

COMMITTEE ON NATURAL RESOURCES
114th Congress Disclosure Form
As required by and provided for in House Rule XI, clause 2(g)(5)

Legislative Hearing on H.R. 1644 (Mooney), To amend the Surface Mining Control and Reclamation Act of 1977 to ensure transparency in the development of environmental regulations, and for other purposes. *“Supporting Transparent Regulatory and Environmental Actions in Mining Act (STREAM Act).”*

May 14, 2015

For Individuals:

Name: Braden Lusk

Address: [REDACTED]

Email Address: [REDACTED]

Phone Number: [REDACTED]

* * * * *

For Witnesses Representing Organizations:

Name:

Name of Organization(s) You are Representing at the Hearing:

Business Address:

Business Email Address:

Business Phone Number:

* * * * *

For Nongovernment Witnesses ONLY:

1. Please attach/include current curriculum vitae or resume.

Attached

2. Please list any federal grants or contracts (including subgrants or subcontracts) related to the subject matter of the hearing that were received in the current year and previous two calendar years by you or the organization(s) you represent at this hearing, including the source and amount of each grant or contract.

1. Lusk, B (PI). “Blasting Effects on Coal Refuse Impoundment Structures.” Office of Surface Mining, August 2012 – August 2015 (Budget \$200,000).
2. Silva, J (PI), Lusk, B. (Co-I), “Design and Construction Considerations for Protected Compressed Air Line to a Refuge Alternative.” CDC – NIOSH, October 2014 – October 2016. (Budget \$299,191, Lusk Responsibility \$150,000).
3. Lusk, B (PI), “Assessment of Technology for Non-destructive Testing of In situ Underground Mine Seals” UK as Subcontractor to Marshall Miller for project funded by NIOSH. November 2012 – August 2014 (Budget \$506,284, Lusk Responsibility - ~ \$151,377).

3. Please list any contracts or payments originating with a foreign government related to the subject matter of the hearing that were received in the current year and previous two calendar years by you or the organization(s) you represent at this hearing, including the amount and country of origin of each contract or payment.

None

Braden T. Lusk, Ph.D., P.E.

Objective

Advance the discipline of Mining Engineering and Explosives Engineering through research and teaching in the explosives, blast mitigation, industrial blasting, and mining fields.

Education

UNIVERSITY OF MISSOURI-ROLLA

PhD in Mining Engineering, Minor in Explosives Engineering

GPA 4.0

May 2006

Dissertation Title: "AN ANALYSIS AND POLICY IMPLICATIONS OF COMFORT LEVELS OF DIVERSE CONSTITUENTS WITH REPORTED UNITS FOR BLAST VIBRATIONS AND LIMITS: CLOSING THE COMMUNICATION GAP"

BS in Mining Engineering – Explosives Emphasis

Dec 2000 -3.5 GPA

Work Experience

University of Kentucky Department of Mining Engineering – Lexington, KY Aug 2006-Present

- Director of Graduate Studies – January 2015 - Present
- Promoted to Professor of Mining Engineering in July 2015
- Promoted to Associate Professor of Mining Engineering with Tenure in July 2012.
- More than \$5M in sponsored research as PI. More than \$10M collaborative.
- MNG 331 – Explosives and Blasting, MNG 371 – Professionalism and Ethics, MNG 431 – Mine Systems Engineering and Valuation, MNG 531 – Advanced Blast Design and Technology, MNG 591,592 Mine Design Project I,II, MNG 621 – Instrumentation for Blast Mitigation
- Previous Advisor to SME student organization
- Consultant to Industry for testing and designing blast resistant materials

UMR- Rock Mechanics and Explosives Research Center – Rolla, MO Aug 2003-July 2006

- Graduate Teaching Assistant to Dr. Paul Worsey, Graduate Research Assistant
- Numerous research projects including multi discipline efforts (see Research Experience)
- Submit proposals to build research base in order to sustain graduate programs
- Development of explosives emphasis area and nation's first Explosives Engineering Minor

Davis Lusk Blasting, LLC – Rolla, MO

May 2004-Jan 2006

- Vice President of Development
- Engineering Feasibility Study for Pacific Underground Storage Project – Project Manager
- Fireworks operator for Six Flags, St. Louis and other Missouri locations
- Developing Partnership with Lantis Fireworks for inventory management and crew training
- Consulting trainer for MLPA Blaster's Training Seminars

Los Alamos National Laboratory – Rolla, MO

Aug 2003-Dec 2004

- Graduate Research Assistant
- Performed numerical modeling of shockwaves and blast effects with Autodyn
- Studied blast effects on structures and personnel in adjacent locations

Cargill Salt Division – Cleveland, OH/ Hutchinson, KS

Jan 2001-Aug 2003

- Engineer, Mine Supervisor, Department Manager
- Mine Engineer in charge of Drilling and Blasting Optimization – Cleveland
- Production Foreman, Belt Crew Foreman, Mill Foreman Managed Crews of more than 20 - Cleveland
- Packaging, Bin Building, and Pellet Processing Departments Supervisor – Hutchinson
- Management of 21 Person Crew on 4 Separate Shifts – Hutchinson
- Behavioral Safety Program Management Sponsor – Hutchinson
- Set and Met a \$5M yearly budget – Hutchinson

Work Experience Continued.

