



Proceedings of a Joint Conference of

American Society of Mining and Reclamation

27th Annual National Conference

12th Annual Pennsylvania Abandoned Mine

Reclamation Conference

4th Annual Appalachian Regional Reforestation

Initiative Mined Land Reforestation Conference

June 4 - 10, 2010

Pittsburgh, Pennsylvania

Richard I. Barnhisel, Editor

Additional copies may be obtained from

ASMR

3134 Montavesta Rd.

Lexington, KY 40502

SPONSORS

Sponsorship of the 2010 Conference of the 27th American Society of Mining and Reclamation, the 12th Annual Pennsylvania Abandoned Mine Reclamation Conference, and the 4th Annual Appalachian Regional Reforestation Initiative Mined Land Reforestation Conference was held the week of June 5-10, 2010 in Pittsburgh, Pennsylvania has been provided in the form of financial contributions or as labor-in-kind by the following entities:

Prime Sponsor

CONSOL Energy

Gold Level

US Office of Surface Mining

Pennsylvania Department of Environmental Protection

Silver Level

Foundation for Pennsylvania Watersheds

Oxford Resource Partners

Bronze Level

BioMost

Foam Concepts, LLC

HDR, Inc.

2010 Organizing Committee Members

Selena Allen, Appalachian Regional Reforestation Initiative

Arielle Avishai, Office of Surface Mining

Richard Barnhisel, American Society of Mining and Reclamation, Registration and Proceedings

Karrie Bernhard, Office of Surface Mining, Graphics

Mike Bower, Appalachian Regional Reforestation Initiative

Anne Daymut, Western Pennsylvania Coalition for Abandoned Mine Reclamation

Jack Felbinger, Office of Surface Mining

Tom Grote, Stream Restoration, Inc.

Mike Hewitt, Eastern Pennsylvania Coalition for Abandoned Mine Reclamation

Robert Hughes, Eastern Pennsylvania Coalition for Abandoned Mine Reclamation

Bruce Leavitt, Consultant

Andy McAllister, Western Pennsylvania Coalition for Abandoned Mine Reclamation

Raul Murguia, Office of Surface Mining

Tiara Neal, Office of Surface Mining, Graphics

Jeff Trump, Office of Surface Mining

Lois Uranowski, Office of Surface Mining

COMMITTEE OF MANUSCRIPT REVIEWS AND PREPARATION OF THE
PROCEEDINGS

Richard Barnhisel, Chair

Stuart Bengson
Fred Brenner
Suzette Burckhard
Lee Daniels

Jennifer Franklin
Robert (BT) Thomas
Pete Stahl

Exhibitors

American Society of Mining and Reclamation
AQUAFIX SYSTEMS INC.
ARBORGEN, LLC. SUPERTREE SEEDLINGS
APPALACHIAN REGIONAL REFORESTATION
INITIATIVE (ARRI)
BIOMOST, INC.
ENVIRONMENTAL PRODUCTS AND APPLICATIONS
ERNST CONVERSATION SEEDS
FOAM CONCEPTS, LLC
Gannett Fleming
GREER INDUSTRIES, INC.
HDR ENGINEERING, INC.
HEDIN ENVIRONMENTAL
JRW BIOREMEDIATION, LLC.

KEDDAL AERIAL MAPPING
LAND & MAPPING SERVICES
NORWEST CORP
OFFICE OF SURFACE MINING RECLAMATION
AND ENFORCEMENT (OSM)
PLANTRA
PRESTO GEOSYSTEMS
ROCKY MOUNTAIN BIO PRODUCTS
RPM ECOSYSTEMS/ THE RESTORATION TREE
TRUST
STONE FORESTRY SERVICES, INC.
WILLIAM FORESTRY AND ASSOCIATES
W.K. MERRIMAN

ASMR 2010 National Executive Committee

Dennis Neuman, *President*,
Kimery Vories, *President Elect*
Vernon Pfannenstiel, *Past President*,
Eddie Bearden, NEC Delegate
Scott Belden, NEC Delegate
Wayne Erickson, NEC Delegate
David Lang, NEC Delegate
Brenda Schladweiler, NEC Delegate
Abbey Wick, NEC Delegate
Robert (BT) Thomas, NEC Representative for Technical Divisions
Richard Barnhisel, Executive Secretary

ASMR Technical Division Chairpersons

Ecology	Pete Stahl
Forestry & Wildlife	Jennifer Franklin & Fred Brenner
Geotechnical Engineering	Suzette R. Burckhard
International Tailings & Reclamation	Stuart Bengson
Land Use Planning & Design	Jon Brian Burley
Soils & Overburden	Lee Daniels
Water Management	Robert (BT) Thomas & Brent Means

Monday PM Session 1 - Title: ACID MINE DRAINAGE TREATMENT COSTS**Moderator - CHRIS JOHNSTON**

Paper	Authors	Page
Post Mining Discharge: Active and Passive Treatment Cost Evaluation	Timothy P. Danehy	138
INVESTIGATION OF THE ACID MINE DRAINAGE AT THE TAB SIMCO MINE, ILLINOIS: OBSERVATIONS AND IMPLICATIONS FOR TREATMENT	Paul T. Behum	6
ACTIVATED IRON SOLIDS TREATMENT FOR HIGH FLOW ACIDIC MINE DRAINAGE: RESULTS OF PILOT STUDIES	Jonathan M. Dietz	204
TYPES OF CALCIUM REAGENTS AND THEIR APPLICATION IN ACID MINE DRAINAGE AND ABANDONED MINE LAND RECLAMATION	Michael C. Schrock	1018
ASSESSMENT OF THE APPLICABILITY OF STEEL SLAG FOR ALKALINE ADDITION TO ACIDIC STREAMS IN SOUTH CENTRAL PENNSYLVANIA	Bradley R. Schultz	1059
UTILIZATION OF AMD SLUDGES FROM THE ANTHRACITE REGION OF PENNSYLVANIA FOR REMOVAL FOR PHOSPHORUS FROM WASTEWATER	Philip L. Sibrell	1085

Monday PM Session 2 - Title: ARRI FORESTRY RECLAMATION APPROACH (FRA)**WORKSHOP Moderator - CARL ZIPPER**

