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From: Linda Raisovich-Parsons [mailto:lparsons@umwa.org]
Sent: Friday, August 15, 2008 5:19 PM
To: zzMSHA-Standards - Comments to Fed Reg Group
Subject: RIN 1219-AB58

Attached are the comments of the United Mine Workers of America on the Proposed Rule for Refuge Alternatives for Underground Coal Mines.

AB58-COMM-11

August 15, 2008

Ms. Patricia Silvey, Director
Mine Safety and Health Administration
Office of Standards, Regulations and Variances
1100 Wilson Boulevard, Room 2350
Arlington, VA 22209-3939

Dear Ms. Silvey,

The attached comments represent the views and concerns of the United Mine Workers of America regarding the Agency's Proposed Rule Refuge Alternatives for Underground Coal Mines. The Union will be happy to answer any questions that these comments raise with appropriate representatives of MSHA or to expand on any comment that requires additional clarification. There are attachments to these comments that cannot be filed electronically because they are too large to e-mail. However, we will forward them to you via courier by the end of the day on August 18, 2008.

I thank you in advance for you immediate attention to this matter.

Sincerely,

Dennis O'Dell
Administrator of Occupational Health & Safety
United Mine Workers of America

United Mine Workers of America
Comments
on the
Mine Safety and Health Administration's
Proposed Rule
Refuge Alternatives for Underground Coal Mines
"RIN 1219-AB58"

The United Mine Workers of America (UMWA or Union) is pleased to have the opportunity to offer these comments on the Mine Safety and Health Administration's (MSHA or Agency) Refuge Alternatives for Underground Coal Mines; Proposed Rule. The Union will attempt to place its comments on the record in a manner that corresponds to the Agency's writing of the Proposed Rule, as reported in the *Federal Register / Vol. 73, No. 116 / Monday, June 16, 2008.*

I. Introduction

"This proposal would implement section 13 of the Mine Improvement and New Emergency Response (MINER) Act of 2006." (p-34141, column 1)

The Union contends that the Agency has made a technical assessment with regard to meeting the mandate of Congress that is not accurate. The processes by which MSHA intends to permit mine operators to comply with the mine refuge requirement leaves too much latitude for interpretation and creates multiple scenarios for compliance that could lead to confusion and delay. There is as much potential for the proposed rule as written to adversely impact miners caught in an emergency situation as there is to assist in their survival.

The Union will seek to have these issues corrected by addressing each concern individually as they arise in the proposal. It is our hope that by doing so the rule can be corrected. In order to do so it will be necessary to eliminate the confusing and complicated refuge "alternatives" currently proposed.

"New requirements for testing and approval of refuge alternatives and components of refuge alternatives;" (p-34141, column 1)

The Union is not aware of any requirement for human testing any of the refuge devices at this time. Such testing must be a prerequisite for the approval of any chamber or shelter that is designed to preserve human life in the event of an emergency. Simulation and studies on these devices may serve as a starting point for evaluation, however, there is no substitute for extensive testing with human subjects to ensure proper function and durability.

This situation is further complicated by the inclusion of "alternative" or "component" based refuges that must be constructed on-site after the accident has occurred. The Union is convinced that this approach will do more to undermine miner safety than enhance it. MSHA has approached this rule-making with a fundamental misunderstanding of what Congress anticipated in Section 13 of the MINER Act: whereas MSHA has focused on refuges and alternatives to refuges, Congress was more interested in the "use of refuge chambers in underground coal mines: as both Senator Kennedy stated ("Our bill requires MSHA and NIOSH to test refuge chambers to see if they should be used here to protect miners in a fire or explosion") and as the Senate Committee report confirmed. In fact, in the Consolidated Appropriations Act of 2008 Congress made clear that the Secretary had to propose regulations pursuant to section 315 of the Federal Coal Mine Health and Safety Act of 1969, consistent with the recommendations of the National Institute for Occupational Safety and Health pursuant to section 13 of the MINER Act requiring rescue chambers, or facilities that afford at least the same measure of protection in underground coal mines. The UMWA believes that refuge chambers are required, as opposed to the rule's proposal for what essentially is nothing more than enhanced barricades. Stated otherwise: Congress was interested in learning what different kinds of refuges would be feasible, while MSHA has considered refuges, as well as other options and alternatives to refuges. We think that MSHA's approach is contrary to the language and intent of the MINER Act contrary to what Congress demanded in the 2008 Appropriation, and is not sufficiently protective of miners.

In fact, MSHA's proposed "alternative" would be no more than barricade supplies. In NIOSH's Research Report on Refuge Alternatives for Underground Coal Mines, they confirm that "NIOSH has no evidence to support the practice of barricading in modern mining operations. Barricading is not considered to be a viable refuge alternative." MSHA's proposal for "refuge alternatives" defeats the purpose of Section 13 of the MINER Act and would not meet the protections that Congress intended then and has re-affirmed in 2008.

"Requirements for miners to be trained in the location, use, maintenance, and transportation of refuge alternatives." (p-34141, column 2)

The Union will elaborate extensively on concerns regarding training as they arise in the writing of the preamble and proposed rule. However, it is clear from the language that the Agency has drafted that the proposed rule does not adequately address the issue.

"MSHA issued Program Policy Letter (PPL) No. P06-V-10 (October 10, 2006 to implement section 2 of the MINER Act." (p-34141, column 2)

Prior to the issuance of that PPL the Union submitted extensive comments (attached) regarding implementation of section 2 of the MINER Act. Those comments expressed our understanding of the intent of Congress and cautioned the Agency against taking too broad a view of what would be acceptable for promulgation into regulation.

The Union believes that MSHA chose to ignore these recommendations. In doing so, the Agency is proposing a diluted and confusing rule that does not offer miners the level protection intended under the MINER Act.

I Section-BY-Section Analysis

A. *Part 7 Approval*

Pre-fabricated Self-Contained Refuge

We do not draw a distinction between the "hard-shell", solid metal shelter or the "soft-shell" vinyl or cloth type (self-inflating) shelter. It is understood that each of these will fulfill a vital function and would be purchased for use based on the conditions at each particular operation.

The Union believes these types of self-contained units represent the only practical solution for sustaining miners near the active working area in the event of an emergency situation in which they could not exit the mine. These systems would require extensive training of each miner to ensure they could immediately access the unit and begin to operate its life sustaining components. These refuges do not require construction of the shelter.

Considering the design of such units the approval process should be straight forward and comprehensive. Approval should require more that manufacturers' or operators' certification that the units meet the MSHA cirteria. As NIOSH indicated in its report, independent testing is necessary. In fact, although four different shelter models were approved by the WV program, NIOSH found that three needed further improvements before they would satisfy NIOSH recommended criteria. The necessary components (oxygen, food, communications, etc.) will already be integrated into a self-sustaining unit that would be required by design to operate as a stand alone refuge. Therefore, testing of the unit would include all necessary devices in an operational mode, all at the same time. This would ensure component function, compatibility and ease of use.

Refuge Alternative Component

While the Union would not remove or reduce current requirements concerning life sustaining materials that must be made available, this should <u>never</u> be used in place of self-contained refuges. The Union supports the installation, training and use of pre-fabricated self-contained refuge chambers. The Union does not believe the alternatives that would require construction <u>during</u> an emergency represent a viable solution for miners seeking refuge in the event of an emergency.

The potential for major problems to arise during the setup of an "alternative" structure, the integration of the various components and the operation and maintenance of devices necessary to sustain life render this approach infeasible and unuseable. Considering the stress and panic that ensues after a mining disaster, the possibility that an alternative refuge could be properly constructed in an inhabitable and expedient manner is speculative at best. It is also necessary to consider the potential that some of the miners necessary for constructing and maintaining this facility would be rendered incapable of doing so, thereby greatly diminishing the potential for the unit to ever become operational.

The Union is also convinced that testing individual components for specific operation would not establish that these components would be compatible after construction is complete. The potential for damage during handling or construction, especially given the circumstances that would exist in an emergency, is too great for this type of system to be relied upon for use in a mine emergency.

The Union would also raise the fact that the potential for manufacturers of component devices to routinely discontinue certain products or create a new product line would cause considerable problems. The possibility that older devices could not be replaced as necessary or newer units are not compatible raises serious operational challenges for component refuge alternatives. The potential for continuous component approval that does not lead to an overall refuge approval also exists given this scenario. Further when you depend on multiple separate components there is the increased likelihood that some components will either be missing or malfunctioning when the emergency event arises. It has been all too common for brattice or other barricade materials to be taken from emergency supplies to supplement what may be needed on the working section during production. This means miners don't have what they need when emergency strikes.

The Union believes that Congress wanted regulations requiring self-contained refuges, so long as NIOSH determined they were feasible. As NIOSH found that "barricading is not considered to be a viable refuge alternative" (NIOSH report at page2) MSHA should not include this concept in its regulations and would request that "component refuge alternatives" that require on-site construction be eliminated from the rule.

"The proposal would: Provide for alternatives for satisfying the requirements; provide performance based approval criteria,..." (p-34142 Column 1)

The Union does not favor affording operators or mining equipment manufacturers significant latitude in the development or deployment of equipment, devices or components that are to be used in the industry. Far too often permitting a performance-based approach leads to the implementation or installation of equipment or standards that do not meet the minimum requirements for ensuring protective health and safety practices.

The Union understands MSHA desires to force new and innovative technology, but would caution against permitting too much latitude in this area. The Agency must exercise proper oversight and place clearly prescribed limitations on what operators and manufacturers are and are not permitted to do to comply with the rule and protect miners. NIOSH recommended certain standards for chambers and nothing less than those recommendations can be accepted.

"The proposed requirements would assure that the refuge alternatives could be used safely and effectively in underground coal mines and that the components could be used safely with each other." (p-34142 column 1)

With regard to self-contained refuge chambers the Union is comfortable that meeting this requirement is achievable. As noted previously, testing of a unit that is self sustaining and designed for immediate occupation and use should be straight forward. Therefore, demonstrations by the manufacturer as to the functionality of the refuge be a useful first step. However, in no case should MSHA accept any manufacturer's internal test results as a basis for granting approval. The Agency must determine if the refuge deploys and operates according to the objective standards NIOSH recommended. Independent testing was recommended by NIOSH and the Union agrees that this must be included in the final rule.

An "alternative" refuge that requires on-site construction will not meet the MINER Act requirements or the 2008 Appropriation Act and should not be allowed. As stated previously, the Union is convinced these types of units present additional problems potentially causing a chaotic and life-threatening situation. Miners caught in life-threatening situations where visibility can be zero and the miners can be injured or panicked shouldn't have to take time to build a shelter. In fact, it could be impossible. Congress intended that these shelters be ready for use in an instant. As pointed out in testimony by Paul Ledford, a survivor of the Darby mine explosion, such a shelter could have saved his co-worker's lives. Each of the miners who perished had crawled more than 1,000 feet toward the mine entrance before they died from breathing poisonous gas. As Ledford pointed out, because a mine would be filled with dust, and possibly toxic gas after an explosion, miners would be unable to construct a shelter in time to save their lives. The Union agrees.

The UMWA would once again request that "component refuge alternatives" that require on-site construction be eliminated from the rule.

Section 7.501 Purpose and Scope

"MSHA solicits comments on the estimated service life of pre-fabricated self-contained units." (p-34142 column 2)

The Union is not able to offer estimates about lengths of the service life for different refuges, but agrees this is critical information. The Union urges MSHA to affirmatively determine if refuges are maintaining their viability after they are placed underground. It is not sufficient to rely on manufacturer's projections. And it is not adequate to depend on employers to certify. For example with SCSR 's miners trapped at Sago had at least one SCSR that was beyond its stated shelf life. For these emergency protections equipment failures can have dire consequences and may mean the difference between life and death. To be protective of miners MSHA should be conservative in accepting shelf-life projections.

"In its report NIOSH recommended that the fire resistance for refuge alternatives be 300°F for 3 seconds. They based this on NFPA-2113, but advised that additional investigation is warranted." (p-34143 column 1)

Insofar as NIOSH acknowledged in its Report that the state of knowledge and technology in this area is "rapidly changing" the union urges the rule to provide for periodic and regular re-evaluation of the established criteria and for improvements to be required in already-deployed refuges as soon as feasible. This should be incorporated into the emergency response plan reviews, and MSHA should provide the more protective improvements to be implemented as soon as when knowledge or technology permits.

Section 7.503 Application Requirements

"Under the proposal, the applicant would be required to develop a training manual for each refuge alternative or component.

Paragraph (b)(7) would require a summary of procedures for constructing and activating the refuge alternatives...This summary information would include all the steps and procedures to construct and activate the refuge alternatives...

Paragraph (b)(8) would require a summary of the procedures related to using refuge alternatives...This summary would include steps and procedures for using the refuge alternative during a substantial period of time." (p-34144 column 1)

The Union recognizes the need for applicants seeking approval of coal mining equipment and devices to create operations and maintenance manuals for their product. We also realize such manuals can be helpful to miners when utilizing, repairing and inspecting such equipment or devices.

Based on the potential to need such materials, the Union encourages MSHA to require detailed manuals for approval purposes. However, MSHA must clearly guard against mine operators who attempt to use manuals as a replacement for any portion of the miners' training with regard to deployment, activation, operation, maintenance or any other aspect of the refuge chambers. Miners must receive sufficient training to ensure they can use the refuge, as designed, without referencing a comprehensive manual. NIOSH recommended that miners and mine management be trained on refuge use and that recommended training should constitute the minimum amounts: quarterly motor task training (including how to and when to use refuges) as well as expectations training. Task training must also be required (in addition to the quarterly training) for those responsible for moving, maintaining and inspecting refuges.

Section 7.504 Refuge Alternatives and Components; General Requirements

"Paragraph (b)(2) would require that calculations or tests be conducted to determine the maximum apparent temperature in the refuge alternative when used at maximum capacity and in conjunction with required components calculations or test results. In addition the proposed rule would require that an application include test results and calculations to demonstrate that the apparent temperature within the refuge alternative would not exceed 95°F when used in conjunction with required components and fully occupied." (p-34145 column 2)

The proposed rule appears to accept the determination on heat sources and heat generation calculations or tests, but it is unclear on what basis the operator or manufacturer is deriving data to make such calculations or assumptions. It is not at all clear, within the context of the proposed rule that these assumptions can be made when discussing refuge chambers.

Considering the fact that these refuges have never previously been installed in the underground workings of coal mines in this country, data not specifically germaine to these units must be viewed as suspect. The Union questions MSHA's ability to approve units based on such data and would suggest human testing on refuge alternatives would be a better method to determine the apparent heat generation. We note that NIOSH found manufacturer's representations about their shelters were not sufficiently reliable. NIOSH recommended independent testing and we support that.

"Paragraphs (c)(1)(I) and (ii) would require that refuge alternatives accommodate a telephone or equivalent two-way communications facility that can be used from inside the refuge alternative, or a two-way wireless system when it is approved in the operator's Emergency Response Plan (ERP)." (p-34145 column 3)

The language leaves some question as to the immediate deployment and use of two-way wireless communications in underground coal mines when those devices become commercially available. The Union understands that such devices would need to be included in the approved ERP, however, we believe that two-way wireless communication devices must be placed in the Plans as soon as they become available.

Therefore, the incorporation of these devices into the refuge chambers should occur at all underground coal mining operations immediately thereafter. While this may be the intent of the Agency the language of the proposed rule does not specify that to be the case. The Union would request such language be added to the rule.

"MSHA requests comments on including a requirement that refuge alternatives be designed with a means to signal rescuers on the surface." (p-34145 column 3)

The Union supports the requirement to have signaling devices incorporated into refuge chambers. While the goal of the chamber is to sustain the lives of trapped miners, it is extremely important they are located and rescued as soon as possible. The signaling device would not only assist rescue workers in locating those trapped, but would confirm that miners were indeed in the chamber.

The Union would suggest that the specific type of device would best be determined on a mine-by-mine basis with input from the mine operator and the representative of the miners.

Regarding this particular issue, it is extremely important that should this requirement be included in the rule, a provision the Union strongly supports, the Agency does not offer miners a false sense of hope. For too long, trapped miners have been trained to signal their location and for far too long no one on the surface has been listening, as happened at Sago. MSHA has an obligation to ensure that listening equipment is immediately deployed to a disaster scene to locate trapped miners; whether it is the government or the operators who obtain the equipment, it must be on site shortly after any emergency that causes miners to remain underground.

"MSHA requests comment on including a requirement that the manufacturers design refuge alternatives with a means to signal underground rescuers with a homing device." (p-34145 column 3)

The Union supports the requirement for the inclusion of a homing device on all refuge chambers. Equipment manufacturers and mine operators must be compelled to utilize every available technology to ensure trapped miners are located and rescued as quickly as humanly possible. The Agency must require every possible means of facilitating such rescues, including homing devices.

"MSHA requests comments on the types, sources, and the magnitude of the lighting needed for the proper functioning of a refuge alternative and the needs of the occupants." (p-34146 column 1)

The Union agrees with the Agency's determination regarding the need for sufficient lighting to perform necessary tasks and read instructions. We also agree that any light source approved for refuge usage cannot generate significant heat or require manual power for activation and use.

The Union would suggest that the type and amount of light supplied would vary widely by the type of refuge chamber in use.

We would expect that a hard-shell unit would contain mostly integrated lighting at fixed locations within the unit. Several of these fixtures should be self activating when the chamber is opened. These light fixtures should be of the type that permits them to be rotated or turned for the specific task at hand. This would maximize their utility and reduce the number that must be illuminated at any one time. It will also be necessary to have several handheld lights available in each chamber.

The UMWA considers providing adequate lighting in a soft-shell (self-inflating) unit to be a bit more complicated. The fact that the unit will need to be inflated prior to occupancy means that any integrated lighting will be limited to the storage device. The fixtures that are integrated should be self-activating when the chamber is opened for deployment. Therefore, all additional lighting must be deployed and activated by miners entering and occupying the chamber. These light fixtures should be compatible for either handheld use or "hooked" to a fixed location as necessary. Lights should also be of the type that would rotate or turn to permit hands free operation of refuge components. It will also be necessary to have several handheld lights available in each chamber.