Dykon Blasting – Tulsa, OK

May-Aug 2000

- Quality Control Engineer on Demolition of S65B Lock and Spillway (Budget \$90K)
- Project Estimating
- Participant in Demolition of Hollander Ridge 21 Story Building (Budget \$250K)

Undergraduate Teaching Assistant to Dr. Paul Worsey – Rolla, MO

Aug 1999-Dec 2001

- Introduction to Explosives (Min 307) and Advanced Blasting Techniques (Min 350)

Cargill Salt Division – Cleveland, OH

May-Aug 1999

- Engineering Project Team
- Surveying Team

Marston & Marston – St. Louis, MO

May-Aug 1998

- Mapping using Autocad 14, GDS, and Microstation SE
- Research and report writing involving mining companies overseas

Hutchinson Salt Company – Hutchinson, KS

May-Aug 1997

- Shift foreman – In charge of operations both underground and topside in the on-sight mill

Certifications

- MSHA Certified Trainer
- State of Ohio Certified Underground Foreman
- Missouri Limestone Producers Association Certified Blaster
- Kentucky State Licensed Blaster
- PGI Certified Lead Pyrotechnician
- Missouri Licensed Pyrotechnician and Fireworks Display Operator
- ATF licensee and responsible person.
- Professional Engineer Registered In Kentucky

Activities & Honors

- 2015, 2009, 2008 Provost's Teaching Award Finalist (UK)
- 2014 Dean's Award for Excellence in Research (UK College of Engineering)
- 7 Time Tau Beta Pi Outstanding Teacher in Mining Engineering Award (UK)
- ISEE Board of Directors 2013-Present
- 2012 ISEE President's Award Recipient
- 2012 SME Coal and Energy Division J.W. Woomer Award Recipient
- Chosen as one of the top 71 Alumni of MSM, UMR and Missouri S&T 2011
- Co-Host "The Detonators" – 12 Episode Series, Discovery Channel, 2009
- 2009 University of Kentucky Student Organization Advisor of the Year (UK)
- Central Appalachian Section of SME Chair 2009-2011
- Technical Reviewer for ISEE publications, SME publications, and Various others
- Outstanding Graduate Student – UMR Mining Engineering Department 2003-2004
- Outstanding Graduate Teaching Assistant – UMR Mining Engineering Department 2003-2004
- Chancellor's Fellowship Recipient – University of Missouri Rolla
- UMRSEE Student Chapter —Founder, Secretary, Treasurer, President
- Sigma Phi Epsilon, MO Gamma —Vice President, Athletics Chairman, Honor Pledge, Senior Chairman
- Tau Beta Pi, Engineering Honor Fraternity
- Sigma Gamma Epsilon—Corresponding Secretary, Treasurer

