

SME Annual Conference & Expo 2017

Creating Value in a Cyclical Environment

Denver, Colorado, USA
19 - 22 February 2017

ISBN: 978-1-5108-3647-1

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 Society for Mining, Metallurgy and Exploration
All rights reserved.

Printed by Curran Associates, Inc. (2017)

For permission requests, please contact Society for Mining, Metallurgy and Exploration
at the address below.

Society for Mining, Metallurgy and Exploration Inc.
12999 East Adam Aircraft Circle
Englewood, CO 80112-4167

Phone: (303) 948-4200
Fax: (303) 973-3845

cs@smenet.org

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
Web: www.proceedings.com

TABLE OF CONTENTS by NUMBER

17-001	A CASE STUDY EXPLORING FIELD LEVEL RISK ASSESSMENTS AS A LEADING SAFETY INDICATOR.....1 E. Haas, B. Connor, J. Vendetti, R. Heiser
17-002	A NEW CAST HARD IRON ELEVATED 250% THE SERVICE LIFE OF CENTRIFUGAL PUMPS IN MULTIPLE WEAR APPLICATIONS.....7 G. Calboreanu, L. Wilfley
17-003	A REVIEW: THE BENEFICATION OF LITHIUM MINERALS FROM HARD ROCK DEPOSITS.....20 C. Gibson, M. Aghamirian, T. Grammatikopoulos
17-004	A STUDY OF U.S. COAL MINE CLOSURES SINCE 1994.....26 J. Brinkman, J. Schafner, C. Johnson
17-005	ADAPTING TO A CYCLICAL MARKET – INTREPID POTASH’S CARLSBAD, NM EAST FACILITY TRANSITION.....34 B. Berg, J. Mansanti, C. Nyikos, J. Stephenson
17-006	AERIAL DRONES USED TO SAMPLE PIT LAKE WATER REDUCE MONITORING COSTS AND IMPROVE SAFETY.....39 D. Castendyk, B. Straight, P. Filiatreault, S. Thibeault, L. Cameron
17-007	ALL-IN SUSTAINING COST ANALYSIS: PROS AND CONS.....N/A A. Yapo, T. Camm
17-008	ALTERNATE TECHNOLOGIES APPLICABLE TO PROXIMITY DETECTION ON MOBILE MACHINES IN UNDERGROUND COAL MINES.....43 P. Bissert, J. DuCarme, J. Noll, C. Jobes
17-009	AN EVALUATION OF THE RELATIVE SAFETY OF U.S. MINING EXPLOSION-PROTECTED EQUIPMENT APPROVAL REQUIREMENTS VERSUS THOSE OF INTERNATIONAL STANDARDS.....48 W. Calder, D. Snyder, J. Burr
17-010	ANALYSIS OF MONITORING TECHNIQUES TO MEASURE FLOOR HEAVE IN AN UNDERGROUND LIMESTONE MINE.....54 B. Slaker, M. Murphy, T. Miller
17-011	APPLICATION OF TAGUCHI’S METHOD TO UNCERTAINTY ASSESSMENT AND SENSITIVITY ANALYSIS FOR MINERAL PROCESSING CIRCUITS.....59 S. Amini, A. Noble
17-012	APPLICATIONS OF AUTOMATIC SENSOR BASED SORTING TO MINING ORES.....62 A. Young, M. Veras, D. Neto, C. Petter, C. Sampaio