Paper	Authors	Page
FRA STEP 1 - CREATE A SUITABLE GROWTH MEDIUM	Jeff Skousen	NAS
FRA STEP 2 - LOOSELY GRADE THE TOPSOIL	Rick Sweigard	NAS
FRA STEP 3 - USE COMPATIBLE GROUND COVERS	Jennifer Franklin	NAS
FRA STEP 4 - TREE SPECIES SELECTION	Ron Rathfon	NAS
FRA STEP 5 - PROPER TREE PLANTING TECHNIQUES	Victor Davis	NAS
FRA AND THE MINING INDUSTRY	Chris Stanley	NAS
REGULATORY APPROVAL OF THE FRA	Tom Shope	NAS

Monday PM Session 3 - Title: BIOLOGICAL AND BIOCHEMICAL REACTORS**Moderator - ROBERT NAIRN**

Paper	Authors	Page
IMPORTANCE OF FUNGI IN BIOLOGICAL MN(II) OXIDATION IN LIMESTONE TREATMENT BEDS	William D. Burgos	71
THIRD-YEAR PERFORMANCE OF 55-GALLON BIOREACTORS TREATING MINING INFLUENCED WATER FROM THE NATIONAL TUNNEL IN BLACK HAWK, COLORADO	Kathryn Tenney	1274
PILOT-SCALE TREATMENT OF SELENIUM IN GRAVEL PIT SEEPAGE WATER USING BIOCHEMICAL REACTOR TECHNOLOGY	Tom Rutkowski	914

Monday PM Session 3 - Continued

Paper	Authors	Page
THE ROLE OF PRECIPITATION AND BIOSORPTION IN THE ABIOTIC REMOVAL OF MANGANESE WITH CRAB SHELL CHITIN	Rachel A. Brennan	828
BIOCHEMICAL REACTOR MEDIA CHARACTERIZATION STUDY	Tom Rutkowski	888
CASE STUDY: EVALUATING THE FEASIBILITY OF CO-TREATING BIOCHEMICAL REACTOR EFFLUENT AND MINING INFLUENCED WATER	Patrick Smart	1162
ASSESSMENT OF TWO FIELD-SCALE SULFATE REDUCING BIOREACTORS USING SULFUR ISOTOPES	Matthew D. Reeder	813

Monday PM Session 4 - Title: SCIENCE, COMMUNITY & RECLAMATION

Moderators - ANDY MCALLISTER AND TOM GROTE

Paper	Authors	Page
MINE POOL MAPPING	R. Hughes and M. Hewitt	NAS
THE USE OF MINE DRAINAGE SOLIDS FOR THE CONTROL OF PHOSPHORUS POLLUTION FROM DAIRY MANURE MANAGEMENT	Robert Hedin	1470
THE SUCCESSFUL REPLACEMENT OF NATIVE BROOK TROUT ON SHINGLE RUN	Larry Hutchinson	NAS
THE LC20D PASSIVE TREATMENT SYSTEM, LITTLE COON RUN, CLARION COUNTY, PENNSYLVANIA	Ted Weaver	1465
DIVERSIFIED FUNDING FOR WATERSHED GROUPS: A CASE STUDY	Adam Cotchen	1455
CURRENT PRACTICES IN PHYSICAL HAZARD CLOSURE	Dennis Dunham	1456

Tuesday AM Session 5 – “APPLYING THE FORESTRY RECLAMATION APPROACH IN MODERN MINING OPERATIONS” THE IMPORTANCE OF THE FRA

Moderator - JOHN HUSTED

Paper	Authors	Page
MINE REFORESTATION: A COAL MINER’S PERSPECTIVE	John P. Jones	NAS
RIPPING COMPACTED MINE SOILS- IMPROVED TREE GROWTH 18 YEARS AFTER PLANTING	James Burger	55
RECLAMATION USING THE FRA - 5 YEARS OF PROGRESS	Scott Eggerud	1471
RECLAIMING AND REFORESTING AML WHILE RECOVERING ABANDONED COAL REFUSE	Walter Crickmer	NAS
APPLYING THE FRA AT ICG BIRCH RIVER, WEST VIRGINIA	Mike Duvall	NAS
APPLYING THE FRA IN TENNESSEE	Curtis Weittenhiller	NAS

Tuesday AM Session 6 – INNOVATIONS USING THE FRA

Moderator - JEFF SKOUSEN

Paper	Authors	Page
APPLYING THE FRA AT OXFORD MINING, JOCKEY HOLLOW, OHIO	Mike Hiscar	NAS
FIELD INVESTIGATIONS OF BEST PRACTICES FOR STEEP SLOPE APPLICATIONS OF THE FRA	Richard Sweigard	1258
THE FRA AND PENNSYLVANIA WILDLIFE GAME LANDS	John Meehan	NAS
FACTORS AFFECTING PERFORMANCE OF ARTIFICIALLY REGENERATED AMERICAN CHESTNUT ON RECLAIMED MINE SITES	Brian McCarthy	582
FRA EFFECTS ON HYDROLOGY AND WATER QUALITY	Chris Barton	NAS
MINED LAND REFORESTATION FOR WATERSHED RESTORATION	Elizabeth Fees	NAS

Tuesday AM Session 7 – METAL REMOVAL FROM MINE DRAINAGE I

Moderator - ROBERT HEDIN

Paper	Authors	Page
LABORATORY AND FIELD-SCALE EVALUATION OF LOW-PH FE (II) OXIDATION AT SEVERAL SITES IN PENNSYLVANIA	William D. Burgos	190
ACCUMULATION OF ECO-TOXIC METALS IN POTATO PLANTS UNDER GREENHOUSE CONDITIONS IRRIGATED WITH SYNTHETIC ACID MINE DRAINAGE IMPACTED WATER AND HEALTH RISK EVALUATION	Alan E. Garrido.	337
THE EFFECTS OF ACID-TOLERANT SULFATE REDUCING BACTERIAL ACTIVITIES ON FE SPECULATION	Doug Bertel	22
METAL AND ARSENIC LEVELS IN DRINKING WATER AT TWO MONTANA SUPERFUND SITES	Dennis R. Neuman	722
CHARACTERIZATION OF IRON OXIDES FROM ABANDONED MINE DRAINAGE DISCHARGES	Cody A. Neely	691
IN SITU IRON OXIDATION USING HYDROGEN PEROXIDE	Bruce R. Leavitt	551
LOW PH IRON REMOVAL AS PART OF MULTI-STAGE PASSIVE TREATMENT	Clifford F. Denholm	170

