

Barbara J. Arnold
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EXPERIENCE HIGHLIGHTS

Dr. Arnold is Professor of Practice in Mining Engineering at Penn State, with over 30 years of experience in the coal and mineral industries. She holds a B.S. (Mining Engineering), M.S. (Mineral Processing), and Ph.D. (Mineral Processing) from Penn State. For over 20 years, she represented several coal and mineral processing equipment companies in the US and consulted with coal companies and engineering contractors to develop flowsheets for new coal preparation plants and plant retrofits. Much of her research experience has focused on coal properties and their effects on coal processing, especially in the areas of froth flotation and dewatering. She is a recognized international expert in coal preparation. Dr. Arnold currently works with Penn State's Center for Critical Minerals (C²M), conducting research related to the physical beneficiation of coal underclays and other horizons that contain rare earth elements and other critical minerals. Her other research is focused on respirable dust and the beneficial use/revalorization of mine tailings. Dr. Arnold is a Penn State Alumni Fellow, Society for Mining, Metallurgy, and Exploration (SME) Fellow, and American Institute of Mining, Metallurgical, and Petroleum Engineers Honorary Member. She served as the 2018 SME President and is a registered Professional Engineer in the Commonwealth of Pennsylvania.

EMPLOYMENT HISTORY

August 2020 - present	Professor of Practice, Mining Engineering, The Pennsylvania State University (now Chair of Mining Engineering-8/1/23)
1997 - present	President, PrepTech, Inc., Apollo, Pennsylvania
December 2018 – May 2020	Managing Specialist, NIOSH. Part time contractor reviewing coal and mineral processing programs.
2010 – 2012	Consulting Senior Process Engineer, Robert & Schaefer Company, Salt Lake City, UT
Fall 1995 - Summer 2000, Summer 2003	Part-time Instructor, The Pennsylvania State University New Kensington Campus, MatSc 101--Energy and Fuels in Society; EMSC 150--Out of the Fiery Furnace
1987 - 1996	Project Manager, CQ Inc.'s (formerly EPRI's) Coal Quality Development Center, Homer City, Pennsylvania

EDUCATION

Ph.D. in Mineral Processing, The Pennsylvania State University, 1989
M.S. in Mineral Processing, The Pennsylvania State University, 1985
B.S. in Mining Engineering (Mineral Processing Option), The Pennsylvania State University, 1982

CERTIFICATIONS

Professional Engineer, Pennsylvania (PE 043678-E)

AWARDS

Howard N. Eavenson Award, SME-AIME, 2023
American Institute of Mining, Metallurgical and Petroleum Engineers, Honorary Member, 2021
Ford City Area Hall of Fame, 2015 Inductee
Percy W. Nicholls Award, SME/ASME, 2014
Frank F. Aplan Award, SME-AIME, 2013
Penn State Alumni Fellow, 2011
Penn State College of Earth and Mineral Sciences Alumni Achievement Award, 2008
Robert Stefanko Distinguished Achievement Award, Penn State Mining Engineering, 2007
Fellow (Distinguished Member), Society for Mining, Metallurgy, and Exploration, Inc., Class of 2006
Distinguished Service Award, Coal & Energy Division, SME, 2006
Chairperson Award, Coal & Energy Division, SME, 2003
J. W. Woomer Young Engineer Award, Society for Mining, Metallurgy, and Exploration, Coal Division, 1992
The Henry DeWitt Smith Trust of AIME, Scholarship for Graduate Studies in Mineral Engineering, 1985-1986
Outstanding Young Women of America, 1986
Eric A. and Josephine Walker Award, Penn State New Kensington Campus, 1980

