



THE GREATEST FIGHT IN WINTER!

WINTER ALERT!

Knock Out the Risk!



SEE INSIDE ...

**CHAMPION
THE MINER**

**CHALLENGER
"THE HAZARDS"**

VS

**WINTER ALERT
TIME: OCT - MAR**

**SANCTIONED
BY THE
U.S. DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION**

Contents

Feature

Winter Alert.....	3
-------------------	---

Safety

NIOSH “What Do Your Miners Know About Taking Refuge?”.....	6
------------------------------------------------------------	---

Historical

Pocahontas Mine 1911.....	12
---------------------------	----

Daniel Boone Mine.....	17
------------------------	----

Magma Metal Mine.....	21
-----------------------	----

Holmes Safety Council

JAHSA Western Kentucky Chapter.....	24
-------------------------------------	----

JAHSA Sunflower Safety Council.....	26
-------------------------------------	----

The Mine Safety and Health Administration and Joseph A. Holmes Safety Association Bulletin contains safety articles on a variety of subjects: fatal accident abstracts, studies, posters, and other health and safety-related topics. This information is provided free of charge and is designed to assist in presentations to groups of mine and plant workers during on-the-job safety meetings. For more information, visit the MSHA home page at www.msha.gov

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Winter



Alert

“Beat Winter Hazards, Win With Winter Alert”

“Conditions at underground and surface coal mines can change dramatically during the winter months,” said Joseph A. Main, Assistant Secretary of Labor for Mine Safety and Health. “We must be ever mindful of the seasonal changes that can affect our work environments.”

Low barometric pressures and low humidity, coupled with seasonal drying of many areas in underground coal mines, have contributed to the larger number of mine explosions during winter months. Other hazards include limited visibility, icy haulage roads and walkways, and freezing and thawing effect on highwalls at surface mines.

MSHA warns miners and operators at underground coal mines to follow safety checklists by ensuring adequate ventilation, apply-

ing liberal amounts of rock dust, conducting frequent and thorough examinations, and being familiar with emergency procedures to prevent coal mine ignitions and explosions.

Miners also are urged to be vigilant about keeping escapeways clear of impediments. Miners and operators of surface mines should examine the stability of highwalls, remove snow and ice from walkways, de-ice any equipment, and apply salt and sand liberally where needed.

During their normal inspection duties, MSHA inspectors will distribute posters, hard-hat stickers, a “practice ventilation awareness” pocket card and a “basic ventilation” compact disc PowerPoint presentation that can be shown and discussed during meetings with underground coal miners.

THE GREATEST FIGHT IN WINTER!

WINTER ALERT!

Knock Out the Risk!

CHECK YOUR LIST

- Ventilation
- Rock Dusting
- Examinations
- Escapeways



**DIRECT AT YOUR
MINE SITE**

JOE THE "HITMAN"

MINER
CHAMPION

VS

WINTER ALERT
"HAZARDS"
CHALLENGER

2011/12

**WINTER ALERT
TIME: OCT-MAR**

Sanctioned
by the
Department of Labor
Mine Safety and Health Administration

★★★THE MINE SITE IS WHERE IT'S AT ★ NO CABLE TV ★ NO INTERNET ★★★

Winter Alert: Examination Awareness

Examinations are the first line of defense for miners working in underground coal mines and are necessary to protect miners.

Diligent examinations will identify and enable correction of hazards and provide substantial measure of protection against mine accidents and emergencies.

Underground coal mines are dynamic work environments where working conditions change rapidly and without warning. Examinations are the first line of defense for miners working in underground coal mines.

Preshift and supplemental examinations require a certified person to:

- Examine for hazardous conditions such as float coal dust accumulations.
- Test for methane and oxygen deficiency.
- Determine if the air is moving in its proper direction.
- Take air measurements at specified locations as required.
- Check the refuge alternative for damage as required.
- Certify by initials, date and time that the examination was made.

Like the preshift examination, the on-shift examination is intended to identify hazards that develop during the shift.

Generally, the on-shift examination includes:

- Tests for methane and oxygen deficiency.
- An examination for hazardous conditions such as adverse roof conditions.
- Air measurements at specified locations.
- An examination to ensure compliance with the respirable dust control parameters specified in the mine ventilation plan.
- Certify by initials, date and time that the examination was made.

Weekly examinations are directed at hazards that develop in remote and less frequently traveled areas of the mine such as worked-out areas and bleeder entries.

Requirements for weekly examinations generally include:

- Tests for methane and oxygen deficiency.
- An examination for hazardous conditions such as missing or damaged ventilation controls.
- Air measurements at specified locations.
- Certify by initials, date and time that the examination was made.

“What Do Your Miners Know About Taking Refuge?”

by Robert H. Peters

Office of Mine Safety and Health Research
National Institute for Occupational Safety and Health

Over the years, several miners, such as those involved in the Sago and Darby mine explosions, have survived an initial disaster, but later succumbed to toxic gases before they could escape or be rescued. In 2008, regulations were passed that require refuge alternatives to be installed in all U.S. underground coal mines. If miners understand when and how to use refuge chambers and other refuge alternatives effectively, their chances of surviving until mine rescue teams arrive are greatly improved.

Mine safety experts agree that miners should be taught that escape should be their first priority in response to most mine disasters. Only when escape is not feasible should miners consider using a refuge alternative. This point is stressed throughout all of NIOSH’s training about refuge alternatives. Given that situations may arise in which escape is impossible, safety experts also agree that it is important for all miners to know three things about using refuge alternatives:

- 1) How to operate them;
- 2) When to use them;
- 3) How it feels to await rescue while inside a refuge chamber.

Operations Training

Obviously, miners need to know how to operate the refuge chambers at their mine. Several different types of refuge chambers are being manufactured for use in U.S. coal

mines. Each manufacturer should provide instruction manuals that explain how to locate, set up, move, inspect, maintain, and operate their units. To supplement the information in these manuals, we suggest reviewing the guidance provided in the report, “Guidelines for Instructional Materials on Refuge Chamber Setup, Use, and Maintenance.” In addition to covering the basics of chamber setup, use, and maintenance, this report provides recommendations on how to develop effective training manuals, and includes a list of items that would be helpful to place inside refuge chambers.

We also recommend reviewing the guidance provided in the report, “Recommendations for Refuge Chamber Operations Training.” This report provides an overview of major topics trainers should be sure to cover when teaching miners how to operate a refuge chamber. It provides several suggestions concerning how to effectively convey information to miners about refuge chambers that are based on principles of adult learning theory. It is vital that miners be able to recall and apply this information in the event of a mine emergency. This report also contains a useful list of the “Top 20” things miners need to know about operating refuge chambers.