Tuesday PM Session 8 - ION EXCHANGE TREATMENT; COAL SLURRY INJECTION; ENGINEERED VEGETATION MATS

Moderator - HENRY AUSTIN

Paper	Authors	Page
MODULAR ION EXCHANGE TREATMENT OF MINE WATER AT SOUDAN STATE PARK	Paul Eger	248
FINDINGS OF THE WVDEP AND OSMRE SCR-15 "PHASE I" STUDY ON THE UNDERGROUND INJECTION OF COAL SLURRY	Andrew Schaer	963
EFFECTS ON THE UNDERLYING WATER COLUMN BY ECOLOGICALLY ENGINEERED FLOATING VEGETATION MATS	William H. Strosnider	1236

Tuesday PM Session 9 - INTERNATIONAL POLICY, ALTERNATIVE ANALYSIS AND GUIDANCE

Moderator - PETER MICHAEL

Paper	Authors	Page
MINING PROJECT APPROVALS IN WESTERN AUSTRALIA	Keith Lindbeck	570
ALTERNATIVES ANALYSIS APPROACH TO ABANDONED MINE RECLAMATION DESIGN	Jeffrey J. Ream	797
SELECTING TECHNOLOGIES TO ADDRESS MINE WASTE ISSUES - A WEB BASED GUIDANCE	Paul Eger	265
WORKSHOP SERIES OF ADTI-MMS	Virginia McLemore	598

Tuesday PM Session 10 – SOIL AND VEGETATIVE COVERS

Moderator - PETER MICHAEL

Paper	Authors	Page
RELEASE OF NUTRIENTS FROM BROWN AND GRAY SANDSTONE SOIL SUBSTITUTES IN SOUTHERN WEST VIRGINIA	Jeff Skousen	1135
SOIL AGGREGATE, ORGANIC MATTER AND MICROBIAL DYNAMICS UNDER DIFFERENT AMENDMENTS AFTER 27 YEARS OF MINE SOIL DEVELOPMENT	Abbey F. Wick	1364
CREATING SUSTAINABLE VEGETATED COVERS OVER DIFFICULT SLOPES	Daniel F. Senf	1040

Tuesday PM Session 11 - Title: GEOMORPHOLOGY: HABITAT, EXCESS SPOIL FILL; TDS AND AQUATIC LIFE

Moderator - LOIS URANOWSKI

Paper	Authors	Page
A GEOMORPHOLOGICAL FRAMEWORK & DECISION TOOL FOR HABITAT TRANSLOCATION PRACTICES IN THE UK	R. Neil Humphries	449
CHALLENGES TO APPLYING GEOMORPHIC AND STREAM RECLAMATION METHODOLOGIES TO MOUNTAINTOP MINING AND EXCESS SPOIL FILL CONSTRUCTION IN STEEP-SLOPE TOPOGRAPHY (E.G. CENTRAL APPALACHIA)	Peter R. Michael	610
ISOLATING EFFECTS OF TOTAL DISSOLVED SOLIDS ON AQUATIC LIFE IN CENTRAL APPALACHIAN COALFIELD STREAMS	Anthony J. Timpano	1284

Tuesday PM Session 12 - Title: STREAM RESTORATION AND ENDANGERED SPECIES

Moderator - LOIS URANOWSKI

Paper	Authors	Page
STREAM RESTORATION: PAST PRACTICES, CURRENT BENCHMARKS	Jack Nawrot	652
IMPLICATIONS OF THE OCCURRENCE AND SPREAD OF THE WHITE-NOSE SYNDROME TO PROTECTION OF ENDANGERED BATS UNDER SMCRA	Kimery C. Vories	1304

Tuesday AM Session 13 - Title: SCIENCE, COMMUNITY & RECLAMATION

Moderator - ROBERT HUGHES

Paper	Authors	Page
CREATING PARTNERSHIPS TO ENHANCE WATERSHEDS BY ELIMINATING SMALL ACID MINE DRAINAGE USING WATERSHED COOPERATIVE AGREEMENT PROGRAM FUNDS	John W. Coleman	123
ANTHRACITE COAL REGION REMEDIATION STRATEGY THROUGH THE UTILIZATION OF MINE POOL WATER	Tom Clark	NAS
PRE-LONGWALL MINING PLAN FOR WETLAND ENHANCEMENT AFTER SUBSIDENCE	Dennis Fredericks	NAS
PLS GIT-ER-DONE WITH THE SOIL YOU GOT - LANDSLIDE REMEDIATION	Michael Shapaka	1463

Tuesday AM Session 14 - Continued

Moderator - ANNE DAYMUT

Paper	Authors	Page
BLACKS, BASEBALL, AND COAL MINING IN WESTERN PENNSYLVANIA	Theresa McDevitt	1462
MINE RECLAMATION-LEVERAGING ECOSYSTEMS MARKETS THROUGH COLLABORATIVE PARTNERSHIPS	Leslie Carrere	1454
PENNSYLVANIA COAL MINERS AND THEIR QUEST FOR DEMOCRACY: THE STRUGGLES OF 1943, A CASE STUDY	Irwin Marcus	NAS

Tuesday PM Session 15 - Title: SCIENCE, COMMUNITY & RECLAMATION CONTINUED

Moderator - MIKE HEWITT

Paper	Authors	Page
MARCELLUS SHALE: THE BASICS	Gary Slagel	NAS
BLACK SNAKES, MARKED BALLOTS, AND PUSSYFOOTS: COMPANY CONTROL IN THE COAL TOWNS OF WESTERN PENNSYLVANIA DURING THE 1920s	Elizabeth Ricketts	NAS
USING FLUVIAL GEOMORPHIC DESIGN TO MEET COMMUNITY RECLAMATION EXPECTATIONS	Nicholas Bugosh	1453

Tuesday PM Session 15 - Title: SCIENCE, COMMUNITY & RECLAMATION
CONTINUED

Moderator - MARGARET DUNN

Paper	Authors	Page
AN UPDATE OF GEOTHERMAL PROJECTS IN THE HILL DISTRICT	J Calvin Cash	NAS
JENNINGS ENVIRONMENTAL LEARNING CENTER	Will Taylor	1464

Wednesday AM Session 16 - Title: PASSIVE TREATMENT OF MINE INFLUENCED WATERS

Moderator - TIM DANEHY

Paper	Authors	Page
CASE STUDY: "THE JENNINGS SYSTEM" – OVER A DECADE OF SUCCESSFUL PASSIVE TREATMENT	Clifford F. Denholm	154
PASSIVE MANAGEMENT OF MINING INFLUENCED WATER AT THE HAILE GOLD MINE, SOUTH CAROLINA	James J. Gusek	417
WATER QUALITY IMPROVEMENTS AFTER INSTALLATION OF A PASSIVE TREATMENT SYSTEM	Julie A. LaBar	525
INITIAL EVALUATION OF A LARGE MULTI-CELL PASSIVE TREATMENT SYSTEM FOR NET-ALKALINE FERRUGINOUS LEAVE-ZINC MINE WATERS	Robert W. Nairn	635

