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**TEXAS**  
ARLINGTON

DIVISION FOR  
ENTERPRISE  
DEVELOPMENT

# Final Project Report

for

## Development and Delivery of Multimedia Miner Health and Safety Training

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**Principal Investigator:** Robert W. Braun, Director, Safety & Health Programs  
The University of Texas at Arlington  
Division for Enterprise Development  
PO Box 19197  
140 West Mitchell Street  
Arlington, Texas 76019  
T | 866-906-9190  
[robbraun@uta.edu](mailto:robbraun@uta.edu)

**THE UNIVERSITY OF TEXAS AT ARLINGTON**  
Box 191945  
701 South Nedderman Drive  
Arlington, Texas 76019

**Co-Investigator:**  
**SAFETY SOLUTIONS INTERNATIONAL, INC.**  
6555 S. Kenton Street  
Centennial, CO 80111-6838

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## List of Terms and Abbreviations

<b>Abbreviation</b>	<b>Explanation</b>
ADDIE	Analysis, Design, Development, Implementation, and Evaluation Model
ASSE	American Society of Safety Engineers
MSHA	<i>Mine Safety and Health Administration</i>
PPE	Personal Protective Equipment
P-P-E	<b>Person - People - Environment</b> <b>P</b> – focuses on the leader as a <b>person</b> , with the goal of clarifying what kind of person or leader participants want to be.  <b>P</b> – deals with the <b>people</b> the leader interacts with, and focuses on effectively interacting and leading others.  <b>E</b> – deals with the <b>environment</b> in which the leader operates, including the company, the industry, and the community.
SSI	<i>Safety Solutions International, Inc.</i> - collaborative partner and co-investigator.
UTA	<i>The University of Texas at Arlington</i>

## **Abstract**

**Title:** Development and Delivery of Multimedia Miner Health and Safety Training

**Investigator:** Robert W/ Braun, The University of Texas at Arlington, Division for Enterprise Development, Arlington, TX 76019 (Email: robbraun@uta.edu)

**Affiliation:** The University of Texas at Arlington OSHA Education Center

**State:** TX

**Telephone:** (817) 272-9493

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### **Final Report Abstract:**

The mining industry must protect workers from hazards they face every day. In most energy and extractive industries, primary responsibility for worker safety lies with frontline supervisors. Most supervisors, however, are promoted because they were experts at certain tasks. It is uncommon for them to be trained in the skills needed to be an effective leader or motivate others how to work safely. Mining companies are now embracing safety management systems and development of “zero harm” cultures to move beyond compliance-based safety. Supervisors need to be trained in these techniques, as well as learning and leadership skills for knowledge transfer and retention. The workforce is changing and growing more diverse in age, gender, background, and national origin. Supervisors must be prepared to deal with these challenges to cultivate a safe and productive workplace.

Dealing with the health and safety of workers in today’s work environment requires a different approach. Supervisors need to adapt to workplace changes and deal with people entering the workforce, regardless of age, gender, culture, or origin. Frontline supervisors responsible for keeping their crews safe must be trained to understand their workers, communicate effectively with them, motivate them to work together, and train them to work safely.

*The University of Texas at Arlington (UTA) and Safety Solutions International, Inc, developed a two-day training course entitled “P-P-E for Leaders: Leadership Development for Frontline Supervisors” to begin the process of training supervisors to become more effective leaders introducing them to these critical issues and the key role they play in safety and productivity. The team investigated workforce changes and developed a training strategy for an innovative 16-hour curriculum providing opportunities for trainees to practice new leadership skills with hands-on activities, case studies, group work, and reflection exercises. Facilitators practice and model effective communication and adult learning techniques. Trainees are given time to reflect on what they learned and develop personal goals to address challenges they face in their jobs. Participants are provided a workbook and encouraged to develop written goals or capture ideas about how to implement and apply their new knowledge.*

Over 740 supervisors were trained and overwhelming reported that the “P-P-E for Leaders: Leadership Development for Frontline Supervisors” course provided the leadership development and applied skills for supervisors to become effective leaders. Participants agreed the course would have a positive effect upon their behavior.

A documentary film was also developed using story telling as another learning tool focusing on a mining disaster to increase awareness among mine rescue and emergency management personnel. UTA's Film and Video Art team used leading edge video production concepts to produce a video story to be used as a tool to sustain training. We developed, produced, and distributed 4,000 copies of the "Remember Wilberg" fire that communicates operational risks and emergency response through a moving and memorable story while documenting those historical events for future generations.

The knowledge gained from both of these knowledge transfer tools provides the basis for future intervention research to improve safety and health in the mining industry.