Finally, we recommend that mine trainers review the training module, “How to Operate a Refuge Chamber: A Quick Start Guide” as a starting point for developing mine-specific

refuge chamber operations training. This module includes an Instructor's Guide and 26 PowerPoint slides explaining the four basic phases to operating all types of refuge chambers. Trainers will need to modify or supplement these slides with more detailed information concerning how to operate the specific model of chamber or other refuge alternatives used at their mines.

Decision-Making Training

Miners also need training to help them make good decisions about when they should and should not use a refuge chamber. In an emergency, miners should first try to escape from the mine if at all possible. They should consider using refuge alternatives only when all escape routes are physically blocked or if they are too badly injured to get out of the mine. In some instances, it may be advisable to use a refuge alternative as a way station—a safe place to temporarily stop, rest, communicate, and plan what to do next. NIOSH has developed three highly interactive training modules to help miners understand the types of decisions they may have to make during their escape, and to help them make choices that optimize their chances of survival given various scenarios. These three interactive problem-solving stories are called, "Harry's Hard Choices," "When Do You Take Refuge?" and "Man Mountain's Refuge." As miners listen to the stories unfold, they are asked to make decisions and given immediate feedback about their choices.

Expectations Training

The third type of information miners should know is what to expect once inside a refuge chamber. Refuge chambers are a relatively new technology. Most miners will never need to use one. But for those who do, it would be beneficial for them to know ahead

of time what to expect in order to better cope with this highly unusual and stressful environment. To that end, NIOSH has produced a training module that provides miners with a basic understanding of the supplies and facilities inside refuge chambers, and what it might be like psychologically and physically to be inside a chamber for a few days. This module, called "Refuge Chamber Expectations Training," includes a multimedia Adobe Flash presentation containing pictures, audio, video, and interviews with miners who used a refuge chamber in an actual emergency. Altogether, eight publications are available from NIOSH to assist mine safety trainers with developing and delivering effective training about refuge alternatives. Six of these publications contain actual training modules and the other two reports provide tips, suggestions and examples of how this information can be effectively conveyed to miners. Table 1 (Page 8) briefly summarizes each of these 8 publications.

Proposed Training Plan

Although it is very important that miners understand all three types of information about refuge chambers, it cannot be accomplished all at once. There is simply too much important information for most people to comprehend and remember in one sitting. These topics will need to be covered in a series of

training classes that are spaced over time. Table 2 shows one possible way to conduct refuge training over the course of a year. We suggest starting by using "Emergency Escape and Refuge Alternatives" to provide an introductory overview of what miners

will need to know about emergency escape and refuge alternatives.



(Continued on Page 10)

Table 1
Refuge Chamber Training Products

Categories and Names of Publications	Contents
Introductory Overview	
“Emergency Escape and Refuge Alternatives” Information Circular 9525	A brief introductory Microsoft® PowerPoint® presentation that provides an overview of what miners need to know about emergency escape and the use of refuge chambers. This module consists of 10 slides and an instructor’s guide.
I. Refuge Chamber Operations Training	
“How to Operate a Refuge Chamber: A Quick Start Guide” Information Circular 9524	Provides a customizable template (26 slides) that trainers can use to instruct miners on the type of refuge chambers installed at their mine. Explains the four fundamental steps to operating refuge chambers in underground coal mines. Unlike the other training modules, this module is not a ready-to-use off-the-shelf product. Due to the variety of chambers on the market, trainers will need to supplement this basic template with information specific to the type of refuge at their mine.
II. Decision-Making Training	
“Harry’s Hard Choices: Mine Refuge Chamber Training” Information Circular 9511	This paper-and-pencil decision-making simulation allows miners to work through a real-life scenario that teaches them alternatives to consider when deciding whether or not to enter a refuge chamber.
“When Do You Take Refuge?: A Computer-Based Training Module” Report of Investigations 9682	In this computer-based decision-making simulation, miners choose from among various courses of action while escaping a mine fire (such as entering a refuge chamber or escaping alone). It is a branching exercise, and trainees are asked to make different sets of choices depending on their earlier decisions.

Table 1 (Continued)

<p>“Man Mountain’s Refuge: Mine Refuge Chamber Training” Report of Investigations 9685</p>	<p>In this paper-and-pencil decision-making simulation, miners must choose whether or not to use a hardened room refuge chamber while escaping from a mine fire. The exercise covers escape strategies and procedures including choice of routes, use of emergency breathing apparatus, information gathering, and communications. It also addresses how to recognize and respond to co-workers experiencing symptoms of traumatic incident stress.</p>
<p>III. Expectations Training</p>	
<p>“Refuge Chamber Expectations Training” Information Circular 9516</p>	<p>This multimedia training module incorporates audio, video, animation and text to teach miners what to expect inside of a refuge chamber. This training exposes miners to what it might be like emotionally and physically inside a refuge chamber over time.</p>
<p>Additional Guidance for Trainers</p>	
<p>“Recommendations for Refuge Chamber Operations Training” Report of Investigations 9683</p>	<p>Provides an overview of major topics to cover when teaching miners how to operate a refuge chamber. Also includes a list of the “Top 20” things miners need to know about operating refuge chambers.</p>
<p>“Guidelines for Instructional Materials on Refuge Chamber Setup, Use, and Maintenance” Information Circular 9514</p>	<p>Provides recommendations on how to develop an effective training manual to teach miners how to set up, inspect, move, use and maintain refuge chambers. It also includes a list of items refuge chambers should contain and discusses seven essential topics that all manuals need to address.</p>

This training module provides answers to some very basic questions including:

- **What are refuge alternatives?**
- **Why are they important?**
- **When should I use a refuge alternative?**
- **What would it feel like to be inside a refuge during an emergency?**
- **What should I do once inside the refuge?**

Following this overview presentation, trainers should provide in-depth training about how to operate the specific types of refuge chambers or alternatives in use at their mine. To help prepare for this training session, trainers may want to review the materials available from their refuge chamber manufacturer, as well as Information Circulars 9514, 9524, and Report of Investigations 9683. This will be enough material for the first training session.

The second training session could address some of the decision-making aspects of when to use a refuge alternative. Any of the three Decision-Making exercises could be used for this session (i.e., Harry’s Hard Choices, When Do You Take Refuge? or “Man Mountain’s Refuge”). The third training session could be devoted to the expectations training module. The fourth training session could be devoted to one of the other two decision-making exercises.

Toward the end of each training session, trainers should always set aside a little time for reviewing and evaluating miners’ ability to recall previously presented information about refuge chambers. Based on these knowledge checks, remedial training should be conducted as needed.

