# Proceedings Table of Contents

**ASSMR 14th Annual Meeting**  
**May 10-15, 1997**

**Session I: Cultural Resources - Archeology** ................................................................. 1

Archeological Investigations at the Oak Hill Village Site (41RK214), Rusk County, Texas

Cultural Resources Investigations at the Dolet Hills Lignite Mine; Desoto Parish, Louisiana
Rogers, R. ............................................................................................................................. 15

**Session 2: Watershed Protection** .................................................................................... 27

TU/NALPAS: Water Treatment to Total Drainage Management
Attaway, T.C. and S.T. Cooney .......................................................................................... 29

Geophysical Mapping and Subsurface Injection for Treatment of Post-Reclamation Acid Drainage
Plocus, V.G. and V. Rastogi ............................................................................................... 34

Retention of Metals and Longevity of a Wetland Receiving Mine Leachate
Beining, B.A. and M.L. Otte ............................................................................................... 43

**Session 3: Watershed and Wetland Issues** ................................................................. 47

Hydrologic Modeling of Coal-Mine Impacts and Associated Remediation Alternatives for the Nanticoke Creek Watershed
Walski, T.M., S.J. Draus, K.M. Klemow, and W.J. Tarutis, Jr. ......................................... 49

Wetland Mitigation Banking for Surface Mining Activities
Sherrod, C.L. ...................................................................................................................... 60
Water Quality Changes and Costs of Remining in Pennsylvania and West Virginia
Skousen, J., R. Hedin, and B. Faulkner ................................................................. 64

Session 4: Revegetation .................................................................................................. 75
Vegetation Trends in Reclaimed Areas at Gibbons Creek Lignite Mine, Grimes County, Texas
Westerman, C.A. ........................................................................................................77

Warm Season Grass Establishment on Limestone-Amended Coal Slurry
Nawrot, J.R., V.A. Skeel, B. Gray, and R. Newton ...................................................... 82

Vegetation and Overburden Cover on Phosphogypsum: Effects on Radon Emission, Runoff Water
Quality, and Plant Uptake of Flouride and Radium
Richardson, S.G. ....................................................................................................... 90

Revegetation of Metal Mine Tailings Under Wetland Conditions
McCabe, O.M. and M.L. Otte ......................................................................................99

Session 5: Evaluation of Minesoils ............................................................................... 105
Introduction to the Papers in Session 5 ....................................................................... 107

Concepts and Criteria for Evaluating Topsoil Substitutes: The Texas Experience
Askenasy, P.E., W.L. Joseph, and A.L. Senkayi ......................................................... 109

A Review of Minesoil Sampling and Spatial Variability in Texas
Myers, J.C., J.E. Brandt, and W.L. Joseph .............................................................. 115

Acid/Base Account and Minesoils: A Review
Hossner, L.R. and J.E. Brandt .................................................................................. 128

Land Capability Classification
Neitsch, C.L., M.L. Golden, and L.R. Hossner ....................................................... 141
Variability of Physicochemical Analytical Results from Minesoils and QA/QC Considerations
Brandt, J.E. and J.K. Horbaczewski ..............................................................................................152

Session 6: Bats and Mines .............................................................................................................165
The North American Bats and Mines Project: A Cooperative Approach for Integrating Bat
Conservation and Mine-Land Reclamation
Ducummon, S.L. ...........................................................................................................................167

Evolution of Abandoned Underground Hardrock Mine Closures by the Texas Abandoned Mine
Land Reclamation Program
Rhodes, M.J. ..................................................................................................................................175

Bat-Compatible Closures of Abandoned Underground Mines in National Park System Units
Burghardt, J.E. ................................................................................................................................184

Renewed Mining and Reclamation: Impacts on Bats and Potential Mitigation
Brown, P.E. and R.D. Berry ..........................................................................................................196

Session 7: Contemporary International Issues ..............................................................................203
Use of Mobile Equipment in Open Pit Lignite Mines Profen and Zwenkau
Evans, B.J. and M.W. Zengerle .....................................................................................................205

Investigation of the Jharia Coalfield Mine Fires - India
Michalski, S.R., E.S. Custer, and P.L. Munshi .............................................................................211

Environmental Management Plan for the Jhaia Coalfield - India
Schori, A., A.H. Scrymgeour, and P.L. Munski ............................................................................224
Session 8: Mine Reclamation in the Southwest ................................................................. 237
Livestock Impacts for Management of Reclaimed Land at Navajo Mine: The Decision-Making Process
Estrada, O.J., S. Grogan, K.L. Gadzia .................................................................................. 239

Livestock Impacts for Management of Reclaimed Land at Navajo Mine: Vegetation Response
Wood, M.K., B.A. Buchanan, O.J. Estrada .......................................................................... 245

Livestock Grazing for Management of Reclaimed Land at Navajo Mine: Animal Response
Gamble, D.C., K.L. Gadzia, and M.F. Raisbeck .................................................................. 255