## Revision History

Name	Date	Reason For Changes	Version
Robert W. Braun	11/01/2017	Initial Draft	1.0
Robert W. Braun, et al	11/27/2017	With contributions and edits from team members, refined the document	2.0

## Group Members

Name	Role	Responsibilities
Robert W. Braun UTA	Project Investigator	Oversee project activities, provide strategic direction, guide program objectives, and approve deliverables.
Julianne Ragland UTA	Project Manager	Provide project management and oversight.
Dr. Elaine Cullen SSI	Producer, SME	Serve as Subject Matter Expert (SME) and Lead Instructor for the leadership training as well as contributing producer and primary interviewer and storyboard developer for the film documentary.
Dr. Lori Guasta SSI	Curriculum Development, SME	Serve as Subject Matter Expert (SME) for curriculum development and instructor for the leadership training.
Mark Clive UTA	Director, SME	Producer - Lead production team for the film documentary composed of faculty, graduate, and undergraduate students.
Dave D. Lauriski SSI	SME	Serve as Subject Matter Expert (SME) for the project.
Tex Frossard	Film Engineer	Film editing.
Wilton Houchens II	Composer	Sound track.

## Section 1 - Final Progress Report

### 1.1. Key Findings

*The University of Texas at Arlington (UTA), Division for Enterprise Development in collaboration with Safety Solutions International, Inc. (SSI) designed and delivered multimedia and instructional materials to meet the challenges of providing health and safety training in a changing work environment in the mining sector for the Western United States.*

Dealing with the health and safety of workers in today's work environment requires a change in approach. Companies need to adapt to changes in the workplace, they must be aware of those changes and how they impact them, and deal with people entering the workforce, regardless of age, gender, culture, or natural origin. Frontline supervisors who are responsible for keeping their crews safe on the job must be trained to understand their workers, communicate effectively with their people, motivate them to work together, and train them to do their work safely so that they can return home to their families and loved ones each day.

The old ways of training and supervising workers are simply not going to work for younger generations because of how these new workers learn, understand information, and relate to the world of work. Adding the complexities of gender, nationality, and cultural diversity creates a situation in which many supervisors find themselves unable to lead effectively, inevitably leading to ineffective and less safe work teams. The innovative training developed to bridge this gap created by a changing work environment and impart new skills to frontline supervisors in the mining industry is entitled "P-P-E for Leaders: Leadership Development for Frontline Supervisors". While it is specific to the Western mining industry, the content of this training is universal and has tremendous value to new and current leaders in the workplace.

The 16-Hour training proved very effective in preparing leaders and providing them with the tools for the continued enhancement of safety and production in the workplace. Over 740 frontline mining supervisors were trained. The results were extremely positive. Trainees overwhelmingly reported that the course met its goal to provide leadership development and that the training provided the applied skills for them to become more effective leaders. Participants agreed that the course would have a positive effect upon their behavior in the workplace. The overall purpose and course value received the highest score during our

*UTA Film and Video Arts and SSI also wrote, directed, and produced a documentary entitled, "Remember Wilberg". This captivating documentary was designed to enhance learning by using storytelling to share mine workers and first responder experiences in a major mine disaster. A premier for the film was shown in Castle Dale, Utah not far from Price, Utah and the actual Wilberg Mine site. An afternoon and evening showing of the documentary film had over 1,500 people attending in this small, rural area. Reception of the film was very positive. Local miners were very touched by the film and thought it was done in good taste. Family members were very proud of the way that the miners in the film were portrayed.*

*A premier was also shown at the 2017 Society of Mining, Metallurgy and Exploration Annual Meeting in February in Denver, Colorado. The Associate Director for Mining, Colorado School*

*of Mines*, who was at the premier wrote that it was "a beautifully and sensitively done film that captures a tragic event that altered the lives of many families and an entire community. It is both poignant and instructional." *UTA* featured the documentary during the *American Society of Safety Engineers (ASSE) Conference and Exposition* at the Colorado Convention Center from the 19th to 22nd of June 2017 in Denver, Colorado where it was very well received.

These training tools were designed to provide frontline supervisors with tools that they can use to create and sustain a safer and more productive workplace.

## **1.2. Translation of Findings**

The design and delivery of new training methods and materials to improve leadership development of frontline supervisors and strengthen on-the-job training in mining operations was provided through free on-site delivery of training sessions to mines in the 22 Western United States. Over 740 frontline mining supervisors were trained. Collaboration with the *Mine Safety and Health Administration (MSHA)* state grant and government sector offices, mining industry associations, and other mine-related organizations made this innovative training widely available for the mining sector. We also actively participated in mining-related conferences during the grant period to present lessons learned and promote the availability of the training to the Western mining community.

The validated training materials which include Instructor Guide, PowerPoint Presentation, and Workbook are available for sustainment beyond the grant period. Additionally, the concepts piloted are being incorporated by *UTA* into frontline training for the construction industry. The content of this training is universal and has tremendous value to new and current leaders in the workplace today.