Table 2
Suggested One-Year Training Plan

1 st Quarter	2 nd Quarter	3 rd Quarter	4 th Quarter
Emergency Escape and Refuge Alternatives (15 minutes)	Harry’s Hard Choices (60 minutes)	Refuge Chamber Expectations Training (30 minutes)	When Do You Take Refuge? (60 minutes)
How to Operate a Refuge Chamber: A Quick Start Guide (30 minutes)	Assess miner’s retention of previously covered information and provide remediation as needed (10 minutes).		

In conclusion, the ultimate goals of a comprehensive training program on refuge alternatives are:

- an increased probability that miners will use chambers when appropriate,
- a decreased probability that miners will use chambers when it is not their best course of action, and
- an increased probability that miners who choose to enter a chamber will know how to use it correctly.

There are several ways to obtain free copies of NIOSH's reports and training materials on refuge alternatives. They can be downloaded from the following webpage:

<http://www.cdc.gov/niosh/mining/topics/training/refugechambers.htm>

Instructions for obtaining free hard copies of NIOSH publications can be found at <http://www.cdc.gov/niosh/mining/aboutus/ordering.htm>

They can also be ordered by calling 1-800-CDC-INFO (1-800-232-4636)

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We especially wish to thank the mine trainers and coal miners who participated in field tests of these training modules. Their evaluations and suggestions for improvements were also extremely helpful.

Disclaimer: The findings and conclusions in this article are those of the author and do not necessarily represent the views of the National Institute for Occupational Safety and Health. ■



Sign pointing to a Refuge Chamber.

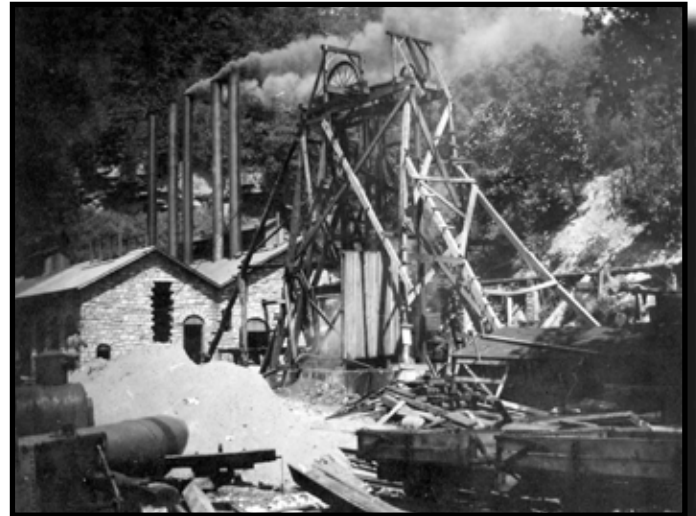
Pocahontas Mine Explosion 1911

Report on Standard Pocahontas
Mine Explosion
August 1, 1911
Welch, West Virginia

Story of the Explosion

The day of the explosion was a clear warm day. The day shift had been working all through the day and no unfavorable conditions had been reported. The night shift of nine men had been at work for several hours. They were all working in the one entry that was being driven to connect the No. one shaft. The temperature was so high (93 degrees wet bulb) at the face due to the steam jet and exhaust steam that the men could only work a short while and would then have to be relieved. This required a large number of men in the one entry to keep the work going continuously. The majority of the men on this shift had been employed by the Patterson Construction Co. of Pittsburgh, PA in sinking the shaft. The Patterson Co. had contracted to drive the entries until the two shafts were connected and the work was in charge of Superintendent Upholster who had supervised the sinking of the shafts. John Smith was the foreman in charge of the night crew.

The face of the entry had been undercut to about five and a half feet and three holes had been drilled and charged with two sticks each of the permissible explosives and the shot firing wire connected at this end.



The men then went back to the shaft bottom carrying the lighting wires and lights back with them and disconnecting these wires at the switch. The firing wires were then connected to the switch and the shots fired. Immediately after the shots were fired the compressed air was turned on the line leading to the face for the purpose of clearing out the smoke. This compressed air line operates the cutting machine.

A few minutes later, John Smith, foreman, accompanied by Mr. Howard, connected the lighting wires and started for the face fastening the wires as he went. The last bulb was fastened to a cross timber about eight feet from the face. Smith then yelled to Howard to have the men at the switch throw in the switch. This was done and the bulb at the face lighted but the next one which was back about twenty-five feet did not light. Smith went back to this bulb and attempted to screw it in. Howard, who was standing alongside Smith, had just turned his back to start out on account of the smoke and related to the writer that as he turned he heard glass break and the same instant he was enveloped in flame. He knew nothing more until he was brought to the surface.

Evidence of the Explosion On the Surface

The explosion was plainly heard at the surface and the men investigated and found smoke coming out of the shaft. The men working in the No. one shaft were then telephoned for and brought to the surface. Mr. Upholster, who lives a couple hundred yards from the shaft, heard the explosion and thinking something was wrong ran down to the mine. He took charge and lowered a safety lamp in the bucket and allowed it to remain in the bottom for a few minutes. When raised it was still lighted. Ted Sweby, who had been called from the No. one shaft, asked for volunteers to go down with him. As no one volunteered, he went down alone in the bucket. The cage landed on something soft and when Sweby stepped out he found that it was the body of Bannister. He loaded him in the bucket and brought him to the surface where he died about twenty minutes later. He then brought out Tucker, Fields, Howard, and Smith, having to carry the three latter some distance as shown by the map. Later, with assistance, the body of Hills and Arnold and Williams and Lilly were brought to the surface. Hills was the only one dead when found. He had a fracture of the right arm and left leg and was badly burned from the abdomen up. Arnold had a slight pulse when brought to the surface and died a few minutes later. Probable cause of death resulted from a fracture on the back of his head. He had slight burns on the right side of face and neck. Bannister died about twenty minutes after he was brought to the surface. He was badly burned about the face and neck. Death was caused by inhaling flame. John Smith (Foreman) died



in the hospital on August 10. The doctor reported that death was caused by inhaling flame as his throat was swollen shut. He was badly burned about the face and neck and his hair was burned off. Henry Lilly died August 4. He was badly burned about the face and neck. His right arm was broken in two places. Charles Fields died on August 8. Cause of death – burns and exhaustion. He was badly burned about the chest, face, arms, and hands. His right arm was broken – both forearm and upper arm. The other three men were in the hospital at the time of this investigation and will recover. A photograph of these three was taken by the writer on the porch of the Miners' hospital at Welch on August 9.