Wednesday AM Session 17 - Title: PASSIVE TREATMENT: OXIDATION CELLS, VERTICAL FLOW WELLS

Moderator - TIM DANEHY

Paper	Authors	Page
PROGRESSIVE IRON REMOVAL WITHIN THE INITIAL OXIDATION CELL OF A PASSIVE TREATMENT SYSTEM	Leah R. Oxenford	767
ADVANCES IN PASSIVE TREATMENT OF COAL MINE DRAINAGE, 1998-2009	Arthur W. Rose	847
EVALUATING LONGEVITY OF VERTICAL FLOW CELLS THROUGH WATER QUALITY ANALYSIS	Beatriz E. Santamaria.	940

Wednesday PM Session 18 – PASSIVE TREATMENT ASSESSMENTS

Moderator - KIM VORIES

Paper	Authors	Page
SLUDGE REMOVAL AND DEWATERING FOR REUSE AT A PASSIVE TREATMENT SYSTEM IN EAST CENTRAL TENNESSEE	Terry W. Schmidt	1005
ASSESSING THE BENEFITS OF A PASSIVE TREATMENT SYSTEM FOR MINE DRAINAGE IN NORTHEAST OKLAHOMA USING ENERGY ANALYSIS	Brandon K. Winfrey	1388
NUISANCE PARAMETERS IN PASSIVE WATER TREATMENT SYSTEMS – A SPECIFIC CASE STUDY	Eric P. Blumenstein	31

Wednesday AM Session 19 - Title: OIL AND GAS RECLAMATION: CARBON STORAGE

Moderator - ABBEY WICK

Paper	Authors	Page
SPATIAL HETEROGENEITY IN VEGETATION AND KEY SOIL CHARACTERISTICS FOLLOWING PIPELINE RECLAMATION IN WYOMING	Caley Gasch-Salava	365
EVALUATION OF RECLAMATION PROGRESS ON NATURAL GAS WELL PADS IN WYOMING	Peter D. Stahl	1179
COMPARISON OF THREE VEGETATION SAMPLING METHODS ON OIL AND GAS SITES IN SOUTHWESTERN WYOMING	Brenda K. Schladweiler	993
CARBON STORAGE IN LANDSCAPES AFFECTED BY OIL SANDS MINING IN ALBERTA’S NORTHERN BOREAL FOREST	Bonnie L. Drozdowski	228

Wednesday AM Session 20 - Title: MINE REFUSE RECLAMATION

Moderator - ABBEY WICK

Paper	Authors	Page
CONTROLS ON PH AND PYRITE OXIDATION PATHWAYS ACROSS THE PHREATIC SURFACE OF A COAL WASTE DEPOSIT IN SOUTHWEST	Dalton Hardisty	434
LEACHING POTENTIALS OF COAL SPOIL AND REFUSE: ACID-BASE INTERACTIONS AND ELECTRICAL CONDUCTIVITY	Zenah Orndorff	736
HYDROCHEMICAL EFFECTS OF USING COAL COMBUSTION BYPRODUCTS AS STRUCTURAL FILL AND CAPPING MATERIAL AT AN ABANDONED MINE LANDS RECLAMATION SITE, SOUTHWESTERN INDIANA	Shawn Naylor	672

Wednesday AM Session 21- Title: RECLAMATION USING SWITCHGRASS**Moderator - CALEY GASCH-SALAVA**

Paper	Authors	Page
ESTABLISHMENT AND EVALUATION OF SWITCHGRASS ON RECLAIMED MINE SOIL	David J. Lang	536
SWITCHGRASS PRODUCTION ON ABANDONED MINED LAND RECLAIMED WITH MANURE BASED AMENDMENTS	Richard Stehouwer	1184
CARBON SEQUESTRATION, BIOFUEL PRODUCTION AND MINE SOIL RECLAMATION WITH SWITCHGRASS	Travis Keene	489

Wednesday AM Session 22- Title: COAL MINE REFORESTATION I**Moderator - VIC DAVIS**

Paper	Authors	Page
TREE SPECIES AND DENSITY EFFECTS ON WOODY BIOMASS PRODUCTION ON MINED LANDS: ESTABLISHMENT AND TWO YEAR RESULTS	Daniel M. Evans	276
ENHANCEMENT OF THE FORESTRY RECLAMATION APPROACH THROUGH EARTHWORM INOCULATION: ENGAGING PRE-SERVICE TEACHERS AND ELEMENTARY SCHOOL STUDENTS IN THE FORESTRY	Holly J. Travis	1437
SECOND YEAR RESPONSE OF APPALACHIAN MIXED HARDWOODS TO SOIL SURFACE GRADING AND HERBACEOUS GROUND COVER ON RECLAIMED MINE LAND	Christopher Fields-Johnson	305
STABILITY AND EROSION ON STEEP SLOPES CONSTRUCTED BY THE FOREST RECLAMATION APPROACH IN THE SOUTHERN APPALACHIAN REGION	Isaac A. Jeldes	470

Wednesday AM Session 23- Title: COAL MINE REFORESTATION II**Moderator - PATRICK ANGEL**

Paper	Authors	Page
SURVIVAL AND GROWTH OF CHESTNUT HYBRID SEEDS AND SEEDLINGS ON MOUNTAINTOP SURFACE MINES IN WEST VIRGINIA	Jeff Skousen	1144
RESPONSE OF IMPROVED AMERICAN CHESTNUTS TO PLANTING PRACTICES ON RECLAIMED SURFACE MINED LAND	Christopher Fields-Johnson	319
SEED COLONIZATION OF HARDWOODS	Jeff Skousen	1161

Wednesday PM Session 24- Title: COAL MINE REFORESTATION III**Moderator** - MICHAEL JACOBSON

Paper	Authors	Page
POST MINING LAND USE TRENDS IN WEST VIRGINIA BETWEEN 1998 AND 2008	Kevin G. Quick	780
THE SIGNIFICANCE OF POLITICAL TRUST IN MINED LAND RECLAMATION AND REFORESTATION EFFORTS	Darren A. Wheeler	1337

Wednesday AM Session 25- Title: MODELS: WATERSHED, GEOCHEMICAL, AND GROUNDWATER FLOW**Moderator** - ERIC PERRY