As expressed previously the Union believes that any refuge alternative that must be constructed on-site is not viable for use in an underground coal mine. The need to "add-on" all necessary lighting from the initial stages of construction would further complicate and delay the usefulness of this proposed option. The UMWA demands that any such refuge alternative be removed from this final rule.

Section 7.505 Structural Components

MSHA solicits comments on these minimum space and volume requirements. (p-34146 column 2)

NIOSH has recommended that refuge chambers afford each miner 15 square feet and 85 cubic feet of space. While NIOSH stated,"...these recommendations should not be considered absolute," it made these recommendations as "reasonable starting points." (p-34146 column 2) The Union understands that increasing the square footage could make such shelters cumbersome for some underground areas. However if the area of the mine would not support one large chamber to accommodate the number of miners affected, we would support the use of more than one chamber on the section. Because it is anticipated that miners may be required to stay in the refuge for up to 96 hours, the Union cannot accept the Agency's decision to reduce the miners' useable space from what NIOSH recommended. We strongly support requiring more space than what was adopted in the West Virginia Rule. From the very beginning, it was always the intent to provide not only the necessary protections for miners to sustain life while they are inside a chamber/shelter, but to also allow miners to be comfortable while awaiting rescue. This is necessary to help protect a miner's mental stability while awaiting rescue. Some of us have been trapped on an elevator half way done a shaft with 35 other miners, shoulder to shoulder for four hours waiting for someone from the surface to safely bring us out. Even after only four hours, and without any fire or explosion, there were many miners who became "stir crazy" and increased tensions for others. We can only imagine what it would be like to be trapped for 96 hours in close quarters waiting for help from the outside, especially when the hazards and risks are much greater than a stuck elevator. During Congressional hearings, stories we were told about miners trapped in other countries, who played cards to help keep their minds off of the dangers that faced them outside of their protected safe haven until help arrive. We contend it has been the intent to provide necessary physical and basic social comforts for miners in these shelter/chambers. The Union insists the required space be large enough to provide comfort so miners are not crammed into these units like sardines.

MSHA's determination that 60 cubic feet of space would suffice, a reduction of nearly 30% does not make sense. The Union can find no justification for any reduction in useable space from what NIOSH recommended and certainly does not support such a large decrease. Given the circumstances miners may find themselves in after an accident, the Union believes that additional space would be beneficial. At a minimum, we urge MSHA to adopt the 85 cubic foot recommendation of NIOSH to all refuges. To achieve this the Union would support more than one chamber be used to accommodate the space needed.

Moreover, this decision by MSHA is particularly odd considering its statement that **"Additional space may be needed to suspend curtains as part of a passive CO^2 removal system. Also larger volumes seem to be more effective at dissipating heat."** (p-34146 column 2)

The Union would suggest that a reduction in useable space would subject miners to greater risk of CO^2 exposure and/or excessive heat within the refuge. This is unacceptable and the Agency must establish a minimum useable space within each chamber for each miner that will best ensure they receive the maximum protection available. NIOSH recommendations should serve as the minimum standards and MSHA should not reduce them in this regulation.

"Paragraph (a)(4) would require that refuge alternatives be designed and constructed to withstand 15 pounds per square inch (psi) over pressure for .02 seconds prior to activation." (p-34147 column 1)

The Union is concerned that an over pressure rating of 15 psi for .02 seconds is not sufficient to protect the refuge from damage. Considering the events at the Sago Mine alone it becomes apparent that the Omega Blocks did not withstand the pressure from the explosion. While the UMWA understands that the overpressures exerted at Sago were much higher than the threshold psi for seals, (at that time was 20 psi) is 5 psi greater than what is being recommended here. We recommend a higher overpressure strength be required.

"Under this provision, trained persons would need to be able to activate the structure without tools, within 10 minutes of reaching the refuge alternative." (p-34147 column 2)

The Union will comment on the training aspects of refuge chambers extensively later in this document. However, the language in this section of the preamble raises concerns regarding "who" will be trained to activate the refuge. Given the potential devastation and destruction that a mine disaster can cause, training must be inclusive and extensive if it is to afford the greatest impact on survival. Ten minutes should be the maximum time tolerated before a refuge can be made available to protect miners from the adverse environment. We still would not accept requiring any miner to engage in physical labor to construct a protective barricade in the post-emergency environment, even if projections would be that a barricade could be constructed within 10 minutes.

Section 75.706 Breathable Air Components

"The Agency recognizes that different types and combinations of breathable air components from several manufacturers may be provided for breathable air for refuge alternatives." (p-34148 column 2)

The Union has expressed concerns regarding these types of issues in the past. We have historically opposed the mixing and matching of different models of SCSRs and other devices at a single mine. Such actions create the possibility to confuse miners in the event of an emergency and could put miners at greater risk. The Union does not support this practice and requests MSHA demand that all components at a location be of uniform type and operated in a single uniform manner.

This once again raises serious concerns regarding the ability of operators to purchase component parts and "create" a refuge alternative. There is every reason to believe mistakes will occur and incompatable component parts will be incorporated if refuge "alternatives" are allowed. For example, at Aracoma, miners had mismatched pieces of equipment which interfered with their ability to fight the fire. There is reason to believe that the tragic events at Aracoma may have been avoided if only compatible parts had been utilized in the fire fighting system. For this and other reasons the Union has expressed, such refuge "alternatives" must be stricken from the rule.

"MSHA solicits comments on the proposed 96 hour supply of breathable air." (p-34148 column 3)

The Union supports MSHA's requirement that a minimum of 96 hour of breathable air be readily available in the event of an emergency. It is important to state that air necessary to inflate the chamber, clear the airlock or repressurize the structure after an unintended leak must be <u>in addition</u> to the 96 hours of breathable air that each miner must have.

"Paragraph (g) would require that respirators or breathing apparatus used within a breathable air component...be capable of being worn for up to 96 hours" (p-34151 column 3)

The Union is uncertain why the Agency is proposing requirements for the use of respirators or breathing apparatus in this rule. Considering the purpose of the rule is to require mine operators to establish a "refuge" that miners would enter to escape a potentially dangerous atmosphere it is unclear what the Agency's intentions are. The fact that MSHA is suggesting the use of such devices suggests miners may be physically exposed to the contaminated mine environment, so long as the operator provided breathable air.

It is unreasonable to expect an individual to remain under apparatus for 96 hours, even in the best conditions. We disagree with the Agency's determination that this is acceptable for miners after a mine emergency has occurred. Relying on respirators should not be allowed as a viable alternative to a chamber. The Union demands that references to such equipment in this context be removed from the rule.

Section 7.510 New Technology

"This proposed section would allow MSHA to approve a refuge alternative or a component that incorporates new knowledge or technology, if the applicant demonstrates that the refuge alternative or component provides no less protection than those meeting the requirements of this subpart." (p-34155 column 1)

MSHA has the right to make such assessments and offer necessary approvals on a wide range of regulations it has promulgated. The Union does not object to this authority in general, however, such approvals must be limited in scope. We note that the NIOSH report indicated the special challenge that mines with less than 36" will face when implementing these protections. Other than these few mines, the UMWA urges MSHA to require chambers near all working sections and in-place shelters for outby areas absent compelling reasons making them infeasible at a particular operation.

The Union has objected to refuge "alternative" that must be constructed post-accident and would therefore object to approvals for components that could be used in such a fashion. The Agency must not be permitted to approve components piece-by-piece with the ultimate objective of "creating" any type of post-accident site-constructed refuge.

The Union accepts that new knowledge and technology will from time-to-time be introduced into the industry that can offer greater protections for miners. The Union believes such knowledge and technology must be immediately utilized as it becomes available. Further, in those instance where new technology, such as wireless two-way communication becomes available, it must be immediately deployed in the industry. The Union not only supports MSHA's authority to approve such equipment, but would request that it require mine operators to immediately purchase and deploy it.

"MSHA solicits comments from the public on the use of refuge alternatives in low coal mines." (p-34155 column 1)

The Union understands that there may be instances where the deployment of a refuge chamber in a low coal seem may create some problems. However, the possibility that miners may be trapped in a low coal mine without the benefit of refuge could be a disaster.

The problems that may be encountered while determining the specific refuge needs of a particular mine pale in comparison to the alternative. The Agency must drive manufacturers and mine operators to seek solutions to these problems and require immediate deployment of refuge chambers at all mines.

The charge of the Agency is to protect the health and safety of all miners. Miners at small mines deserve the same level of protection as those at larger mines. Likewise, miners at low coal mines deserve the same protections as those working in high seams. A miner is a miner, MSHA's charge is protecting them all.

B. Part 75 Safety Standards

Section 75.221 Roof Control Plan Information

The Union agrees with the Agency.

Section 75.313 Main Mine Fan Stoppage With Persons Underground

The Union agrees with the Agency.

Section 75.360 Preshift Examination

MSHA requests specific comments on the visual damage that would be revealed during the preshift examinations. The Agency is concerned with the feasibility and practicality of checking the status of the refuge alternatives without having to enter the structure or break the tamper evident seal." (p-34155 column 2)

The practice of visually examining equipment on a routine basis is an essential first step in assuring it is in operational condition. These exams could reveal any number of problems that may exist. Properly trained examiners would be able to detect potentially dangerous conditions that could result from collision with other equipment or damage sustained while moving the refuge. These could be as minor as a sheared bolt or dent to something that could compromise the chamber's functionality.

Doing these preshift examinations may lead to additional examinations and repairs or replacement. The Union strongly supports the practice of performing a preshift examination on all refuge chambers, as well as any in-place shelters.

Section 75.372 Mine Ventilation Map

The Union agrees with the Agency.

Section 75.1200 Mine Map

The Union agrees with the Agency.

Section 75.1202-1 Temporary Notations, Revisions and Supplements

The Union agrees with the Agency.

Section 75.1500 Emergency Shelters

The Union agrees with the Agency.

Section 75.1501 Emergency Evacuations

The Union agrees with the Agency.

Section 75.1502 Mine Emergency Evacuation and Firefighting Program of Instruction

"Paragraph § 75.1502 (c)(10) would be new and require a summary of the procedures related to constructing and activating refuge alternatives." (p-34156 column 1)

The Union adamantly opposes allowing refuges that would require construction in a post-accident situation.

However, we support regular training and reviews of the procedures for activation of hard-shell and soft-shell self-activating chambers, and proper procedures for using an already constructed in-mine shelter.

Section 75.1404 Mine Emergency Evacuation Training and Drills

"MSHA and NIOSH have found that training is necessary to instill the discipline, confidence and skills necessary to survive a mine emergency." (p-34156 column 1)

"In a series of studies from 1990 through 1993, the U.S. Bureau of Mines, University of Kentucky, and MSHA researchers measured skills degradation. In one study, the proficiency dropped about 80 percent in follow-up evaluations conducted about 90 days after training." (p-34156 column 2)

"In another study researchers concluded that "companies should adopt a hands-on training protocol." (p-34156 column 2)

These statements in the preamble provide some insight into the level and frequency of training necessary to ensure miners are prepared to utilize a refuge chamber in the event of a mine emergency. The Union would agree with each statement individually and note that viewed as a whole they make a compelling argument for new and innovative training models.

Unfortunately, the Agency does not appear to be taking that approach. The fact that expectations training is required only once a year is inconsistent with the data presented. Further, there is no requirement for hands-on training to be conducted with a refuge chamber.

The Union would request that the Agency require demonstration models of the refuge chamber(s) being utilized at an operation be available for hands-on training every 90 days for all miners employed at the operation. These demonstration models could be purchased on a mine-by-mine basis or on a company-wide basis and deployed as necessary for training.

To adequately protect miners in the post-accident situation, the training protocol must require hands-on training at least every 90 days.

"NIOSH is developing a refuge alternative training program that is expected to be available by the end of 2008. MSHA plans to include a delayed effective date in the final rule." (p-34156 column 3)

The Union is deeply concerned with any further delays in issuing and implementing a final rule for rescue chambers. Miners in this country have been waiting for MSHA to require chambers since 1969. Considering the importance of this rule the Union would request that the Agency require the final rule to take effect immediately. While training must be an element of the final rule, it is not necessary for MSHA to delay the rule's effective date just because NIOSH may later be able to offer useful training materials. Operators should be required to provide training even if more convenient or better training tools may later become available. There is no reason to delay deployment of chambers because of this.

"Properly constructing and activating a refuge alternative can be a relatively complex procedure that must be done correctly to establish a breathable environment in a smoke-filled mine." (p-34156 column 3)

The UMWA agrees with this assessment by the Agency. However, the Agency does not seem to understand the gravity of the situation to its fullest extent. In a smoke-filled life threatening environment, with the potential for hazardous or poisonous gases, the possibility of a second explosion, or promulgation of a fire, dealing with sick and injured miners and countless other problems how could anyone expect miners to be able to perform the task of building a shelter? This is simply not a reasonable solution to the refuge problem. Once again the Union demands references to these types of refuge alternatives that require post-accident construction be removed from the rule.

"MSHA solicits comment from the public on the Agency's proposed approach to

expectations training." (p-34157 column 1)

The Union agrees about the need for hands-on training, but feels it is necessary for MSHA to add requirements for the quantity and quality of such training and re-training.

All miners must be familiar with their escape route out of the mine. Therefore, walking portions of the escapeway every 90 days is a necessity. Expectation training, including walking through a smoke-filled environment (at the mine or in a simulated mine) while breathing through a mouthpiece that simulates an operating SCSR must be done annually.

Deploying and activating a chamber when escape is cut-off is a critical task that must be performed accurately the first time if miners are to survive an emergency situation. Given the grave circumstance miners would face if these tasks are not done correctly the Union strongly recommends hands-on refuge chamber training be completed by every miner every 90 days. Every miner should be trained to perform all aspects of activating and maintaining a chamber. During an emergency some miners may be incapacitated so it is not sufficient to train only some miners on the various tasks. For maximum protection, all miners should be capable of performing all tasks.

We recommend that this training be done using refuge demonstration models.

Section 75.1506 Refuge Alternatives

MSHA solicits comment from the public on the Agency's proposed approach to refuge alternative capacity." (p-34158 column 1)

The Union believes that outby shelter chambers can offer important protections. However, we urge MSHA to consider the mine's work cycles when determining such matters. For instance, a large operation with many miles of belt line may routinely have two or three beltman assigned to one area. However, based on the need to keep the entire belt line clean, the operator may assign other miners to assist the beltman on a routine basis. Chambers must possess enough capacity to accommodate these miners also.

MSHA is proposing to allow, depending on mine specific conditions, refuge alternatives with boreholes to be located up to 4,000 feet from the working face. MSHA solicits comments on this proposed alternative to locating refuge alternatives in inby areas." (p-34158 column 2)

The Union opposes placing the primary chamber miners may need as a refuge at a distance greater than 1,000 feet from the working face. Insofar as MSHA suggests that a chamber can be located up to 4,000 feet from the working face, such a refuge may serve to complement a refuge near the face, but it should never be used in place of a chamber near the face. Shelters located at a distance of 4,000 feet outby with a borehole would serve a different purpose.

The Union supports having additional stationary refuges placed at different locations outby to provide shelter if an escape is interrupted; however, the primary chamber must be within 1,000 feet of the working face. In fact it would be desirable to have stationary refuge shelters located along the miners' escapeway. Otherwise, the primary chamber is the only such refuge located near the working face, miners whose escape may be blocked in the escapeway would be forced to retreat to the section to reach the refuge shelter. However, if such shelters are required along the escape route, miners would have a place to go should their escapeway be blocked. This was the recommendation of NIOSH in the December 2007 Research Report on Refuge Alternatives for Underground Coal Mines. NIOSH recommended that "A refuge chamber or in-place shelter should be available and readily accessible from each active working section. Additionally, refuge alternatives such as in-place shelters may be desirable in more "outby" locations, e.g. between the mouth of the panel and the shaft, to facilitate escape or handling of injured miners." Such refuges along the miner's escape route would provide a place to shelter should their route of escape be blocked. Often miners are several miles underground. If they should encounter a blockage halfway on their journey through the escapeway to the surface, they would be forced to retreat into the face of a fire, explosion or other emergency to get to the shelter on the working section. It would be safer if additional shelters would be located along the escape route, so miners could shelter there if needed. The Union would therefore recommend that, in addition to the refuge chamber within 1,000 of the working face, other in-place shelters also be located along the mine escapeways.

MSHA also solicits comments on the proposed requirement that refuge alternatives be located between 1,000 feet and 2,000 feet from the working face and from areas where mining equipment is being installed or removed." (p-34158 column3)

The Union believes chambers must be located within 1,000 feet of the working face or where mining equipment is being installed or removed in order to protect miners in an emergency. MSHA must look at this issue from a practical perspective: If the chamber is located 1,000 feet outby the face of a longwall section, and the shear operator is at the tailgate, then that individual could be nearly one-half mile from the chamber. In a smoke-filled environment or after an emergency situation develops traveling this far already is a lot to ask of miners. As Paul Ledford recounted his ordeal at Darby mine, dust was so thick "you can hardly see your hand in front of your face." Ledford said he prayed as he crawled 1,500 feet along the mine's rocky bottom, then lost consciousness. He added "I just knew I was going to die in there that night." Ledford believes most of his co-workers would have survived if the federal government had required protective chambers stocked with oxygen supplies.

Based on this Darby scenario alone, MSHA must require a 1,000 foot maximum distance. Those who perished in the Darby explosion were able to crawl a distance of 1,400 feet before succumbing to the toxic atmosphere. Had a shelter been available within 1,000 feet they all would likely have survived.