Notes of Evidence by Bureau of Mines Engineers

On the morning of August 2, Mr. Paul received a report from the Associated Press which stated that an explosion had occurred on the night of August 1 in a mine of the Standard Pocahontas Coal Co. at Shannon near Bluefield, WV. in which four were killed and nine hurt. Being unable to locate Shannon, Mr. Paul called the Bluefield Telegram on the telephone and received the following

information:

“The mine is located near Welch and the General Manager lives at Welch. It is a shaft mine three hundred feet deep and mine only in three hundred feet. No coal had been shipped. Four were killed and several injured. Inspector Nicholson was at the mine but could not be com-

municated with as line was out of order. Will make effort to learn if rescue car is needed and wire Pittsburgh. Think all have been

recovered from the mine. Mr. Paul telegraphed the company at Welch, W.Va., asking if assistance was needed and also notified cars six and seven to be in readiness to answer a call if wired to move.

At 2 p.m. of the same day, Mr. Paul received the following telegram from the Bluefield Telegraph Co.: "Three men killed and six injured in Standard Pocahontas explosion. No need of aid as all men were gotten out within an hour after explosion."

At 8:05 a.m. August 3, the following telegram was received by Mr. Paul from the Standard Pocahontas Fuel Co. at Welch: "Thanks for offer of assistance. It is unnecessary; all men recovered."

On August 7, 1913, the following telegram was received by Mr. Paul from the Standard Pocahontas Co. in answer to an inquiry of his asking for information regarding explosion and location of mine: "Explosion occurred in connecting entry between two shafts. Will be working in same Monday night. Mine located two miles west of Welch, W.Va."

The writer was directed by Mr. Paul on August 6 to make an investigation of this explosion. He directed me to proceed to Bluefield and look up Inspector Nicholson and arrange with him to inspect the mine. The writer reached Bluefield on the evening of August 7, having telegraphed Inspector Nicholson on the way and was met at the train by him. He arranged to accompany me to the mine on the following morning. On the morning of August 8, the writer and Inspector Nicholson arrived at Welch and after much trouble secured a mule and buggy and drove to the mine where we were met by General Superintendent Vest and Assistant Superintendent Upholster. The rest of the day was spent in examining the No. one shaft, taking air measurements, gas samples, and coal samples. The descent was made in the bucket and at the time the pumps at the two water rings were not operating. Water was falling down the shaft from the rings in great volume so that when we reached the bottom the bucket was filled with water above boot tops. The

party consisted of Nicholson, Vest, Upholster, and the writer.

After about an hour and a half spent in the shaft, all the members of the party had left on account of the high temperature except the writer, who remained down about three hours. Before I had completed taking the coal samples I entirely disrobed. It was a very good place for taking a Turkish bath.

The following day, August 9, was spent in making an examination of No. one shaft securing coal samples, air samples, and air measurements, taking photographs, interviewing the survivors and assisting the engineer in making a map for this report. Returned to Pittsburgh on the night of the ninth.

At the time of the investigation, which was seven days after the explosion, the damage to the mine had been repaired but the face of the entry had not been disturbed since the



explosion. Mr. Cooper, a Mining Engineer at Welch, made a survey with very complete notes on the day following the disaster. I obtained a copy of his map and this with the information I obtained is incorporated in a map attached to this report. From what evidence could be obtained it was learned that in the entry on the North side of the shaft all brattice cloth for conducting the air to the face was blown down. The brattice cloth dividing the shaft into two compartments was also blown

out for a distance of twenty feet up the shaft. On the South side of the shaft no damage was done except that the line brattice was partly blown down. The wires were up in this entry. No unusual conditions were found in this entry on the day following the explosion other than that gas was detected at the face.

At the face of the North entry it was found that the working face was sixteen feet wide. This was due to an apprehension that the entry being driven from No. one shaft was to their left. For this reason they widened out on the left and had undercut the left side for a width of about ten and a half feet and had fired three shots which did their work nicely as shown on the map by the pile of coal at the face. The explosion caused no damage at the face. A puncher board and four shovels were found just as they had been left by the workmen. The incandescent light suspended from the cross timber near the face which was surrounded by a wire guard was not damaged except that the tip of the bulb was broken off, but the filament was not broken.

No. two bulb back a distance of about twenty-five feet from No. one and the one which probably caused the ignition was broken and pieces of glass were still sticking in the socket. The bulb at the junction where this connecting entry turns off the main was not damaged at all. Some slightly charred dust was observed in the recesses of this junction and a sample of the dust taken, analysis of which is in the addenda. This was the only place in the mine where charred dust was observed. Inspector Nicholson maintained that previous to the explosion the line brattice had been carried so close to the rib on the return side that sufficient ventilation had not been maintained. Consequently, after the explosion he had them change the line brattice to follow along the right rib so as to have the greater velocity on the intake air and also give a larger area. Mr. Vest, the Superintendent, claimed that there were places in the airway erected by Nicholson just as restricted as what were there prior to the

explosion and if the explosion had resulted from this restricted airway then the same occurrence was liable to happen again even though the mine had been put in shape under the direction of Inspector Nicholson and pronounced safe.

To determine this point, measurements were made of the most restricted area of the present airway and also of restricted sections of the old airway. These measurements are given on the map. The measurements given for the old brattice are by Cooper except at point marked "A" which appeared to be the most restricted point. The greatest area that was possible to have at this point was 8.5 sq. ft. That was only possible in case the prop to which the brattice was attached was set directly against the rail and also set in a vertical position. It not being possible to set the prop that close to the rail I should judge that the area here was not more than seven sq. ft. and was the most restricted point in the airway.

At point marked "B" which was the most restricted point in the intake of the present airway, the measurements were as follows: 3 ft. wide by 4' 9" high, Area 14.25 sq. ft. The velocity of the air at this point was taken when the steam jet was not operating but pumps were running. These conditions were said to have prevailed at the time the explosion occurred. The velocity was found to be forty-five feet per minute. Velocity taken at the same point when steam jet was in operation was one hundred eighty-two ft. per minute. Total quantity two thousand five hundred ninety-three sq. ft. per minute. On the return side of the temporary brattice erected by Nicholson a few feet away from shaft bottom measurements taken by Cooper and Vest and recorded in map give an area of only five feet six inches sq. ft. About twenty feet inside this point on the intake side the measurements taken by the writer were as follows: Width 6 ft. 3 in.; height 6 ft.; velocity of air 125 ft. per minute. Total quantity of air 4,687 cu. ft. per minute.