PROFESSIONAL MEMBERSHIP AND ACTIVITIES

Coal Preparation Society of America
 Secretary, since 2008
 Secretariat, XVI International Coal Preparation Congress, 2010, Lexington, KY
 International Organizing Committee Representative, International Coal Preparation Congress, beginning 2016
Society for Mining, Metallurgy, and Exploration, Inc.
 President, 2018
 Coal & Energy Division, Chair, 2003
 Coal & Energy Division, Miscellaneous Service and Technical Committees since 1993
 SME Board Member, 2002-2005, 2010-2013
 SME Foundation Vice President, 2009 —2011; President, 2011-2013; Trustee, 2014-2020
 Pittsburgh Section Treasurer (2022-2023), Chair (2024-2025)
American Institute of Mining, Metallurgical, and Petroleum Engineers, Inc.
 Miscellaneous Award Committees
Editor-in-Chief, *International Journal of Coal Preparation and Utilization*
Sigma Xi, The Scientific Research Society
Tau Beta Pi, Engineering Honorary Society
Consortium for Premium Carbon Products from Coal, Penn State University, 1998-2004
 PrepTech Representative, Proposal Review Committee
Montana Tech Metallurgical & Materials Engineering Industrial Advisory Board, since 2013
Penn State University, Mining Engineering Program Industrial Advisory Board, 2015-2020
Mortar Board National College Senior Honor Society
 National President 2001-2003; National Foundation Board of Trustees President 2021-current
National Mining Hall of Fame and Museum, Board of Directors, beginning 2023

GRANTS

Gladys Snyder Education Grant, Penn State College of Earth and Mineral Sciences, 2022
George H. Deike Jr. Research Grant, Penn State College of Earth & Mineral Sciences, 2023

PUBLICATIONS AND PRESENTATIONS

(* Indicates peer reviewed publication)

Technical Papers in Journals

*"The Effect of Clay Slimes on Coal Flotation, Part I: The Nature of the Clay," *International Journal of Mineral Processing*, Vol. 17, pp. 225-242, 1986, with F.F. Aplan. Presented at SME-AIME Annual Meeting, New York, NY, 1985.

*"The Effect of Clay Slimes on Coal Flotation, Part II: The Role of Water Quality," *International Journal of Mineral Processing*, Vol. 17, 243-260, 1986, with F.F. Aplan. Presented at SME-AIME Annual Meeting, New York, NY, 1985.

*"The Hydrophobicity of Coal Macerals," *Fuel*, Vol. 68, pp. 651-658, 1989, with F. F. Aplan. Presented at Engineering Foundation Conference, Henniker, NH, 1985.

*"Coal Handleability: Addressing the Concerns of the Electric Utility Industry," *Mining Engineering*, January 1992, pp. 84-89, and *Coal Handling Systems: The State of the Future*, EPRI GS-6996, September 1990, Electric Power Research Institute, Palo Alto, CA, with C.D. Harrison and R.A. Lohnes. Presented at EPRI Conference, Pensacola, FL, 1989 and SME-AIME Annual Meeting, Las Vegas, 1989.

*"The Effect of Water Carry-over in a Bank of Industrial Coal Flotation Cells with a Comparison to Laboratory Test Results," *Mining Engineering*, December 1990, pp. 1347-1351, with F.F. Aplan. Presented at SME-AIME Annual Meeting, Salt Lake City, UT, 1990.

*"The Effect of Chemical and Physical Coal Properties on Handling Behavior," *Mining Engineering*, February 1991, pp. 228-231. Presented at SME-AIME Annual Meeting, Salt Lake City, UT, 1990.

"Coal Blending--Meeting Specifications," *Mining Engineering*, Vol. 46, No. 10, October 1994, pp. 1144-1148, with D. B. Smith. Feature Article. Presented at SME Annual Meeting, Albuquerque, NM, February 1994.

"Coal Cleaning Developments Meet Emission Requirements," *Power Engineering*, Vol. 98, No. 7, July 1994, 23-25.

*"Simulation of Dewatering Devices for Predicting the Moisture Content of Coals," *Coal Preparation*, Vol. 20, 1999, pp. 35 - 54.

*"Use of residence-time distribution techniques to analyze industrial-scale froth-flotation circuits," with E.C. Dowling, Jr., R. R. Klimpel, and F.F. Aplan, *Minerals & Metallurgical Processing*, Vol. 16, No. 1, February 1999, pp. 18 - 26.