The objectives for creating a new documentary on a mining disaster were to demonstrate the value of storytelling as an effective training tool and use it to increase awareness and understanding among mine rescue and emergency management personnel. Leading edge video production concepts were used to design and develop the film.

A premier of the documentary was shown in Castle Dale, Utah not far from Price, Utah and the actual Wilberg Mine site. An afternoon and evening showing of the documentary film had over 1,500 people attending in this rural area. Reception of the film was very positive. Local miners were very touched by the film and thought it was done in good taste. Family members expressed pride in the way that miners in the film were portrayed. A premier was also shown at the 2017 *Society of Mining, Metallurgy and Exploration Annual Meeting* in February in Denver, Colorado. The Associate Director for Mining, *Colorado School of Mines*, who was at the premier wrote that it was "a beautifully and sensitively done film that captures a tragic event that altered the lives of many families and an entire community. It is both poignant and instructional."

*The University of Texas at Arlington* also featured the documentary during the *American Society of Safety Engineers (ASSE) Conference and Exposition* in June in Colorado. 4,000 copies of the documentary film and accompanying Trainer's Guide were distributed to *MSHA* identified state mining organizations, associations, and societies across the Western United States. Other recipients included the *National Mine Rescue Association*, universities with mine safety

programs, organizations that participated in our training, and other interested organizations and individuals identified during the project. Availability of the documentary through both media and electronic formats for subsequent viewing as a supplemental tool will allow its use by both public and private sectors beyond the grant period.

### **1.3. Research Outcomes/Impact**

The “P-P-E for Leaders: Leadership Development for Frontline Supervisors” training provided no-cost opportunities for frontline supervisors in the mining industry to acquire leadership development and trainer skills through on-site instructor-led training. The impact from this intervention was to increase the number of frontline supervisors in the Western mining sector who are better leaders and have the expertise to train and mentor their workforce. Over 740 frontline mining supervisors were trained. The validated training materials which include an Instructor Guide, PowerPoint presentation, and Workbook are available for sustainment beyond the grant period. Additionally, the concepts piloted are being incorporated by *UTA* into frontline supervisor training for the construction industry.

The development and distribution of the Wilberg Mine disaster documentary, “Remember Wilberg”, communicates risks and emergency response within the mining industry and documents this historical event for future generations. The documentary underscores the effectiveness of using stories to create personal experiences providing a way to better remember information. The inherently dangerous nature of mining makes it easy for a miner to put themselves into a story and imagine what they would have done in that situation. Developing a documentary to share critical worker and first responder experiences through a captivating story is an effective way to make miners care and be more aware of safety. 4,000 copies of the documentary film and an accompanying Trainer’s Guide were distributed to *MSHA* identified state mining organizations, associations, and other organizations. Making the documentary available as an effective tool to sustain training to a wide population of mine workers enables them to be active participants in improving workplace safety and health. The documentary is available on YouTube: <https://www.youtube.com/watch?v=YQhyIgJZftU>.

## **Section 2 – Scientific Report**

### **2.1. Scope**

It is becoming increasingly apparent that the workforce of today and definitely of the future will not resemble the workforce of the past. Supervisors and managers need to be trained on how to lead a diverse worker population. Training curricula must include skills such as effective communication, communicating across cultures, building multi-generational work teams, understanding adult learning styles, and motivating diverse teams. It is these skills which we focused on and incorporated in the development of our training.

The overall objectives for *The University of Texas at Arlington Division for Enterprise Development* working in collaboration with *Safety Solutions International, Inc. (SSI)* and *The University of Texas at Arlington Art and Art History Department* under this grant were to incorporate these critical skills into our training to improve leadership development of frontline supervisors in Western mining operations in order to increase safety and health and productivity in mines and to create a documentary on a mining disaster to increase awareness and understanding among mine rescue and emergency management personnel with relevance to all miners during mine disasters.

### **2.2. Schedule**

During Year 1, the development group researched the characteristics of the workforce in mines and identified the critical skills necessary for effective leadership in today's workplace and that of the future. Using these insights, we developed an instructor-led leadership development course for frontline supervisors.

In Year 2, we began delivery of that special leadership training to Western mining organizations. We also began development of the documentary film entitled, "Remember Wilberg", on the tragic fire in the Wilberg coal mine in Emery County, Utah on 19 December 1984 which claimed 27 lives.