Conclusions and Lessons

The explosion was caused by the ignition of gas by the breaking of an incandescent bulb. The gas probably was an accumulation of methane liberated by the three drill holes at the face and after the breaking down of the coal and also from the combustible gases liberated by the explosives. The amount of combustible gases from the latter would be small as both Monibel and Colliers give off little gas. The ventilation at best was not very effective and the appliances for producing the ventilation may not have been in operation just prior to the explosion, though this could not be corroborated. Otherwise, I don't see how an explosive mixture of gas could have accumulated twenty-five or thirty feet back from the face and on the intake where the ignition occurred unless this condition may have prevailed on account of the large area of the intake air-way compared with the small area of the return in several places (one place the writer figured it could not have been more than seven sq. ft.) the velocity in the intake would be very low and when the compressed air was turned on the pressure on the return side due to the friction of the restricted air way might have been greater than the ventilating pressure on the intake side and consequently the gases and smoke forced out on the intake side by the compressed air.

This supposition is borne out by the statement of Howard who was with Smith and who had started out on account of the smoke being so thick just as the explosion occurred.

That it could have been an ignition of coal dust is, in the opinion of the writer, out of the question, on account of the wet condition and saturation of the dust as shown from the analysis of the dust collected at and near the point of ignition. A comparison of the volatile fixed carbon ratio from analysis of the face

coal and dust is evidence of the dust having been little affected.

That these dangerous conditions existed was due partly to lack of experience on the part of the officials and miners. Due to their inexperience they did not comprehend the dangers incident to working a mine generating gas as freely as this one. Sufficient precautions were not taken in regard to the ventilation and the examination for gas especially before firing shots. The two Wolf lamps in the mine at the time of the explosion had both gone out some time before according to the evidence of the survivors so that no examination for gas could have been made before the shots were fired. The one lamp was suspended from a timber some distance back from the face so that it may have been extinguished by an explosive mixture prior to the firing of the shots.

Another condition which existed prior to the explosion and which may have had some bearing on it is the fact that no provision was made at the mouth of the shaft for conducting away the return air and it could, therefore, mix with the intake air.

It must be admitted that conditions for working in the No. two shaft were extremely bad, in fact the worst that the writer has ever encountered and it was difficult to obtain or keep men of any type.

The bravery of Ted Sweby is worthy of mention. Going down the No. one shaft in the bucket under favorable conditions tries a man's nerve, yet he went down alone a few minutes after the explosion had occurred and without knowing what the conditions were like. Several of the survivors owe their lives to the quick action of Sweby. ■

The Bureau of Mines at Vincennes received word of the disaster about 8:30 a.m., Mr. James Fugate, District State Mine Inspector, having left word with Mrs. Fugate to call the Bureau at the time he left for Daniel Boone. A short time later a telephone call was received from Mr. J.J. Forbes, Pittsburgh, who had received word of the explosion from the Associated Press.

An unsuccessful attempt was made to communicate with the mine to ascertain the seriousness of the explosion in order that the Washington and Pittsburgh offices of the Bureau might be advised. In the meantime, Mr. L.H. McGuire, Associate Mining Engineer, who was at the time underground at the No. 8 mine of the Old Ben Coal Corporation, West Frankfort, Illinois, and Mr. W.O. West, Senior Safety Instructor, who was conducting mine rescue training at Terre Haute, Indiana, were advised. Mr. J.C. Reardon, Junior Mining Engineer, stationed at Vincennes, was confined to his home because of illness and was not available.

In Mr. Forbes' telephone communication he suggested sending additional help, and failing to get authentic information concerning the seriousness of the disaster, C.A. Herbert in a subsequent telegram suggested to him that Messrs. Powell and Park of the Norton, Virginia Station be sent to Daniel Boone.

Mr. C.A. Herbert left Vincennes about 10:15 a.m. and arrived at the mine about 2:00 p.m. Mr. L.H. McGuire arrived from West Frankfort, Illinois about the same time, as Mr. W.O. West arrived at the mine with the rescue truck and equipment about 5:00 p.m. Messrs. Powell and Park left Norton, VA Station about 3:30 p.m. and arrived at the mine about 1:00 a.m. the following morning.

Messrs. L.H. McGuire and W.O. West went below soon after their arrival and remained below assisting with recovery operations until completed, about 4:00 a.m. October 28.

Mr. James Fugate, State Mine Inspector, arrived at the mine shortly after 8:00 a.m. with the State rescue truck and equipment,

and was met by officials from adjoining mines with their rescue equipment.

Mr. G.M. Patterson, Chief Inspector, Department of Mines and Minerals of Kentucky, in company with Mr. L.W. Huber of the Mine Safety Appliances Company, arrived at the mine shortly after 3:00 p.m. and went into the mine immediately. Mr. Patterson assumed charge of recovery operations.

After the men had been rescued from the shaft bottom, Mr. Fugate, together with a picked crew of mine officials and men, started recovery operations. The fact that none of the brick stoppings along the main east entries had been disturbed between the air shaft and the 7th north entries, greatly facilitated these operations. A canvas curtain was first erected across the overcast near the bottom of the air shaft to divert most of the air up the north air course. A curtain was then hung in the opening between the main haulage road and the north air course at the 6th south to replace a door which had been damaged. At the 6 ½ north it was again necessary to curtain over a damaged door which was permitting air to short-circuit. At this point three bodies were located, one of which was that of William Compton, mine foreman. Compton was wearing an electric cap lamp while the other two men each had carbide lamps.

From the 6 ½ north to the 7th north rapid progress was made as none of the masonry stoppings along this entry had been disturbed.

A telephone was then installed in the air course between the 6 and 6 ½ north entries establishing communication between this point and the surface, which was of material assistance.

All stoppings in the 7th north entries had been blown out and progress from this point was slow and required the extensive use of All-Service gas masks.

After Mr. Patterson and fresh crew members arrived at the scene of recovery work, James Fugate, State Mine Inspector, and others who had been underground since shortly after the explosion, went on top.

INVESTIGATION OF CAUSE OF EXPLOSION

As a line curtain was being extended up the room parallel to the 7th north, a smoke haze was observed and as this room was suspected of making gas because of a fault that had been encountered, it was deemed advisable to explore this room for possible fire before advancing the air farther. Accordingly, Messrs. Patterson, Huber, and McGuire, wearing gas masks, made a careful exploration before any additional air was turned into this room. The methane tester showed an explosive mixture of gas for a distance of 30 feet back from the face. The CO detector also indicated the presence of 0.5 percent of carbon monoxide. This methane had accumulated following the explosion during a period of approximately 9 hours and indicated conclusively, that considerable methane was being liberated in this room. No fire was found and the ventilation was restored by extending a line curtain to within a short distance of the face. Four bodies were then recovered from the room and electric cap lamps were found on all of them.

The air was next conducted to No. 3 room off the right hand air course of 7th north, by means of a line curtain, and five additional bodies recovered. Two bodies were recovered on the 7th north entries and the last body was found about 10:00 p.m. on the main east haulage road between the 6th and 6 ½ north entries. By 1:30 a.m. October 28, all of the bodies had been brought out to the mouth of the 6th north entries.