*“The Grab and Run Revisited—Improving the Selectivity Between Organic and Inorganic Components in Conventional Coal Froth Flotation,” *International Journal of Mineral Processing*, Volume 58, Nos. 1-4, February 2000, pp. 119 - 128.

“Coal Cleaning Plant Upgrade Benefits Rosebud Mining,” with B. Parker, presented at SME Annual Meeting, Cincinnati, OH, February 24-26, 2003; published in *CPSA Journal*, Volume 1, No. 4, Winter 2003.

“Fine Refuse and Coal Dewatering,” with G. Prat, N. Terblanche, L. van der Walt, and G. Bickert, *World Coal*, April 2013.

“Spiral Concentrators,” *CPSI Journal, A Magazine by the Coal Preparation Society of India*, V. 5, No. 12, July 2013, pp. 39-43.

“Exploring Circuit Variations for Conventional Froth Flotation Cells,” *The Journal of the Coal Preparation Society of America*, Spring 2015, Vol. 14, No. 1, pp. 24-31.

“Coal Handling Systems, The EPRI Coal Handling Project,” *The Journal of the Coal Preparation Society of America*, Fall 2015, Vol. 14, No. 3, pp. 12-16.

“Coal Preparation in the United States of America,” *CPSI Journal*, Volume XII, No. 34, April 2020, pp. 35-38.

*“The Reprocessing and Revalorization of Critical Minerals in Mine Tailings,” with Caden Vitti, *Mining, Metallurgy & Exploration*, January 1, 2022, <https://doi.org/10.1007/s42461-021-00524-6>.

*“Preface to the MME Special Focus Issue in Memory of Emeritus Professor Frank F. Aplan: Between Theory and Practice,” *Mining, Metallurgy & Exploration*, January 3, 2022, <https://doi.org/10.1007/s42461-021-00530-8>.

*“Understanding coal quality and the critical importance of comprehensive coal analyses,” *International Journal of Coal Geology*, Invited Review Paper with James C. Hower, Robert B. Finkelman, Cortland F. Eble, V 263, 2022, 104102.

*“Element partitioning during coal preparation,” *International Journal of Coal Geology*, Invited Review Paper, June 2023, <https://doi.org/10.1016/j.coal.2023.104296>.

*“Examining toxicity of respirable coal dust from interaction with moisture,” AUS IMM Conference, with S. Azam, S. Bhattacharyya, S. Liu, 2022.

***“An evaluation of pyrite as a component of respirable coal dust,” *Journal of Hazardous Materials*, with A. Eskinlou, V 477, Sept 2024, 135340, <https://doi.org/10.1016/j.jhazmat.2024.135340>

*"Utilization of Coal Wastes for the Production of Ceramic Materials: A Review" with H. Chop, *Mining, Metallurgy & Exploration*, published February 7, 2025, <https://doi.org/10.1007/s42461-025-01195-3>

*"An evaluation of quartz as a component of respirable coal dust," *Journal of Hazardous Materials*, with A. Eskinlou, V 490, 15 June 2025, 137873, <https://doi.org/10.1016/j.jhazmat.2025.137873>

Technical Papers in Symposia or Conference Proceedings

"Coal Froth Flotation: The Response of Coal and Mineral Particles to Reagent and Circuit Variations," *Advances in Mineral Processing*, P. Somasundaran, Ed., SME-AIME, Littleton, CO, 1986, with F.F. Aplan. Presented at SME-AIME Annual Meeting, New Orleans, LA, 1986.

"Reagents Used in Coal Preparation," *Chemical Reagents in the Mineral Processing Industry*, D. Malhotra and W.F. Riggs, Eds., SME-AIME, Littleton, CO 1987, with F.F. Aplan and S. Chander.

"Crushing Before Cleaning: Does It Pay?" *Coal Prep '88*, Lexington, KY, March 1988, with D. Akers, T. Parsons and J. Molburg.

"A Practical View of Rate and Residence Time in Industrial Coal Froth Flotation Circuits," *Fifth Annual International Pittsburgh Coal Conference Proceedings*, September 12-16, 1988, Pittsburgh, PA, pp. 328-341.