Refereed Journal Articles

1. Schonberg, W., J. Baird, P. Worsey, A. Belarbi, R. LaBoube, B. Lusk, R. Flanagan, H. Burleson, R. Woodley and W. Noll, "Rubble pile characterization model," Structures under Shock and Impact IX, 10 p., (ISBN: 1-84564-175-2) WIT Press, 2006.
2. Lusk, B., Worsey, P., Oakes, K., Crabtree, S., Brasier, T., Wheeler, R. "Field Application of Destructive Wave Interference." Blasting and Fragmentation Volume 2 Number 3 November, 2008. (ISSN: 1937-6359). ISEE, Cleveland, OH. pp. 189-210.
3. Lusk, B., K. Unrug, K. Perry, "Gob Seals – an effective alternative to structural seals." Mining Engineering Volume 61 Number 11 November, 2009. SME, Littleton, CO. pp. 36-40.
4. Hoffman, J., B. Lusk, K. Perry, "Investigations of Shock Tunnel Dynamics and Energy Realization." Blasting and Fragmentation Volume 3 Number 3 December, 2009. (ISSN: 1937-6359). ISEE, Cleveland, OH. pp. 207-226.
5. Lusk, B., K. Perry, S. Lusk, "Predictability of a High Explosives Shock Tube for Testing Blast Resistant Windows." Blasting and Fragmentation Volume 4 Number 2 October, 2010. (ISSN: 1937-6359). ISEE, Cleveland, OH. pp. 75-90.
6. Lusk, B.T., J. Silva Castro, J. Hoffman, "Case Study of Blast Vibration Induced Sounds Recorded Inside a House Near a West Virginia Coal Mine." 2010 Transactions of the Society for Mining, Metallurgy and Exploration, Inc., Volume 328, 2010, SME, Littleton, CO. pp. 1-8.
7. Lusk, B., K. Perry, J. Hoffman, "Laboratory Investigation of Layered Aluminum Mesh for Blast Mitigation Purposes Using an Arena Test Setup." Journal of Battlefield Technology Volume 13 Number 2 July, 2010. (ISSN: 1440-5113) Argos Press. pp. 1-12.
8. Reneer, D., R. Hisel, J. Hoffman, R. Kryscio, B. Lusk, J. Geddes, "A Multi-Mode Shock Tube for Investigation of Blast-Induced Traumatic Brain Injury." Journal of Neurotrauma Volume 28 Number 1 January, 2011. (ISSN: 0897-7151). DOI: 10.1089/neu.2010.1513. Mary Ann Liebert, Inc. pp. 95-104.
9. Lusk, B., K. Perry, J. Hoffman, "Laboratory Investigation of Layered Aluminum Mesh for Blast Mitigation Purposes Using a Shock Tube." Journal of Battlefield Technology Volume 14 Number 1, March, 2011. (ISSN: 1440-5113) Argos Press. pp. 1-6.
10. Lusk, B., J. Hoffman, "Analysis of Survey Information about Airblast and Ground Vibration Reporting Units." International Journal of Mining, Reclamation and Environment Volume 25 Number 2, June 2011. (ISSN 1748-0930) Taylor & Francis. pp. 161-176.
11. Lusk, B., J. Silva Castro, J.M. Hoffman, K. Eltschlager. "A Public Relations Plan Based on Structure Generated Sounds and Public Input." The Journal of Explosives Engineering Volume 28 Number 1, Jan/Feb. 2011. ISEE, Cleveland, OH. pp. 34-43.
12. Lusk, B., K. Perry, J. Hoffman, "Field Investigation and Modeling of Layered Aluminum Mesh for Blast Mitigation Purposes." Journal of Battlefield Technology Volume 15 Number 2, July 2012. (ISSN: 1440-5113) Argos Press. pp. 1-10.
13. Wedding, C., B. Lusk, "Novel Method to Determine Blast Resistant Glazing System Response to Explosive Loading." Measurement Volume 45 Issue 6, July 2012 (ISSN: 0263-2241) Elsevier. pp. 1471-1479.
14. Silva Castro, J.J., B. Lusk, "Development of an equation describing signature waveform based on the Fourier series for blast vibration prediction." 2012 Transactions of the Society for Mining, Metallurgy and Exploration, Inc., Volume 332, 2012, SME Littleton, CO. pp. 440-449.
15. Lee, N., B. Lusk, J. Silva Castro "Anfo Versus 100% Emulsion: Quantitative Assessment of Performance with Constant Drilling and Blasting Costs." Blasting and Fragmentation Volume 5 Number 3 2012. ISEE, Cleveland, OH pp. 123-144.
16. Lusk, B. J.M. Hoffman, J.J. Silva Castro, W.C. Wedding, E.G. Morris, J. Calnan, "Evaluation of Emergent Electronic Detonators and Modern Non-Electric Shocktube Detonators Accuracy." Blasting and Fragmentation Volume 6 Number 1 June 2012. ISEE, Cleveland, OH pp. 1-18.
17. Silva Castro, J.J., B. Lusk, "Monte Carlo Approach to Signature Hole Analysis." Blasting and Fragmentation Volume 7 Number 1. ISEE, Cleveland, OH pp. 47-62.
18. Silva Castro, J.J., B. Lusk, "Modeling of Signature Waves Based on Fourier Series for Blast Vibration Prediction." Blasting and Fragmentation Volume 6 Number 3 December, 2012. ISEE, Cleveland, OH. Pp. 181-195