"Proposed paragraph (b)(4) further provides that the operator may request and the District Manager may approve a different location in the Emergency Response Plan." (p-34158 column 3)

The Union opposes permitting alternative locations for outby refuge chambers being approved by the District Manager. The UMWA believes that to request an alternate location the operator must show compelling need, such as adverse roof conditions that cannot be corrected. Further, the alternate location must be in as close proximity as possible to the original location. Finally, this decision should not be made at the MSHA District level. Such determinations create too varying a policy across MSHA nationwide. It also has become clear over the years that some District Managers do not make sound judgements when dealing with mine management on these types of issues. Crandall Canyon would be only the most recent affirmation of this flaw. The DOL internal investigation of the Crandall Canyon disaster found numerous problems of MSHA procedures at the District level. Instead there should be a small group of individuals within MSHA who must develop special expertise to consider all such requests.

"Refuge alternatives that have materials and components stored on transportable equipment, such as a skid would require care to assure that they are not damaged while in storage." (p-34159 column 2)

The Union opposes the deployment of these types of refuges under any circumstance. Post-accident construction of a refuge is not feasible and will not offer miners the protection required in the MINER Act or the 2008 Appropriation Act. The Union demands the final rule prohibit the use of these units.

Section 75.1507 Emergency Response Plan; Refuge Alternatives

"One type is a pre-fabricated self-contained unit. The unit is portable and may be used in outby applications as well as near the working section. This unit has all the components built-in." (p-34159 column 3 – p-34160 column 1)

The Union is convinced that these are the only types of refuge chambers that should be permitted near a working face in the mine.

"MSHA solicits comment from the public on the 96 hour duration." (p-34160 column 2)

The Union strongly supports the 96 hour minimum requirement for breathable air.

"The proposal includes locations for refuge alternatives that are consistent with NIOSH's

recommendations. The Agency would consider exemptions to this requirement when it is not feasible to locate the refuge alternative according to this provision." (p-34161 column 2)

The Union would caution MSHA to permit such exemptions only in rare instances and for compelling reasons. Such allowances must only be permitted when conditions make it impossible to do otherwise. Decisions on this should not be made at the District level, but by headquarters' personnel.

"Paragraph (d) contains provisions for ERPs if the refuge alternative would only sustain persons for 48 hours." (p-34162 column 1)

The Union is not convinced that permitting a mine operator to store only enough air to sustain persons for 48 hours is sufficiently protective. If rescue cannot be accomplished within 48 hours, it is also unlikely that enough additional supplies could be provided to sustain persons. If chamber manufacturers have the ability to build units that meet a 96 hour capacity, then all mine operators should be required to provide this protection.

The Union is aware of provisions contained in the proposed rule to ensure miners would receive necessary provision should they be trapped beyond the 48 hour time frame, however, that would still leave too much to chance. Introducing these risks is not reasonable and not necessary given the current availability of more protective chambers and shelters. In instances where miners are trapped it is reasonable to believe drilling will be initiated and other necessary activities will be started. However, to accomplish rescue can still take a long time. For example, at Sago, the rescue effort took nearly four days. Therefore, to add an additional level of safety the Union recommends 96 hour of breathable air and other life-sustaining supplies be stored in all chambers at last for 96 hours, not 48..

Section 75.1508 Training and Records for Examinations, Maintenance, Transportation, and Repair of Refuge Alternatives and Components

The Union agrees that training must be completed by the mine operator on all the areas outlined by the Agency. Such training must be comprehensive and practical in its approach. The Union also believes that hand-on training should be applied to all areas where such a practice is possible.

"MSHA requests comments on these training requirements and whether it would be more appropriate to include training on examining, maintaining, transporting, and repairing refuge alternatives under the training provisions of Part 48." (p-34163 column 2)

The Union adamantly opposes adding the needed training regarding ERPs, refuge chamber, or other such matters to the existing Part 48 training. The Agency has been on notice for years that Part 48 training as it currently exists is already grossly overburdened. Subject topics now required by MSHA in Part 48 cannot possibly be adequately covered in the time allowed by that regulation.

Every aspect of training outlined in this proposed rule must be wholly separate from and in addition to, any other training currently required. The information and practical application of this training is of vital importance. Miners lives will literally depend on the adequacy of this training. MSHA must require mine operators to provide sufficient time and adequate resources to ensure the training is as successful as possible.

UMWA Overview

The United Mine Workers of America is deeply disappointed with much of the contents of the *Refuge Alternatives for Underground Coal Mines; Proposed Rule.* To say the least the Union finds the proposal to be confused, overly broad, impracticable to enforce, and not within the mandate set down by Congress in the MINER Act, and the Consolidated Appropriations Act of 2008. US miners have waited nearly <u>forty years</u> since passage of the 1969 Coal Mine Health and Safety Act for MSHA to provide these protections. After the Farmington Disaster, Congress clearly intended that Emergency Shelters be provided to miners in this country and that mine health and safety take a clear new direction. Unfortunately, that Act's mandate for Emergency Shelters was never implemented. MSHA historically accepted simple barricade supplies to suffice for emergency shelter protection. A simple barricade has never been adequate to protect miners facing a mine emergency. For MSHA to propose the continuation of such "alternative shelters" is unacceptable and does not meet the mandate of the most recent directives by Congress in the MINER Act and the Consolidated Appropriations Act of 2008. It is completely unacceptable for MSHA to continue to ignore the directives of Congress again as it has since 1969. The number of lives that may have been saved had miners had these protections is appalling. Some of those include:

DATE	MINE	LOCATION	NUMBER KILLED	CAUSE
12/30/70	Finley Coal No. 15 & 16	Hyden, KY	38	Explosion
7/22/72	Blacksville No. 1	Blacksville, WV	9	Explosion
12/16/72	Itmann No. 3	Itmann, WV	5	Explosion
3/9/76	Scotia	Whitesburg, KY	15	Explosion
3/11/76	Scotia	Whitesburg, KY	11	Explosion
4/4/78	Moss No. 3	Duty, VA	5	CO Inundation

DATE	MINE	LOCATION	NUMBER KILLED	CAUSE
11/7/80	Ferrell No. 17	Uneeda, WV	5	Explosion
4/15/81	Mid-Continent Resources Dutch Creek #1	Redstone, CO	15	Explosion
12/07/81	Adkins Coal Mine # 11	Kite, KY	8	Explosion
12/8/81	Grundy Mining Co. Mine #21	Whitewell, Tn	13	Explosion
1/20/82	No. 1	Craynor, KY	7	Explosion
6/21/83	Clinchfield Coal McClure #1	McClure, VA	7	Explosion
12/19/84	Emory Mining Co. Wilberg Mine	Orangeville, UT	27	Fire
9/13/89	Pyro Mining Co. No. 9 Wm. Station	Sullivan, KY	10	Explosion
12/7/92	Southmountain Coal Mine #3	Norton, VA	8	Explosion
9/23/01	Jim Walter Resources, Inc. #5	Brookwood, AL	13	Explosion
1/2/06	Sago Mine	Upshur County, WV	12	Explosion
5/20/06	Darby Mine No. 1	Harlan County, KY	5	Explosion

Although a safety chamber may not have saved all of the lives involved in these disasters, had a safety chamber been available, it is fair to say that some of these miners would not have perished. The Union and the miners in this country are tired of waiting for protections that should have been available to them in 1969. In those countries which do provide such protections to miners, the safety chambers have proven to save lives. One such accident was the mine fire in the Mosaic Co. potash mine in Saskatchewan in 2006. Seventy-two Canadian miners walked away from a toxic underground fire after spending the night locked inside such a safety chamber. The miners had plenty of oxygen, food and water and simply sealed themselves inside and waited for help to arrive. Had it not been for the safety chamber, potentially seventy-two victims would have been recovered from this mine. Another such two incidents happened in the gold mines in Perth, Australia in 2007. Twice in less than two months miners in the Australian hard rock mines were rescued from mine safety chambers. (Articles attached). So safety chamber are proven to save lives. It is long overdue for the United States to provide the same protections to our miners.

Post-Accident Construction of Refuge

The Union opposes the inclusion of any refuge alternative that is not a self-contained and self-deploying chamber, or an already fully constructed and supplied shelter. Miners, including those who may be injured in an accident, must be assured they have immediate access to a refuge chamber. They should not be concerned that they will perish in the aftermath of such an accident because they are required to construct their own safe haven.

The Union demands that any reference to permitting the creation of such refuges from stored materials be stricken from the final rule.

Oxygen Tank and Face Masks

Likewise, the Union opposes the Agency's suggestion that mine operators could deploy an oxygen tank and face masks to constitute a suitable refuge. A miner trapped after a fire or explosion might have facial injuries precluding him from wearing such an apparatus. How could the miner who is severely burned and suffering great pain can keep the face piece on until rescue is facilitated? This is not, a refuge by any definition moreover, this is contrary to NIOSH's recommendation and to the direction from Congress.

The Union demands that any reference to this ridiculous provision be removed from the final rule.

Training

In an effort to create a "performance-based" rule MSHA has failed to ensure miners will be able to utilize the refuge chambers. The Agency has not established adequate criteria for training miners on the deployment and activation of refuge chambers.

The Agency must specify in the rule that <u>all</u> miners at the operation must be trained in <u>all</u> aspects of chamber deployment, activation, maintenance, emergency repair and other essential tasks. It would not be sufficient to train specific persons on specific tasks that would be assigned to them in the event of an emergency situation. The potential for one on more miners to be seriously injured or worse is a real problem that would render training limited to some miners useless. The remaining miners would not be sufficiently familiar with the operational aspects of the chamber, and they would suffer as a result.

Training should be done at-least every 90 days and include hands-on training. The Union has suggested this can be accomplished by the mine operator by means of a refuge demonstration models.

Other

The Union is concerned that the Agency has only completed part of the necessary work with regard to refuge chambers. While it is clear that if the Agency cleans-up the proposed rule, as the Union has suggested, there may be times when miners seek safety in a refuge chamber. These miners will be capable of surviving for a period of at-least 96 hours. The Agency should also include provisions to facilitate the miners' escape from the chamber and ultimately the mine.

Such provisions must take into account all the possible scenarios mine rescuers and trapped miners may encounter during such an event. The Agency must consider that extraction may occur in a hazardous atmosphere, requiring trapped miners to don breathing apparatus. There is also the possibility that post-accident fires and smoke will affect extraction and escape.

These scenarios must be looked at by the Agency and means must be developed to deal with these issues. The bottom line is getting the miners into the refuge is not the end of the story. Getting them out and to safety is the ultimate goal. MSHA must include provisions for doing so in the final rule.

West Virginia

Following the tragic events of January 2006, legislation was passed by the West Virginia legislature and signed by Governor Manchin in record time establishing a Task Force which made recommendations to the Governor and the Office of Miners Health Safety and Training regarding available technology to comply with the Governors Bill. It is important to remember that this group worked diligently to meet established timelines at a time of intense pressure immediately following the tragedies at Sago and Aracoma.

The Union commends the work that was done in West Virginia and believes the Task Force should be applauded for being the first State in the Country to require chambers/shelters for miners. The 1969 Mine Act adopted language for the use of safety chambers into law at the insistence of the UMWA, but promulgation of these regulations was left up to the Secretary of the Interior and the Bureau of Mine's to implement. Miners might still be waiting for shelters/chambers if West Virginia had not forced the issue and moved forward to implement these protections.

The UMWA's comments to MSHA recommend more stringent requirements for shelters/chambers than are currently required in West Virginia. We urge MSHA to adopt our recommendations in the final rule. If MSHA's final rule is more stringent then the current requirements of West Virginia, the UMWA recommends grand fathering the operations in West Virginia that are complying with that state law as of the date MSHA's rule is promulgated or December 31, 2008, whichever is sooner. However, if any such shelters need to be replaced, units must meet the new requirements that are adopted under this final rule. In any event, no grandfathered shelter should be allowed to remain beyond 10 years of their original purchase

The Union has already commented on other areas of West Virginia's regulation where we agree, such as supporting West Virginia's requirement of shelter placement within 1,000 feet the nearest working face in each working section. We agree with West Virginia in their conclusion that the first and preferred option for miners in an emergency is to escape without delay. These units are to be taught to be used as a last resort if miners have been forced to return to the shelter/chamber to await rescue. Such a unit may have saved the lives of the miners that became trapped at the Sago mine. The Union also believes that MSHA should take further steps to require placement of additional shelters/chambers in outby areas throughout the mine in case miners need to access them on their way out or, miners that are assigned regular work duties in outby areas would need a safe haven to utilize if they become trapped while trying to escape.

Review

Though most of these issues are addressed in these comments to the Section by Section analysis, we wish to re-iterate these items of concern in the rule, as proposed:

7.503 Application requirements
(a) All references to "components" should be removed to the extent they refer to items that would be provided for purposes of post-emergency construction of a barricade or shelter. This is acceptable only if this refers to items that are included within a pre-fabricated chamber or outby shelter that is already fully stocked AND protected for post-emergency use - so that any supplies intended for post-emergency use cannot be taken from it for mining, etc... At a minimum, this section of the rule suffers from ambiguity.
(e) The certification process is not sufficiently reliable nor is it protective of miners. As written, it anticipates that operators simply "sign off," that is, inform MSHA that what they have purchased will meet the regulatory standard. Even if they "swear" to this, the Union contends MSHA must independently determine if what refuge protections the operator has for its miners' use meet all the regulatory minimum standards. While having an operator "certify" may be a component of the process, MSHA cannot simply take the operators' word on this. Having this be a paperwork verification by inspectors fails to acknowledge that improper compliance may mean the difference between life and death in an emergency. Learning that some operator's certification was over-stated cannot be discovered only after an emergency arises. The Crandall Canyon submissions by the operator indicated everything met MSHA standards, yet after the disaster MSHA discovered that the operator's submissions were substandard. At the outset,

MSHA must take a hard and complete look at what refuge protections the operator is making available to its miners, and not rely on an operator's certification.

7.505

(a)(1) The 60 cubic feet of volume per person is inadequate. NIOSH recommended 85 cubic feet and the UMWA supports 85 cubic feet as the minimum for the final rule.

7.506

(a) Breathable air. Relying on fans and compressors installed on the surface cannot take the place of breathable air supplies placed underground.
(g) (4) While having ample supplies of breathable air is advisable, there should be no proposal that expects miners to wear breathing apparatus for even most of the time while they await rescue, much less the full 96 hours otherwise required in this proposed rule. We agree that 96 hours constitutes a reasonable standard as for the duration of post-emergency protections that should be made available to miners, but oppose any rule that would expect miners to wear breathing apparatus for a prolonged period of time.

75.1504

(b)(6) This provision anticipates miners will construct their refuge place after the emergency develops. We oppose this concept; the language in this section must be changed to eliminate construction as an acceptable option.

75.1506

(a)(1) "60" should be replaced with "85" (regarding the minimum cubic feet allotted per person)
(3) Refuge alternatives for outby areas should be large enough to accommodate not only "persons assigned to work in the outby area" but also "the maximum number of persons that can be expected on or near" the outby area. In the same way that subsection (2) provides for all those who may be present "on or near the section at any time" the outby areas should also anticipate that persons other than those assigned there may be present when emergency strikes.
(1) Between 1,000 and 2,000 is too far; a maximum of 1,000 feet is needed to protect miners.
(2) Any exceptions to the standards set forth in the final rule should be allowed only upon approval from MSHA headquarters, not at the District level. The post-Crandall Canyon investigation of MSHA's handling of operator requests revealed too many problems with the existing system whereby the District is given such discretion. Even if MSHA attempts to correct the particular problems Crandall Canyon brought to light, the Agency's history of problems make this a hollow promise. After each recent major accident (JWR in 2001, Sago, Aracoma and Darby in 2006 and Crandall Canyon in 2007), post accident investigations have uncovered problems with the existing system. MSHA has promised to correct the problem too many times for a promise to satisfy us as miners' advocates. If there shall ever be any exceptions granted, the authorization should come from MSHA headquarters, and only based on compelling reasons.
(g) We suggest that word "REFUGE" be placed on each side of the protective area to provide maximum protection for miners who may approach the shelter from different directions. It should be visible from each direction.

75.1507
(a)(1) This section contemplates miners constructing their shelter after an emergency arises. This is unacceptable. NIOSH found that barricading is not protective, and we agree. We have grieved for too many miners' deaths after barricading failed them.
(c) This whole section must be struck because it anticipates post-emergency construction of a refuge.
(d) A 48 hours system is not sufficiently protective and should not be allowed at all, so language dealing with how protections will be made available after the initial 48 hours should not be included in the final rule.
(e)(1) While the UMWA urged greater quantities of food and potable water (as well as breathable air) in our comments to Section Two of the MINER Act (attached), we agree that the minimums NIOSH recommended are the minimum amounts that should be required in the final rule.

75.1508.
The Union's concerns with a system that depends on an operator's certification to determine compliance (as set forth in comments to 7.503(e), above) apply equally to these provisions that provide for operators' certifications about training required under the final rule. Certification by an operator is not reliable and cannot be the basis for determining that the required training has taken place. At a minimum, MSHA should be provided notice prior to each training session (in advance so the inspector may observe) and its inspectors should observe such training for at least 80% of the workforce no less than once each year. While we believe MSHA should affirmatively confirm that every miner is fully trained on these (and other) protections, this level is recommended to accommodate the reality that it may pose unreasonable scheduling problems to ensure that MSHA observe this kind of training for every miner; yet by setting a high percentage, it would ensure that most miners will know the kind of training that is expected and required and the standards will more likely be maintained throughout the workplace.

Conclusion

Based on the language of the proposed rule The United Mine Workers of America adamantly urges significant improvements, as described in these comments, before the rule is promulgated as a final rule.

Commenter: Dennis O'Dell, United Mine Workers of America

These following documents were submitted as attachments to Mr. O'Dells comments. As they are currently available on the web, we are providing links to these documents. This will help save on the size of this submission.

- Aracoma Fatal Investigation Report January 19, 2006
- Report of Investigation Darby Mine No. 1 May 20, 2006
- UMWA's Report on the Sago Mine Disaster January 2, 2006

GOLD NEWS

BALLARAT INCIDENT

Refuge chamber used as 27 Lihir gold miners rescued

For the second time in less than two months modern mine safety practices being applied in Australian hard rock mines paid off with 27 trapped underground miners recovered from a mine in the historic gold mining centre of Ballarat.