"CQDC Dewatering Research Overview," *Coal Handling Systems: The State of the Future*, EPRI GS-6996, September 1990, Electric Power Research Institute, Palo Alto, CA. Presented at EPRI Conference, Pensacola, FL, February 1989.

*"Coal Handleability: Addressing the Concerns of the Electric Utility Industry," *Mining Engineering*, January 1992, pp. 84-89, and *Coal Handling Systems: The State of the Future*, EPRI GS-6996, September 1990, Electric Power Research Institute, Palo Alto, CA, with C.D. Harrison and R.A. Lohnes. Presented at EPRI Conference, Pensacola, FL, 1989 and SME-AIME Annual Meeting, Las Vegas, 1989.

*"The Use of Pyrite Depressants to Reduce the Sulfur Content of Upper Freeport Seam Coal," *Processing and Utilization of High Sulfur Coals III*, R. Markuszewski and T.D. Wheelock, Eds., Elsevier, New York, 1990, pp. 171-186, with F.F. Aplan. Presented at Processing and Utilization of High Sulfur Coals III, Ames, IA, 1989.

*"Use of Petrologic Analysis and Flotation Kinetics to Evaluate Froth Flotation Products," *Processing and Utilization of High Sulfur Coals III*, R. Markuszewski and T.D. Wheelock, Eds., Elsevier, New York, 1990, pp. 221-236, with F.F. Aplan. Presented at Processing and Utilization of High Sulfur Coals III, Ames, IA, 1989.

"A Comparison of Laboratory- and Commercial-Scale Coal Froth Flotation Using Models of Rate and Residence Time," *Advances in Coal and Mineral Processing Using Flotation*, S. Chander and R.R. Klimpel, Eds., SME-AIME, Littleton, CO, 1989, pp. 130-143, with F.F. Aplan. Presented at Engineering Foundation Conference, Palm Coast, FL, 1989.

"Conventional and Advanced Coal Cleaning Technology: Application to Low Rank Coal," *Proceedings of the Energy and Environment: Transitions in Eastern Europe Conference*, Volume 2, Energy and Environmental Research Center, Grand Forks, ND, 1992, pp. 321-338, with D.J. Akers. Presented at Energy and Environment: Transitions in Eastern Europe Conference, Prague, The Czech Republic, April, 1992.

"The Effect of Coal Quality on Coal Handling," Presented at and published in the proceedings of an EPRI Conference on *Impact of Coal Quality on Power Plant Performance*, La Jolla, CA, August 1992, with D. C. O'Connor.

"The Froth Factor and What It Tells You About Your Coal Flotation Circuit," *Flotation Plants: Are They Optimized?* D. Malhotra, Ed., SME, Littleton, CO, 1993. Presented at SME Annual Meeting, Reno, NV, 1993.

"Using Coal Cleaning Simulators to Optimize Clean Coal Production," *Coal Prep '94*, May 3-5, 1994, pp. 145-157, with P. Gallier. Presented at Coal Prep '94, Lexington, KY, May 1994.

*"Meeting More Stringent Coal Specifications While Maximizing Clean Coal Production," *High Efficiency Coal Preparation: An International Symposium*, Chapter 28, S. K. Kawatra, Ed., Society for Mining, Metallurgy, and Exploration, Littleton, CO, 1995, pp. 325-334. Presented at SME-AIME Annual Meeting, Denver, CO, 1995.

"Improving the Performance of Conventional and Column Froth Flotation Cells," presented at and printed in the proceedings of *Eleventh Annual Coal Preparation, Utilization, and Environmental Control Contractors Conference*, U.S. Department of Energy, Pittsburgh, PA, July 12-14, 1995.

"Predicting the Moisture Content of Coals Dewatered by Vacuum Filters," *Twelfth International Pittsburgh Coal Conference*, Pittsburgh, PA, Sept. 11-15 1995, pp. 445-460.