Session 9: Reclamation Strategies .................................................................................... 263
First Year Survival of Bareroot and Containerized Hardwood Tree Seedlings Planted in Northeast Texas Lignite Minesoils
Wood, J., M. Waxler, D.A. Huber, and J. Denman .............................................................. 265

Texas Lignite Mining: Groundwater and Slope Stability Control in the Nineties and Beyond
Lawrence, J. ....................................................................................................................... 272

Reclamation of Coal Refuse with a Papermill Sludge Amendment
Li, R.S. and W.L. Daniels ..................................................................................................... 277

Stabilization and Revegetation of Metal Smelter Wastes in Poland
Stuczynski, T., W.L. Daniels, K. Pantuck, and F. Pistolok ................................................... 291

Enhanced Cover Methods for Surface Coal Refuse Reclamation

A Program to Expedite Reclamation while Reducing Costs
Friedlander, J.D. and G.M. Hawkey ................................................................................... 309
Scientific Soundness and Socio-Economic Realities in Reclamation for Habitat
Trimble, K.D. .............................................................................................................................. 317

Session 10: Post-Reclamation Land Use ..................................................................................... 327
Reclamation Planning for Sensitive Species in Southwest Wyoming
Harshbarger, R.M. .......................................................................................................................... 329

Evaluating Biodiversity of Mineral Lands
Wade, G.L. and L.M. Tritton ........................................................................................................ 336

Value of Commercial Forestry as a Post-Mining Land Use
Kelting, D.L., C. Siegel, and J.A. Burger .................................................................................... 344

Session 11: Structures and Previously Mined Land ..................................................................... 349
Investigation of Alleged Subsidence Damage to a Residential Structure in Indiana
Chandrashekhar, K. and J.W. Richardson.................................................................................... 351

The Siting of a Prison Complex above an Abandoned Underground Coal Mine
Marino, G.G. .................................................................................................................................. 359

Investigation of the Allowable Deformations of Buildings Subjected to Mining Influence
Kawulok, M. .................................................................................................................................. 376

The Effects of Mine Field Subsoils Deformations on Construction’s Supports
Klosek, K. .................................................................................................................................... 382

Session 12: Prediction of Acid Mine Drainage ............................................................................ 391
Acid Base Accounting Success Rates in Acid Mine Drainage Laboratory Predictive Tests
Bradham, W.S. and F.T. Caruccio .............................................................................................. 393
<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methodologies for the Characterization of Hard-Rock Mine Sites</td>
<td>Zehner, Sr., W.B., J.M. Cornelius, and D.L. Beeson</td>
</tr>
<tr>
<td>Sensitivity Analysis of Acid Mine Drainage Prediction Leaching Tests</td>
<td>Bradham, W.S. and F.T. Caruccio</td>
</tr>
<tr>
<td>Geochemical Forecast of Acid Mine Drainage to Evaluate Corrective</td>
<td>Simmons, S.P., L.F. Gentile, and S.D. McGarvie</td>
</tr>
<tr>
<td>Action Plans for Mine Reclamation</td>
<td></td>
</tr>
<tr>
<td>Session 13: Use of Computers in Reclamation Planning</td>
<td></td>
</tr>
<tr>
<td>Achieving Optimum Post Mine Reclamation Results through Computer</td>
<td>Johnson, M., R. Irvin, and D. Metcalf</td>
</tr>
<tr>
<td>Aided Design</td>
<td></td>
</tr>
<tr>
<td>the Oxbow Mine, Louisiana</td>
<td></td>
</tr>
<tr>
<td>Facilities Management System (AM/FM)</td>
<td></td>
</tr>
<tr>
<td>Session 14: Combustion and Mining by-Products</td>
<td></td>
</tr>
<tr>
<td>Erodibility of Fly Ash-Treated Minesoils</td>
<td>Gorman, J.M., J.C. Sencindiver, D.J. Horvath, R.N. Singh, and R.F.</td>
</tr>
<tr>
<td>Keefer</td>
<td></td>
</tr>
<tr>
<td>Hydraulic Conductivity of Ash Mixtures and Metal Release upon</td>
<td>Slousen, J., D.K. Bhumbla, J. Gorman, and J.C. Sencindiver</td>
</tr>
<tr>
<td>Leaching</td>
<td></td>
</tr>
<tr>
<td>The Use of Coal Combustion Residues to Control Acid Mine Drainage</td>
<td>Jones, J.R., A.G. Kim, and T.E. Achman</td>
</tr>
</tbody>
</table>
Codisposal of FBC By-Products and Coal Slurry Solids: Characterization of Materials
Tungate, D.E., R.G. Darmody, G.B. Dreher, W.R. Roy, and J.D. Steele ........................................503

Session 15: Water Quality ..............................................................................................................513
Pilot Scale ILS Treatment of Cyanide Process Sludges
Lentz, R.T. and G.H. Knott ...........................................................................................................515

Effects of Storm Runoff on Acid-Base Accounting of Mine Drainage
Sjogren, D.R., G.A. Olyphant, and D. Harper ............................................................................525

Metals and Other Components of Coal Mine Drainage as Related to Aquatic Life Standards
Hyman, D.M. and G.R. Watzlaf ....................................................................................................531