Paper	Authors	Page
DEVELOPING AND EVALUATING OPTIONS FOR LARGE-SCALE WATERSHED REMEDIATION	James M. Stiles	1199
DATASHED: A FREE ONLINE TOOL FOR PASSIVE TREATMENT SYSTEM MONITORING AND MAINTENANCE	Shaun Busler	89
A GEOCHEMICAL MODULE FOR AMD TREAT TO COMPUTE CAUSTIC QUANTITY, EFFLUENT QUALITY, AND SLUDGE VOLUME	Charles A. Cravotta III	1413
GROUNDWATER FLOW MODELING OF AN ABANDONED MINE LANDS SITE SCHEDULED FOR RECLAMATION	Robert C. Waddle	1320

Wednesday AM Session 26- Title: WATERSHED STUDIES I**Moderator** - ERIC PERRY

Paper	Authors	Page
RESTORING THE BENNETT BRANCH SINNEMAHONING CREEK, CLEARFIELD AND ELK COUNTIES, PENNSYLVANIA	Eric E. Cavazza	99
LAND AND WATER RESTORATION OF THE COPPER BASIN OF TENNESSEE	Ben B. Faulkner	292
CREATING PARTNERSHIPS TO ENHANCE WATERSHEDS BY ELIMINATING SMALL ACID MINE DRAINAGE USING WATERSHED COOPERATIVE AGREEMENT PROGRAM FUNDS	John W. Coleman	123

Wednesday PM Session 27- Title: WATERSHED STUDIES II**Moderator - JACK FELBINGER**

Paper	Authors	Page
SEASONAL VARIABILITY OF DISCHARGES FROM WETLANDS CONSTRUCTED BELOW KYANITE MINE TAILINGS PONDS; GRAVES MOUNTAIN SITE, LINCOLNTON, GEORGIA	Gwendelyn Geidel	385
COMPARISON OF NOAA ATLAS 14 PRECIPITATION ESTIMATES TO SITE SPECIFIC DATA FOR STORMWATER MANAGEMENT AT QUESTA MINE, NEW MEXICO	Paul Kos	506
CHARACTERIZING GROUNDWATER QUALITY AT AN ABANDONED MINE SITE USING ELECTRICAL GEOPHYSICAL TECHNIQUES	D. Alex Gore	403

Wednesday AM Session 28- Title: SCIENCE, COMMUNITY & RECLAMATION**Moderator - MELISSA RECKNER**

Paper	Authors	Page
CLEANING UP ABANDONED MINE DRAINAGE IN THE WEST BRANCH SUSQUEHANNA WATERSHED: WHY IT MAKES ECONOMIC SENSE	Amy Wolfe	1466
CONSOL ENERGY'S GREENHOUSE GAS ABATEMENT RESEARCH & DEVELOPMENT PROGRAM	Richard A. Winschel	NAS
SUSTAINED TREATMENT OF AMD CONTAINING AL AND FE3+ WITH LIMESTONE AGGREGATE	Neil Wolfe	1467
DEVELOPING PARTNERSHIPS FOR A COMMON GOAL	Danny Allgeier	1452

Wednesday AM Session 29- Title: SCIENCE, COMMUNITY & RECLAMATION**Moderator - TOM GROTE**

Paper	Authors	Page
IN STREAM DATA LOGGER MONITORING PROGRAM FOR TDS	Dave Kemp Eric Noll	NAS
TRANSLOCATION OF CUMBERLANDIAN MUSSELS TO ACHIEVE SPECIES CONSERVATION	Craig Walker	1469
CARBON CAPTURE AND SEQUESTRATION WITH A FOCUS ON APPLICATIONS TO COAL-FIRED POWER PLANTS	Richard A. Winschel	NAS

Wednesday PM Session 30- Title: SCIENCE, COMMUNITY & RECLAMATION

Moderator - ANNE DAYMUT

Paper	Authors	Page
COMMUNITY ENGAGEMENT IN RECLAMATION, PART 1	Lauren Lindgren Scott Fanello	1457
COMMUNITY ENGAGEMENT IN RECLAMATION, PART 2	Lauren Lindgren Scott Fanello	1457
INTEGRATING VISUALIZATION AND GEOMORPHIC LANDFORMING FOR RECLAMATION IN APPALACHIAN COAL MINES	Charles Yuill	1468
“OUT OF THE GROUND” DOCUMENTARY FILM	Andy McAllister	1461

Wednesday PM Session POSTER SESSION

Paper	Authors	Page
Evaluation of Mine Drainage Abatement Projects: Comparison of Results From Simple Field Tests of Water Quality With Laboratory Analyses	Paul T. Behum	1
Passive Remediation of “High Risk” Acid Mine Drainage: Microcosm Studies Using Crab-Shell Chitin as a Fractional Substrate Amendment	Amanda K. Brown	54
Passive Remediation of Acid Precipitation Using Crab-Shell Chitin: A Treatability Study	Abby F. Caporuscio	98
Substrate, Groundcover, and Bark Mulch Effects on Tree Growth and Survival on a Reclaimed West Virginia Surface Mine	Curtis A. DeLong	153
Cost-Effective Treatment of High-Risk Mine Impacted Water Using Crab-Shell Amendments to Spent Mushroom Compost: Column Studies	Jessica A. Grembi	415
Phosphorus Fertilizer Rate and Extractable Phosphorus on a Reclaimed and Undisturbed Pasture Soil	Josh Hall	433
Measurements of Dissolved Oxygen in Active and Passive Treatment Systems	Robert Hedin	1459
Anna S System: Reliable Passive Treatment of Severe Acid Mine Drainage	Robert Hedin	1458
Cadmium Uptake Enhanced in Elodea Canadensis by Plant-Induced pH-Rise	M. Tariq Javed	469
Fabricated Soil Recipes for Mining Landscape Rehabilitation	Valentine Kefeli	504
Woody Plant Colonization of a Reclaimed Anthracite Surface Mine in Northeastern Pennsylvania	Kenneth M. Klemow	505
Application of Microbes for Surmounting Acid Mine Drainage in an Abandoned Coal Mine: A Case Study	Pradeep Kumar	524
Use of Stream Restoration and Passive Treatment Technologies for Improving Water Quality in an Eastern Kentucky Valley Fill	Courtney Mastin	581
Long-Term Effects of Rock Type, Weathering, and Amendments on Southwest Virginia Mine Soils	Whitney L. Nash	650
Using Computer Tools and Databases to Develop Soil Reconstruction Plans Following Surface Coal Mining	H. Raymond Sinclair	1101
Soil Properties and Hardwood Growth After One Year on	Calene Thomas	1283
Post-SMCRA Reclaimed Mine Soils: Slope and Cover Effects on Runoff Under Natural Conditions	Anthony J. Willard	1387
Surface Mine Reclamation Needs in Mongolia’s Selenga Watershed	Stephen E. Williams	468