Author: Ross Louthean

Posted: Monday , 19 Nov 2007

PERTH -

Lihir Gold Ltd (ASX: LGL) said the cause of a rock fall on a mine development in the Ballarat goldfield in Victoria which led to 27 miners being trapped underground was still to be assessed and operations would not resume until there is a safety clearance.

There was a rock fall in the early hours of this morning at around 700 metres into the upper level decline of a mine being developed by subsidiary Ballarat Goldfields.

"The fall was not in a mine working area and no injuries were sustained," said Lihir's general manager-corporate affairs, Joe Dowling.

Mine rescue procedures were applied and all miners made their way to the mine's safety refuge chambers to await evacuation.

They were all brought to surface in a crane-hoisted large kibble via a ventilation shaft.

The incident replicates Barrick Gold Corporation's experience at the Kanowna Belle gold mine near Kalgoorlie last month when an underground vehicle caught on fire and the underground miners went immediately to underground refuge chambers before being given the all-clear to return to surface.

The Ballarat incident may provide raw nerves for some Lihir shareholders, as there were mixed market reactions to the big Papua New Guinea gold miner taking over Ballarat Goldfields Ltd which had been making slow progress on re-opening the Ballarat field.

At the close of trade today Lihir's shares slipped to $A3.85 ($US3.43) down about 10 cents on Friday's close, but on a sliding trend since early this month as the gold price stuttered.

One party not happy with today's incident was the Australian Workers Union (AWU) which claimed the company had "put mine operations ahead of safety in the past."

Cesar Melham, Victorian secretary of the AWU told *The Age* newspaper that in June a controlled blast was carried out "but correct procedures were not followed."

He called on Lihir and the Victorian Government to put a safety system in place to ensure safety was top priority at all mining sites.

The Age reported that the men extracted in the kibble on heading to surface were in good spirits and quoted rescuer Brian Kane: "If you're in the industry, you know what's going on. We knew they were ok."

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72 Canada miners safe after fire

The Boston Globe

Refuge rooms seen as primary factor

By Beth Duff-Brown, Associated Press | January 31, 2006

TORONTO -- Seventy-two Canadian potash miners walked away yesterday from an underground fire and toxic smoke after spending a night locked inside airtight chambers packed with enough oxygen, food, and water for several days.

The company said the textbook case of safe underground mining was due to those chambers, extensive training of rescue workers, and support from the rural community.

"I'm almost getting choked up thinking about how well this team worked together," Marshall Hamilton, a spokesman for Mosaic Co., the Minneapolis-based owner of the mine, said after he got word that all the men were evacuated safely.

Greg Harris, one of the miners, said he was never concerned about his safety as he played checkers with colleagues in the refuge room waiting to be rescued. They drew the checkerboard on the back of a map and used washers as chips.

"Everything is good," Harris told The Canadian Press from his home. "Communication was excellent. We had no problems whatsoever."

Analysts said the rescue could serve as a lesson for the mining industry in the United States, China, and other countries.

"It really looks like a textbook recovery to me" said Davitt McAteer, head of the US Mine Safety and Health Administration under President Bill Clinton.

McAteer is leading the investigation into the deaths of 12 miners earlier this month at the Sago coal mine in West Virginia.

In a telephone interview, McAteer said the safety chambers in the Mosaic mine in Canada's central Saskatchewan province were key to the miners' survival.

"I think that the question of the existence of the chamber that provided oxygen, food, and protection is fundamentally important in any kind of a mine," he said. He acknowledged, however, that potash mines are not nearly as dangerous as those for coal, where an initial explosion can provoke a secondary one 10 times as strong.

There are no safety chambers in US mines, he said, because in the late 1970s, the US government determined there was no material strong enough to withstand the secondary explosion. ■

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UMWA Starts New Drive For Safety Chambers, Canopies

Much of the time of the two-day meeting of the UMWA International Executive Board on September 7 and 8 in New York City was devoted to coal mine safety matters with discussions being led by Acting Safety Director Leonard J. Pnakovich, former Safety Director Lewis E. Evans, who made a special presentation to the Board, and UMWA President W. A. Boyle.

The speakers emphasized the necessity for having underground safety chambers installed in coal mines and for the installation of cabs or canopies on mining equipment to protect men from roof falls. Both safety chambers and cabs and canopies are provided for in the 1969 Federal Coal Mine Health and Safety Act. But promulgation of regulations on these safety items is left up to the Secretary of the Interior and the Bureau of Mines which have not acted to implement the law.

Former Safety Director Evans told the Board that the proposals for safety chambers and cabs and canopies were both written into the new law at the insistence of the UMWA during the legislative battle to get the 1969 law enacted.

It also was pointed out that if the nine men who were killed in the recent Blacksville, W. Va., mine fire had been able to flee to a safety chamber in the mine their lives might have been spared. (Such safety chambers would provide completely enclosed fireproof rooms with an air supply whereby coal miners could stay alive despite the exhaustion of oxygen in the mine due to an explosion or fire.

Evans reviewed the long battles of the UMWA to get adequate safety laws enacted and the continuing efforts necessary by the Union to get the laws enforced. He recalled that former President Lyndon B. Johnson had sent a long telegram to the Denver convention of the UMWA in September, 1968, two months prior to the Farmington, W. Va., mine disaster, describing a proposed new mine safety law. Evans said he regarded the Johnson administration proposals as inadequate and that he went back to Washington and drafted UMWA proposals. The Evans' proposals and various bills introduced by coal state Congressmen and the Nixon administration eventually were pulled together to become the 1969 law.

Evans was particularly indignant about various charges that have been made in the press that the UMWA has been lax on safety. He said that ever since the UMWA was established in 1890 coal mine safety always has been a number one goal of the Union.

"It is, however, part of the tragic history of the coal industry in the United States that the constant efforts of the United Mine Workers of America for 82 years for adequate safety laws have seldom been enough," Evans told the IEB. "Nearly always it has taken some terrible disaster such as the West Frankfort, Ill., disaster in 1951 (111 men killed) and the Farmington, W. Va., disaster in 1968 (78 men killed) to get the Congress to move."

Evans also noted that he and Dr. Lorin E. Kerr, Director of the UMWA Department of Occupational Health, and Joseph E. Brennan, Director of the UMWA Research and Marketing Department worked together with Sen. Robert C. Byrd (D., W. Va.) and Sen. Jennings Randolph (D., W. Va.) and Rep. Carl Perkins (D., Ky.) to get black lung benefits legislation through the Congress. The black lung benefits legislation eventually became part of the Federal Coal Mine Health and Safety Act of 1969.

Evans emphasized that most of the strong provisions in the law were picked up from UMWA proposals including the ideas of increased ventilation, safety chambers and canopies. Evans said some coal mines already are using canopies or cabs on their underground equipment.

Evans said he had, before he retired, tried and failed to move the Interior Department on the matter enforcing the provisions for safety chambers and canopies. He suggested an intensive campaign by the membership of the UMWA to "move" the Interior Department and its Bureau of Mines on the matter of promulgating regulations on safety chambers and canopies and cabs.

Recently, Acting Safety Director Pnakovich sent a request to Rogers C. B. Morton, Secretary of the Interior, urging the implementation of the 1969 Act in relation to safety chambers (reported in the August 15 *Journal* on Page 2). Pnakovich also presented a statement on cabs and canopies to a U.S. Bureau of Mines hearing in Charleston, W. Va. (reported in the August 15 *Journal* on Page 3). The letter was sent to Secretary Morton on August 11. The Charleston statement was made by Pnakovich on July 31.

Backing up the Pnakovich letter and statement on the matter, the IEB, after its discussion, instructed President Boyle to take action.

As a first step in the nationwide campaign to get action on safety chambers and canopies and cabs, Boyle sent a memorandum to the officers and members of all Local Unions of the UMWA in the U.S. on September 8. The text follows:

Two of the most important provisions of the Federal Coal Mine Health and Safety Act of 1969 pertain to safety chambers in underground mines and the use of cabs or canopies on mining equipment. Both of these provisions came from the original safety bill your union drafted and had introduced in Congress.

The UMW worked diligently to have these provisions incorporated in the law with the hope these safety improvements would reduce the loss of life and limbs of coal miners.

Ever since 1969 the Union's international officers and safety director have repeatedly urged the U.S. Department of Interior to implement these provisions of the law. Although hundreds of lives could have been saved and countless disabling accidents prevented, our efforts have been rebuffed. However, we will continue to insist upon the Department of Interior carrying out the mandate of Congress.

At its meeting today (September 8), the International Executive Board took action to instruct all UMW local unions to write a letter to the Secretary of the Interior, Rogers C. B. Morton, Washington, D. C. 20240 with a copy to the United States Bureau of Mines, Washington, D. C. 20240 and the UMWA Safety Division, 1437 K Street, N. W., Washington, D. C. 20005. Your letter should insist that the Secretary of Interior immediately implement the law by issuing regulations requiring coal companies to provide for safety chambers and cabs or canopies on mining equipment.

Pnakovich Writes Morton

Blacksville Nine Died Needlessl

By Rex Lauck
Assistant Editor, the Journal

The nine men killed in a fire at Blacksville No. 1 Mine, Consolidation Coal Co. on July 22 should have lived. This statement was made by Vice President Leonard J. Pnakovich as Acting Safety Director to the *Fairmont Times — West Virginian* and later implemented by an August letter from Pnakovich to Secretary of the Interior Rogers C. B. Morton. The letter states:

"It is without question that proper implementation of the Federal Coal Mine Health and Safety Act of 1969 would have prevented the tragic death of nine coal miners in the Blacksville No. 1 Mine of Consolidation Coal Company. As W. A. Boyle, President of the International Union, United Mine Workers of America advised the Congress, as early as April 1969, 'Our bill provides for the establishment of safety chambers. These chambers, properly sealed and ventilated, would provide a place where men could go to be protected from deadly carbon monoxide in the event of a mine explosion.' That was the first time the concept of safety chambers was ever enunciated. The International Union, United Mine Workers of America was pleased when that proposal was incorporated as Section 315 of the Act as finally enacted. The importance of that new provision and concept is immediately apparent. The presence of such safety chambers in which miners could have sought refuge during the tragic fire at the Blacksville No. 1 Mine would have saved the lives of nine men and eliminated another tragic chapter of unnecessary death in the coal mines.

"A clear reading of Section 315 of the Act discloses a precise duty imposed upon you, as Secretary, with regard to implementation of that Section. As you are fully aware, Section 315 of the Act authorizes that the Secretary 'may prescribe in any coal mine that rescue chambers, properly sealed and ventilated, be erected at suitable locations in the mine to which persons may go in case of an emergency for protection against hazards.' The Section requires that the chambers 'be properly equipped with first aid materials, an adequate supply of air and self-contained breathing equipment, an independent communication system to the surface, and proper accommodations for the persons while awaiting rescue, . . .' Likewise, the Section provides that 'A plan for the erection, maintenance, and revisions of such chambers and the training of the miners in their proper use shall be submitted by the operator to the Secretary for his approval.' I have been informed that even though the Act has been in effect for almost 32 months, there has not been one chamber erected in any coal mine in the United States, nor are we aware of any specific plan or specification for such emergency chambers. It appears vividly clear that implementation of this Section of the Act continues to be bogged down in administrative red tape and time consuming programs of research. Needless to say, time is of the essence in this matter, as clearly demonstrated by the unnecessary loss of nine lives.

"Accordingly, demand is hereby made for immediate action by the United States Department of the Interior to cause the requirements of Section 315 of the Federal Coal Mine Health and Safety Act of 1969 to be meticulously adhered to without further delay. The Act's provisions must be implemented immediately.

"One wonders what magnitude of shock is required to cause the Secretary of the Interior to invoke the authority with which he is empowered by the specific provisions of the Federal Coal Mine Health and Safety Act of 1969. Is not the loss of nine more coal miners' lives sufficient?"

As the *Journal* went to press, only routine patrol duty and air sampling was taking place at the actual disaster site at the mine which is located in Monongalia Co., W. Va. It was sealed July 24.

An investigation by U.S. Bureau of Mines ended August 8. Results of that investigation will be published by the Bureau in a formal report on the disaster sometime in the future.

Newspaper reports indicated that a public hearing by the West Virginia Department of Mines would be held at Morgantown on August 15. Witnesses were expected to include Consol officials and rank-and-file coal miners. Included in both categories will probably be the men working underground at the time the fire started who were able to escape.

Newspapers indicated that efforts to collect money for the nine widows of the dead miners and their 22 children were disappointing. The *Journal* will inform its readers where money should be sent when that information becomes available.

Newspaper reports didn ... veal how many of the 350 employed at the mine were ... to find work. One report ... cated that 30 men remain... work at Blacksville No. 1 ... another source indicated ... 43 men had found news jo... Blacksville No. 2. The A... President of District 31, An... Morris, says the Union i... operating fully in the effo... find employment for these ... displaced by the disaster.

As this was written all ... mines in District 31 had retu... to work. An impromptu w... out of the miners in mour... for the disaster victims ... closed several mines in No... ern West Virginia.

Public figures were harsl... their criticism of the U.S. ... reau of Mines and Consol. ... Robert C. Byrd (D., W.Va.) s... "Laxity on the part of the ... reau of Mines has been i... cated."

Byrd added, "Early evide... indicates the disaster should n... er have occurred."

A Young Consol Coal Miner Is Killed After 12 Days On Job

Consolidation Coal Co. strikes again. On June 14, 22-year-old Thomas M. Ball, shotfire and timberman, was killed in a roof-fall at the Franklin No. 25 Mine, Hanna Coal Co., Division of Consolidation Coal Co., at New Athens, Ohio.

Mr. Ball, a member of UMWA Local Union 1360, District 6, had 12 days of underground mining experience. This is what U.S. Coal Mine Inspector Paul J. Gregor reported as the cause of the accident:

"The general laxness on the part of management, its supervisors, and employes to follow sound proven roof support and roof testing practices precluded the detection of a dangerous roof condition and its ultimate failure. Although not listed in chronological order, this r... fall and death were a result ... a culmination of:

"1. Installed temporary r... supports being in many instanc... more than five feet apart, mo... than five feet inby permane... supports, of improper length, ... loosely set,

"2. Thomas M. Ball (victim ... having never received a form... course of instruction designed ... train him in the performance ... his duties as a shotfirer and tim... berman.

"3. The victim with only 1... days underground mining exp... rience being permitted to wor... alone while installing temporar... roof support in face areas,

"4. Management's failure t... enforce the company's approve...

(Cont. on Page 3, Col. 1)

United Mine Workers Journal, official publication of the United Mine Workers of America, is published on the first and fifteenth of each month by the International Executive Board of the United Mine Workers of America; W. A. Boyle, International President; Leonard J. Pnakovich, International Vice President; John Owens, International Secretary-Treasurer; Justin McCarthy, Editor; Rex Lauck, Assistant Editor; Editorial office, 1437 K Street, N. W., Washington, D. C. 20005. Publication office, 2457 East Washington Street, Indianapolis, Ind. 46201. Address all communications to the editorial office. Subscription price, $1.00 per year to non-members of the United Mine Workers of America. Second class postage paid at Indianapolis, Ind. All material produced under union conditions.

Aracoma Coal Company

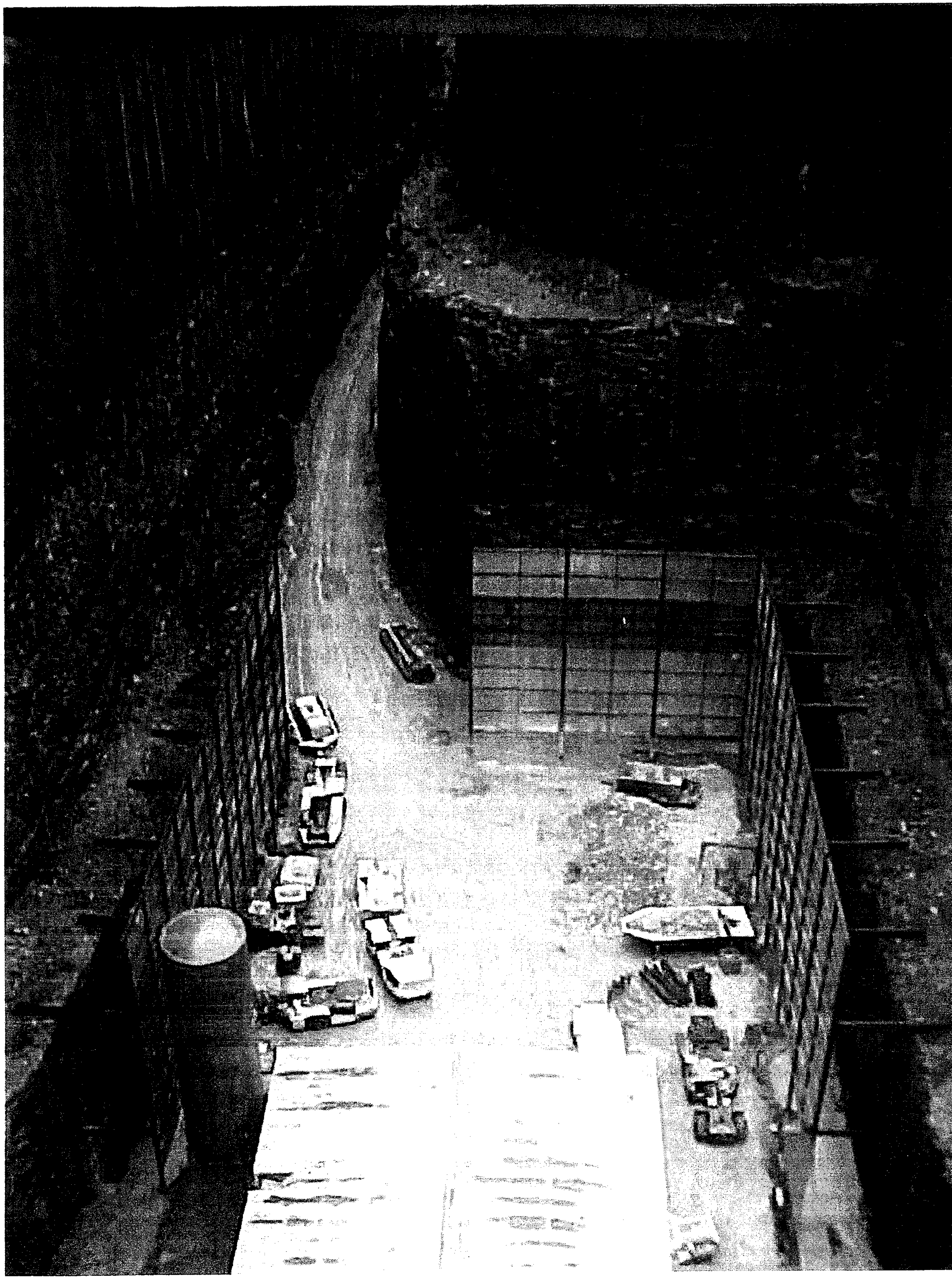
Alma No. 1 Mine

Fatal Investigation

January 19, 2006

Permit No.: U-5006-99

AB58-COMM-11-5



West Virginia Office of Miners' Health, Safety and Training

January 19, 2006

Conveyor Belt Fire/Double Fatality
Aracoma Coal Company, Inc.
Aracoma Alma No. 1
Permit No. U-5006-99