In order that the bodies could be taken out the main haulage road in cars, it was necessary to clear this entry of afterdamp. This was accomplished by short-circuiting all of the air out the main haulage road at the 6th north. Messrs. Patterson, Huber, and McGuire walked out the main haulage road to the slope and made tests of the air to make sure it was safe for the crews to bring the bodies out that way. Mules were then taken into the mine and the bodies were hauled out in mine cars arriving at the outside about 4:00 a.m.

An investigation to attempt to determine the cause of the explosion was started at 2:30 p.m. on October 28, 1941, by the following investigators: G.M. Patterson, Chief Mine Inspector, and James Fugate, District Mine Inspector of the Kentucky Department of Mines and Minerals; L.W. Huber, Mine Safety Appliances Company; L.H. McGuire, G.T. Powell, W.R. Park, of the Bureau of Mines.

The evidence of force disclosed the fact that the explosion had come out of the room parallel to the 7th north entry and it was agreed by all parties to the investigation that it had been due to the ignition of a body of explosive gas in this room. In fact, gas could be detected at the face of this room despite the line curtain extending up nearly to the face. The analysis of a sample of air collected at this time showed 3.8 percent methane. Heavy deposits of coke were also observed in this room.

The coal had all been loaded out of this room on the previous shift and the pan line was empty. It is very unlikely, therefore, that the Duckbill loader had been started. The cutting machine in this room had been sumped in and was in position to start cutting across the face, and at the time of the investigation it was thought that the controller was in the "on" position. A more thorough subsequent inspection, however, disclosed the fact that the controller was in the "off" position and that the bit clutch was in a neutral position. In other words, the machine was not in operation. The machine runner on the previous shift stated that the machine was in exactly the same position in which he had left it and that he was certain it had not been operated since he left it.

At the time of the investigation it was reported that Dan Pearson, African American timberman whose body was found along the rib and about 100 feet back from the face, had been wearing an open light and it was therefore believed that this open light might

have been the source of ignition. Subsequent information and investigation proved that this was incorrect and that he had been wearing an Edison electric cap lamp. This error was due to the fact that the man's cap, together with the headpiece and part of the lamp cord, had been blown away and the battery was hidden by his jacket.

The undertaker at Madisonville found the battery with the short piece of cord on the body and returned it to the mine.

No holes had been drilled at the face and no electric drill was in the room. No explosives or detonators were found.

It would appear; therefore, that open lights, electric arc, and explosives are eliminated as possible sources of ignition.

The men at this mine were permitted to smoke at will and it was disclosed by the management that Dan Pearson, the timberman who was at first thought to have been wearing an open light was an inveterate pipe smoker and it is thought that possibly he or one of the other men in this room may have ignited the gas when attempting to smoke.

The key-locked Koehler flame safety lamp belonging to the mine foreman was found at the junction of the 7th north and the crossover to the parallel room entry, approximately 625 feet outby the face. While the globe had been broken by the force of the explosion it is not thought that the lamp had been moved very far from its position before the explosion. The foreman's body was found on the main air course at the 6 ½ north and it is thought likely he had sent the lamp in with someone, to the point where it was found and had not as yet been in the 7th north entries to make an inspection for gas.

The rotary converter supplying power to the mine was started directly after the fan had been started shortly after 6:00 a.m. The blower fans were supposed to be left connected to the trolley circuit to start operating as soon as the power came on. If this were the case the blower fan at the place where the explosion occurred had been in operation

about an hour when the explosion occurred and should have had the place cleared of gas. However, there is no certainty that the fan had been in operation for that length of time. In any event, it is certain that an accumulation of explosive gas had formed in the room parallel to the 7th and was ignited. The most likely source of ignition would appear to have been a lighted match in the hands of one of the workmen when attempting to smoke.

The direction of forces had all been outby from the room in which the explosion originated. Heavy deposits of coke were observed in this room and also in the rooms off the right entry. Lighter deposits were observed along the 7th north entries, thus showing conclusively that coal dust had entered into the explosion.

Flame extended out into the main entries for a short distance but had died out before reaching the 6 ½ north entries as none of the three bodies found at this point had been burned.

The force had also rapidly died out along the main entries. Damage to the door at the 6th north and the blown-out wood stopping in the air course at these entries were the last evidence of violence observed.

It is believed that expansion played an important part in stopping the explosion as it is certain that there had not been enough rock-dusting done to materially affect the incombustible content of the coal dust.

Property damage as a result of this explosion was confined almost entirely to the 7th north entries in which it originated and was exceedingly small considering the number of lives lost. The damage could be repaired and work resumed in the affected section in a few days. ■

Magma Metal Mine Explosion

SYNOPSIS

On August 10, 1993, at about 9:45 p.m., an ore pass raise collapsed at Magma Copper Company's Magma Mine while four persons were working inside. The fall of materials accident resulted in the deaths of four miners: Jeff S. Christiansen, Operations Tech 1; John H. Dalton, Jr., Materials Handling Group Leader; Alfred D. Edwards, Materials Handling Team Leader; and Nicholas P. Truett, Support Tech III.

The accident occurred at the 865 Raise when the miners climbed into the manway compartment to free a hang-up of material in the ore pass side of the structure. Armored cribbing, dividing the manway and the adjoining ore pass compartments, dislodged and allowed ore, cribbing, and timber to fall into the manway, striking and killing the four victims. The raise, which had been constructed by an independent contractor, Dynatec Mining Corporation, had been opened for production about six weeks before the accident. It was subsequently closed to repair damage from structural settlement and blasting, and then placed back in production the night before the accident.

The 865 Raise was designed as a timber-framed ground support structure comprised of two compartments, a manway and an ore pass. The raise was 364 feet high and framed with 10-inch by 10-inch timber. A

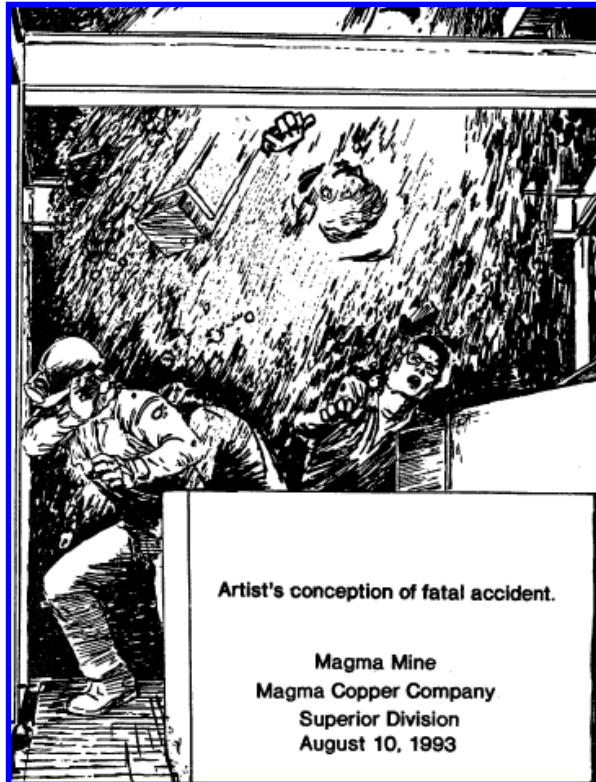
single bearing set was hitched into the rock and encased in concrete at the bottom of the timber structure.