17-013	ASSESSING FOAM APPLICATION TO MINE ROOF FOR LONGWALL MINING SHIELD DUST CONTROL.....67 W. Reed, Y. Zheng, S. Klima, M. Shahan, T. Beck
17-014	ASSESSING THE CHALLENGES IN THE EXTRACTION OF GOLD FROM BACTERIAL-TREATED DOUBLE-REFRACTORY CONCENTRATE.....80 A. Adam, G. Ofori-Sarpong, R. Amankwah
17-015	BALL MILL CLASSIFICATION SYSTEM OPTIMIZATION THROUGH FUNCTIONAL PERFORMANCE MODELING.....87 R. McIvor, K. Bartholomew, O. Arafat, J. Finch
17-016	BENEFITS OF FRAGMENTATION OPTIMIZATION ON THE TOTAL MINING VALUE CHAIN.....92 J. Peterson, P. McKneight, R. Riggle
17-017	BIOLEACHING SECONDARY SULFIDES AND IMPROVING COMMERCIALITY IN A CYCLICAL COPPER MARKET - LISBON VALLEY MINING CO LLC SAN JUAN COUNTY, UTAH.....95 L. Indergard, T. Tucker, S. Davis, D. Kidd
17-018	BREAKING THE WALL OF ASM MERCURY POLLUTION: THE LANTERN RETORT.....97 R. Amankwah, D. Adjei, G. Ofori-Sarpong
17-019	CFD ANALYSIS ON GAS DISTRIBUTION FOR DIFFERENT SCRUBBER REDIRECTION CONFIGURATIONS IN SLAB CUT AND SUMMARY OF PREVIOUS SUMP CUT ANALYSIS.....101 Y. Zheng, J. Organiscak, L. Zhou, T. Beck, J. Rider
17-020	CFD MODELING OF CLOUD COVER FOR POLLUTANTS DISPERSION IN DEEP OPEN-PIT MINES UNDER ARCTIC AIR INVERSION.....108 K. Raj, S. Bandopadhyay
17-021	CFD MODELLING OF LONGWALL TAILGATE VENTILATION CONDITIONS.....116 A. Juganda, J. Brune, G. Bogin, Jr., J. Grubb, S. Lolon
17-022	CHARACTERIZATION OF A MINE FIRE USING ATMOSPHERIC MONITORING SYSTEM SENSOR DATA.....120 L. Yuan, R. Thomas, L. Zhou
17-023	CHARACTERIZATION OF AIRBORNE FLOAT COAL DUST EMITTED DURING CONTINUOUS MINING, LONGWALL MINING, AND BELT TRANSPORT.....125 M. Shahan, C. Seaman, T. Beck, J. Colinet, S. Mischler
17-024	CHROMITE PLANT CAPACITY INCREASE USING EXPERIMENTAL AND MODELING TECHNIQUES.....129 E. Tuzcu, Y. Vural, A. Acar
17-025	COMBUSTION CHARACTERISTICS OF COAL BLENDS.....133 S. Aich, B. Nandi, S. Bhattacharaya
17-026	COMPARISON OF DIFFERENT HOLLOW CONE WATER SPRAYS FOR CONTINUOUS MINER DUST CONTROL APPLICATIONS.....138 S. Klima, C. Seaman, S. Mischler, J. Organiscak

17-027	COMPARISON OF UNDERGROUND COAL AND TRONA MINE SEISMICITY.....142 W. Pariseau
17-028	CONSIDERATIONS FOR HYDROGEOLOGICAL TESTING USING INFLATABLE PACKERS, LESSONS LEARNED & PROJECT EXAMPLES.....151 J. White
17-029	CONTRIBUTION OF MINING INDUSTRY TO SUSTAINABLE DEVELOPMENT OF TERRITORIES: THE LATIN AMERICAN CASE.....155 G. Aristazabal, A. Delgado-Jiménez, O. Restrepo-Baena
17-030	CONTROLLING FACTORS OF THE E-FIELD OF ELECTRODE-BASED THROUGH-THE-EARTH (TTE) COMMUNICATION.....158 L. Yan, C. Zhou, M. Reyes
17-031	COPPER RECOVERY FROM WASTE PRINTED CIRCUIT BOARDS.....162 N. Santa, V. Salinas
17-032	CURRENT PROGRESS IN THE DEVELOPMENT OF THE WEBGROUNDCONTROL APPLICATION.....165 C. Newman, Z. Agioutantis, N. Schaefer
17-033	DEASHING AND DESULFURIZATION OF FINE COAL USING ENHANCED GRAVITY CONCENTRATOR.....168 Y. Tao, X. Zhu, Y. Xian, Z. Man
17-034	DEMONSTRATION CAMPAIGN RESULTS ON A CYANIDE-FREE PROCESS FOR GOLD EXTRACTION FROM A REFRACTORY PYRITE CONCENTRATE.....172 A. Drouin, D. Lemieux, J. Lalancette, C. Chouinard
17-035	DESIGN OF A LABORATORY SCALE WIND TUNNEL FOR STUDYING OF MINE FIRES.....177 J. Davis, E. Jong, K. Luxbacher
17-036	DESIGN OF A NOVEL AUTO-ROTATING UAV PLATFORM FOR UNDERGROUND MINE CAVITY SURVEYING.....181 J. Mitchell, J. Marshall
17-037	DETERMINE THE POTENTIAL DRILL UTILIZATION IMPROVEMENTS AND ROCK FRAGMENTATION REQUIREMENTS USING DIRECTIONAL DRILLING IN A COAL MINING OVERBURDEN HIGHWALL APPLICATION.....187 K. Dill, S. Rosenthal
17-038	DEVELOPMENT OF A SIX DRILLHEAD ROOF BOLTING MACHINE.....196 B. Kyslinger
17-039	DEVELOPMENT OF AN AUTOMATION LABORATORY AND COURSES FOR MINING ENGINEERING EDUCATION.....201 T. Novak, K. Mayfield
17-040	DEVELOPMENT OF FLOWSHEET FOR A LOW GRADE CHROMITE ORE IN TURKEY.....205 L. Ergün, I. Celik, Ö. Gulsoy