Region Three – Danville Office
137 Peach Court, Suite 2
Danville, West Virginia 25053
Harry Linville, Inspector-at-Large

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Alma No.1 Mine
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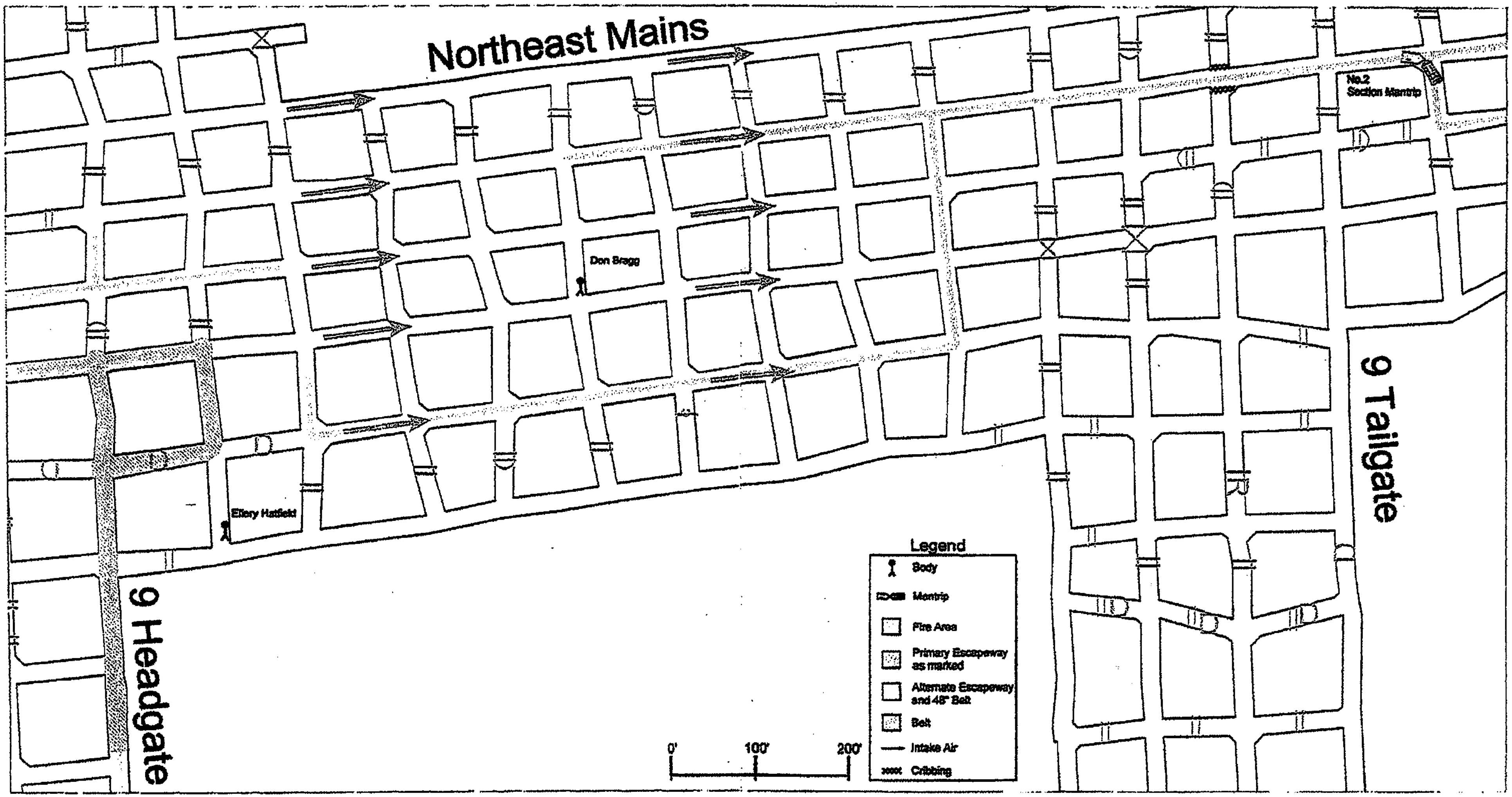


Conveyor Belt Fire/Double Fatality
Aracoma Coal Company, Inc.
Aracoma Alma No. 1
Permit No. U-5006-99

GENERAL INFORMATION

Aracoma Coal Company, Inc. was permitted to operate the Aracoma Alma No. 1 mine (Permit No. U-5006-99) on January 25, 2000. The mine employs 182 people on three shifts and utilizes Apollo Mine Services, Inc. (Permit No. C-3920) contractor employees to assist in manpower needs at the Aracoma Alma No. 1 mine (hereafter referred to as Alma No. 1). The mine utilizes swing shift rotation on two-week intervals for all production employees. Two underground continuous mining units, one longwall mining unit and one construction section are currently in operation. Coal is being mined in the Alma seam. Transportation of supplies and personnel to the continuous miner sections, longwall section and the construction section is by rubber-tired diesel-powered equipment. Track is utilized along the Rum Creek belts.

An underground conveyor belt fire occurred on January 19, 2006 at the Alma No. 1 mine located near Stollings in Logan County, West Virginia.

Mr. Don Israel Bragg and Mr. Ellery Elvis Hatfield, roof bolter operators on the active No. 2 section, were fatally injured when they became separated from their crew while attempting to evacuate from the No. 2 section. Both victims expired as a result of asphyxiation due to, or as a consequence of, an underground mine fire with suffocation and carbon monoxide intoxication. The men were recovered from the mine on January 21, 2006.

Mr. Don Israel Bragg, age 33, had been employed at the Alma No. 1 mine since January 5, 2004 and had approximately 9½ years total mining experience. Mr. Don Israel Bragg resided at Accoville, Logan County, West Virginia and is survived by his wife, Delorice.

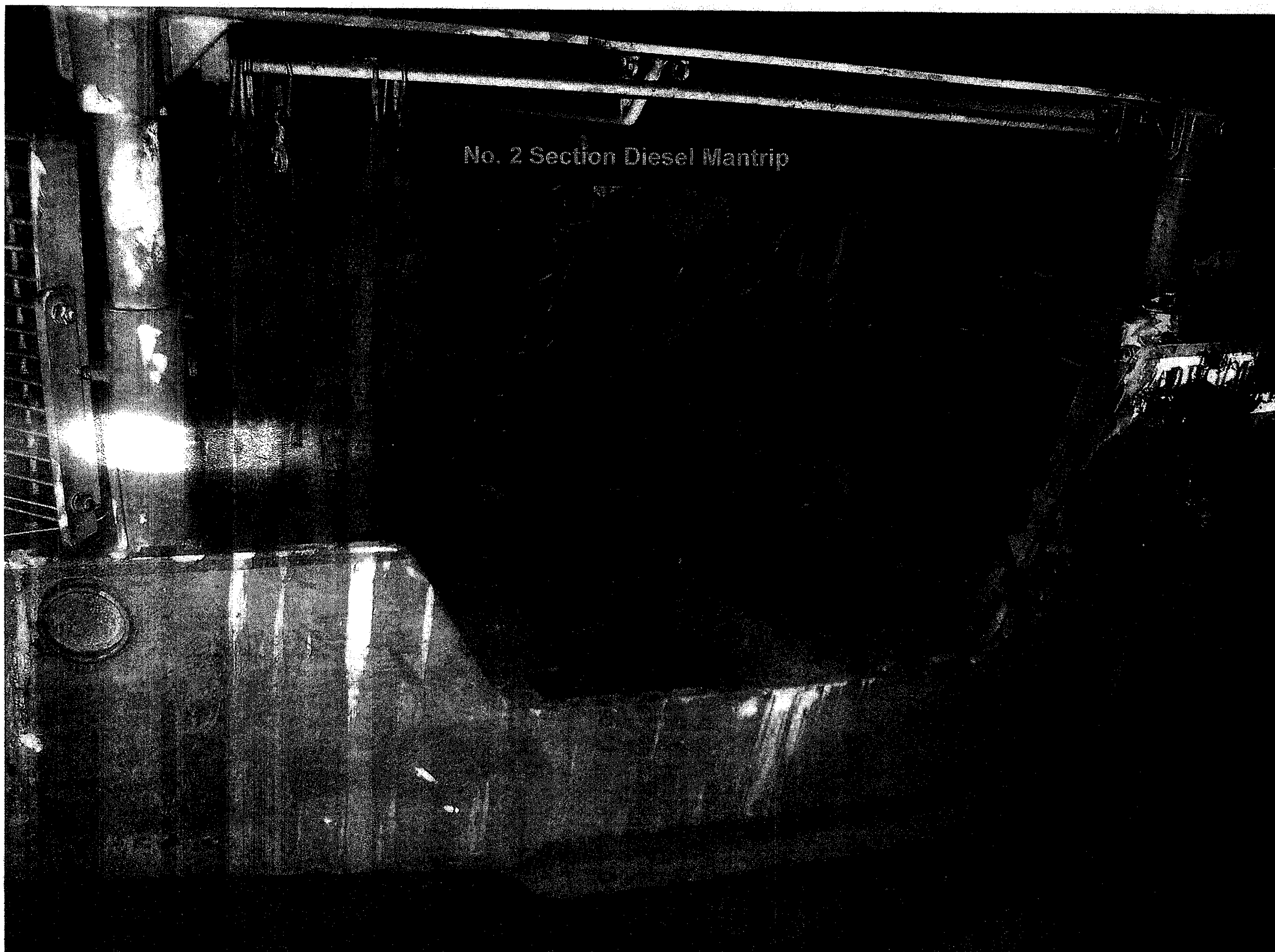
Mr. Ellery Elvis Hatfield, age 46, had been employed at the Alma No. 1 mine since August 31, 2001 and had approximately 11½ years total mining experience. Mr. Ellery Elvis Hatfield resided near Simon, Wyoming County, West Virginia and is survived by his wife, Freda.

Mr. Don Israel Bragg and Mr. Ellery Elvis Hatfield received annual refresher training on January 14, 2006.

Mr. Eddie Lester, Vice President of Operations for Alma No. 1 mine, notified Mr. Richard Boggess, District Inspector for the Office of Miners' Health, Safety and Training, at approximately 7:33 p.m. on January 19, 2006 of the conveyor belt fire and that two miners were unaccounted for. A mine rescue/fire fighting operation was started immediately.

DESCRIPTION

The No. 2 Northeast Mains evening shift crew entered the Alma No. 1 mine on January 19, 2006 at their normal starting time of 2:30 p.m. under the direction of Section Foreman Mr. Michael Plumley. The No. 2 section crew included the following persons – Mr. Steve Hensley, Continuous Miner Operator; Mr. Billy Mayhorn, Continuous Miner Operator; Mr. Elmer Mayhorn, Roof Bolter Operator; Mr. Ellery Elvis Hatfield, Roof Bolter Operator; Mr. Don Israel


No. 2 Section Diesel Mantrip

Bragg, Roof Bolter Operator; Mr. Randall Crouse, Roof Bolter Operator; Mr. Michael Shull, Electrician; Mr. Joe Hunt, Shuttle Car Operator; Mr. Pat Kinser, Shuttle Car Operator; Mr. Gary Baisden, Shuttle Car Operator; Mr. Duane Vanover, Scoop Operator; and Mr. Michael Plumley, Section Foreman.

The crew entered the mine from the box cut portal on a Brookville 14-man, rubber-tired diesel mantrip (Serial No. 9059). They proceeded along their normal travel route to the No. 1 four-way through the airlock doors into the North Mains intake escapeway travelway, turning right along the North East Mains to the airlock doors at the No. 9 longwall headgate conveyor belt. The crew traveled through the outby set of doors under the No. 9 longwall conveyor belt to the inby set of doors where Mr. Carl White, Dayshift Belt Examiner, opened and shut the airlock doors, allowing the mantrip to enter the Northeast Mains intake escapeway travel way.

The No. 2 section crew proceeded from spad 3333 in the No. 8 entry of North East, traveling seven crosscuts then turning left traveling three crosscuts to the No. 5 entry, then turning right, traveling five crosscuts to spad 3546, turning right traveling one crosscut to spad 3547 in the No. 4 entry, then turning left traveling approximately twenty-three crosscuts (approx. 2325 ft.) to the mouth of the No. 2 section. This is the normal daily travel route from the box cut to the No. 2 section.

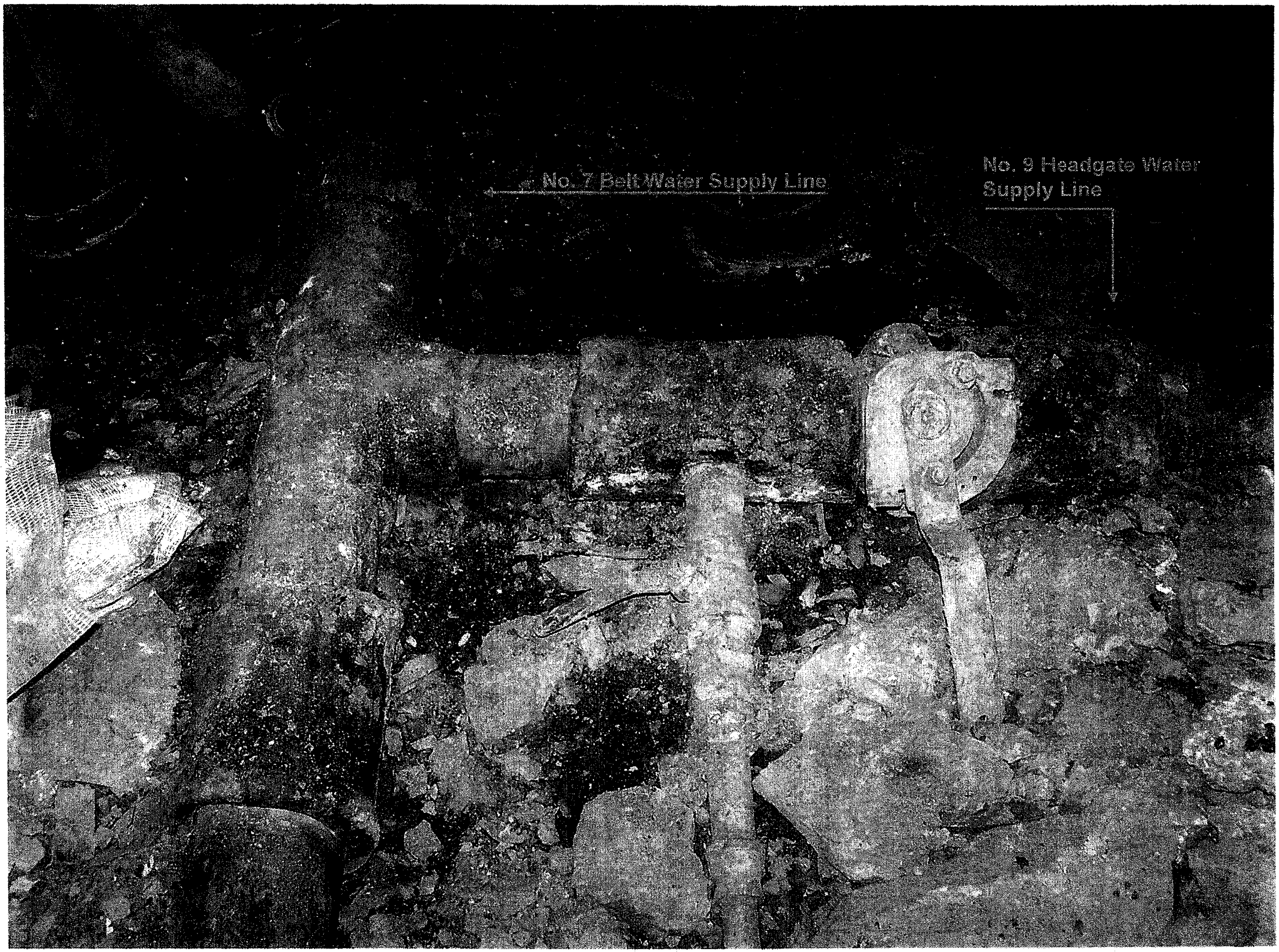
Upon arrival on the No. 2 section the evening shift crew met the dayshift crew along with Mr. Terry Shadd (No. 2 Section Mine Foreman/Superintendent) at the mantrip staging area. The dayshift crew had just finished rock dusting the section. While waiting for the rock dust to clear the face areas, a brief meeting was held with both crews concerning a new proposed work schedule. The discussion of the proposed work schedule lasted approximately ten to fifteen minutes.