Authors who did not submit abstracts were not included in this index

PAPER TITLE	FIRST AUTHOR	PAGE
DEVELOPING PARTNERSHIPS FOR A COMMON GOAL	Danny Allgeier	1452
Evaluation of Mine Drainage Abatement Projects: Comparison of Results From Simple Field Tests of Water Quality With Laboratory Analyses	Paul T. Behum	1
Investigation of the Acid Mine Drainage at the Tab Simco Mine, Illinois: Observations and Implications for Treatment	Paul T. Behum	6
THE EFFECTS OF ACID-TOLERANT SULFATE REDUCING BACTERIAL ACTIVITIES ON FE SPECULATION	Doug Bertel	22
NUISANCE PARAMETERS IN PASSIVE WATER TREATMENT SYSTEMS – A SPECIFIC CASE STUDY	Eric P. Blumenstein	31
THE ROLE OF PRECIPITATION AND BIOSORPTION IN THE ABIOTIC REMOVAL OF MANGANESE WITH CRAB SHELL CHITIN	Rachel A. Brennan	828
Passive Remediation of “High Risk” Acid Mine Drainage: Microcosm Studies Using Crab-Shell Chitin as a Fractional Substrate Amendment	Amanda K. Brown	54
USING FLUVIAL GEOMORPHIC DESIGN TO MEET COMMUNITY RECLAMATION EXPECTATIONS	Nicholas Bugosh	1453
RIPPING COMPACTED MINE SOILS- IMPROVED TREE GROWTH 18 YEARS AFTER PLANTING	James Burger	55
LABORATORY AND FIELD-SCALE EVALUATION OF LOW-PH FE (II) OXIDATION AT SEVERAL SITES IN PENNSYLVANIA	William D. Burgos	190
IMPORTANCE OF FUNGI IN BIOLOGICAL MN(II) OXIDATION IN LIMESTONE TREATMENT BEDS	William D. Burgos	71
DATASHED: A FREE ONLINE TOOL FOR PASSIVE TREATMENT SYSTEM MONITORING AND MAINTENANCE	Shaun Busler	89
Passive Remediation of Acid Precipitation Using Crab-Shell Chitin: A Treatability Study	Abby F. Caporuscio	98
MINE RECLAMATION-LEVERAGING ECOSYSTEMS MARKETS THROUGH COLLABORATIVE PARTNERSHIPS	Leslie Carrere	1454
RESTORING THE BENNETT BRANCH SINNEMAHONING CREEK, CLEARFIELD AND ELK COUNTIES, PENNSYLVANIA	Eric E. Cavazza	99
SECOND YEAR RESPONSE OF APPALACHIAN MIXED HARDWOODS TO SOIL SURFACE GRADING AND HERBACEOUS GROUND COVER ON RECLAIMED MINE LAND	Christopher Fields-Johnson	305
RESPONSE OF IMPROVED AMERICAN CHESTNUTS TO PLANTING PRACTICES ON RECLAIMED SURFACE MINED LAND	Christopher Fields-Johnson	319
CREATING PARTNERSHIPS TO ENHANCE WATERSHEDS BY ELIMINATING SMALL ACID MINE DRAINAGE USING WATERSHED COOPERATIVE AGREEMENT PROGRAM FUNDS	John W. Coleman	123

PAPER TITLE	FIRST AUTHOR	PAGE
DIVERSIFIED FUNDING FOR WATERSHED GROUPS: A CASE STUDY	Adam Cotchen	1455
A GEOCHEMICAL MODULE FOR AMD TREAT TO COMPUTE CAUSTIC QUANTITY, EFFLUENT QUALITY, AND SLUDGE VOLUME	Charles A. Cravotta III	1413
Post Mining Discharge: Active and Passive Treatment Cost Evaluation	Timothy P. Danehy	138
Substrate, Groundcover, and Bark Mulch Effects on Tree Growth and Survival on a Reclaimed West Virginia Surface Mine	Curtis A. DeLong	153
CASE STUDY: “THE JENNINGS SYSTEM” – OVER A DECADE OF SUCCESSFUL PASSIVE TREATMENT	Clifford F. Denholm	154
LOW PH IRON REMOVAL AS PART OF MULTI-STAGE PASSIVE TREATMENT	Clifford F. Denholm	170
Activated Iron Solids Treatment for High Flow Acidic Mine Drainage: Results of Pilot Studies	Jonathan M. Dietz	204
CARBON STORAGE IN LANDSCAPES AFFECTED BY OIL SANDS MINING IN ALBERTA’S NORTHERN BOREAL FOREST	Bonnie L. Drozdowski	228
CURRENT PRACTICES IN PHYSICAL HAZARD CLOSURE	Dennis Dunham	1456
MODULAR ION EXCHANGE TREATMENT OF MINE WATER AT SOUDAN STATE PARK	Paul Eger	248
SELECTING TECHNOLOGIES TO ADDRESS MINE WASTE ISSUES - A WEB BASED GUIDANCE	Paul Eger	265
RECLAMATION USING THE FRA - 5 YEARS OF PROGRESS	Scott Eggerud	1471
TREE SPECIES AND DENSITY EFFECTS ON WOODY BIOMASS PRODUCTION ON MINED LANDS: ESTABLISHMENT AND TWO YEAR RESULTS	Daniel M. Evans	276
LAND AND WATER RESTORATION OF THE COPPER BASIN OF TENNESSEE	Ben B. Faulkner	292
ACCUMULATION OF ECO-TOXIC METALS IN POTATO PLANTS UNDER GREENHOUSE CONDITIONS IRRIGATED WITH SYNTHETIC ACID MINE DRAINAGE IMPACTED WATER AND HEALTH RISK EVALUATION	Alan E. Garrido.	337
SPATIAL HETEROGENEITY IN VEGETATION AND KEY SOIL CHARACTERISTICS FOLLOWING PIPELINE RECLAMATION IN WYOMING	Caley Gasch-Salava	365
SEASONAL VARIABILITY OF DISCHARGES FROM WETLANDS CONSTRUCTED BELOW KYANITE MINE TAILINGS PONDS; GRAVES MOUNTAIN SITE, LINCOLNTON, GEORGIA	Gwendelyn Geidel	385
CHARACTERIZING GROUNDWATER QUALITY AT AN ABANDONED MINE SITE USING ELECTRICAL GEOPHYSICAL TECHNIQUES	D. Alex Gore	403
PAPER TITLE	FIRST AUTHOR	PAGE
Cost-Effective Treatment of High-Risk Mine Impacted	Jessica A. Grembi	415