During Year 3, we held the premiere of the documentary film, "Remember Wilberg". The premier was conducted on February 8th, 2017 in Castle Dale, Utah near Price, Utah and the actual Wilberg Mine site. The documentary was also premiered at the 2017 *Society of Mining, Metallurgy and Exploration (SME) Annual Meeting* held in Denver, Colorado on the 20th of February, 2017 and featured at the *American Society of Safety Engineers (ASSE) Conference and Exposition* at the Colorado Convention Center from the 19th to 22nd of June, 2017 in Denver, Colorado. We distributed 4,000 copies of the documentary film and the accompanying Trainer's Guide to *Mine Safety and Health Administration (MSHA)* identified state mining organizations, associations, and societies across the Western United States. Other recipients included the National Mine Rescue Association, universities with mine safety programs, organizations that participated in our training, and other interested organizations and individuals identified during the project.

### **2.3. Leadership Development Course for Frontline Supervisors**

The training course developed to impart these new skills to frontline supervisors in the mining industry is entitled "P-P-E for Leaders: Leadership Development for Frontline Supervisors".

While it is specific to the Western mining industry, the content of this training is universal and has tremendous value to new and current leaders in the workplace. “PPE” is a common acronym in the safety and health field, standing for “Personal Protective Equipment.” The development team used this well-known term to brand the new leadership course, changing the meaning as follows:

**P** – focuses on the leader as a **person**, with the goal of clarifying what kind of person or leader participants want to be. In this element, participants identify and examine personal strengths, weaknesses, preferences, biases, etc. The underlying concept that people are different is heavily stressed here, particularly regarding the fact that those differences heavily influence behavior and can cause conflict among team members. Modules under this first categories pertain to:

- Biographical and Culture Differences (derived from Hofstede’s seminal study)
- Values, Motivation, Attitude, and Personality
- Generational Differences
- Adult Learning Styles

**P** – deals with the **people** the leader interacts with, and focuses on effectively interacting and leading others. In this element, participants are given a chance to practice skills related to communication, teambuilding, leading across differences, motivating others, and mentorship/coaching. Modules in this element include:

- Embracing Differences
- Effective Communication
- Team Building
- Motivation, Feedback, and Recognition
- Mentoring and Coaching

**E** – deals with the **environment** in which the leader operates, including the company, the industry, and the community. The focus of this element is to demonstrate leadership within the context of the organization. Participants will learn how to model leadership in terms of:

- Accountability and Commitment to Organizational Values and Vision
- Creating and Promoting a Positive Safety Culture

A masters-level design student helped to create the design for the presentation and "brand" the course with a Western theme fitting for the Western Mines.



**Figure 1: PPE for Leaders Logo**

The “PPE for Leaders: Leadership Development for Frontline Supervisors” training is an innovative 16-hour course that provides opportunities for trainees to practice new leadership skills, with hands-on activities, case studies, small group work, and reflection exercises built into the curriculum. Facilitators practice and model effective communication and adult learning techniques throughout the training. Participants are also given ample time to reflect on what they have learned and to develop personal goals that address challenges they may personally be facing in their jobs. They are provided a workbook in which they can develop written goals or capture ideas they may have about how to implement and apply their new knowledge.

The “P-P-E for Leaders: Leadership Development for Frontline Supervisors” training is an innovative 16-hour course that provides opportunities for trainees to practice new leadership skills, with hands-on activities, case studies, small group work, and reflection exercises built into the curriculum. Facilitators practice and model effective communication and adult learning techniques throughout the training. Participants are also given time to reflect on what they have learned and to develop personal goals that address challenges they may personally be facing in their jobs. They are provided a workbook in which they can develop written goals or capture ideas they may have about how to implement and apply their new knowledge.

*UTA’s* novel approach focused on isolating the difference between training and developing leaders specific to the mining industry. “Leadership development should be designed to build better leaders. Training focuses on best practices, while development focuses on next practices. The majority of training takes place within a monologue (lecture/presentation) rather than a dialog” (Myatt, 2012). The training was designed to provide an alternative to the status quo monologue. The training is contextual, collaborative, fluid, and actionable. Training focuses on the occupational mining culture, maximizing potential, growth, innovation, performance, and solutions to preventing injuries and fatalities in a journey to “zero.”

Motivating and preparing supervisors to engage, involve, and recognize workers can make a positive difference in the workplace. Improving the ability of supervisors to engage their workers to improve safety in high-risk mining activities was our primary focus for this training. The *Gallup* report “State of the American Workplace” focuses on employee engagement as it relates to the United States workforce. Their 2017 findings clearly show that companies with high levels of engagement experience:

- 41% Lower absenteeism
- 24% lower turnover
- 70% fewer employee safety incidents
- 40% fewer quality incidents (defects)
- 17% higher productivity
- 21% higher profitability

A major mining company in South Africa, which had one of the lowest worker engagement levels, decided to implement a program designed to boost employee engagement at their mines. They implemented this strategy at 70 of their locations with very positive results.