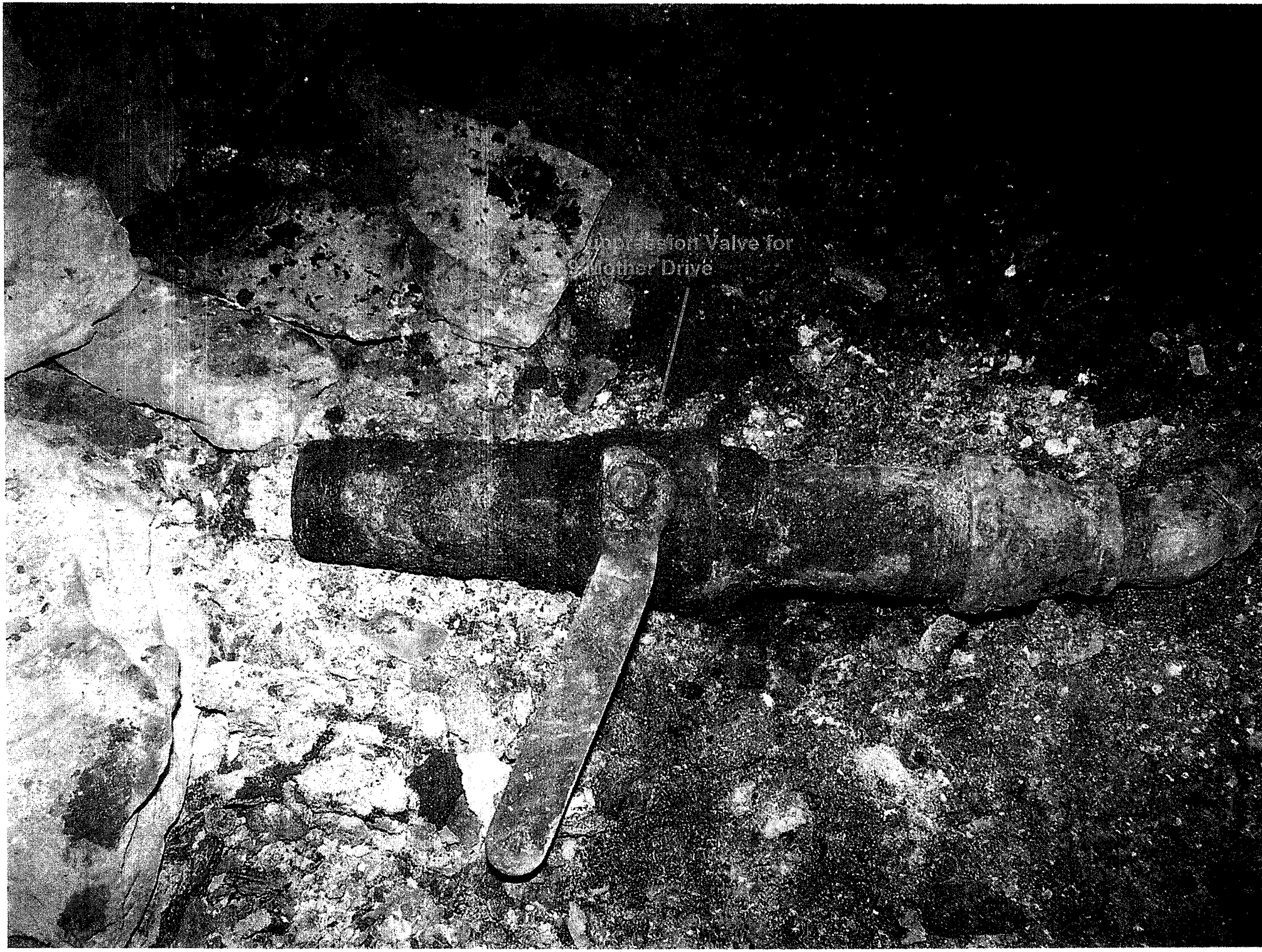
At the conclusion of the meeting, the dayshift coal crew exited the mine without delay and did not notice anything unusual during their travel out of the mine. The evening shift coal crew proceeded to their assigned duties.

The No. 2 section utilizes split ventilation with four working faces. The No. 3 entry is intake. Two remote control continuous miners, three shuttle cars, two roof bolting machines and two battery-operated scoops are utilized on this section.

Mr. Steve Hensley, Continuous Miner Operator, completed a partial scrap cut in the No. 1 face. Mr. Steve Hensley then trammed the continuous miner to the No. 2 entry and mined 2 break right through into the No. 3 entry. Upon completing 2 break right, Mr. Steve Hensley trammed the continuous miner down the No. 2 entry and was waiting on the roof bolt crew. Section Foreman Mr. Michael Plumley mined 3 break right. Continuous Miner Operator Mr. Billy Mayhorn and Shuttle Car Operator Mr. Gary Baisden at the start of the shift had been instructed to get a scoop and a load of crib blocks and set some cribs at an area at the mouth of the No. 2 section.

Mr. Carl White, Dayshift Belt Examiner, was stationed at the No. 9 headgate longwall mother drive on January 19, 2006 to watch over the No. 9 headgate longwall belt. The No. 9 longwall belt shut down several times during his shift. Mr. Carl White said he could see a hazy mist around the mother drive and storage unit but could not find any problems. He checked drive motors and bearing temperatures with a heat temperature gun and found no problems. Mr. Dustin Dotson, Mine Foreman, arrived at the No. 9 headgate and briefly talked with Mr. Carl White. Mr. Dustin Dotson then proceeded to the belt starter box, opened a door on the box and


No. 7 Belt Water Supply Line
No. 9 Headgate Water Supply Line


Valve for
Drive

shortly thereafter left the area. The belt continued to run uninterrupted the remainder of the day shift.

At the end of Mr. Carl White's shift, he was still concerned with the condition at the longwall belt. Therefore, he contacted Mr. Bryan Cabell, Evening Shift Belt Examiner/Fireboss, who was located at the No. 7 belt head and asked him to report to the No. 9 headgate longwall belt as soon as possible. Mr. Carl White then traveled outby, down the No. 9 headgate longwall belt and met with the longwall dayshift crew and proceeded to the surface. They arrived on the surface at approximately 4:00 p.m.

Mr. Bryan Cabell, Belt Examiner/Fireboss, stated that a carriage was wrecked in the mother drive storage unit causing a misalignment of the beltline and allowing the belt to rub a bearing. Mr. Bryan Cabell unsuccessfully tried to train the beltline and align the carriage unit. Mr. Bryan Cabell called Mr. Fred Horton, Evening Shift Mine Foreman, to inform him of the belt condition and to request chain ratchets. Mr. Bryan Cabell was at the No. 9 headgate mother drive unit when the fire started.

The evening shift longwall crew, under the direction of Mr. David R. Runyon, arrived at the No. 9 longwall section at approximately 3:50 p.m. When the crew arrived the No. 9 longwall belt was off. The evening shift crew started the No. 9 longwall belt to clear the face chain so slack could be removed from the chain. Also at this time two setups of belt structure were removed.

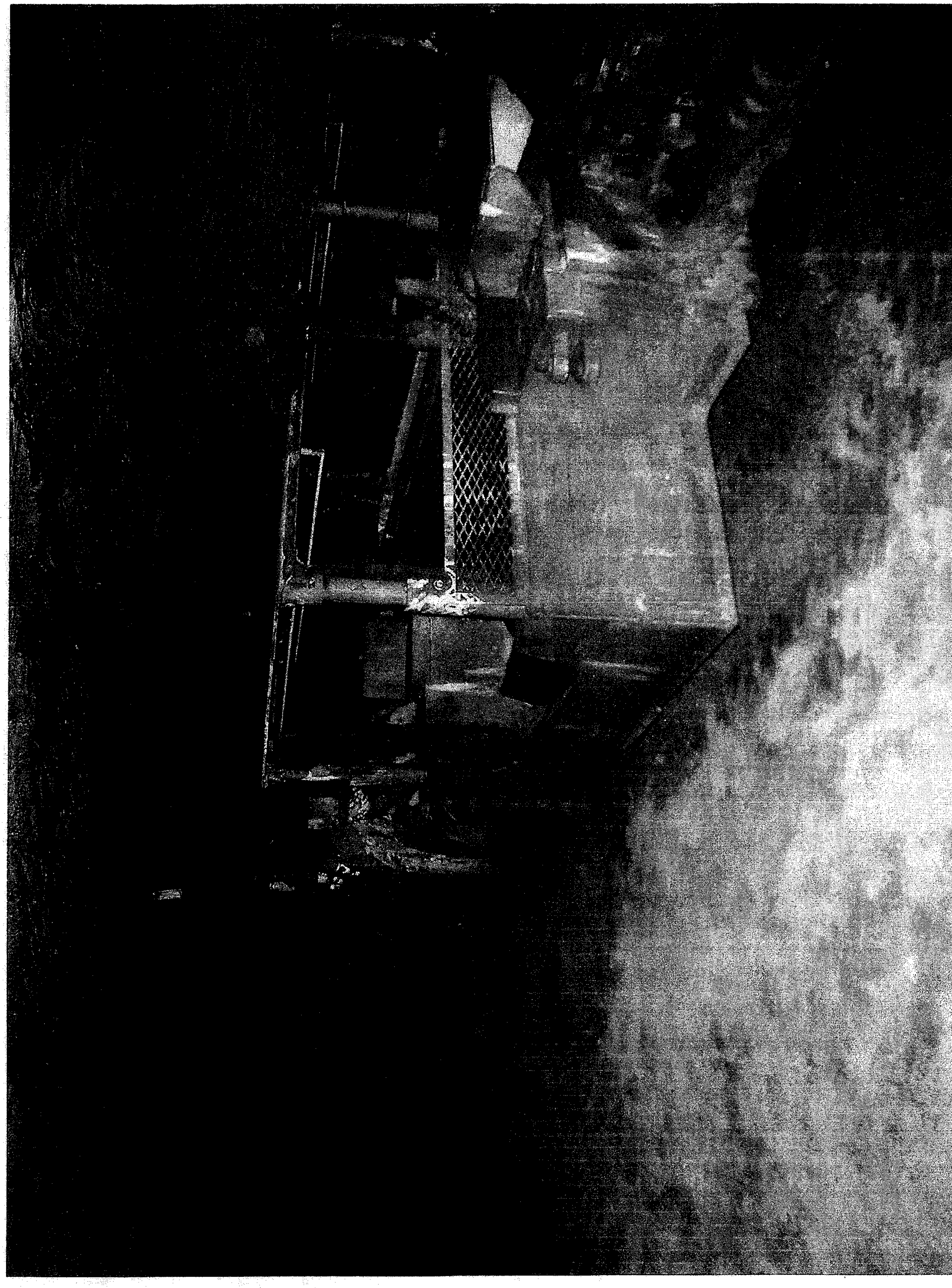
According to Mr. Gary Richardson, Longwall Headgate Operator, the second shift started producing coal at 4:25 p.m. The conveyor belt ran uninterrupted until 5:05 p.m. Mr. Gary Richardson, when calling about the belt conveyor, was told by Mr. Bryan Cabell that he had shut the belt conveyor down due to smoke and would get it running again as soon as possible.

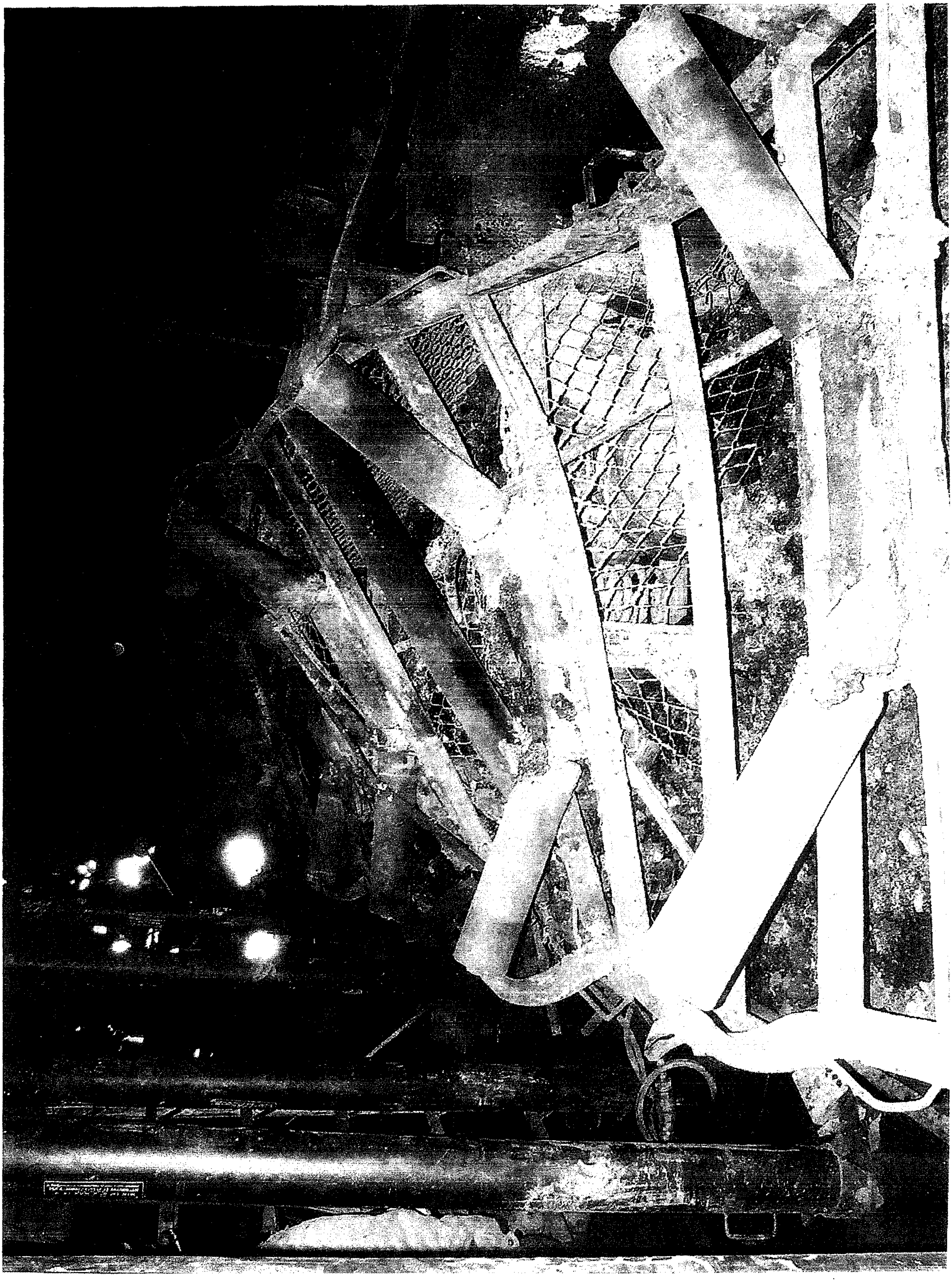
At this time, Mr. Pat Calloway and Mr. Jonah Rose arrived on the scene on the No. 714 Wallace 5-man diesel powered, rubber-tired vehicle, parking it in the main travel way that crosses under the mother drive beltline. An attempt was made by Mr. Pat Calloway to move the No. 714 diesel mantrip. The mantrip would not start and was completely destroyed in the fire. Mr. Bryan Cabell received a fire extinguisher from Mr. Pat Calloway and proceeded to fight the fire, Mr. Jonah Rose gathered additional fire extinguishers. At least three fire extinguishers were discharged on the fire with no success. Mr. Bryan Cabell stated that he attempted to attach a fire hose to the fire valve at the storage unit but was unsuccessful because the fire hose and fire valve fittings were incompatible.

Mr. Bryan Cabell then attempted to open the fire valve and direct water onto the fire area but no water was present in the water supply line. Mr. Bryan Cabell instructed Mr. Pat Calloway to check the water supply line to determine why no water was being supplied and to correct the problem. Mr. Bryan Cabell then tried to locate the cutoff valve for the yellow two-inch water supply line by traveling along the No. 7 belt toward the No. 9 longwall belthead. He was unable to get within 75 feet of the discharge roller where the cut off valve is located due to heavy black smoke. The fire was burning out of control and no means was available to fight the fire.

Mr. Jonah Rose was left at the outby set of double airlock doors to look and listen for miners retreating from the No. 2 section.

Mr. Gary Richardson, Longwall Headgate Operator, was listening on the mine phone and heard someone tell the dispatcher, Mr. Gary (Mike) Brown, to contact the No. 2 section and have them come off the section and tell the longwall crew if they encountered smoke to get into the





intake and come off the section. He also heard conversation between Mr. Bryan Cabell and Mr. Fred Horton concerning the fire at the mother drive.

At approximately 5:55 p.m. Mr. Gary Richardson attempted to call out his two-hour report when he discovered that the mine phone was inoperative. After he updated the longwall crew, the Section Foreman Mr. David R. Runyon and Chief Electrician Mr. Jamie Adkins, decided to go see what was going on. Approximately ten minutes after they left, the longwall section lost power. It was at this time that the longwall crew took it upon themselves to evacuate. They traveled off the No. 9 headgate longwall section through the cut through into the North Mains primary intake escapeway.

After several unsuccessful attempts to contact the section by mine phone, Mr. Gary (Mike) Brown, Dispatcher, who is located on the surface, shut down the No. 2 section conveyor belts at approximately 5:39 p.m. to get the attention of someone on the crew. Shortly thereafter, Section Foreman Mr. Michael Plumley called outside to see why his belt was not running when Dispatcher Mr. Gary (Mike) Brown and Shift Foreman Mr. Fred Horton notified Mr. Michael Plumley of a fire and for him to assemble his crew and leave the section.

Section Foreman Mr. Michael Plumley then instructed the crew to meet at the mantrip. A headcount of the crew was conducted and the crew proceeded to exit the mine, not knowing the extent or seriousness of the fire.