The 865 and two other raises had been designed to transfer ore, ventilate, and provide a secondary escapeway. During development of access drifts and a borehole for this project, loose and soft ground was encountered causing Magma to abandon plans for the three raises and to incorporate all three junctions into a single raise, the 865.

The poor ground conditions causing the development problems were located near the site selected for the 865 Raise. Consequently, Magma said they designed the raise for adverse ground conditions. However, adverse ground was not encountered during

development of the raise and the design was not modified to be appropriate for the ground in which the raise was developed.

About a month after the 865 Raise was first used for production and 12 days before the accident, 60 to 100 cubic yards of a water, sand, and cement mix, normally used for backfilling slopes in the mine, was dumped into the raise. Once the mix was in the raise, muck was not withdrawn from the raise for about 20 hours, allowing the cemented mix to set, forming a plug. As a result, hang-ups occurred in the ore pass compartment and Magma blasted the constriction in attempts to free the ore.



Artist's conception of fatal accident.

Magma Mine
Magma Copper Company
Superior Division
August 10, 1993

Six days after the mix was dumped, the 865 was closed to repair damage from the blasting and raise settlement. Inspections conducted by Magma and Dynatec revealed eight to ten inches of settlement from Set 8 through Set 20. There was joint separation, a broken divider plate, sheared blocking, loose and broken ladders, displaced landings, movement of the divider wall toward the manway, and divider cribbing and ore in the manway. Besides settlement, the cribbing in the manway was evidence that the divider posts were moving outward, away from one another. These conditions indicated that the raise was in a state of impending failure. The MSHA investigators determined that an imminent danger existed as defined in Section 3(j) of the Federal Mine Safety and Health Act of 1977.

The single bearing set at the bottom of the timbered structure bore the entire load of the raise, about a half million pounds, when the raise was empty. Although a number of repairs were effected, no effort was made to



Drawing of Magma Mine fatality.

stop the settlement or correct the outward movement of the timber framework.

Magma decided that the raise be returned to service by midnight shift of August 8, 1993. The raise was placed back in production at some time during the evening shift of August 9. Magma began dumping in the raise as soon as it was available. Ore was pulled for the balance of this shift and through the succeeding shift without unusual incident. Dumping continued in the raise and ore was not pulled during day shift, August 10.

Ore was pulled during the evening shift and the raise was emptied to about Set 8 where it was reported to be hung-up. Two of the victims tried unsuccessfully to free the hang-up by blasting. They sought assistance from two supervisors who joined them later in the shift. When the four miners entered the raise, the ground support structure failed, fatally injuring them.

Background

Prior to ceasing production at the Magma Mine in 1982 because of low copper prices, Magma Copper Company was a subsidiary of Newmont Mining Corporation. From 1982 through 1985, a small maintenance crew pumped water and kept the mine available to reopen. The company decided to permanently abandon the operation in 1985 and removed pumps and electrical equipment. The mine was allowed to flood in 1986. Magma Copper Company separated itself from Newmont Mining Corporation about this time and became an independent entity.

During late 1988 and early 1989, Magma considered reopening the mine due to an increase in copper prices. For about two years, Magma hired a series of independent contractors to pump water from the mine and rehabilitate the shafts and underground workings.

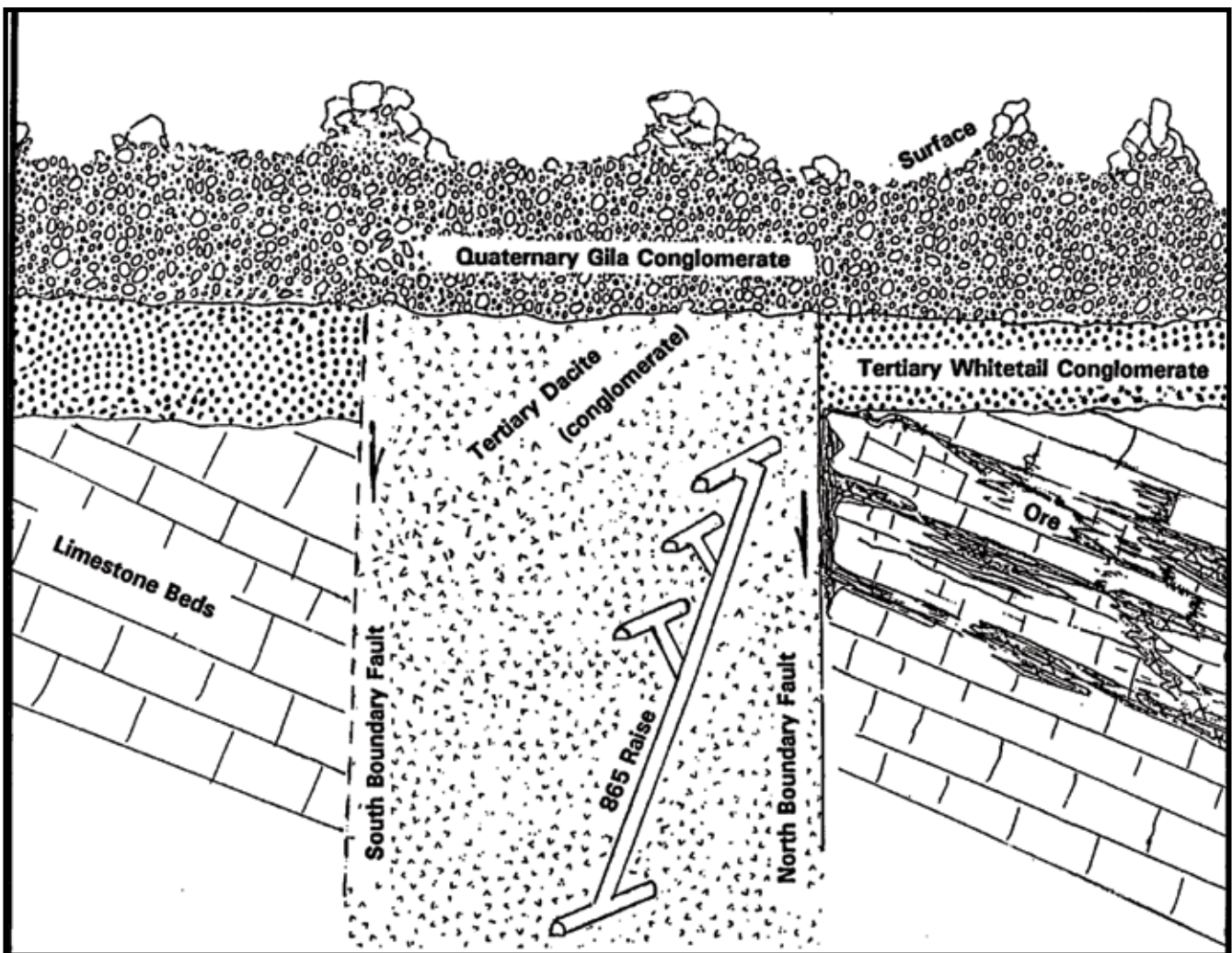
The mine historically used relatively small stopes, short raises and a light rail system. While the mine was being restored, Magma developed plans to change the mine from