17-041	DEVELOPMENT, TESTING, AND PROPOSED APPLICATION OF MULTIPLE PASSIVE SOURCE TRACERS FOR UNDERGROUND MINE VENTILATION SYSTEMS.....208 E. Watkins, K. Luxbacher, E. Jong
17-042	DIGGING FOR SURVIVAL: FEMALE PARTICIPATION IN ARTISANAL AND SMALL-SCALE MINING IN THE TARKWA MINING DISTRICT OF GHANA.....211 K. Bansah, N. Dumakor-Dupey, G. Sakyi-Addo
17-043	DRAGLINE EXTRACTION OF 1.2 MILLION TONNES OF A 52-METER THICK VERTICALLY DIPPING COAL SEAM.....215 T. Morris
17-044	DRILL & BLAST IMPLEMENTATION CASE STUDY AT MULTIPLE SITES WITHIN FREEPORT MCMORAN INC.....219 S. Gering, C. Calderon-Arteaga, L. Gutierrez, T. White
17-045	DYNAMIC MODELING & SIMULATION OF A SAG MILL FOR CHARACTERIZATION OF MILL CHARGE.....222 V. Srivastava, G. Akdogan, T. Ghosh, R. Ganguli
17-046	DYNAMIC SEALS: A WAY TO PREVENT LONGWALL GOB EXPLOSIONS.....227 J. Brune, S. Saki
17-047	DYNAMIC SIMULATION OF PRECIOUS METAL RECOVERY FROM A VALLEY-FILL HEAP LEACH FACILITY.....230 J. Bilant, J. Donnelly
17-048	EFFECT OF SIMULATED GOB CONDITIONS ON THE BURNING VELOCITY OF PREMIXED METHANE-AIR COMBUSTION.....235 C. Strebing, M. Fig, G. Bogin, J. Brune, J. Grubb
17-049	EFFECTIVE APPLICATION OF SYNTHETIC APERTURE RADAR INTERFEROMETRY FOR MONITORING MINE SUBSIDENCE IN THE MOUNTAIN WEST UNITED STATES.....241 J. Wempen, M. McCarter
17-050	EFFECTS OF CORROSION ON GROUND SUPPORT AND CORROSION MONITORING METHODS.....245 A. Chambers, D. Benton, M. Stepan, S. Finley
17-051	EFFECTS OF LONGWALL-INDUCED SUBSURFACE DEFORMATIONS ON THE MECHANICAL INTEGRITY OF SHALE GAS WELLS DRILLED OVER A LONGWALL ABUTMENT PILLAR.....251 D. Su
17-052	ELECTROKINETIC AND FLOTATION BEHAVIORS OF ILMENITE IN THE PRESENCE OF LEAD IONS USING SODIUM OLEATE AS THE COLLECTOR.....257 P. Chen, J. Zhai, W. Sun, Y. Hu, Z. Yin
17-053	ELECTROMAGNETIC INTERFERENCE WITH PROXIMITY DETECTION SYSTEMS.....260 J. Noll, R. Matetic, J. Li, C. Zhou, J. DuCarme, M. Reyes, J. Srednicki

