P. Smyntek

[Detecting the Presence of Coal Mining Impacts by Predicting Acid Mine Drainage Impacted Streams Using Aerial Imagery.....83](#)

J. R. Bowman, S. C. Porter, S. A. Miller

[Unmanned Aerial Vehicle \(UAV\) Survey for Year-End Mining Reclamation Estimation.....84](#)

M. S. Maguire

[Applying Landforming to Reclamation: A Case Study in Central Appalachia.....85](#)

L. C. Hopkinson, J. D. Quaranta, J. Hause, J. Lorimer, R. Park, I. Santos

[Subsidence Wetland Formation and Transition in the High Ground Water Table Coal Mining Areas.....86](#)

Y. H. Fu, Z. Q. Hu, X. M. Dong, Q. Y. Wang, W. Xiao

[3D Modeling of the Sand Coulee Basin Abandoned Mine Lands .....87](#)

K. M. Brown

[Exploration of a Multi-Sensor Approach for the Detection and Mapping of Coal Seam Fires in the United States.....88](#)

A. J. Sivitskis, J. Richards

[Communicating Maintenance of Acid Mine Drainage Treatment Projects in Ohio.....89](#)

S. D. L. Cornwell

[Coupling Technical Assistance with Student Service Learning in Mine Water Reclamation.....90](#)

K. J. Green, M. H. Whited, W. H. J. Strosnider

[Development of International Standards for Mine Reclamation.....91](#)

W. L. Daniels, S. Carpenter

[Carbon Dioxide: A Global Problem in Search of a Rational Global Solution.....92](#)

K. C. Vories

[Development of a Low-cost Remote Water Quality Monitoring System in Acid Mine Drainage Impaired Watersheds.....93](#)

N. A. Kruse, G. G. Ogallo, H. Kruse

Posters

[Stand Level Nutrient and Carbon Content Across One Rotation of Loblolly Pine Plantations on a Reclaimed Surface Mine .....94](#)

H. Z. Angel, J. S. Priest, J. P. Stovall, B. P. Oswald, Y. Weng, H. M. Williams

[Competition Among Understory Plants Varies Depending on Reclamation Soil and Fertilization .....95](#)

J. Buss, K. Stratechuk, B. Pinno

[Seasonal Recovery of an Appalachian Stream Affected by Acid Mine Drainage and Municipal Waste Water.....96](#)

M. Whited, J. Gaughan, S. Rensel, J. Hugo, W. H. J. Strosnider, P. M. Smyntek

[Utilizing an Unmanned Aerial System and a High Resolution Multi-Spectral Sensor to Evaluate Ecosystem Health and Predict Surface Water Quality .....97](#)

B. K. Holzbauer-Schweitzer, R. W. Nairn

[Reclassification of the Upper Little Juniata River Based on Continuous In-Stream Monitoring .....98](#)

S. Long, W. Strosnider, J. Eckenrode

[Labware Evaluation for Selenium Sorption Experiments .....99](#)

R. K. McGrail, L. M. McDonald

[Acid Mine Drainage Water Testing and Metals Analysis at Morris Creek, WV .....100](#)

J. Serafin, L. Cox

[Geomorphic Reclamation and Landscape Heterogeneity: A landscape approach to quantify geomorphic stability and vegetation community diversity .....101](#)

A. Pennino, K. Fleisher, K. Vaughan, K. Hufford, T. Kelleners, J. Norton, P. Stahl, C. Strom

[Evaluation of Risk Posed by Trace Metals in Soils of a Mining-Impacted Agricultural Watershed .....102](#)

A. L. Sikora, R. W. Nairn

[Mass Transport Controls on Aluminum Removal in Limestone-Based Treatment Systems.....103](#)

C. Spellman, D. Madl, A. Rose, E. Zovinka, J. Bandstra, W. Strosnider

[Drone Imagery Acquisition to Perform Volumetric Analysis for Landscape Mapping.....104](#)

M. P. Strager, P. Kinder, J. A. Kimmet, A. Hentz

[Phosphorus, Iron and Trace Metal Interactions at the Sediment Layer-Water Column Interface: The Role of Recovered Mine Drainage Residuals .....105](#)

Z. Tang, R. W. Nairn

[A Seasonal Comparison of the Passive Abandoned Coal Mine Remediation System at Wingfield Pines .....106](#)

M. Valkanas, N. Trun

[A Drainable Limestone Bed Constructed in a Botanic Garden .....107](#)

G. R. Watzlaf, R. S. Hedin, B. C. Hedin

[Cluster planting: A New Prescription for Enhancing Structural Diversity in Reclaimed Boreal Forest](#) .....108

B. Pinno, A. Schoonmaker, R. Albricht

[Pollution Loading Tracking to Characterize Success of an Anoxic Limestone Drain Installation on Lambert's Run, Southwestern Pennsylvania](#) .....109

H. E. Patton, L. G. Mignogna, K. Tomkowski, J. Vinglish, K. J. Palmer, M. C. Whited, M. Crittenden, G. Shustrick, W. H. J. Strosnider