Geochemistry of Water and Mobilization and Transport of Solutes in Coal Mine Spoils, East-
Central Texas
Lee, R.W. and J.T. Wilson .............................................................................................................546

Session 16: Reclamation of Mine Tailings ...................................................................................569
Geochemical Treatment and Phytostabilization of Acidic Mill Tailings in the Southern Rocky
Mountains

An Integrated System for Recycling Base Metal Mine Tailings
Struthers, S., J. Brumley, and G. Taylor .......................................................................................579

Effect of Earthen Covers on Tailings Impoundment Hydrology, Pore Water Chemistry and Gas
Content
Dollhopf, D.J. and T. Smith ..........................................................................................................593
Design, Permitting, and Construction Issues Associated with Closure of the Panna Maria Uranium Tailings Impoundment
Strachan, C.L. and K.L. Raabe ........................................601

Session 17: Treatment of Acid Mine Drainage ........................................609
Passive Treatment of Acid Mine Drainage in Down-Flow Limestone Systems
Watzlaf, G.R. .................................................................611

Treatment of Metal Containing Ground and Surface Water in Passive Systems
Mueller, R.F. W. Chatham, W. Drury, and F. Diebold ..........................623

Session 18: Computer Technology - Hydrology ..................................631
Cumulative Hydrologic Impact Assessments on Surface-Water in Northeastern Wyoming Using HEC-1; A Pilot Study
Anderson, A.J., D.C. Eastwood, and M.E. Anderson ......................633

Assessing the Cumulative Impacts of Surface Mining and Coal Bed Methane Development on Shallow Aquifers in the Powder River Basin, Wyoming
Peacock, K. ........................................................................648

Utilizing Geographic Information Systems Technology in the Wyoming Cumulative Hydrology Impact Assessment Modeling Process
Hamerlinck, J.D. and J.R. Oakleaf ...........................................667

Session 19: Mining and Education ..................................................677
Overview of the Texas Mining Reclamation Association’s Education Project
Hutchins, M.F. ........................................................................679

TU System Environmental Research Program
White, R.L., S.F. Smith, and P.J. Miller ........................................680
The Sabine Mining Company Education Program
Pirtle, M.W. ...................................................................................................................................685

Session 20: Reclamation and Soils ..............................................................................................687
Surface Mining - Using Mixed Overburden to Create Prime Farmland
Bearden, E.D. ................................................................................................................................689

Post-Mine Soils - A Legacy of Surface Mining Reclamation
Dement, J.A., F.S. Stroud, and E.D. Bearden .............................................................................693

Assessment of Hillslope Design Using RUSLE at the Coeur Rochester Mine, Lovelock, NV
Toy, T.J., S.D. Hasenjager, and S. McLeod ..................................................................................698

Session 21: Contemporary Regulatory Issues ..............................................................................703
Overcoming Murphy’s Law to Gain ERP - A Case Study at Gibbons Creek Lignite Mine, Texas
Lancaster, E.M. and J.K. Horbaczewski .......................................................................................705

Self-Monitoring and Rehabilitation in the Aggregates Industry: Changes to Provincial Policy in
Ontario
Miller, M. ......................................................................................................................................711

Compliance Audits for Environmental Health
Blevins, C.N. ...................................................................................................................................715

ISO 14000: Impact on Mining and Reclamation
Russell, K. and S.G. Tipton ...........................................................................................................721

Session 22: Applied Technology ...................................................................................................727
Infiltration Control at the Soil Surface: A New Revegetation Technique
Dixon, R.M. and A.B. Carr ............................................................................................................729
The Biopass System Phase II: Full Scale Design and Construction of an In Situ Anaerobic Biochemical System
Cellan, R., A. Cox, R. Uhle, D. Jenevein, S. Miller, and T. Mudder ............................................. 730

Ditch Stabilization with Shoreline Common Reed
Walker, M.J. and C. Grimes ............................................................................................................. 731

Posters ........................................................................................................................................... 733

An Overview of the Reclamation Program at the Big Brown Lignite Mine
Gentry, R.R. ................................................................................................................................... 735

Assessment of Risk from Land Application of Waste Water Containing Elevated Levels of Naturally Occurring Radioactive Materials
Johnson, J.A., E.D. Caldwell, and A.K. Woodland ...................................................................... 736

Passive Removal of Manganese from Acid Mine Drainage
Brant, D.L. and P.F. Ziemkiewicz ................................................................................................. 741

Restoration of a Watershed Through Remining and Funded Projects
Enix, N. .......................................................................................................................................... 745

Groundwater Flow Characterization Using Geographic Information Systems (GIS) and Global Positioning Systems (GPS)
Liddle, R. ....................................................................................................................................... 746

Integrated Passive Treatment to Reduce Metal and Nutrient Concentrations in Water
Bass, B.D. and R.F. Mueller ......................................................................................................... 747

Plan for Injection of Coal Combustion Byproducts into the Omega Mine for the Reduction of Acid Mine Drainage