In Year 1, we completed development of the Leadership Development Course for Frontline Supervisors: “P-P-E for Leaders: Leadership Development for Frontline Supervisors”.

During Year 2, the “P-P-E for Leaders: Leadership Development for Frontline Supervisors” course was pilot tested and the course revised to respond to comments received during the pilot evaluations. A total of 21 classes to include the Pilot were held for mining organizations in Alaska, Utah, Arizona, Colorado, Nevada, and Wyoming. A total of 422 supervisors were trained. Additional minor revisions were made to improve the course as we gained experience.

In Year 3, an additional 320 supervisors were trained in 16 classes conducted in the Western United States.

#### **2.4. Documentary, “Remember Wilberg”**

The objectives for creating a new documentary film on a mining disaster were to increase the awareness and understanding among mine rescue and emergency management personnel through storytelling. Utilizing leading edge video production concepts and *UTA*’s dynamic program-centered *Film and Video Art* team, our development team wanted to provide a video story that could be used as an effective supplemental tool to sustain training. We developed and produced a documentary of the Wilberg Mine disaster that communicates operational risks and emergency response through a moving and memorable story within the mining industry and documents those historical events for future generations.

Year 1 efforts focused on research and gathering first-hand information on the actual fire, filming dramatic re-enactments on location, and working on design and animation to enhance the learning aspect of the documentary. Thirty-one personal interviews were filmed on location at a mining museum in Utah, including the only survivor of the Wilberg mine fire. Location filming included four days of filming in two different underground mines to capture B-Roll footage and live re-enactments to tell the story in a dramatic and engaging way. The recent dedication of the new Miners’ Memorial in Price, Utah was also recorded for use in the documentary.

*UTA* undergraduate and graduate students helped develop the look and feel of the production by incorporating graphic design, as well as 2-D, and 3-D animation. All of these techniques were used to describe in detail the safety and rescue operation at the Wilberg mine. The personal interviews were analyzed for themes and a storyboard was created that covered the main themes selected for presentation. The length of the documentary is approximately 60 minutes.

A technical review was conducted with select interviewees to assure that the film was accurate and complete. A premier for the film was shown on February 8<sup>th</sup> in Castle Dale, Utah not far from Price, Utah and the actual Wilberg Mine site. An afternoon and evening showing of the documentary film had over 1,500 people attending. This was a major community event for this rural area which consists of a very small population. The reception of the film was very positive.

Local miners were very touched by the film and thought it was done in good taste. Family members were very proud of the way that the miners in the film were portrayed.

A premier was also shown at the 2017 *Society of Mining, Metallurgy and Exploration (SME) Annual Meeting* in February in Denver, Colorado. The Associate Director for Mining, *Colorado School of Mines*, who was at the Premier wrote that it was "a beautifully and sensitively done film that captures a tragic event that altered the lives of many families and an entire community. It is both poignant and instructional." *The University of Texas at Arlington* also featured the documentary during the *American Society of Safety Engineers (ASSE) Conference and Exposition* at the Colorado Convention Center from the 19th to 22nd of June 2017 in Denver, Colorado where it created a lot of interest and was very well received.

## **2.5. Instructional Design Process**

As the Continuing Education Branch of *The University of Texas at Arlington*, the *Division for Enterprise Development* is poised to assess and meet any identified need for adult training. The project team employed subject matter experts, instructional designers, curriculum specialists, and training experts in the instructional design process for this special project to provide leading edge design and development support. The foundation of our systematic instructional design methodology used to develop this training is built upon proven industry processes and standards found in "Merrill's First Principles of Instruction", the "Analysis, Design, Development, Implementation, and Evaluation (ADDIE) Model", and "Kirkpatrick's 4 Levels of Training Evaluation". Our development team utilized the five Merrill principles while assessing the dynamics of the unique mining workplace environment and modern workforce to promote learning by engaging participants in solving real-world problems, activating their existing knowledge as a foundation for acquiring new knowledge, demonstrating the knowledge, having participants apply the new knowledge, and assisting them in integrating the new knowledge into their unique world.

Our instructional design team incorporated these principles into our Instructor Course Guide and Participant Workbook which defines the specific learner-centered course structure and includes in-class knowledge checks, exercises, group and individual exercises, and case studies.

## **2.6. Evaluation**

The UTA project team utilized the Kirkpatrick model for the development and implementation of our Level I satisfaction survey process. Training sessions were evaluated for adherence to course objectives, effectiveness of instruction, conduciveness of the training environment, value of course content, and applicability of training to daily work activities. Trainee feedback was used to constantly assess operational strengths and weaknesses, evaluate the quality of training and support services, and capture trainee recommendations. All this input was used to continually improve and refine the course content and delivery. A review is provided below.