19. Lashgari, A., C. Johnson, V. Kecojevic, B. Lusk, J.M. Hoffman, "NO_x Emission of Equipment and Blasting Agents in Surface Coal Mining." 2013 Transactions of the Society for Mining, Metallurgy, and Exploration, Inc., Volume 65, Number 10, 2013 SME Littleton, CO.
20. Nawar, M., Salim, H., Lusk, B., and Kiger, S. (2014). "Numerical Simulation and Verification of Curtain Wall Systems under Shock Pressure." *Pract. Period. Struct. Des. Constr.*, 19(2), 04014008
21. Nawar, M., Salim, H., Lusk, B., and Kiger, S. (2014). "Modeling and Shock Tube Testing of Architectural Glazing Systems for Blast Resistance", *ASCE Journal of Structural Engineering*, Approved on June 2, 2014.
22. Reneer, D., C. Crowds, R. Hisel, B. Lusk, J. Geddes. "Extent of cerebrovascular disruption following blast exposure is influenced by the duration of the positive phase in addition to peak overpressure." *Journal of Neurology & Neurophysiology*. (ISSN: 2155-9562) Volume 5 Number 2. Pp 8. February 5, 2014.
23. Rathbun, J.T., D.J. McLane, J.M. Hoffman, B.T. Lusk. "Examination of Shock Wave Characteristics in Open-Air Arena Test vs. Shock Tunnel Confinement." *Blasting and Fragmentation* Volume 7 Number 3, 2014. ISEE, Cleveland, OH. Pp. 10.
24. Silva Castro, Jhon J., B.T. Lusk. "Signature hole method for ground vibration and airblast in mine blasting; Convolution or Superposition?" *Blasting and Fragmentation* Volume 8 Number 1, August, 2014. ISEE, Cleveland, OH. Pp. 65-76.
25. Sainato, P., Lusk, Perry, Wenstrup, Hatfield. "Concrete Cloth Hydration Study." *SME Transactions*. (Accepted October, 2014)
26. Hoffman, J., B. Lusk, "Applying a Classical Human Needs Theory to the Mining Industry." 2014 *International Journal of Mining, Reclamation and Environment* (UNDER REVIEW).
27. Huang, Q., R. Honaker, K. Perry, B. Lusk, "Surface Chemistry Modification of Rock Dust for Improved Dispersion and Coal Dust Explosion Prevention." *SME Transactions*. (Accepted May, 2015).

Refereed Conference Papers

1. Lim, S, B. Lusk, and P.N. Worsey, "Mechanisms of Linear Shaped Charge Cutting – A New Explanation", "Proceedings of the Thirty-First annual Conference on Explosives and Blasting Technique," Orlando, FL, February 4-6, 2005, 10 pgs.
2. Lusk, B., P.N. Worsey, "Public Perception of Blasting at Rock Quarries in Expanding Urban Environments – St. Charles, MO," "Proceedings of the Thirty-First Annual Conference on Explosives and Blasting Technique," Orlando, FL, February 4-6, 2005, 10 pgs.
3. Lusk, B., P.N. Worsey, "Correlation of Public Perception of Blasting at Rock Quarries to Reporting Practices, Public Relations, and Units of Measurement Used For Regulations," "Proceedings of the Third EFEE World Conference on Explosives and Blasting," Brighton, UK, September 13-16, 2005, pp. 55-63.
4. Lim, SB., Lusk, B., Worsey, P. "The Characteristic of Blade Formation/Cutting Process of Linear Shaped Charges (LSCs)", 76th Shock & Vibration Symposium, Destin, FL, Nov, 2nd, 2005.
5. Lusk, B, L. Frost, S. Lim, and P.N. Worsey, "Large Arena Test Simulator Using Small High Explosive Charges," "Proceedings of the Thirty-Second Annual Conference on Explosives and Blasting Technique Volume II," Dallas, TX, January 29-February 1, 2006, pp. 83-92.
6. Lusk, B, P.N. Worsey, K. Oakes, J. Chambers, S. Crabtree, T. Brasier, and R. Wheeler, "Destructive Wave Interference in Underground Blasting Utilizing Precise Timing," "Proceedings of the Thirty-Second Annual Conference on Explosives and Blasting Technique Volume I," Dallas, TX, January 29-February 1, 2006, pp. 365-375.
7. Schonberg, W., Baird, J., Worsey, P., Belarbi, A., LaBoube, R., Lusk, B., Woodley, R., and Noll, W., "Characterizing the Rubble Pile Following Building Collapse", Paper No. PP-31, Proceedings of the 25th Army Sciences Conference, Orlando, Florida, November, 2006.
8. Lusk, B., Schonberg, W., Baird, J., Woodley, R., and Noll, W., "Using Coupled Eulerian and Lagrangian Grids to Model Explosive Interactions with Buildings", Paper No. PP-32, Proceedings of the 25th Army Sciences Conference, Orlando, Florida, November, 2006.
9. Lusk, B., P.N. Worsey, "Advancing public relations through simplifying communication," Proceedings of the Fourth EFEE World Conference on Explosives and Blasting, Vienna, Austria, September 9-11, 2007.
10. Lusk, B. and K. Perry. "Underground Coal Mine Seal Regulations Update." "Proceedings of the Thirty-Fourth Annual Conference on Explosives and Blasting Technique," New Orleans, LA, January 27-30, 2008, 8 pgs.