17-054	EMBRACE THE UNKNOWN: STOP SAYING “IT’S TOO HARD” AND START EMBRACING UNCERTAINTY IN YOUR MINE PLANS.....265 C. Roos
17-055	EMPLOYING OPERATIONAL EXCELLENCE TO OPTIMIZE UNDERGROUND HAULAGE SYSTEMS.....270 Y. Sun, J. Sidhom, W. Fourie
17-056	ENERGY ANALYSIS IS A KEY FOR MINER PROFITABILITY.....273 R. Miller
17-057	ENGINEERING ONLINE: PROGRAM DEVELOPMENT TO ADDRESS THE EDUCATIONAL NEEDS OF THE MINING INDUSTRY.....277 T. Katsabanis, E. Tremblay, D. Yokom
17-058	ENVIRONMENTAL ISSUES OF ARTISANAL AND SMALL-SCALE MINING IN THE TARKWA MINING AREA OF GHANA.....283 N. Dumakor-Dupey, K. Bansah
17-059	ESTIMATION OF METABOLIC HEAT FOR REFUGE ALTERNATIVE TESTING.....286 T. Bernard, D. Yantek, E. Thimons
17-060	EVALUATING THE MAJOR PERFORMANCE CHARACTERISTICS OF CURRENT STANDING SUPPORT SYSTEMS.....290 T. Batchler
17-061	EVALUATION OF BLASTING-INDUCED GROUND VIBRATIONS ON HIGHWALL STABILITY.....295 R. Eades, K. Perry
17-062	EVALUATION OF GOB PRESSURE RESPONSE DUE TO CHANGES IN MINE ATMOSPHERIC PRESSURE.....299 S. Lolon, J. Brune, G. Bogin, Jr., J. Grubb, A. Juganda
17-063	EVALUATION & SELECTION OF NOVEL SURVEYING SYSTEMS FOR USE IN SURFACE COAL MINING.....305 M. Drake, C. Roos, P. Conrad, T. Stack
17-064	EXPERIMENTAL AND NUMERICAL INVESTIGATIONS OF THE FLUID FLOW IN A HYDROCYCLONE WITH AN AIR CORE.....310 R. Ke, C. Shingote, J. Kadambi, J. Furlan, R. Visintainer
17-065	FIBER REINFORCED ULTRA RAPID HARDENING SPRAYED CONCRETE FOR MINING AND CIVIL APPLICATIONS.....318 S. Tadolini, P. Mills
17-066	FLOTATION OF PROBLEMATIC CU-ZN ORES IN ÇBİ (TURKEY).....324 Z. Ekmekçi, Ö. Bıçak, M. Can, İ. Çelik, Y. Öztürk, B. Kocabıyık, N. Şahin
17-067	FUNDAMENTAL ERROR ESTIMATION AND ACCOUNTING IN THE BLASTHOLE SAMPLING PROTOCOL AT A COPPER MINE.....329 R. Ganguli, A. Chierigati, A. Purvee
17-068	GRAVITY CONCENTRATION OF CHROMITE FINES.....333 N. Duru

17-069	HEAT/HUMIDITY TESTS OF A BUILT-IN-PLACE REFUGE ALTERNATIVE.....339 D. Yantek, G. Homce, L. Yan, T. Lutz, J. Srednicki, J. Yonkey
17-070	HOLDEN MINE — APPLICATION OF JET GROUTING TO IMPROVE STABILITY OF A TAILINGS EMBANKMENT IN A NARROW MOUNTAIN VALLEY.....346 C. Weber, P. Crouse, J. Obermeyer
17-071	IMPACT OF CLAY ON PHOSPHATE BENEFICIATION.....351 L. Moore, G. Wang, Y. Xiong, J. Gu, S. Renslow
17-072	IMPROVING CONVEYOR TRANSFER POINT PERFORMANCE IN HARD ROCK MINES.....355 R. Shields
17-073	IMPROVING DIESEL QUALITY REDUCES COST AND EMISSIONS.....360 R. Miller
17-075	INDEX OF NATURE FRIENDLY SUSTAINABILITY (NFS) IN MINING.....364 M. Javier
17-076	INDUSTRIAL INTERNET OF THINGS (IIOT) APPLICATIONS IN UNDERGROUND COAL MINES.....368 C. Zhou, N. Damiano, B. Whisner, M. Reyes
17-077	INVESTIGATION ON THE USE OF CHEMICAL DUST SUPPRESSANTS ON ASH EMISSIONS DUE TO FORT MCMURRAY WILDFIRE.....375 D. Omane, H. Yu, W. Liu, Y. Pourrahimian
17-078	LUCK & SKILL: BLACK SWANS & MACHIAVELLI'S IDEAS ON POWER, FORTUNE, VIRTÙ.....381 T. Camm
17-079	MANAGEMENT OF EXPLOSION RISKS IN UNDERGROUND COAL MINES WITH THE USE OF BAG BARRIERS.....385 J. Schafner, J. Brinkman, C. Johnson, D. Humphreys, T. O'Beirne
17-080	MANAGING ENGINEERING TALENT: UNIQUE CHALLENGES TO OPTIMIZE THE BEST AND BRIGHTEST.....394 T. Camm, J. Johnson
17-082	MATERIAL PROPERTY TESTS OF FOAM AGENTS TO DETERMINE THEIR POTENTIAL FOR LONGWALL MINING DUST CONTROL RESEARCH.....396 W. Reed, T. Beck, Y. Zheng, S. Klima, J. Driscoll
17-083	MAXIMIZING REE ENRICHMENT BY FROTH FLOTATION USING BOX-BEHNKEN DESIGN IN ALASKAN COAL.....408 T. Gupta, T. Ghosh, G. Akdogan, S. Bandopadhyay
17-084	METALLURGY, PROCESS CONTROL AND MINERALOGY INTEGRATION AT THE KITTILA MINE, FINLAND.....413 R. Thorpe, P. Gottlieb, R. Mermillod-Blondin, A. Niiranen, J. Ruokanen, A. Kopřiva, M. Dosbaba
17-085	MINER ACT TECHNOLOGY: PAST, PRESENT, AND FUTURE.....419 D. Snyder, J. Burr, S. Moore, R. Fernando