Mr. Steve Hensley, Mantrip Operator, stopped the mantrip and picked up Mr. Billy Mayhorn and Mr. Gary Baisden at spad 4177. The No. 2 section coal crew proceeded out their normal travel route down the No. 5 entry to spad 3547, turning right and traveling through the crosscut to the No. 4 entry at spad 3546.

The No. 2 section coal crew encountered a burning smell during their travel in the No. 5 entry at the mouth of the No. 10 headgate construction work site and shortly thereafter could actually see light smoke. As the crew proceeded along the No. 5 entry roadway, some crew members pulled their shirts up over their mouths and noses to help with breathing.

When Mr. Steve Hensley, Mantrip Operator, turned left into the No. 4 entry at spad 3546, the crew encountered a wall of thick black smoke that traveled up the primary intake escapeway toward the No. 2 section as a result of a missing ventilation control at the No. 7 conveyor belt tailpiece. Mr. Steve Hensley immediately stopped the mantrip and informed the crew he could not see to go any farther.

At this point, a panic situation occurred. A decision was made to go through the mandoor located three crosscuts outby spad 3546, which was installed by members of the No. 2 section coal crew approximately three weeks prior to the fire. The No. 2 section crew was familiar with this area and stopped at this location to allow Section Foreman Mr. Michael Plumley to fireboss the seal. Physical evidence (self-rescuer tops and bottoms) indicated that the No. 2 section coal crew traveled outby the manbus approximately one or two crosscuts before donning their self-rescuer devices.

The coal crew felt their way along the coal ribs for approximately three crosscuts in heavy, dense black smoke with zero visibility.

When the crew entered through the mandoor into the 48-inch belt secondary escapeway, the air was clear. Once the crew entered into the belt entry, Section Foreman Mr. Michael Plumley conducted a headcount and, at this time, the crew realized that Mr. Don Israel Bragg and Mr. Ellery Elvis Hatfield were missing.

Section Foreman Mr. Michael Plumley, Mr. Steve Hensley and Mr. Billy Mayhorn traveled back through the mandoor and into the smoke filled No. 4 entry roadway, trying to locate Mr. Don Israel Bragg and Mr. Ellery Elvis Hatfield. They traveled outby and inby for a short distance, shouting for the missing miners. They soon retreated due to thick heavy smoke and after receiving no response from the missing miners.

The No.2 section crew regrouped and proceeded down the 48-inch belt secondary escapeway toward the mouth of Northeast Mains outby the No. 9 headgate mother drive belt. The No. 2 section crew stated that the air was clear on the 48-inch belt and that some of the crew had removed their mouthpieces but kept their rescuers on. The No. 2 section crew exited the secondary escapeway into North Mains primary intake escapeway through mandoors at spads 2859 and 2866 where they were met by Mr. Bryan Cabell, Evening Shift Belt Examiner, and Mr. Pat Calloway, Foreman

A headcount was taken and Mr. Pat Calloway instructed the crew to stay together. Mr. Bryan Cabell and Mr. Pat Calloway were informed by the No. 2 section crew at this time that two of the crew members were unaccounted for. The No. 2 section crew and longwall crew met at the mouth of the cut through in the North Mains primary intake escapeway.

Section Foreman Mr. Michael Plumley, Mr. Steve Hensley and Mr. Joe Hunt attempted to travel back up the 48-inch belt secondary escapeway to try and locate Mr. Don Israel Bragg and Mr. Ellery Elvis Hatfield but were stopped due to smoke entering the belt escapeway at the area of No. 9 headgate mother drive.

Mr. Fred Horton, Evening Shift Mine Foreman, and Mr. Billy Hall, Evening Shift Maintenance Chief, arrived and instructed Mr. Pat Calloway to stay with the No. 2 section crew and to keep everybody together. Mr. Raymond Grimmett, Grader Operator, arrived at the top of the hill and was instructed by Mr. Pat Calloway to park the grader in a crosscut and stay with the No. 2 section crew.

Mr. Fred Horton and Mr. Billy Hall traveled through the cut through and up the No. 9 headgate longwall belt to determine if the fire could be accessed from this location, but because of heavy smoke roll back they had to retreat.

Mr. Dustin Dotson, Mr. Terry Shadd, Mr. Bob Massey and other company officials arrived and were informed of the two missing crew members and the severity of the fire.

A decision was made to travel back to the longwall face to retrieve extra rescuers and line curtain. They cut the No. 9 longwall belt inby the cut through and removed the belt structure. Ventilation controls were installed in an attempt to remove air from the fire. Members of the No. 2 section crew and the longwall crew assisted with this work.

After ventilation controls were installed, Mr. Fred Horton, Evening Shift Mine Foreman, directed Mr. Pat Calloway and Mr. Michael Plumley to take all of the hourly employees to the surface. A headcount was taken and they proceeded to the surface on two diesel rubber-tired mantrips, arriving on the surface at approximately 8:00 p.m.

The following persons remained in the mine and attempted unsuccessfully to locate the missing miners: Mr. Dwayne Francisco, Mr. Fred Horton, Mr. Chris Adkins, Mr. Peppy Lester, Mr. Terry Shadd, Mr. Bob Massey, Mr. Edward Ellis, Mr. Dustin Dotson, Mr. Rodney Morrison, Mr. Billy Hall, Mr. David R. Runyon, and Mr. Gary Goff.

Mine rescue teams had arrived at the mine therefore, a decision was made to bring all persons to the surface. At approximately 10:30 p.m., all non-mine rescue personnel had been removed from the mine.

FINDINGS OF FACT

1. The Aracoma Coal Company's Alma No. 1 Mine is ventilated by three main fans, one blowing and two exhaust.
2. On January 19, 2006 one hundred fifty-seven (157) persons reported for work at the Alma No. 1 Mine, one hundred twenty-five (125) employees and thirty-two (32) contractor employees.
3. This mine utilizes one longwall mining section and two continuous miner sections for coal production.
4. Mine transportation recently switched from a battery operated track system to rubber-tired diesel equipment.
5. CSE SR-100 self-rescuer devices are utilized at this mine.
6. The No. 9 headgate longwall section was utilizing the tailgate blockage plan on January 19, 2006 as a result of a roof fall.
7. The No. 3 continuous miner section was idle on the evening shift on January 19, 2006.
8. An accurate map of the mine was not provided on January 19, 2006.
9. The fire hose outlets provided at the mother drive storage unit area for the No. 9 longwall belt could not be utilized because the shut-off valve for the water supply for the fire hose outlets was found in the closed position.
10. The water sprinkler fire suppression system installed on the No. 9 headgate longwall belt conveyor drive area could not activate in the event of a fire or a rise in temperature because the water supply valve was found in the closed position.
11. The air direction on the longwall belt was not traveling in the proper direction in that air was traveling outby toward the discharge instead of inby toward the longwall working sections.
12. The No. 2 section was utilizing air that ventilated the No. 2 section 48-inch belt conveyor as a supplement to face ventilation. No device was provided on the section to alert persons of rising carbon monoxide levels.
13. The No. 9 headgate mother belt storage unit was not properly maintained thus allowing the belt to run out of alignment.
14. Ventilation controls were missing, allowing smoke to enter the primary intake escape-way for the No. 2 section.
15. Nine subpoenas were issued during this investigation.
16. Eighty-three (83) interviews were conducted.

CONCLUSION

Mr. Don Israel Bragg, age 33, and Mr. Ellery Elvis Hatfield, age 46, were fatally injured when they became separated from their crew after encountering thick black smoke in their primary intake escapeway while attempting to evacuate from the No. 2 section during a conveyor belt fire at the No. 9 headgate mother drive. Both expired as a result of asphyxiation due to or as a consequence of an underground mine fire with suffocation and carbon monoxide intoxication.

ENFORCEMENT ACTION

During the course of this extended investigation, several inspections were conducted. A total of one hundred and sixty-eight (168) notices of violations were issued. Seven (7) of the violations were determined to have contributed to the occurrence of this accident. Sixteen (16) individual personal assessments were also issued. Seven (7) recommendations for withdrawal or suspension of certifications were issued.

The Office of Miners' Health, Safety & Training issued a control order under Chapter 22A, Article 2, Section 68. The order was issued at 8:45 p.m. on January 19, 2006 to preserve the accident scene and was terminated at 12:50 p.m. on July 17, 2006.

The following is a list of the contributing violations:

(V-1) Title 36, Series 6, Section 4 4.1(j): Based on testimony and evidence received during an investigation following a fatal mine fire, the approved longwall mining plan was not being complied with on the No. 9 longwall headgate section in that the mother drive beltline ventilating air current that is normally used to supplement the intake air current to the longwall face was traveling in the opposite direction. The ventilating air current that is required to travel toward the longwall face along the beltline was reversed, resulting in the air current traveling toward the mother drive head.

(V-2) Chapter 22A, Article 2, Section 58 (d)(1): Based upon testimony received and evidence obtained during an investigation of a fatal mine fire that occurred on January 19, 2006, it has been determined that no water was available at the fire hose outlets on the mother drive belt for the No. 9 headgate longwall section. The fire hose outlet valve on the two-inch supply waterline at the fire location was opened and no water was available. The main cutoff valve for the two-inch water supply line for the longwall belt was found in the closed position. The cutoff valve is located near the longwall belt discharge roller.

(V-3) Chapter 22A, Article 2, Section 58 (f): Based on testimony and evidence obtained during a fatal mine fire investigation, it was determined that a fire hose with fittings suitable for connection with each belt conveyor waterline system was not provided at or near the No. 9 headgate longwall belt drive and take-up area. The connector on the fire hose provided was too large in diameter for the fire hose outlet and could not be attached to allow water to be used to fight a mine fire. Additionally, the same problem existed on the No. 9 headgate longwall belt on December 23, 2005 according to testimony provided by Brandon Conley, a smoldering fire occurred December 23, 2005 and he could not get the fire hose to connect to the water hose outlet. He stated this condition was reported to management at that time.

(V-4) Chapter 22A, Article 2, Section 60(b): Based on testimony and evidence obtained during a fatal mine fire investigation, a separate and distinct intake air escapeway is not provided from the active North East Mains No. 2 Section to the surface. Required ventilation controls were not provided at the No. 7 belt tailpiece area. This condition allowed heavy black smoke to enter the primary intake escapeway following a belt fire that occurred on January 19, 2006.

(V-5) Chapter 22A, Article 2, Section 37(o): According to testimony and evidence received during a mine fire/fatal investigation, the No. 9 headgate mother drive conveyor belt was not maintained in a safe operating condition. The storage unit drop-off carriage system contained damaged, missing or improperly installed components, which caused the drop-off carriages to improperly unlatch. This condition contributed to the belt running out of alignment causing a fire at the storage unit area.

(V-6) Chapter 22A, Article 2, Section 39(j): Based on evidence obtained and testimony received during a fatal mine fire investigation, it was determined that the water sprinkler system designed to be automatically activated in the event of a fire or rise in temperature failed to activate on the No. 9 headgate longwall belt drive on January 19, 2006. The water supply valve for the fire suppression system was found in the off position.

(V-7) Chapter 22A, Article 2, Section 17: Based upon testimony and evidence obtained through a fatal mine fire investigation, it has been determined that a belt fire occurred at the mother drive area of the No 9 headgate longwall belt on January 19, 2006 at approximately 5:00 p.m. and all persons whose safety was endangered were not promptly notified to remain clear of the area where the dangerous condition existed. The No. 2 section crew was not notified until approximately 5:40 p.m. The crew traveled down their intake escapeway and travel way leading straight to the fire where they encountered heavy black smoke. Two of the crew members became separated from the crew and eventually succumbed while trying to escape.

RECOMMENDATIONS OF

ARACOMA COAL COMPANY, INC.
P.O. BOX 1120
HOLDEN, WV 25625
304-752-6194

Aracoma Coal Company, Inc. is committed to the safety of its employees and everyone on its property. Notwithstanding this commitment to safety, on January 19, 2006, the Alma Mine, MSHA Id. No. 46-08801 and State Id. U-5006-99, suffered a fatal accident when two members died as a result of a fire at the mine.

Aracoma continues to investigate this matter and while its investigation is not concluded, the Company can, with its preliminary findings, make the following proposals. To prevent a re-occurrence of this accident, Aracoma has undertaken the following remedial measures, some of which are beyond state and federal mine safety requirements:

1. The mine has checked and repaired all stoppings along beltlines in the Alma Mine. Further, all belt examiners and other examiners have been re-instructed to check stoppings during their exams, and to further work with the mine foreman to make any changes necessary to make the 75.1200 map reflect the situation of all ventilation controls.

2. The mine has checked all fire fighting nozzles, lines, and hoses and ensured they are in proper working order.

3. The mine has installed a new custom designed sprinkler system on the belt head and belt storage unit for the longwall mother belt.

4. The mine has conducted a thorough inspection of the belt system to ensure it is in proper working order. Further, belt examiners and electricians have been re-instructed on belt maintenance.

5. The mine has re-instructed all members on the requirements of the Emergency Evacuation and Fire Fighting Plan and taken steps to ensure that the immediate withdrawal of all inby personnel takes place when a fire occurs. Specifically, the contents of the Emergency Evacuation and Fire Fighting Plan have been discussed with members and it has been the subject of weekly safety talks. Further, the mine has conducted emergency evacuation drills for all members, including the walking of escapeways. All new hires walk the escapeways for their work area when they are hired.

These items will be incorporated into the mine's West Virginia Comprehensive Safety Program. All members have been retrained on these provisions.

Sid Young
President, Aracoma Coal Company
July 14, 2006

Comprehensive Mine Safety Program

Modifications as required by WVOMHS&T

The following changes are required in the Comprehensive Mine Safety Program due to a fatal accident on January 19, 2006.

1. Management shall provide training, at a minimum of eight hours, for all persons who are required to conduct mandatory fireboss examinations as required by law. This training shall include all persons conducting the required examinations, as well as others who may by used in that capacity even if on an infrequent basis. The content of this training will be approved by the WVOMHS&T prior to the training being conducted. A representative of the WVOMHS&T will be present during this training.
2. Deluge type water sprays, water sprinklers, dry chemical sprinkler systems or foam generators (designed to be automatically activated in the event of a fire or rise in the temperature) shall be installed at each main and secondary belt drive, take-up and storage unit system installed underground. This mine shall also

comply with all provision of 30 CFR from the Federal Register, pertaining to fire protection along beltlines.

3. The mine's emergency response plan shall include a means to assure that adequate water is available for fire fighting purposes at all times, particularly during times of power outages.
4. On all sprinkler-type fire suppression systems, a water pressure gauge will be installed at or near the end of the water line and in a position that the gauge can be readily seen. The belt examiner shall note and record the pressure reading when making his examination.
5. Mine management will designate a competent individual at the mine to be responsible for reviewing and counter signing the electrical examination books to assure that all required equipment is being properly examined.
6. Mine management will train all mine personnel in the response requirements of the Co monitoring system. Also, all new employees, contractors, vendors, etc., will be trained on this same system prior to entering the mine.
7. The Emergency Evacuation and Fire Fighting Plan as required by 30 CFR 75.1502 from the Federal Register shall be incorporated into the Comprehensive Mine Safety Program.
8. All belt storage units for the longwall belts will be examined by a representative of the manufacturing company for proper installation prior to the belts being placed in operation.
9. A checklist will be developed to determine exactly what items are to be checked to satisfy the monthly examination of fire suppression equipment on belt lines.
10. A functional examination of all belt fire-fighting equipment will be conducted every 6 months. This examination will require opening fire valves, assuring fire hose will couple to fire hose, fire hose and fire outlets are compatible, fire nozzles are compatible with fire hose and visually check fire extinguishers. A written record of this examination will be maintained at the mine.
11. Main water lines used to deliver water for fire fighting purposes shall not be located in the same entry at conveyor belt drives, take-ups and storage units.

APPENDIX

- Mine Information Sheet
- Victim Information Sheets
- Persons Present During Investigation
- Attachments A, B, C, D, E & F

MINE INFORMATION

COMPANY Aracoma Coal Company, Inc.

MINE NAME Aracoma Alma No. 1

WV PERMIT U-5006-99 MSHA PERMIT NO. 46-08801

ADDRESS P. O. Box 1120 Holden, WV 25625

COUNTY Logan PHONE NO. 304-752-6195

DATE PERMIT ISSUED January 25, 2000

WORKING STATUS Active

LOCATION Rt. 17 and Airport Road at Stollings, WV

UNION NON-UNION X

DAILY PRODUCTION 1569 tons ANNUAL PRODUCTION TO DATE 25,112 tons

TOTAL EMPLOYEES 180

NUMBER OF SHIFTS 3

COAL SEAM NAME AND THICKNESS Alma – 42 inches to 68 inches

ACCIDENT INCIDENT RATE 10.44 LOST TIME ACCIDENTS 2

TYPE OF HAULAGE Belt

WVOMHST INSPECTOR Richard Boggess

DATE OF LAST INSPECTION January 19, 2006

NOTIFIED BY Eddie Lester

NOTIFICATION TIME 7:33 p.m. January 19, 2006

CMSP – ANNIVERSARY DATE February 7, 2006

CMSP – CONTACT PERSON Charles Conn

INVESTIGATION

The following persons were present for the initial onsite investigation conducted on January 31, 2006.

ARACOMA COAL COMPANY, INC.

Drexel Short	Senior Vice President, Group Operations
Frank Foster	Corporate Safety Coordinator
Keith Hainer	Manager of Maintenance
Robert Ellis	Chief of Maintenance (Aracoma Alma No. 1)
Bill Stapleton	Mine Engineer
Chad Evans	Diesel Tractor Operator

MINE SAFETY AND HEALTH ADMINISTRATION

Bill Corroco	Accident Investigation Program Manager
Kenny Murray	Accident Investigator - Leader
Anthony Webb	Investigator
Dennis A. Beiter	Technical Support

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
William Tucker	Investigator
Eugene White	Investigator
Willie Barker	Safety Instructor

INTERVIEWS
(* Denotes those interviewed)

The following persons were present during interviews conducted on February 8, 2006.