11. Unrug, K., Lusk, B., and Perry, K. "Mine Seals – A Rational Base for Design and Construction." 27th International Conference on Ground Control in Mining., Morgantown, WV, July 29-31, 2008. pp 189-196.
12. Hoffman, J., Lusk, B., Perry, K., "Investigation of Shock Tunnel Dynamics and Energy Realization." "Proceedings of the Thirty-Fifth Annual Conference on Explosives and Blasting Technique." Denver, CO, February 8-11, 2009, 11 pgs.
13. Perry, K., Lusk, B., Hoffman, J., "Field Testing of Aluminum Mesh for Blast Mitigation Properties." "Proceedings of the Thirty-Fifth Annual Conference on Explosives and Blasting Technique." Denver, CO, February 8-11, 2009, 11 pgs.
14. Lusk, B., Castro, J., "Acoustic Response of Structures to Blasting." "Proceedings of the Thirty-Fifth Annual Conference on Explosives and Blasting Technique." Denver, CO, February 8-11, 2009, 11 pgs.
15. Perry, K., Lusk, B., Hoffman, J., "Charge Geometry Effects on Pressure Waveforms in a Shock Tube." "Proceedings of the Thirty-Sixth Annual Conference on Explosives and Blasting Technique." Orlando, FL, February 7-10, 2010, 9 pgs.
16. Lusk, B., Wedding, W.C., "Method for Developing Explosion Damage Potential Contours in Urban Areas." "Proceedings of the Thirty-Sixth Annual Conference on Explosives and Blasting Technique." Orlando, FL, February 7-10, 2010, 9 pgs.
17. Silva-Castro, J., Bryson, L.S. Gamber, N.K., and Lusk, B.T. (2011), "Numerical Modeling of Subsurface Blast", 14th Pan-American Conference on Soil Mechanics and Geotechnical Engineering (PCSMGE), Toronto, Ontario, Canada, 2-6 October, 2011.
18. Lusk, B., J.S. Castro, "Blasting versus Non-Blasting Related Sounds in a House Near Surface Blasting." "Proceedings of the Thirty-Seventh Annual Conference on Explosives and Blasting Technique." San Diego, CA, February 6-9, 2011, 12 pgs.
19. Hoffman, J., B. Lusk, W. Wedding, "Electronic Detonator and Modern Non-Electric Shocktube Detonator Accuracy." "Proceedings of the Thirty-Seventh Annual Conference on Explosives and Blasting Technique." San Diego, CA, February 6-9, 2011, 14 pgs.
20. Wedding, W., B. Lusk, J. Hoffman, "Influence of Environment on Explosively Driven Shock Waves in Air." "Proceedings of the Thirty-Seventh Annual Conference on Explosives and Blasting Technique." San Diego, CA, February 6-9, 2011, 13 pgs.
21. McLane, D., J. Rathbun, J. Hoffman, B. Lusk, "Shock-Tunnel Waveform Analysis." "Proceedings of the Thirty-Seventh Annual Conference on Explosives and Blasting Technique." San Diego, CA, February 6-9, 2011, 12 pgs.
22. Rathbun, J.T., McLane, D.J., Hoffman, J.M. Lusk, B.T., "Investigating Planar Propagation of a Shockwave in a Shock Tunnel." "Proceedings of the Thirty-Eighth Annual Conference on Explosives and Blasting Technique." Nashville, TN, February 12-15, 2012, 11 pgs.
23. Morris, E., Lusk, B.T., Hoffman, J.M., "Influence of Street Intersections on Blast Channeling and Diffraction Effects." "Proceedings of the Thirty-Eighth Annual Conference on Explosives and Blasting Technique." Nashville, TN, February 12-15, 2012, 13 pgs.
24. Lusk, B., Morris, E., Hoffman, J., "Influence of Street Intersections on Blast Channeling and Diffraction Effects." "Proceedings of the Thirty-Eighth Annual Conference on Explosives and Blasting Technique." Nashville, TN, February 12-15, 2012, 13 pgs.
25. Silva Castro, J., B. Lusk, "Case Study: Mining Blast Information Management", 2012 General Proceedings of the Thirty-Eighth annual conference on explosives and blasting technique, Nashville, TN. February 12-15, 2012, 12 pgs.
26. Lusk, B., J.M. Hoffman, P. Mulligan, T. Worsey, "Shock Tube Detonator Shelf Life in Relation to Timing Accuracy" "Proceedings of the Thirty-Ninth Annual Conference on Explosives and Blasting Technique." Ft. Worth, TX, February 10-13, 2013, 6 pgs.
27. Lusk, B., J. Rathbun, J.M. Hoffman, "Update: Industry Task Force on Eliminating Blasting-Based Flyrock Incidents.", "Proceedings of the Thirty-Ninth Annual Conference on Explosives and Blasting Technique." Ft. Worth, TX, February 10-13, 2013, 14 pgs.
28. Hoffman, J.M., B.T. Lusk, C. Johnson, "NOx Emissions from Blasting Activities in a Surface Mining Operation", "Proceedings of the Fortieth Annual Conference on Explosives and Blasting Technique." Denver, CO, February 9-12, 2014, 10 pgs.
29. Johnson, C.E., B. Lusk, J.M. Hoffman, J. Rathbun, "Surface Coal Mine Blasting Optimization and Mitigation of Environmental Impacts: Mine to Fill." Environmental Considerations in Energy Production, (ISBN: 978-0-87335-380-9). April 2013, SME Littleton, CO.