17-086	MINING AT THE WASTE ISOLATION PILOT PLANT.....425 A. Urquidez, Z. Hyder
17-087	SATISFYING APPARENT TEMPERATURE REQUIREMENTS IN MOBILE REFUGE ALTERNATIVES USING VAPOR COMPRESSION REFRIGERATION AND EXPENDABLE DESICCANT.....431 K. Deaton
17-088	MOLYBDENUM SOLVENT EXTRACTION USING CYANEX® 600 EXTRACTANT.....434 B. Gay, T. Bednarski, T. McCallum, L. Moya
17-089	NEW INSIGHTS INTO THE ADSORPTION OF BENZOHYDROXAMIC ACID ON SCHEELITE IN THE PRESENCE OF LEAD NITRATE.....441 H. Han, Y. Hu, X. Li, X. Tong, R. Liu, T. Yue, Z. Gao, P. Chen, J. Wang
17-090	NUMERICAL MODELING OF MAIN AND TAIL GATE OF A MODIFIED LONG WALL MINING OPERATION.....447 M. Emad, M. Khan
17-091	OCEANAGOLD HAILE: CONCEPT TO REALITY.....452 C. Larson, C. Anderson, M. Deal, D. Carr, Q. Johnston
17-092	OPEN-AIR SPRAYS FOR CAPTURING AND CONTROLLING AIRBORNE FLOAT COAL DUST ON LONGWALL FACES.....457 T. Beck, C. Seaman, M. Shahan, S. Mischler
17-093	OVERBURDEN STRATA DEFORMATION MONITORING BASED ON DISTRIBUTED OPTICAL FIBER SENSING: NOVEL METHOD FOR GROUND CONTROL.....463 J. Chai, Q. Yuan, D. Zhang, B. Qiu, J. Liu, Y. Li
17-094	OVERVIEW OF CURRENT US LONGWALL GATEROAD SUPPORT PRACTICES.....473 M. Sears, I. Tulu, G. Esterhuizen
17-095	POTASH PRODUCTION HOISTING PLANT UPGRADE & BEYOND.....478 D. Ziebarth
17-096	PRECISION PRESPLITTING.....484 A. Konya, C. Konya
17-097	PRE-CONCENTRATION BY AUTOMATIC SORTING.....489 C. Petter, M. Veras, A. Young, A. Bastos, R. Paranhos, E. dos Santos, C. Sampaio
17-098	PREDICTION OF HUMAN CORE TEMPERATURE RISE AND MOISTURE LOSS IN COAL MINE REFUGE ALTERNATIVES.....494 M. Klein, D. Yantek, M. Hepokoski, L. Yan
17-099	PROJECT OPTIMIZATION AND COMPETITIVENESS ENHANCEMENT TROUGH AN INTERGRATED HEALTH AND SAFETY MANAGEMENT – SAFETY FOR CONSTRUCTION WORK UNDERGROUND.....500 J. Herhold, H. Mischo, S. Plaum
17-100	QUANTIFYING AND MONITORING CONTROL ROOM PROTECTION FACTORS AGAINST RESPIRABLE DUST AT AN UNDERGROUND CRUSHER BOOTH.....505 J. Patts, A. Cecala, J. Rider, J. Organiscak, J. Zimmer