### **Quantitative Evaluation**

Ten (10) quantitative questions regarding the materials and design, purpose and value, and quality of instruction for the training were rated on a 5-point Likert scale (1= Strongly Disagree, 2= Disagree, 3=Not Sure, 4= Agree, 5= Strongly Agree). Overall the results from the training was extremely positive. The highest mean rating individual rating on the questions was 4.76

(N=269), which indicates that participants strongly agreed that there was a high-quality facilitator of the course. The category that had the highest mean (4.57) was overall purpose and course value (see Table below).

	<b>Course Materials and Design</b>	<b>Overall Purpose and Course Value</b>	<b>Quality of Instruction</b>
Mean of	4.49	4.57	4.52
Rating Scale 1-5, 1= Strongly Disagree, 2= Disagree, 3=Not Sure, 4= Agree, 5= Strongly Agree			

To see more detail regarding individual ratings on questions refer to the Quantitative Evaluation Results in the Appendix.

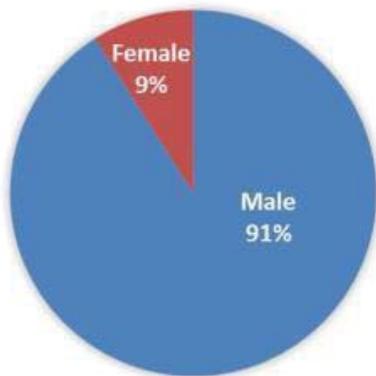
## 2.7. Results

Our primary goal was to provide effective training to frontline supervisors so that they can lead workers to achieve a safer and more productive workplace. The results are presented below.

In the first year of delivery, 422 supervisors were trained across 21 classes in six different states: Arizona (7 classes), Alaska (3 classes), Colorado (2 classes), Nevada (2 classes), Utah (5 classes), and Wyoming (1 class). An overview of the data collected is as follows:

### Demographics

#### Sex & Age



AGE	
18-30 years	11.3%
31-40 years	30.8%
41-50 years	30.6%
51-60 years	20.8%
61-70 years	5.9%

## Language & Race

- 93.3% reported English as their first language

RACE	
White	76.3%
Hispanic, Latino or Spanish	15.4%
American Indian or Alaska Native	1.5%
Asian	0.8%
Black or African American	0.8%
Biracial	3.1%
Other	1.3%

## Years Experience

TOTAL YEARS EXPERIENCE		YEARS AS SUPERVISOR	
0-5 years	13.6%	0-5 years	44.7%
6-10 years	23.4%	6-10 years	25.4%
11-20 years	30.8%	11-20 years	21.9%
21-30 years	21.9%	21-30 years	6.4%
31+ years	10.3%	31+ years	1.3%

## Mining Sector

SECTOR	
M/NM (Surface)	63.8%
M/NM (Underground)	11.8%
Aggregate	13.4%
Coal (Surface)	6.2%
Other	4.9%

In the second year of delivery, 320 supervisors were trained across 16 classes. Data from the second year of delivery were collected for 13 of 16 classes, as two classes (Freeport Globe Mine dates 9-20/21,2016 and Pogo Mine dates 5/3-5/4,2017) were missing demographics and one class (Great Basin College dates 8/23-24) was missing evaluation data. This summary contains the findings based on the data collected.

265 total participants provided demographical data. Participants were asked eight questions regarding their gender, if English was their first language, race, age group, mining sector, geographic location, number of years in the field, and number of years as a supervisor. Participants indicated that they worked in eight different states including, Alaska, Arizona, California, Illinois, Missouri, Nevada, Utah, and Wyoming (N=265).

- Participants indicated that they worked in eight different states including, Alaska, Arizona, California, Illinois, Missouri, Nevada, Utah, and Wyoming (N=265).
- Around one fourth of the participants worked in (26.4%) Nevada (n=70).
- Over half of the participants (62%) reported working in Mineral/Non-Mineral surface sector of mining (n= 160).
- The majority of participants (85.9%) were male (n=226). While there were 76 females.
- Most of the participants (73%) identified themselves as White/Caucasian (n=192).
- The largest age group (31.3%) was 31-40 years old (n=82). The smallest (5.7%) age group represented was 61-70 years old (n=15).
- The average amount of experience in the field was 17.6 years (N=263, SD=10.68)
- The average amount of experience as a supervisor was 9.2 years (N=263, SD=8.53)

## **2.8. Learning Outcomes Summary**

Dealing with the health and safety of workers in today's work environment requires a different approach. We need to adapt to changes in the workplace, we must understand those changes, and deal with the people who are entering the workforce, regardless of age, gender, culture, or natural origin. Frontline supervisors who are responsible for keeping their crews safe on the job must be trained to understand their workers, communicate effectively with their people, motivate them to work together, and to train them to do their work safely so that they can return home to their families and loved ones every day.