"Rate and Residence Time Studies Applied to the Operation of Conventional Coal Froth Flotation Cells," *Advances In Flotation Technology*, B. K. Parekh and J. D. Miller, Eds., SME, Littleton, CO, 1999, pp. 321 - 330.

*"Comparing a Two-stage Spiral to Two Stages of Spirals for Fine Coal Preparation," with P. Bethell, *Advances in Gravity Concentration*, R. Q. Honaker and W. R. Forrest, Eds., SME, Littleton, CO, 2003, pp. 107 - 114.

"Preparation Plant Sampling: Avoiding Sample Collection Errors and Dealing With Difficult Data," *Proceedings Coal Prep 2004*, Lexington, Kentucky, May 4-6, pp. 115-126.

*“Recent Advances in Coal Flotation,” with S. Chander, *Innovations in Natural Resource Processing, Proceedings of the Jan D. Miller Symposium*, Society for Mining, Metallurgy and Exploration, 2005, 14 pp.

*“Applications for Two-Stage Coal Spirals for Fine and Ultrafine Coal Cleaning,” with D. Petrunak, *XV International Coal Preparation Congress and Exhibition*, Beijing, October 2006, China University of Mining and Technology Press, pp. 479-488.

“Fine Coal Spirals: Data from a Plant Circuit Treating 0.15 x 0.053 mm Coal,” with M.S. Klima and M.D. Benusa, *Coal Preparation in a Changing World, South African Coal Preparation Conference and Exhibition*, Johannesburg, South Africa, September 10-14, 2007.

“Testing of a Pilot-scale, Plate-and-Frame Filter Press for Dewatering Fine Silica-Sand Slurries,” with S. Verma and M.S. Klima, *Advanced Separation Processes, Yoon Symposium*, Society for Mining, Metallurgy and Exploration, Annual Meeting, Denver, CO, February 2011.

“Coal Properties and Challenges for Fines Processing,” *Challenges in Fine Coal Processing, Dewatering, and Disposal*, M.S. Klima, B.J. Arnold and P.J. Bethell, Eds., Society for Mining, Metallurgy and Exploration, Inc., 2012, proceedings of a Conference in Pittsburgh, PA, October 2012, pp. 47-66.

*“Application of a Pilot-Scale Plate Filter Press in Dewatering Coal Slurries,” with M.S. Klima, J. Munjack, and B. Barry, *Environmental Considerations in Energy Production*, Society for Mining Metallurgy and Exploration, 2013, proceedings of the 2013 ECEP Symposium, Charleston, WV, April.

“Full Wash Coal Washery Design and Implementation for Indian Thermal Coal Production,” with Z. Wang, J. Nielson, S. Saurabh, and A. B. Chatterjee, *Proceedings 5th International Conference on Coal Washing*, Coal Preparation Society of India, New Delhi, November 2017.

“Future Coal Processing Strategies for India,” with S. Saurabh and D. Carter, *Proceedings 5th International Conference on Coal Washing*, Coal Preparation Society of India, New Delhi, November 2017.

*“New Spiral Technologies,” *Challenges and Opportunities in Coal Preparation—2019*, M.S. Klima, B.J. Arnold, and P.J. Bethell, Eds., Society for Mining, Metallurgy and Exploration, Inc., 2019, Proceedings of a Conference in Pittsburgh, PA, October 2019, in process.

*“Development of a Low Specific Gravity Cutpoint Spiral,” with W. Erasmus, F. Bornmann, and P.J. Bethell, *XIX International Coal Preparation Congress*, Ed. Raj K. Sachdev, Woodhead Publishing India Pvt. Ltd, 2019, pp. 370-377.

*“When to Blend Raw Coal with Clean Coal from Full-Wash Coal Preparation Plants—Case Studies from Indian and US Coals,” with S. Saurabh and R. Stephenson, *XIX International Coal*

Preparation Congress, Ed. Raj K. Sachdev, Woodhead Publishing India Pvt. Ltd, 2019, pp. 46-55.