17-101	RARE EARTHS IN REVIEW - A DECADE OF DECLINE & DECEPTION.....513 J. Kennedy
17-102	REAL-TIME INTEGRATION OF SENSOR DATA FOR IMPROVED GRADE CONTROL.....525 J. Benndorf, M. Buxton
17-103	RECOVERY OF VALUABLE ELEMENTS FROM CHINESE COAL BY-PRODUCTS.....529 M. Fan, Y. Zhao, Z. Long, W. Liu
17-104	REFUGE ALTERNATIVES RELIEF VALVE TESTING AND DESIGN WITH UPDATED TEST STAND.....535 T. Lutz, P. Bissert, G. Homce, J. Yonkey
17-105	REMOVAL OF HEAVY METAL IONS FROM ACID MINE DRAINAGE USING A WATER TREATMENT WASTE SORBENT.....539 L. Ackah, R. Guru, M. Peiravi, M. Mohanty, X. Ma, S. Kumar, R. Ma, Z. Qian, Z. Yude, X. Baolin
17-106	RESEARCH OF THE INJURY RATE IN SELECTED MINING SECTORS AND THE ECONOMIC BENEFIT OF MINE SAFETY IMPROVEMENTS.....544 C. Fuellenbach, J. Brune, H. Mischo
17-107	RESPIRABLE DUST MEASURED DOWNWIND DURING ROCK DUST APPLICATION.....548 M. Harris, J. Organiscak, S. Klima, I. Perera
17-108	REVISITING SCRUBBING UNIT OPERATIONS IN THE PHOSPHATE INDUSTRY.....553 F. Sotillo
17-109	RISK ANALYSIS FOR EVALUATION OF MINE IMPOUNDED WATER.....561 M. Gobla
17-110	SAFETY FACTOR DESIGN ANALYSIS: INTEGRATION OF BOLTS, MESH, AND SHOTCRETE SUPPORT IN WEAK ROCK MASSES, TURQUOISE RIDGE MINE, NEVADA.....565 L. Sandbak
17-111	SMART MONITORING AND CONTROL SYSTEM TEST APPARATUS.....572 K. Raj, R. Jacksha, C. Sunderman, C. Pritchard
17-112	TECHNOLOGICAL INNOVATIONS THAT CAPTURED SIGNIFICANT PROJECT VALUE AT PEÑA COLORADA.....575 J. Villa, R. Vivas
17-113	TEMPERATURE AND HUMIDITY TESTS FOR MOBILE REFUGE ALTERNATIVES.....578 L. Yan, D. Yantek, P. Bissert
17-114	THE ABCS OF MINE-TO-MILL AND METAL PRICE CYCLES.....583 P. Cameron, D. Drinkwater, J. Pease, T. BoBo
17-115	THE CERRO VERDE 2 CONCENTRATOR: DESIGN, START UP AND OPERATION.....591 J. Vanderbeek, P. Gelfi, J. Enriquez