The "P-P-E for Leaders: Leadership Development for Frontline Supervisors" course proved effective in preparing leaders and providing them tools for the continued enhancement of safety and production in the workplace. Overall the results from the training were very positive. Participants overwhelmingly reported the training met its goal to provide leadership development and that it provided the applied skills necessary to become more effective leaders. Participants also agreed that the course would have a positive effect upon their behavior on the job. The highest mean individual rating on the questions was 4.76 (N=269), indicating that participants

strongly agreed that there was a high-quality facilitator for the course. The category that had the highest mean (4.57) was the overall purpose and course value.

Frontline supervisors are often ill-equipped for their leadership roles. Most are promoted based upon their work skills and abilities not their leadership skills. The situations for which supervisors are responsible are becoming increasingly more complex as workforces become more diverse generationally, ethnically, and culturally, and with more women in fields that have been historically male-dominated. Part of this complexity lies with how different segments of a diverse workforce learn, communicate, follow instruction, and relate to supervisors or authority figures. Given the favorable responses by participants in the “P-P-E for Leaders: Leadership Development for Frontline Supervisors” course, the leadership development skills provided during this training met these challenges. Participants strongly recommended the course for others.

If we are going to adapt to changes in the workforce, we must understand those changes taking place, and deal with the people who are entering work, regardless of age, gender, culture, or natural origin. Frontline supervisors, those responsible for keeping their crews safe on the job, must be trained to understand their workers, communicate effectively with their people, motivate them to work together, and to train them to do their work safely so that they can return to their families and loved ones every day. The “P-P-E for Leaders: Leadership Development for Frontline Supervisors” course does develop these important leadership skills as evidenced by feedback from supervisors in the Western mines.

## **2.9. Future Directions**

Given the favorable responses provided by “P-P-E for Leaders: Leadership Development for Frontline Supervisors” course participants, a more comprehensive and definitive analysis of the course’s effects with collection of additional participant feedback is strongly deserved to continue developing important leadership skills among supervisors.

Resources to conduct a full analysis of evaluation data collected were not included in the existing grant, but efforts should be taken to secure opportunities to continue this work, glean additional insight from the development and delivery of safety training materials, and remain engaged in efforts to promote leadership development among frontline supervisors.

Of critical interest would be a Level 3 behavior evaluation determining the degree to which participants apply what they learned during the training when they are back on the job or a Level 4 result demonstrating the degree to which targeted outcomes occur as a result of the training provided.

## **Publications**

### *Proceedings*

Guasta, Lori Ph.D. & Cullen, E.T. Ph.D. [2016] Insights from Leadership Development Training for Frontline Supervisors. Proc of 2016 American Society of Safety Engineers (ASSE) Conference, Denver, CO. Session 770, June 2017.

P-P-E for Leaders: Leadership Development for Frontline Supervisors Instructor Guide

P-P-E for Leaders: Leadership Development for Frontline Supervisors Workbook

P-P-E for Leaders: Leadership Development for Frontline Supervisors PowerPoint Presentation

“Remember Wilberg” Documentary - <https://www.youtube.com/watch?v=YQhyIgJZftU>

“Remember Wilberg” Trainer Guide

## Bibliography

AARP. 2007. *Leading a Multigenerational Workforce*. Washington, D.C.

Cullen, E.T. Ph.D. & Fein, Albert H. Ph.D., August 2005, Report Of Investigations 9664, “*Tell Me a Story: Why Stories are Essential to Effective Safety Training*”

Cullen, E.T., 2008. *Tell Me A Story: Using Stories to Improve Occupational Safety Training*. *Professional Safety*. July, 2008: 20-27.

Cullen, E.T., Fairhurst, C., et al. 2013. *Emerging Workforce Trends in the U.S. Energy and Mining Industries: A Call to Action*. National Research Council of the National Academies. The National Academies Press, Washington D.C.

Gallup report, 2017 “*State of the American Workplace*”

Hofstede, Geert. 1991. *Cultures and Organizations: Software of the Mind*. McGraw-Hill.

IBM Institute for Business Value, April 2009 “*Unlocking the DNA of the Adaptable Workforce: The Global Human Capital Study 2008/Metals and Mining Edition.*”

Livo, Norma J. & Rietz, Sandra A. 1986, *Storytelling: Process and Practice*

Merrill, M. David 2002, “*First Principles of Instruction*”

Myatt, Mike 2012, “*The #1 Reason Leadership Development Fails*”

Ragain, R. 2012. *A Best Boss Is a Good Decision Maker & Deals Effectively with Conflict*. Retrieved February 15, 2016 from <http://theradgroup.com/decision-making-conflict-resolution>

## **APPENDIX**

### **Quantitative Evaluation Results**

## Quantitative Evaluation

10 quantitative questions regarding the materials and design, purpose and value, and quality of instruction for the training were rated on a 5-point Likert scale (1= Strongly Disagree, 2= Disagree, 3=Not Sure, 4= Agree, 5= Strongly Agree). Overall the results from the training were positive.