30. Johnson, C., B.T. Lusk, J.M. Hoffman, "Investigating Colliding Shock", "Proceedings of the Fortieth Annual Conference on Explosives and Blasting Technique." Denver, CO, February 9-12, 2014, 8 pgs.
31. Johnson, C., J.M. Hoffman, B.T. Lusk, R. Farnfield, M. Lane, "Risk Assessment Software Applied to Large Bomb Detonations Near Structures", "Proceedings of the Fortieth Annual Conference on Explosives and Blasting Technique." Denver, CO, February 9-12, 2014, 14 pgs.
32. Calnan, J., B. Lusk, K. Perry, "Load Transfer of Polycarbonate Blast Resistant Glazing Systems", "Proceedings of the Fortieth Annual Conference on Explosives and Blasting Technique." Denver, CO, February 9-12, 2014, 10 pgs.
33. Perry, K.A., R.A. Meyr, B.T. Lusk, "The Construction and Testing of a Polycarbonate Safe Haven Wall" , "Proceedings of the Fortieth Annual Conference on Explosives and Blasting Technique." Denver, CO, February 9-12, 2014, 11 pgs.
34. Jackson, B.C., B.T. Lusk, "Industry Task Force for Elimination of Blasting-Based Flyrock Incidents Update", "Proceedings of the Fortieth Annual Conference on Explosives and Blasting Technique." Denver, CO, February 9-12, 2014, 11 pgs.
35. Johnson, C.E., B.T. Lusk, J.M. Hoffman, N. Lee. "Investigating Shock Wave and Detonation Wave Interactions and their affect on Fragmentation" Submitted to the fifteenth International Detonation Symposium. San Francisco, CA, July 13-18, 2014.

Conference Papers

1. Lim, S., B. Lusk, and P.N. Worsey, "An Investigation of The Blade Formation & Cutting Process of Linear Shaped Charges," "Proceedings of the Annual conference on Korea Institute of Military Science and Technology," Seoul, Korea, Aug 30, 2005, 4 pgs.
2. Lusk, B, P.N. Worsey, K. Oakes, J. Chambers, S. Crabtree, T. Brasier, and R. Wheeler, "Mining Under a Municipal Water Supply Using Electronic Detonators and Destructive Waveform Interference to Achieve Acceptable Vibration Levels." Proceedings of the 2006 Annual meeting of SME. St. Louis, MO, March, 2006.
3. Lusk, B., Salim, H., Perry, K., Nawar, M., Wedding, W.C., Kiger, S. and Ibrahim, A. (2011). "Modeling and Testing of Laminated Window Systems under Blast Loading," 2011 Structures Congress, Structural Engineering Institute, ASCE, Las Vegas, NV, April 14-16, 2011.
4. Nawar, M., Salim, H., Lusk, B., Perry, K., Kiger, S., and Miller, G. (2013) Modeling and Testing of Laminated Curtain Wall Systems under Blast Loading. Proceeding of the Structures Congress 2013: pp. 170-180.
5. Nawar, M., Lusk, B., Salim, H., Perry, K., Kiger, S. and Miller, G. (2013). "Modeling and Testing of Laminated Window Systems under Blast Loading," 2013 Structures Congress, Structural Engineering Institute, ASCE, Pittsburgh, PA, May 2-4, 2013.
6. Harwood, C., B. Lusk, K. Luxbacher, W. Weitzel. "Assessment of Technology for Non-Destructive Testing of In-Situ Underground Mine Seals: GPR Assessment." Proceedings of the 2014 Annual meeting of SME. Salt Lake City, UT, February, 2014.
7. Brashear, K.T., K. Luxbacher, E. Westman, C. Harwood, B. Lusk, W. Weitzel. "Assessment of Sonic Waves and Tracer Gases as Non-Destructive Testing Methods to Evaluate The Condition and Integrity of In-Situ Underground Mine Seals. "Proceedings of the 2014 Annual meeting of SME. Salt Lake City, UT, February, 2014.

Book Chapters

1. Worsey, P., B. Lusk, "Chapter 7.3 Rock Breaking Methods: Explosives and Blasting." *SME Mining Engineering Handbook, 3rd Edition*, 2011 (ISBN 978-0-87335-264-2) SME, Littleton, CO. Pp 43-63.
2. Lusk, B., "Chapter 16 Explosives and Blasting in Underground Mines." *Coal Mining Reference Book, 6th Edition*, 2011.
3. Lusk, B., "Chapter 20 Explosives and Blasting." *Coal Mining Reference Book, 6th Edition*, 2011.