*“(Mis)adventures in Fine Coal Processing from a US Perspective,” Arthur Le Page Memorial Lecture, in Vince, A. (Ed.), *Proceedings of the Eighteenth Australian Coal Preparation Conference*, (2021) Australian Coal Preparation Society, Brisbane and Pokolbin, Paper 4.

*“Recovery of Valuable Commodities from Tailings Streams—No Molecule Left Behind,” *Proceedings of SMART 2020: Safety, Health, and Environment: Sustainable Practices*, Department of Mining Engineering, IIT Kharagpur, 1 June 2021.

*“Coal to Carbon Research at Penn State,” presented at International Coal Preparation Congress, Gold Coast, Australia, October 2023 and published in the proceedings of the conference, with Arash Dahi Taleghani, Jonathan Mathews, Akshay Gharpure, Randy Vander Wal, Sarma Pisupati.

*“Coal Preparation in the United States of America—2023,” presented at International Coal Preparation Congress, Gold Coast, Australia, October 2023 and published in the proceedings of the conference.

“Practical Application of Surfactants for Respirable Silica Dust Control” with Randy Reed. Preprint for SME MINEXCHANGE 2024, Phoenix, AZ.

Additional Technical Presentations

"Residence Time Distribution in Coal Froth Flotation Cells," presented at 1988 SME Annual Meeting, Phoenix, AZ, January 1988, with F.F. Aplan.

"The Application of Rate Models to Pilot- and Commercial-Scale Coal Froth Flotation Circuits," presented at the 1989 SME Annual Meeting, Las Vegas, NV, March 1989, with F.F. Aplan.

"An Overview of EPRI's Coal Handling Assessment Project," presented at EPRI Seminar *Utility Applications of On-Line Coal Analysis*, Pittsburgh, PA, October 17-19, 1989.

"EPRI's Coal Handleability Project: A Status Report," presented at SME Annual Meeting, Denver, CO, February 1991. Preprint 91-144.

"Coal Blending--When 1 + 1 Isn't Always 2," presented at CAER/CRSC Fine Coal & Coal Blend Processing Workshop, Evansville, IN, April 29, 1991.

"EPRI Coal Handleability Project: Handleability Index Validation," presented at SME Annual Meeting, Phoenix, AZ, February 1992, with R. A. Lohnes and D. C. O'Connor. Paper No. 92-212.

“Predicting the Moisture Content of Coals Dewatered by Centrifuges,” presented at SME Annual Meeting, Phoenix, AZ, March 11-14, 1996; submitted for publication.

“Predicting the Moisture Content of Coals Dewatered by Screens,” presented at SME Annual Meeting, Denver, CO, February 24-27, 1997.

“Froth Flotation with the Turbo Froth Flotation Column,” with N. Terblanche, presented at SME Annual Meeting, Denver, CO, February 26-28, 2001.

“Fine Coal and Refuse Dewatering,” presented at 118th Illinois Mining Institute Annual Meeting, Ina, Illinois, August 11, 2010.

“Arctic Sea Ice, Then and Now: The Search for the Northwest Passage,” Presented at SME Annual Meeting, Denver, CO, 2017.

“Consortium to Assess Northern Appalachian Resource Yield (CANARY) of CORE-CM for Advanced Materials,” SME Pittsburgh/PCMIA Annual Meeting, Southpointe, PA, Oct 21-22, 2021.

“Coal Froth Flotation and Remembrances of Frank F. Aplan,” (for Tim Olson who could not attend), SME MINEXCHANGE 2022 Annual Conference and EXPO, Salt Lake City, UT.

“Use of Modeling to Characterize and Optimize Froth Flotation Performance—Laboratory to Industrial Practice,” with Ed Dowling, SME MINEXCHANGE 2022 Annual Conference and EXPO, Salt Lake City, UT.

“The Reprocessing and Revalorization of Critical Minerals in Mine Tailings,” with Caden Vitti, SME MINEXCHANGE 2022 Annual Conference and EXPO, Salt Lake City, UT.

“Role of Mining in the Renewable Energy Sector,” Society for Mining, Metallurgy, and Exploration, Inc., The Federal University of Technology Akure, Nigeria, April 21, 2022, via Zoom.