Water Using Crab-Shell Amendments to Spent Mushroom Compost: Column Studies		
PASSIVE MANAGEMENT OF MINING INFLUENCED WATER AT THE HAILE GOLD MINE, SOUTH CAROLINA	James J. Gusek	417
Phosphorus Fertilizer Rate and Extractable Phosphorus on a Reclaimed and Undisturbed Pasture Soil	Josh Hall	433
CONTROLS ON pH AND PYRITE OXIDATION PATHWAYS ACROSS THE PHREATIC SURFACE OF A COAL WASTE DEPOSIT IN SOUTHWEST	Dalton Hardisty	434
Anna S System: Reliable Passive Treatment of Severe Acid Mine Drainage	Robert Hedin	1458
Measurements of Dissolved Oxygen in Active and Passive Treatment Systems	Robert Hedin	1459
THE USE OF MINE DRAINAGE SOLIDS FOR THE CONTROL OF PHOSPHORUS POLLUTION FROM DAIRY MANURE MANAGEMENT	Robert Hedin	1470
A GEOMORPHOLOGICAL FRAMEWORK & DECISION TOOL FOR HABITAT TRANSLOCATION PRACTICES IN THE UK	R. Neil Humphries	449
Cadmium Uptake Enhanced in Elodea Canadensis by Plant-Induced pH-Rise	M. Tariq Javed	469
STABILITY AND EROSION ON STEEP SLOPES CONSTRUCTED BY THE FOREST RECLAMATION APPROACH IN THE SOUTHERN APPALACHIAN REGION	Isaac A. Jeldes	470
CARBON SEQUESTRATION, BIOFUEL PRODUCTION AND MINE SOIL RECLAMATION WITH SWITCHGRASS	Travis Keene	489
Fabricated Soil Recipes for Mining Landscape Rehabilitation	Valentine Kefeli	504
Woody Plant Colonization of a Reclaimed Anthracite Surface Mine in Northeastern Pennsylvania	Kenneth M. Klemow	505
COMPARISON OF NOAA ATLAS 14 PRECIPITATION ESTIMATES TO SITE SPECIFIC DATA FOR STORMWATER MANAGEMENT AT QUESTA MINE, NEW MEXICO	Paul Kos	506
WATER QUALITY IMPROVEMENTS AFTER INSTALLATION OF A PASSIVE TREATMENT SYSTEM	Julie A. LaBar	525
ESTABLISHMENT AND EVALUATION OF SWITCHGRASS ON RECLAIMED MINE SOIL	David J. Lang	536
IN SITU IRON OXIDATION USING HYDROGEN PEROXIDE	Bruce R. Leavitt	551
MINING PROJECT APPROVALS IN WESTERN AUSTRALIA	Keith Lindbeck	570
COMMUNITY ENGAGEMENT IN RECLAMATION, PART 1	Lauren Lindgren Scott Fanello	1457
Use of Stream Restoration and Passive Treatment Technologies for Improving Water Quality in an Eastern Kentucky Valley Fill	Courtney Mastin	581
“OUT OF THE GROUND” DOCUMENTARY FILM	Andy McAllister	1461
PAPER TITLE	FIRST AUTHOR	PAGE
FACTORS AFFECTING PERFORMANCE OF ARTIFICIALLY	Brian McCarthy	582

REGENERATED AMERICAN CHESTNUT ON RECLAIMED MINE SITES		
BLACKS, BASEBALL, AND COAL MINING IN WESTERN PENNSYLVANIA	Theresa McDevitt	1462
WORKSHOP SERIES OF ADTI-MMS	Virginia McLemore	598
CHALLENGES TO APPLYING GEOMORPHIC AND STREAM RECLAMATION METHODOLOGIES TO MOUNTAINTOP MINING AND EXCESS SPOIL FILL CONSTRUCTION IN STEEP-SLOPE TOPOGRAPHY (E.G. CENTRAL APPALACHIA)	Peter R. Michael	610
INITIAL EVALUATION OF A LARGE MULTI-CELL PASSIVE TREATMENT SYSTEM FOR NET-ALKALINE FERRUGINOUS LEAVE-ZINC MINE WATERS	Robert W. Nairn	635
Long-Term Effects of Rock Type, Weathering, and Amendments on Southwest Virginia Mine Soils	Whitney L. Nash	650
STREAM RESTORATION: PAST PRACTICES, CURRENT BENCHMARKS	Jack Nawrot	652
HYDROCHEMICAL EFFECTS OF USING COAL COMBUSTION BYPRODUCTS AS STRUCTURAL FILL AND CAPPING MATERIAL AT AN ABANDONED MINE LANDS RECLAMATION SITE, SOUTHWESTERN INDIANA	Shawn Naylor	672
CHARACTERIZATION OF IRON OXIDES FROM ABANDONED MINE DRAINAGE DISCHARGES	Cody A. Neely	691
METAL AND ARSENIC LEVELS IN DRINKING WATER AT TWO MONTANA SUPERFUND SITES	Dennis R. Neuman	722
LEACHING POTENTIALS OF COAL SPOIL AND REFUSE: ACID-BASE INTERACTIONS AND ELECTRICAL CONDUCTIVITY	Zenah Orndorff	736
PROGRESSIVE IRON REMOVAL WITHIN THE INITIAL OXIDATION CELL OF A PASSIVE TREATMENT SYSTEM	Leah R. Oxenford	767
POST MINING LAND USE TRENDS IN WEST VIRGINIA BETWEEN 1998 AND 2008	Kevin G. Quick	780
ALTERNATIVES ANALYSIS APPROACH TO ABANDONED MINE RECLAMATION DESIGN	Jeffrey J. Ream	797
ASSESSMENT OF TWO FIELD-SCALE SULFATE REDUCING BIOREACTORS USING SULFUR ISOTOPES	Matthew D. Reeder	813
ADVANCES IN PASSIVE TREATMENT OF COAL MINE DRAINAGE, 1998-2009	Arthur W. Rose	847
BIOCHEMICAL REACTOR MEDIA CHARACTERIZATION STUDY	Tom Rutkowski	888
PILOT-SCALE TREATMENT OF SELENIUM IN GRAVEL PIT SEEPAGE WATER USING BIOCHEMICAL REACTOR TECHNOLOGY	Tom Rutkowski	914
EVALUATING LONGEVITY OF VERTICAL FLOW CELLS THROUGH WATER QUALITY ANALYSIS	Beatriz E. Santamaria.	940
FINDINGS OF THE WVDEP AND OSMRE SCR-15 "PHASE I" STUDY ON THE UNDERGROUND INJECTION OF COAL SLURRY	Andrew Schaer	963
PAPER TITLE	FIRST AUTHOR	PAGE
COMPARISON OF THREE VEGETATION SAMPLING METHODS	Brenda K. Schladweiler	993