17-116	THE CONSTRUCTIVE ROLE OF VENTILATION MODELS IN ATMOSPHERIC MONITORING SIGNAL EVALUATION.....603 W. Asante, D. Bahrami, G. Danko
17-117	THE EFFECTS OF DETONATION WAVE COLLISIONS ON ROCK THROW.....610 P. Cahill, C. Johnson, J. Nawrocki
17-118	THE EFFECTS OF SEASONAL HEAT AND HUMIDITY ON MINE STRATA TEMPERATURES IN UNDERGROUND COAL MINES.....615 P. Bissert, D. Yantek, L. Yan, J. Srednicki, J. Yonkey
17-119	THE INTRODUCTION AND ADVANCEMENT OF REMOTE ROOF BOLTING IN SOUTH AFRICAN COAL MINES.....620 R. Burgess, D. Gill, J. Steyn, B. Kysliger
17-120	THE PAYBACK OF SAFETY AND JUSTIFYING EXPENDITURES FOR SAFETY IMPROVEMENTS.....625 R. Swinderman
17-121	THE STUDY OF UTILITY OF TAILINGS FOR SHOTCRETE PRODUCTION.....627 A. Bascetin, D. Adiguzel, S. Tuylu
17-122	THREE-DIMENSIONAL SLOPE STABILITY ANALYSIS OF BLOCK SLIDING SLOPE FAILURE AT THE PIKEVIEW QUARRY, EL PASO COUNTY, COLORADO.....631 J. Varnier, J. Cremeens, D. Overton
17-123	UNDERGROUND APPLICATION OF ULTRA-WIDEBAND RADIO FOR ROBUST POSITIONING AND COMMUNICATION.....635 C. Niestroj, S. Schade, G. Möllemann, K. Nienhaus
17-124	UNTIL THE END AND BEYOND: THE SUSTAINABLE DEVELOPMENT STRATEGY OF THE GERMAN HARD COAL MINING INDUSTRY.....638 J. Kretschmann
17-125	USING A QSO EXPERT MODEL TO GENERATE QUARRY OPTIMIZATION PLAN TO IMPROVE OPERATION AT LAFARGEHOLCIM LIMESTONE QUARRY, CRYSTAL RIVER, FL.....643 K. Boakye, T. Newman, M. Toelle, P. Bláha
17-126	CONCENTRATION OF RARE EARTH MINERALS FROM COAL BY FROTH FLOTATION.....647 W. Zhang, R. Honaker, J. Groppo
17-127	EFFECTS OF LONGWALL MINING ON AQUATIC RESOURCES AT THE BAILEY MINE IN SOUTHWESTERN PENNSYLVANIA.....652 J. Silvis, M. Shema, M. Haibach
17-128	CHEMICAL EXTRACTION OF RARE EARTH ELEMENTS FROM COAL ASH.....659 M. Peiravi, L. Ackah, R. Guru, M. Mohanty, J. Liu, B. Xu, X. Zhu, L. Chen
17-129	PROCESS EVALUATION AND FLOWSHEET DEVELOPMENT FOR THE RECOVERY OF RARE EARTH ELEMENTS FROM COAL AND ASSOCIATED BYPRODUCTS.....665 R. Honaker, J. Groppo, R. Yoon, G. Luttrell, A. Noble, J. Herbst

- 17-130** **MANUAL P-PHASE PICKING ON NOISY ACOUSTIC EMISSION/MICROSEISMIC DATA.....672**
C. Mborah, M. Ge
- 17-131** **LABORATORY DEMONSTRATION OF DPM MASS REMOVAL FROM AN EXHAUST STREAM BY FOG DROPS.....676**
L. Mendoza, Z. Henderson, E. Sarver, J. Saylor
- 17-132** **MINING FACULTY ACROSS THE GLOBE: A SNAPSHOT TODAY OFFERS A GLIMPSE INTO TOMORROW'S OPPORTUNITIES AND CHALLENGES.....680**
E. Tarshizi, E. Sarver, R. Setterlind, Z. Scopa, R. Livernois, L. Frost
- 17-133** **LARGER TONNAGES, LARGER CRUSHERS?.....684**
K. Boyd
- 17-134** **BUILDING SERVICES IN UNDERGROUND MINES – SIGNIFICANCE FROM A COST ESTIMATORS PERSPECTIVE.....691**
T. Lupek, H. Mischo, S. Plaum
- 17-135** **THE USE OF ATMOSPHERIC MONITORING SYSTEMS IN U.S. UNDERGROUND COAL MINES.....697**
J. Rowland III, S. Harteis, L. Yuan
- 17-136** **AFTER MARKET COATINGS TO REDUCE ROCK DUST BUILDUP ON UNDERGROUND SIGNS.....700**
J. Sismour, T. Resende, S. Schafrik, E. Sarver
- 17-137** **TRACER GAS STUDY TO DETERMINE FACE VENTILATION AIR AND GOB GAS MOVEMENT PATTERNS ON A BLEEDERLESS LONGWALL PANEL.....704**
S. Schatzel, V. Gangrade, C. Hollerich, J. Addis, L. Chasko
- 17-138** **IMPROVING MODERN UNDERGROUND MINING METHODS FOR MODERATELY INCLINED TABULAR DEPOSITS.....711**
T. Rockley, L. Rattmann, J. Brune
- 17-139** **A FIELD STUDY OF MINERAL SCALE BUILDUP ON LINED AND TRADITIONAL PE WATER PIPES.....714**
A. Pezzuto, E. Sarver, H. Mischo