### Summary

- The highest mean rating individual rating on the questions was 4.76 (N=269), which indicates that participants strongly agreed that there was a high-quality facilitator of the course.
- The category that had the highest mean (4.57) was overall purpose and course value (see Table 1.3 below).

Table 1.1 Overview of Courses, Trainer, Location, Class Size, and Data Availability (N=320)				
Date	Trainer	Location	Class Size	Information Missing
9-20/21, 2016	Elaine	Freeport Globe Mine	20	Demographics
9-22/23, 2016	Elaine	Freeport Globe Mine	22	
10-24/25, 2016	Lori	Rio Tinto/ South Jordan	9	
10-26/27, 2016	Lori	Rio Tinto/ South Jordan	11	
11-30-12/1, 2016	Elaine	Pogo Mine	21	
12-13/14, 2016	Lori	Superior/Rio Tinto	21	
1-10/11, 2017	Elaine	Missouri Mining	27	
4-17/18, 2017	Elaine	KGHM, Ely, NV	17	
4-19/20, 2017	Elaine	KGHM, Ely, NV	13	
5-3/4, 2017	Elaine	Pogo Mine	17	Demographics
7-19/20, 2017	Lori	Mesquite Mine (Yuma, AZ)	18	
7-19/20, 2017	Elaine	Mesquite Mine (Yuma, AZ)	24	
8-14/15, 2017	Lori	Utah Mining Associations (Midway,	18	
8-21/22, 2017	Elaine	Great Basin College (Elko, NV)	26	
8-23/24, 2017	Elaine	Great Basin College (Elko, NV)	22	Evaluation
8-30/31, 2017	Tim	Dry Fork Mine	34	

<b>Table 1.2 Demographics Overview</b>			
<b>Gender (N=263)</b>		<b>Age Group (N=262)</b>	
	Count	Percentage	
Male	226	85.93%	Count 28 10.69%
Female	37	14.07%	Count 82 31.30%
<b>Is English your first language?</b>			
	Count	Percentage	
Yes	243	92.40%	Count 62 23.66%
No	20	7.60%	Count 15 5.73%
<b>Race (N=263)</b>			
	Count	Percentage	
Biracial	7	2.66%	Count 1 0.39%
Hispanic, Latino, or Spanish Origin	49	18.63%	Count 33 12.79%
Native Hawaiian or Other Pacific	2	0.76%	Count 30 11.63%
White/ Caucasian	192	73.00%	Count 160 62.02%
American Indian or Alaska Native	4	1.52%	Count 13 5.04%
Other	1	0.38%	Count 21 8.14%
Black	3	1.14%	
Asian	5	1.90%	Mean SD 17.6 10.68
<b>State of Mining Location (N=265)</b>			
	Counts	Percentage	
AK	15	5.66%	Mean SD 9.2 8.53
AZ	46	17.36%	
CA	35	13.21%	
IL	2	0.75%	
MO	24	9.06%	
NV	70	26.42%	
UT	35	13.21%	
WY	38	14.34%	
<b>Years in the Field (N=263)</b>			
<b>Years as a Supervisor (N=263)</b>			

**Table 1.3 Evaluation Category Overview Means**

	Course Materials and Design	Overall Purpose and Course Value	Quality of Instruction
Mean of	4.49	4.57	4.52
Rating Scale 1-5, 1= Strongly Disagree, 2= Disagree, 3=Not Sure, 4= Agree, 5= Strongly Agree			

**Table 1.4 Quantitative Evaluation Means from 15 courses\* (N= 275) \*\***

Categories	Course Materials and Design			Overall Purpose and Course Value			Quality of Instruction			
	Design of slide show easy to follow	Participant Workbook easy to follow	Participant Workbook provided enough room to write	Course met its goal to provide leadership development	Course provided applied skills for leaders	Course will have positive effect on my behavior	I would recommend this course to others	Right amount of time was spent on each topic	Course facilitator provided a high quality of instruction	Reflecting and reviewing content was useful
<b>Mean</b>	4.48	4.32	4.68	4.53	4.51	4.54	4.68	4.36	4.76	4.46
<b>N</b>	275	275	273	275	274	269	269	270	269	266
Rating Scale 1-5, 1= Strongly Disagree, 2= Disagree, 3=Not Sure, 4= Agree, 5= Strongly Agree										

\*One class held at Great Basin College in Elko, Nevada was missing their evaluations

\*\*Not all the items on the evaluations were completed so the highest count possible was 275, therefore number of participants (N) are indicated for each question