Reviewed Technical Reports

1. Grulke, E., Lusk, B., Perry, K., Hoffman, J. (2008), "Development of Design Tools for Blast Mitigation by Layered Aluminum Mesh," *Technical Report*, submitted to National Surface Treatment Center, Louisville, KY, October 2008.
2. Lusk, B., Silva, J., Eltschlager, K., Hoffman, J. (2010), "Acoustic Response of Structures to Blasting Analyzed Against Comfort Levels of Residents Near Surface Coal Operations," *Final Report*, submitted to Office of Surface Mining, Reclamation, and Enforcement, Pittsburg, PA, March 2010.

3. Phillips, B., Ethington, Z., Kalinski, M.E., Bryson, L.S., and Lusk, B. (2011), "Existing Barrier and Less Than Lethal Technologies," *Technical Report*, submitted to the National Institute for Hometown Security, Somerset, KY, July 2011, For Official Use Only (FOUO).
4. Janbakhsh, L.A., Bryson, L.S., Lusk, B., and Kalinski, M.E. (2011), "Identification of Generic Dam and Spillway Configurations," *Technical Report*, submitted to the National Institute for Hometown Security, Somerset, KY, July 2011, For Official Use Only (FOUO).
5. Heiser, J.M., Bryson, L.S., Lusk, B., and Kalinski, M.E. (2011), "Underwater and Surface Water Blast Safety Zones for Concrete Dams," *Supplemental Report*, submitted to the National Institute for Hometown Security, Somerset, KY, July 2011, For Official Use Only (FOUO).
6. Lusk, B. "Blast and Ballistic Protection for Power Transformers Final Report," Submitted to the National Institute for Hometown Security, Somerset, KY, May 2012 p. 556.
7. Lusk, B. "Response of Curtain Wall Architectural Envelopes to Negative Phase Blast Effects." Submitted to the National Institute for Hometown Security, Somerset, KY, May 2012 p. 169.
8. Perry, K., B. Lusk, "Development of 15 PSI Safe Haven Polycarbonate Walls for Use in Underground Coal Mines" Final Report submitted to Kentucky Energy and Environment Cabinet, Frankfort, KY, March, 2013.
9. Lusk, B., J. Silva, K. Eltschlager, "Field Testing and Analysis of Blasts Utilizing Short Delays with Electronic Detonators" Final Report submitted to Office of Surface Mining, Reclamation, and Enforcement, Pittsburgh, PA, September, 2013.

Research Experience (\$5 M as PI, \$10.8 M Total)

Silva, J (PI), Lusk, B. (Co-I), "Design and Construction Considerations for Protected Compressed Air Line to a Refuge Alternative." CDC – NIOSH, October 2014 – October 2016. (Budget \$299,191, Lusk Responsibility \$150,000).

Lusk, B (PI), "Blasting Optimization for Nelson Brothers, LLC" Graduate fellowships totaling \$500,000 over 5 years. 2014-2019.

Perry, K (PI), Lusk, B. "Modern Rock Dust Development and Evaluation." Kentucky Department for Energy Development and Independence. March 2013 – May 2015 (Budget \$368,000, Lusk Responsibility - ~ \$150K).

Lusk, B (PI), "Assessment of Technology for Non-destructive Testing of In situ Underground Mine Seals" UK as Subcontractor to Marshall Miller for project funded by NIOSH. November 2012 – August 2014 (Budget \$506,284, Lusk Responsibility - ~ \$151,377).

Lusk, B (PI). "Blasting Effects on Coal Refuse Impoundment Structures." Office of Surface Mining. August 2012 – August 2014 (Budget \$200,000).

Lusk, B (PI), "Blasting Optimization for Nelson Brothers, LLC" Industrial Grant from Nelson Brothers to sponsor graduate student work in surface coal blasting. August 2012-August 2014 (Budget \$150,000)

Lusk, B (PI), Perry, K. "Investigation of Mining Applications for Concrete Cloth" Industrial Grant from Milliken to sponsor graduate work in mining applications for Concrete Cloth. August 2012-August 2014 (Budget \$50,000)

Lusk, B (PI), Honaker, R, Perry, K, Novak, T "University of Kentucky Experimental Mine Feasibility Study" Kentucky Department for Energy Development and Independence. July 2012-July 2014 (Budget \$350,000)

Lusk, B (PI), "Kentucky Flyrock Task Force." Industrial donations to support graduate work on flyrock. August 2012-August 2014 Budget (\$40,000)

Perry, K (PI), Lusk, B. "Development of 15 PSI Safe Haven Polycarbonate Walls for Use in Underground Coal Mines" Kentucky Department for Energy Development and Independence. August 2011 – August 2012 (Budget \$249,689, Lusk Responsibility - ~ \$125K).