ON OIL AND GAS SITES IN SOUTHWESTERN WYOMING		
SLUDGE REMOVAL AND DEWATERING FOR REUSE AT A PASSIVE TREATMENT SYSTEM IN EAST CENTRAL TENNESSEE	Terry W. Schmidt	1005
Types of Calcium Reagents and Their Application in Acid Mine Drainage and Abandoned Mine Land Reclamation	Michael C. Schrock	1018
Assessment of the Applicability of Steel Slag for Alkaline Addition to Acidic Streams in South Central Pennsylvania	Bradley R. Schultz	1059
CREATING SUSTAINABLE VEGETATED COVERS OVER DIFFICULT SLOPES	Daniel F. Senf	1040
PLS GIT-ER-DONE WITH THE SOIL YOU GOT - LANDSLIDE REMEDIATION	Michael Shapaka	1463
Utilization of AMD Sludges from the Anthracite Region of Pennsylvania for Removal of Phosphorus from Wastewater	Philip L. Sibrell	1085
Using Computer Tools and Databases to Develop Soil Reconstruction Plans Following Surface Coal Mining	H. Raymond Sinclair	1101
RELEASE OF NUTRIENTS FROM BROWN AND GRAY SANDSTONE SOIL SUBSTITUTES IN SOUTHERN WEST VIRGINIA	Jeff Skousen	1135
SURVIVAL AND GROWTH OF CHESTNUT HYBRID SEEDS AND SEEDLINGS ON MOUNTAINTOP SURFACE MINES IN WEST VIRGINIA	Jeff Skousen	1144
SEED COLONIZATION OF HARDWOODS	Jeff Skousen	1161
CASE STUDY: EVALUATING THE FEASIBILITY OF CO-TREATING BIOCHEMICAL REACTOR EFFLUENT AND MINING INFLUENCED WATER	Patrick Smart	1162
EVALUATION OF RECLAMATION PROGRESS ON NATURAL GAS WELL PADS IN WYOMING	Peter D. Stahl	1179
SWITCHGRASS PRODUCTION ON ABANDONED MINED LAND RECLAIMED WITH MANURE BASED AMENDMENTS	Richard Stehouwer	1184
DEVELOPING AND EVALUATING OPTIONS FOR LARGE-SCALE WATERSHED REMEDIATION	James M. Stiles	1199
EFFECTS ON THE UNDERLYING WATER COLUMN BY ECOLOGICALLY ENGINEERED FLOATING VEGETATION MATS	William H. Strosnider	1236
FIELD INVESTIGATIONS OF BEST PRACTICES FOR STEEP SLOPE APPLICATIONS OF THE FRA	Richard Sweigard	1258
JENNINGS ENVIRONMENTAL LEARNING CENTER	Will Taylor	1464
Third-Year Performance of 55-Gallon Bioreactors Treating Mining Influenced Water from the National Tunnel in Black Hawk, Colorado	Kathryn Tenney	1274
Soil Properties and Hardwood Growth After One Year on	Calene Thomas	1283
ISOLATING EFFECTS OF TOTAL DISSOLVED SOLIDS ON AQUATIC LIFE IN CENTRAL APPALACHIAN COALFIELD STREAMS	Anthony J. Timpano	1284
PAPER TITLE	FIRST AUTHOR	PAGE
ENHANCEMENT OF THE FORESTRY RECLAMATION APPROACH THROUGH EARTHWORM INOCULATION: ENGAGING PRE-	Holly J. Travis	1437

SERVICE TEACHERS AND ELEMENTARY SCHOOL STUDENTS IN THE FORESTRY		
IMPLICATIONS OF THE OCCURRENCE AND SPREAD OF THE WHITE-NOSE SYNDROME TO PROTECTION OF ENDANGERED BATS UNDER SMCRA	Kimery C. Vories	1304
GROUNDWATER FLOW MODELING OF AN ABANDONED MINE LANDS SITE SCHEDULED FOR RECLAMATION	Robert C. Waddle	1320
TRANSLOCATION OF CUMBERLANDIAN MUSSELS TO ACHIEVE SPECIES CONSERVATION	Craig Walker	1469
The LC20D Passive Treatment System, Little Coon Run, Clarion County, Pennsylvania	Ted Weaver	1465
THE SIGNIFICANCE OF POLITICAL TRUST IN MINED LAND RECLAMATION AND REFORESTATION EFFORTS	Darren A. Wheeler	1337
SOIL AGGREGATE, ORGANIC MATTER AND MICROBIAL DYNAMICS UNDER DIFFERENT AMENDMENTS AFTER 27 YEARS OF MINE SOIL DEVELOPMENT	Abbey F. Wick	1364
Post-SMCRA Reclaimed Mine Soils: Slope and Cover Effects on Runoff Under Natural Conditions	Anthony J. Willard	1387
Surface Mine Reclamation Needs in Mongolia's Selenga Watershed	Stephen E. Williams	468
ASSESSING THE BENEFITS OF A PASSIVE TREATMENT SYSTEM FOR MINE DRAINAGE IN NORTHEAST OKLAHOMA USING ENERGY ANALYSIS	Brandon K. Winfrey	1388
CARBON CAPTURE AND SEQUESTRATION WITH A FOCUS ON APPLICATIONS TO COAL-FIRED POWER PLANTS	Richard A. Winschel	NAS
Cleaning Up Abandoned Mine Drainage in the West Branch Susquehanna Watershed: Why it Makes Economic Sense	Amy Wolfe	1466
Sustained Treatment of AMD Containing AL and Fe ³⁺ with Limestone Aggregate	Neil Wolfe	1467
Integrating Visualization and Geomorphic Landforming for Reclamation in Appalachian Coal Mines	Charles Yuill	1468