“Consortium to Assess Northern Appalachian Resource Yield (CANARY) of CORE-CM for Advanced Materials,” SME Pittsburgh/PCMIA Annual Meeting, Southpointe, PA, Oct 20-21, 2022.

“A Surface Chemistry Approach to Reducing Respirable Dust Toxicity,” SME Pittsburgh/PCMIA Annual Meeting, Southpointe, PA, Oct 20-21, 2022.

“Consortium to Assess the Northern Appalachian Resource Yield (CANARY) of CORE-CM for Advanced Materials,” with Sarma Pisupati, SME MINEXCHANGE 2023 Annual Conference and EXPO, Denver, CO.

“Consortium to Assess Northern Appalachian Resource Yield (CANARY) of CORE-CM for Advanced Materials,” SME Pittsburgh/PCMIA Annual Meeting, Southpointe, PA, Oct 26-27, 2023.

“Reducing the Toxicity of Respirable Dust Using Non-Hazardous Additives,” 7th International Symposium on Mine Safety Science and Engineering, Pittsburgh, PA, Aug 17-21, 2024.

“Practical Applications of Surfactants for Respirable Silica Dust Suppression,” 7th International Symposium on Mine Safety Science and Engineering, Pittsburgh, PA, Aug 17-21, 2024.

Chapters in Books

*"Flotation," *Coal Preparation*, Chapter 7, Part 2, Section 3, J. W. Leonard, Ed., SME, Littleton, CO, 1991, pp. 450-485, with F. F. Aplan.

*"Dry Particle Concentration," *Coal Preparation*, Chapter 7, Part 3, J. W. Leonard, Ed., SME, Littleton, CO, 1991, pp. 486-498, with J. D. Hervol and J. W. Leonard.

“Coal,” *Standard Handbook of Powerplant Engineering*, Section 1.2, T. C. Elliott, K. Chen, and R. C. Swanekamp, Eds., 1997, McGraw-Hill, New York, pp. 1.11 - 1.44.

“Spiral Concentrators,” *The Coal Prep Primer*, Chapter 11, K. Alderman, Ed., 2010, Coal Preparation Society of America, pp. 11-1 – 11-9.

“Sampling,” *The Coal Prep Primer*, Chapter 22, K. Alderman, Ed., 2010, Coal Preparation Society of America, pp. 22-1 – 22-11.

“Coal Formation,” *The Coal Handbook, Towards Cleaner Production*, Volume 1, Chapter 2, Osborne, Ed., 2013, Woodhead Publishing Limited, pp. 31-52.

“Guidelines for the Design of a Feedstock Handling and Pretreatment Module,” Guidelines/Handbook for the Design of Modular Gasification Systems, Chapter 4, DOE/NETL-2022/3209, July 2022, pp. 67-72.

“Coal formation, coal types and coalification,” *The Clean Coal Handbook*, Volume 1, Chapter 1, Second Edition, Elsevier, April 2023.

“Future directions toward more efficient and cleaner use of coal,” *The Clean Coal Handbook*, Volume 2, Chapter 21 (with multiple co-authors), Second Edition, Elsevier, April 2023.

Technical Reports

Cleaning Lower and Middle Kittanning Seam Coals for Sulfur Removal Before and After Blending, EPRI Report CS-5642, Electric Power Research Institute, Palo Alto, CA, May 1988, with R. G. Moorhead et al.

Coal Quality Information System™: User's Manual, EPRI Report CS-5774, Electric Power Research Institute, Palo Alto, CA, July 1988, with J. W. Parkinson et al.

Workshop Proceedings on Defining Coal Handleability: Its Cost Impact and Control, EPRI CS-

6015, Electric Power Research Institute, Palo Alto, CA, November 1988.

Review of Research on Coal-Handling Characteristics, EPRI GS-6677, Electric Power Research Institute, Palo Alto, CA, January 1990, with R. Lohnes et al.

Proceedings: Coal Handling Systems, 1989, EPRI GS-6996, Electric Power Research Institute, Palo Alto, CA, September 1990.