a relatively localized mining system to an integrated operation that depended more on ramped access to stopes, centralized maintenance, and concentrated haulage. The new approach, referred to by Magma as the Ramp, Orepass, Rail, Shop (RORS) project would be composed of larger ore passes, heavier rail haulage, and a centralized shop.

Some mining activities were started on March 5, 1990, with activity gradually increasing. Ore was produced during the latter part of the year. On November 5, 1991, an under-

ground fire interrupted mining for three to four weeks. Production resumed in December 1991 and continued until early January 1993.

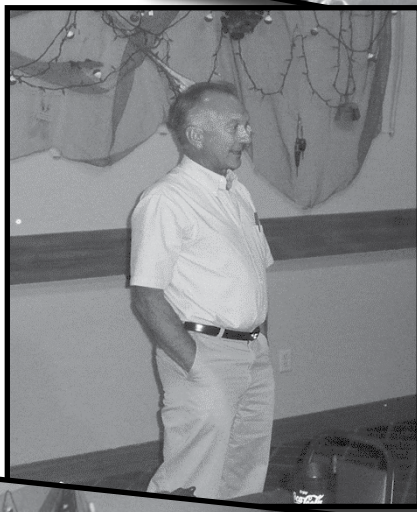
During January and February 1993, heavy rains in the area caused excessive ground water to flow into the mine, reducing production as resources were diverted to cope with the water. Full production was resumed in March 1993. ■



Geologic Sketch of the 865 Raise Looking West.

Joseph A. Holmes Safety Association
Western Kentucky Chapter

3rd Quarter Meeting



Joseph A. Holmes Safety Association Western Kentucky Chapter

September 13, 2011 3rd Quarter Meeting Follow-Up



Twenty-six people signed in representing five local aggregate companies and MSHA for the 3rd quarter meeting sponsored by Hunter Sand & Gravel. Robert Stone made the presentation for HS&G outlining events that culminated to the Mine Act of 1977 and its significance. YOU are the most valuable asset on mine property.

Gene Whelan was introduced as Pine Bluff Sand & Gravel's General Manager representing the company as new owners of the former Ingram Materials. Gene introduced his associates in attendance and briefed the group on their immediate objectives.

Jim Croft (Supervisor, MSHA Franklin District) addressed the group and presented the Holmes Safety Association award to representatives of the companies present in recognition of the collective accomplishments of 983,815 injury-free man-hours during calendar year 2010. It's the Chapter's second, consecutive year for this recognition (Group II), and Jim congratulated everyone for this great achievement.

Kevin Dycus briefed the group on the upcoming MSHA Birmingham conference scheduled for November, encouraging anyone who could attend to do so. He also outlined the Chapter's meeting and event plans into next year and invited each member organization's participation.

Holmes Sunflower Safety Council West Mineral, Kansas



The Holmes Sunflower Safety Council held their September 27, 2011 meeting and first fundraiser at the site of Big Brutus in West Mineral, KS. Twenty members were in attendance. Everyone enjoyed a picnic lunch, went through the museum, saw the exhibits, enjoyed everyone's company, won some great door prizes, and raised the money needed to continue a productive safety council. We hope to continue fundraisers once a year, at different mining locations throughout our area, to help our Council continue to grow and enhance the safety environment for our upcoming young miners. We also have hope of establishing a scholarship program from our Council to help promote education in the mining field.

We would like to thank everyone at Big Brutus Museum for all their hospitality. Take the time to go to their Web site at www.bigbrutus.org.

Located at West Mineral in Southeast Kansas, Big Brutus will take your breath away!!! Miles before you get to this retired giant — you can see it in the sky south of West Mineral.

Here are the statistics of Bucyrus Erie model 1850B:

- Largest electric shovel in the world
- 16 stories tall (160 feet)
- Weighs 11 million pounds
- Boom 150 feet long
- Bucket capacity 90 cubic yds. (by heaping, 150 tons - enough to fill three railroad cars.)
- Maximum speed 0.22 MPH
- Cost \$6.5 million (in 1962)

The following is some informatoin about Big Brutus from their Web site:

On July 13, 1985, Big Brutus was dedicated as "a Museum and Memorial Dedicated to the Rich Coal Mining History in Southeast Kansas." In September 1987, The American Society of Mechanical Engineers (ASME) designated Big Brutus a Regional Historic Mechanical Landmark, the 10th since 1971 to be so designated.

Big Brutus is a museum open year round. Hours vary with the season. Call (620) 827-6177 for more information.

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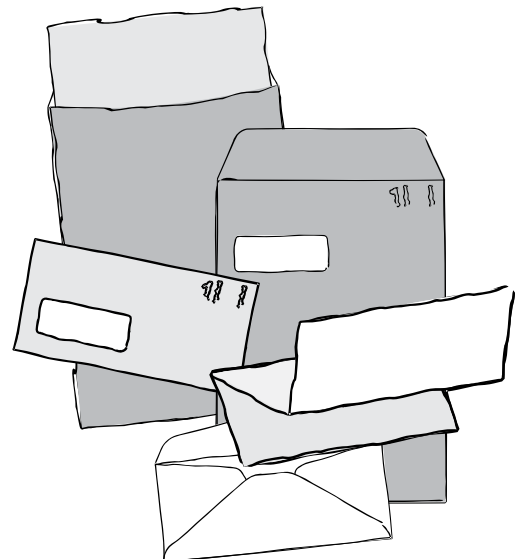
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