Lusk, B (PI), "Development of Unitized Mining Operations for Optimum Fill Construction" Appalachian Research Initiative for Environmental Science, Industry funded. August 2011 - August 2016 (Budget \$375,000).

Sweigard, R (PI), Lusk, B (CO-PI) "Ukrainian Mine Safety Project." Partnership for Energy and the Environment (PEER), DOL. January 2004 – September 2010 (Budget \$1,377,679, Lusk Responsibility - ~ \$200K)

Lusk, B (PI), "Field Testing and Analysis of Blasts Utilizing Short Delays with Electronic Detonators." Office of Surface Mining, September 2009 – September 2010 (Budget \$200,000)

Bryson, S (PI), Lusk, B. "Assessment and Mitigation of Water-Side Attacks on Dams." National Institute for Hometown Security, August 2009 – August 2012 (Budget \$2,717,595, Lusk Responsibility - ~\$150K)

Lusk, B (PI), "Response of Curtain Wall Architectural Envelopes to Negative Phase Blast Effects." National Institute for Hometown Security, August 2008 – August 2011 (Budget \$874,750.82)

Lusk, B (PI), "Blast Protection for Power Transformers." National Institute for Hometown Security, August 2008

– August 2011 (Budget \$824,969.09)

Andrews, R (PI), Braden Lusk “Carbon Foam-Based Protection Systems.” National Institute for Hometown Security, August 2008 – August 2010 (Budget \$836,964, Lusk Responsibility - ~\$40K)

Sottile, J (PI), Braden Lusk “Identifying Barriers and Developing Preliminary Solutions to the Extraction of Thin-Seam Coal Resources.” Governor’s Office of Energy Policy, July 2007 – July 2008 (Budget \$101,041, Lusk Responsibility - ~\$10K)

Lusk, B (PI), “Acoustic Response of Structures to Blasts Analyzed Against Comfort Levels of Residents Near Surface Coal Operations.” Office of Surface Mining, September 07-September 08. (Budget \$100,000)

Lusk, B (CO-PI @ 90% Responsibility), Eric Grulke, Kozo Saito, “Development of Design Tools for Blast Mitigation by Layered Aluminum Mesh.” Innovative Productivity Incorporated for Navy, IPI-05-5300-C08. May 07-May 08. (Budget \$443,533)

Lusk, B, Baird, J, Schonberg, W, “AMMOSIM rubble model research.” 21st Century, May 05-May 06. Lead modeler in AUTODYN Version 6. (Budget \$70K)

Lusk, B, Tichenor, J, and Worsey, P.N., “Fiber Optic Pressure Sensor Development and Testing”, Honeywell, May 03-May-04. Responsible for test design and physical testing of explosives for fiber research. (Budget \$150K)

Lusk, B “Modeling of Los Alamos National Laboratory Building 340 for calculation of damage due to accidental detonation inside a processing bay.” LANL. Oct 03-Dec 04. Modeling work for comparison to actual test results. No budget, internship.

Lusk, B and Worsey, P.N., “Winco blast resistant window testing and development of new glazing system”, Winco Windows, May 04-Present. Responsible for billing, budgeting and investigating. (Budget \$200K)

Baird, J, Lusk, B and Worsey, P.N., “Axi-Symmetric Shaped Charge Breaching Tool”, R9825, US Army Corps of Engineers, ERDEC, Jan 03-Mar 04. Built targets and tested various breaching methods. Budget (\$50K)

Teaching Experience

- Mining Engineering 331, 531 UK – Explosives Engineering Courses
- Mining Engineering 371UK – Professional Development
- Mining Engineering 621 UK – Instrumentation for Blast Mitigation
- Mining Engineering 591, 592 UK – Mine Design Project I and II
- Mining Engineering 431 UK – Mine Systems and Valuation Course
- Mining Engineering 307, 350, 406 UMR – Explosives Engineering Courses
- Missouri Limestone Producers Association Trainer – Explosive Licensing Board
- Certified MSHA Trainer, Private Blasters Training Seminar Instructor

Highlighted Fireworks Experience

- Lead Pyro for Chesterfield, MO, July 4, 2008. \$50,000 Show.
- Consultant to University of Kentucky Occupational Health and Safety office concerning pyrotechnics for UK sporting events.
- Lead Pyro for Eureka, MO, July 4, 2007. \$20,000 Show.
- Lead Pyro for Eureka, MO, July 4, 2006. \$15,000 Show.
- Lead Pyro for Eureka Days, September, 2005. \$15,000 Show.
- Lead Pyro for Six Flags, July 4, 2005 \$12,000 Show.
- 4 Year Shooter at KUDL Christmas in the Sky, Kansas City, MO. \$40,000 + Show
- Lead Pyro for dozens of smaller venue shows budgets < \$10,000.