Proceedings: Coal Handling Systems--The State of the Future II, EPRI Report TR-100828, Electric Power Research Institute, Palo Alto, CA, December 1992.

Coal Quality Information Book (Second Edition), EPRI Report GS-7194, Electric Power Research Institute, Palo Alto, CA, May 1991, with J. Parkinson.

Proceedings: Coal Handling Systems--The State of the Future III, EPRI Report TR-100828, Electric Power Research Institute, Palo Alto, CA, in publication.

Development of a Coal Handleability Index, EPRI Report TR-103196, Electric Power Research Institute, Palo Alto, CA, June 1995.

A Guide to Coal Handling, EPRI Report TR-105110, Electric Power Research Institute, Palo Alto, CA, June 1995.

Development of a Coal Blending Model, ESEERCO Report EP 89-37, Empire State Electric Energy Research Corporation, New York, NY, August 1994.

Invited/Keynote Presentations

“Sustainable Development and the Society for Mining, Metallurgy, and Exploration,” *Beneficiation of Phosphates VI*, Kunming, China, Feb 20-25, 2011.

“Recovery of Valuable Commodities from Tailings Streams—No Molecule Left Behind,” Mines to Mill: Technology Towards Zero Waste Generation Session for the International Webinar on Smart Mining and Advanced Resources Technology—2020, Indian Institute of Technology Kharagpur (December 16-18).

“(Mis)adventures in Fine Coal Processing from a US Perspective,” Arthur Le Page Memorial Lecture, Eighteenth Australian Coal Preparation Conference, Australian Coal Preparation Society, Brisbane and Pokolbin, presented virtually March 16, 2021

“The Perception of Mining: Emphasis on Coal,” Khanitra: SME India Section Annual Meeting, June 28, 2021.

“Ellen Swallow Richards: My Hero,” AIME 150th Anniversary Celebration, Lehigh University, Bethlehem, PA, October 2, 2020.

Books Serving as Editor

Designing the Coal Preparation Plant of the Future, with M.S. Klima and P.J. Bethell, Society for Mining, Metallurgy and Exploration, Inc., 2007, ISBN-13: 978-0-87335-257-4. Proceedings of a Conference in Pittsburgh, PA, October 2007.

Challenges in Fine Coal Processing, Dewatering, and Disposal, with M.S. Klima and P.J. Bethell, Society for Mining, Metallurgy and Exploration, Inc., 2012, ISBN-13: 978-0-87335-363-2. Proceedings of a Conference in Pittsburgh, PA, October 2012.

Challenges and Opportunities in Coal Preparation—2019, with M.S. Klima and P.J. Bethell, Society for Mining, Metallurgy and Exploration, Inc., 2019, Proceedings of a Conference in Pittsburgh, PA, October 2019.

Short Courses/Workshops

Coal Preparation, Massey Energy Coal Preparation Plant Superintendents' Meetings, Logan, WV, 2006.

Introduction to Coal Preparation, with Manoj Mohanty (Southern Illinois University), CoalPrep 2009, Lexington, KY

Coal Preparation, Multotec Process Equipment, Johannesburg, South Africa, 2009.

Coal Preparation, Roberts & Schaefer, Salt Lake City, UT, May, 2010.

Sampling and Analysis, CoalPrep 2012, Lexington, KY.

Introduction to Coal Preparation, CoalPrep 2014, Lexington, KY, April 28-May 1, CoalPrep 2015, Lexington, KY, April 27-29, CoalPrep 2016, Louisville, KY, 2017, CoalProTec, Lexington, KY, April 23, 2018, CoalProTec, Lexington, KY, April 25, 2022.

Fine Coal Circuits, Spiral Concentrators, with Wynand Erasmus (Multotec Process Equipment), CoalPrep 2014, Lexington, KY, April 28-May 1.

Introduction to Coal Preparation, New Delhi, India, November 6 – 9, 2017.

Introduction to Coal Preparation, Teck Resources, Sparwood, BC, Canada Apr 30 – May 1, 2019.