ARACOMA COAL COMPANY, INC.

Randall Crouse *	Roof Bolter Operator
Steve Hensley *	Continuous Miner Operator
Patrick W. Kinser *	Shuttle Car Operator
H. Michael Shull *	Electrician
Mark E. Heath	Attorney

MINE SAFETY AND HEALTH ADMINISTRATION

Kenny Murray	Accident Investigator – Leader

Michael Finnie	Investigator
Ronald W. Stahlhut	Investigator
Charles W. Pogue	Investigator
Arlie A. Webb	Investigator
Anthony J. Burke	Investigator
Dennis A. Beiter	Technical Support
William J. Francart	Technical Support
Derrick Tjernlund	Technical Support
Rodney Brown	Inspector
Daniel M. Barish	Solicitor – U. S. Dept. of Labor
Keith A. Bell	Solicitor – U. S. Dept. of Labor
Marne Mitskog	Solicitor – U. S. Dept. of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
Terry Farley	Health and Safety Administrator
William Tucker	Investigator
Eugene White	Investigator
Steve Cox	Investigator
Timothy Bradford	Attorney

The following persons were present during the interviews conducted on February 9, 2006.

ARACOMA COAL COMPANY, INC.

Joseph F. Hunt *	Shuttle Car Operator
Thomas D. Vanover *	Scoop Operator
Brandon U. Conley *	Beltman
Candice Conley	B. Conley's Representative
Mark E. Heath	Attorney

MINE SAFETY AND HEALTH ADMINISTRATION

Kenny Murray	Accident Investigator – Leader
Michael Finnie	Investigator
Ronald W. Stahlhut	Investigator
Charles W. Pogue	Investigator
Arlie A. Webb	Investigator
Anthony J. Burke	Investigator
Dennis A. Beiter	Technical Support
William J. Francart	Technical Support
Derrick Tjernlund	Technical Support
Jeffrey Waggett	Technical Support
Rodney Brown	Inspector

Daniel M. Barish	Solicitor – U. S. Dept. of Labor
Keith A. Bell	Solicitor – U. S. Dept. of Labor
Marne Mitskog	Solicitor – U. S. Dept. of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
Terry Farley	Health and Safety Administrator
William Tucker	Investigator
Eugene White	Investigator
Steve Cox	Investigator
Timothy Bradford	Attorney

The following persons were present during the interviews conducted on February 10, 2006.

ARACOMA COAL COMPANY, INC.

Elmer "Blue" Mayhorn *	Roof Bolter Operator
Billy Mayhorn*	Continuous Miner Operator
Brian Cabell *	Belt Examiner
David J. Hardy	Attorney

MINE SAFETY AND HEALTH ADMINISTRATION

Kenny Murray	Accident Investigator – Leader
Anthony J. Burke	Investigator
Charles W. Pogue	Investigator
Ron Stahlhut	Investigator
Arlie A. Webb	Investigator
Dennis A. Beiter	Technical Support
William Francart	Technical Support
Derrick Tjernlund	Technical Support
Daniel M. Barish	Solicitor – U. S. Dept. Labor
Keith A. Bell	Solicitor – U. S. Dept. Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
Terry Farley	Health and Safety Administrator
William Tucker	Investigator
Eugene White	Investigator
Steve Cox	Investigator
Danny Cook	Investigator

The following persons were present during the interviews conducted on February 16, 2006.

ARACOMA COAL COMPANY, INC.

Patrick Calloway *	Section Foreman
David J. Hardy	Attorney

MINE SAFETY AND HEALTH ADMINISTRATION

Kenny Murray	Accident Investigator – Leader
Anthony Burke	Investigator
Arlie A. Webb	Investigator
Dennis A. Beiter	Technical Support
William J. Francart	Technical Support
Jeffrey Waggett	Technical Support
Daniel M. Barish	Solicitor – U. S. Dept. of Labor
Keith Bell	Solicitor – U. S. Dept. of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
William Tucker	Investigator
Eugene White	Investigator
Steve Cox	Investigator
Beth Spence	Representative – Governor's office

The following persons were present during the interviews conducted on February 23, 2006.

ARACOMA COAL COMPANY, INC.

Gary Richardson *	Longwall Head Gate Operator
Kirby Puett *	Day Shift Dispatcher
Gary D. Baisden *	Shuttle Car Operator
David J. Hardy	Attorney
Mark E. Heath	Attorney

MINE SAFETY AND HEALTH ADMINISTRATION

Kenny Murray	Accident Investigator – Leader
Anthony Burke	Investigator
Ronald Stahlhut	Investigator
Charles Pogue	Investigator
Arlie A. Webb	Investigator
Michael Finnie	Technical Support
Dennis A. Beiter	Technical Support

William Francart	Technical Support
Derrick Tjernlund	Technical Support
Daniel M. Barish	Solicitor – U. S. Dept. of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
William Tucker	Investigator
Eugene White	Investigator
Steve Cox	Investigator
J. Davitt McAteer	Representative – Governor's Office
Beth Spence	Representative – Governor's Office

The following persons were present during interviews conducted on February 24, 2006.

ARACOMA COAL COMPANY, INC.

Jonah Rose *	Roof bolter Operator
Gary (Mike) Brown *	Dispatcher, Second Shift
Mike Plumley *	Section Foreman, Second Shift
Michael M. Fisher	Attorney
Mark Heath	Attorney

MINE SAFETY AND HEALTH ADMINISTRAION

Kenny Murray	Accident Investigator – Leader
Arlie A. Webb	Investigator
Ronald W. Stahlhut	Investigator
Charles W. Pogue	Investigator
Anthony Burke	Investigator
Michael Finnie	Investigator
William J. Francart	Technical Support
Dennis A. Beiter	Technical Support
Derrick Tjernlund	Technical Support
Jeffrey Waggett	Technical Support
Daniel M. Barish	Solicitor – U. S. Dept of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
William Tucker	Investigator
Eugene White	Investigator
Steve Cox	Investigator
Beth Spence	Representative – Governor's office

The following persons were present during the interviews conducted on February 28, 2006.

ARACOMA COAL COMPANY, INC.

Jesse J. Jude II *	Electrician
Timothy Dingess *	Electrician
James L. B. Shelton *	Dispatcher
David J. Hardy	Attorney
Jennifer Shelton	J. Shelton's Representative

MINE SAFETY AND HEALTH ADMINISTRATION

Kenny Murray	Accident Investigator – Leader
Arlie A. Webb	Investigator
Anthony Burke	Investigator
Michael Finnie	Investigator
Ronald W. Stahlhut	Investigator
William J. Francart	Technical Support
Dennis A. Beiter	Technical Support
Daniel M. Barish	Solicitor – U. S. Dept. of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
William Tucker	Investigator
Eugene White	Investigator
Danny Cook	Investigator
Steve Cox	Investigator
Beth Spence	Representative – Governor's office

The following persons were present during the interviews conducted on March 2, 2006.

ARACOMA COAL COMPANY, INC.

Darrick Vannatter *	Longwall Move Crew
Larry Browning *	Longwall Head Gate Operator
Wyatt Robinson, Jr. *	Beltman
David J. Hardy	Attorney
Rebecca Robinson	W. Robinson, Jr.'s Representative

MINE SAFETY AND HEALTH ADMINISTRATION

Kenny Murray	Accident Investigator – Leader
Ronald W. Stahlhut	Investigator
Michael Finnie	Investigator

Charles Pogue	Investigator
Anthony Burke	Investigator
Arlie A. Webb	Investigator
William J. Francart	Technical Support
Dennis A. Beiter	Technical Support
Derrick Tjernlund	Technical Support
Jeffrey Waggett	Technical Support
Daniel M. Barish	Solicitor – U. S. Dept. of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
William Tucker	Investigator
Eugene White	Investigator
Danny Cook	Investigator
Beth Spence	Representative – Governor's office

The following persons were present during the interviews conducted on March 3, 2006.

ARACOMA COAL COMPANY, INC.

Shane Stanley *	Dispatcher
Bucky D. Harvey *	Longwall Headgate Operator
David J. Hardy	Attorney

MINE SAFETY AND HEALTH ADMINISTRATION

Kenny Murray	Accident Investigator – Leader
Anthony Burke	Investigator
Ronald W. Stahlhut	Investigator
Charles Pogue	Investigator
Michael Finnie	Investigator
Arlie A. Webb	Investigator
Derrick Tjernlund	Technical Support
Daniel M. Barish	Solicitor – U. S. Dept. of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
William Tucker	Investigator
Eugene White	Investigator
Danny Cook	Investigator
Beth Spence	Representative – Governor's office

The following persons were present during the interviews conducted on March 6, 2006.

ARACOMA COAL COMPANY, INC.

Carl White *	Beltman
David J. Hardy	Attorney

MINE SAFETY AND HEALTH ADMINISTRATION

Kenny Murray	Accident Investigator – Leader
Ronald W. Stahlhut	Investigator
Michael Finnie	Investigator
Charles Pogue	Investigator
Anthony Burke	Investigator
Arlie A. Webb	Investigator
William J. Francart	Technical Support
Dennie A. Beiter	Technical Support
Derrick Tjernlund	Technical Support
Keith Bell	Solicitor – U. S. Dept of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
William Tucker	Investigator
Eugene White	Investigator
Steve Cox	Investigator
Beth Spence	Representative – Governor's office

The following persons were present during the interviews conducted on March 7, 2006.

ARACOMA COAL COMPANY, INC.

Nicholas D. Baisden *	Construction Crew
Joshua W. F. Noe *	Roof bolter Operator
Steve A. Marcum *	Electrician
David J. Hardy	Attorney

MINE SAFETY AND HEALTH ADMINISTRATION

Kenny Murray	Accident Investigator – Leader
Ronald W. Stahlhut	Investigator
Michael Finnie	Investigator
Anthony Burke	Investigator
Arlie A. Webb	Investigator
William J. Francart	Technical Support

Dennis A. Beiter	Technical Support
Derrick Tjernlund	Technical Support
Keith Bell	Solicitor – U. S. Dept. of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
William Tucker	Investigator
Eugene White	Investigator
John Kinder	Investigator
Steve Cox	Investigator
Beth Spence	Representative – Governor's office

The following persons were present during the interviews conducted on March 8, 2006.

MSHA MINE EMERGENCY TEAM

Ronald Hixson *	Team Member
Jan Lyall *	Team Member

MINE SAFETY AND HEALTH ADMINISTRATION

Kenny Murray	Accident Investigator – Leader
Anthony Burke	Investigator
Ronald Stahlhut	Investigator
Charles Pogue	Investigator
Michael Finnie	Investigator
William J. Francart	Technical Support
Dennis A. Beiter	Technical Support
Keith Bell	Solicitor – U. S. Dept. of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
William Tucker	Investigator
Eugene White	Investigator
Steve Cox	Investigator
Beth Spence	Representative – Governor's office

The following persons were present during the interviews conducted on March 9, 2006.

ARACOMA COAL COMPANY, INC.

Donald R. Hagy, Jr. *	Construction Crew Foreman

David J. Hardy	Attorney

PYOTT-BOONE ELECTRONICS, INC.

Joey A. Davis *	Computer Technician
Doug Kuhn	Sales/Engineering Director

MINE SAFETY AND HEALTH ADMINISTRATION

Kenny Murray	Accident Investigator – Leader
Michael Finnie	Investigator
Ronald W. Stahlhut	Investigator
Charles Pogue	Investigator
Arlie A. Webb	Investigator
Anthony Burke	Investigator
William J. Francart	Technical Support
Dennis A. Beiter	Technical Support
Keith Bell	Solicitor – U. S. Dept. of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
William Tucker	Investigator
Danny Cook	Investigator
Eugene White	Investigator
Steve Cox	Investigator
Beth Spence	Representative – Governor's office

The following persons were present for the interviews conducted on March 14, 2006.

ARACOMA COAL COMPANY, INC.

Gary M. Brown *	Dispatcher
Brian Cabell *	Belt Examiner
Rod Morrison *	Longwall Superintendent
David J. Hardy	Attorney

LOGAN COUNTY MINE SERVICES

Roy S. Stepp *	Engineer

MINE SAFETY AND HEALTH ADMINISTRATION

Ron Stahlhut	Investigator
Michael Finnie	Investigator

Arlie A. Webb	Investigator
Anthony Burke	Investigator
Charles W. Pogue	Investigator
William J. Francart	Technical Support
Dennis A. Beiter	Technical Support
Keith Bell	Solicitor – U. S. Dept of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
William Tucker	Investigator
Eugene White	Investigator
Steve Cox	Investigator
Monte Hieb	Chief Engineer
Beth Spence	Representative – Governor's office

The following persons were present during the interviews conducted on March 15, 2006.

ARACOMA COAL COMPANY, INC.

Jesse J. Jude II *	Electrician
Patrick Callaway *	Production Foreman
John McNeely *	Airway Walker
David J. Hardy	Attorney
Mark E. Heath	Attorney

SOUTHERN COALFIELD MINE RESCUE TEAM

C. Bradley Justice *	Team Member

MINE SAFETY AND HEALTH ADMINISTRATION

Kenny Murray	Accident Investigator – Leader
Arlie A. Webb	Investigator
Ronald W. Stahlhut	Investigator
Charles W. Pogue	Investigator
Anthony Burke	Investigator
Michael Finnie	Investigator
William J. Francart	Technical Support
Dennis A. Beiter	Technical Support
Keith Bell	Solicitor – U. S. Dept. of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
William Tucker	Investigator
Eugene White	Investigator
Danny Cook	Investigator
Steve Cox	Investigator
Beth Spence	Representative – Governor's office

The following persons were present during the interviews conducted on March 16, 2006.

ARACOMA COAL COMPANY, INC.

Edward R. Ellis *	Assistant Longwall Coordinator
Raymond L. Grimmett *	Road Grader Operator
Gary L. Richardson *	Headgate Operator
Renee Grimmett	R. Grimmett's Representative

MINE SAFETY AND HEALTH ADMINISTRATION

Arlie A. Webb	Investigator
Anthony Burke	Investigator
Ronald Stahlhut	Investigator
Charlie Pogue	Investigator
Michael Finnie	Investigator
William J. Francart	Technical Support
Dennis A. Beiter	Technical Support
Derrick Tjernlund	Technical Support
Keith Bell	Solicitor – U. S. Dept. of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
William Tucker	Investigator
Eugene White	Investigator
Steve Cox	Investigator
Beth Spence	Representative – Governor's office

The following persons were present during the interviews conducted on March 17, 2006.

PINNACLE MINING COMPANY

Richard Crockett *	Mine Rescue Team Member

MINE SAFETY AND HEALTH ADMINISTRATION

Kenny Murray	Accident Investigator – Leader
Arlie A. Webb	Investigator
Anthony Burke	Investigator
Charles Pogue	Investigator
Ronald Stahlhut	Investigator
Michael Finnie	Investigator
William J. Francart	Technical Support
Dennis A. Beiter	Technical Support
Keith Bell	Solicitor – U. S. Dept. of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING MINE EMERGENCY TEAM

Clarence Dishman *	Mine Emergency Team Member

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
William Tucker	Investigator
Eugene White	Investigator
Steve Cox	Investigator
Beth Spence	Representative – Governor's office

The following persons were present during the interviews conducted on March 20, 2006.

MINE SAFETY AND HEALTH ADMINISTRATION MINE EMERGENCY TEAM

Franklin D. Thomas *	Mine Emergency Team Member

MINE SAFETY AND HEALTH ADMINISTRATION

Kenny Murray	Accident Investigator – Leader
Charlie Pogue	Investigator
Michael Finnie	Investigator
Ronald Stahlhut	Investigator
William J. Francart	Technical Support
Daniel M. Barish	Solicitor – U. S. Dept. of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

Richard Boggess *	District Inspector
C. A. Phillips	Deputy Director

William Tucker	Investigator
Beth Spence	Representative – Governor's office

The following persons were present during the interviews conducted on March 21, 2006.

ARACOMA COAL COMPANY, INC.

Charles E. Conn *	Massey Energy East Ky. Mine Rescue Captain
Mark E. Heath	Attorney

ELK RUN COAL COMPANY

Robert Asbury *	Mine Rescue Team Captain
Mark E. Heath	Attorney

MINE SAFETY AND HEALTH ADMINISTRATION MINE EMERGENCY TEAM

Mack Wright *	Mine Emergency Team Member

MINE SAFETY AND HEALTH ADMINISTRATION

Kenny Murray	Accident Investigator –Leader
Ronald L. Stahlhut	Investigator
Charles Pogue	Investigator
Anthony Burke	Investigator
William J. Francart	Technical Support
Derrick Tjernlund	Technical Support
Dennis A. Beiter	Technical Support
Daniel M. Barish	Solicitor – U. S. Dept. of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
William Tucker	Investigator
Eugene White	Investigator
Beth Spence	Representative – Governor's office

The following persons were present during the interviews conducted on March 22, 2006.

ARACOMA COAL COMPANY, INC.

Brandon Lusk *	Roof Bolter Operator

CONSOLIDATION COAL COMPANY

James Kelly *	Consol of Kentucky Mine Rescue Captain
C. E. "Spike" Bane	Safety Director

MINE SAFETY AND HEALTH ADMINISTRATION

Kenny Murray	Accident Investigator – Leader
Charles Pogue	Investigator
Ronald Stahlhut	Investigator
William J. Francart	Technical Support
Dennis A. Beiter	Technical Support
Derrick Tjernlund	Technical Support
Daniel M. Barish	Solicitor – U. S. Dept. of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING MINE EMERGENCY TEAM

John Scott *	Mine Emergency Team Member

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINNG

C. A. Phillips	Deputy Director
William Tucker	Investigator
Eugene White	Investigator
Beth Spence	Representative – Governor's office
J. Davitt McAteer	Representative – Governor's office

The following persons were present during the interviews conducted on March23, 2006.

WHITE COUNTY COAL COMPANY

Michael Emery *	Alliance Coal Mine Rescue Team Captain
Phillip Kettinger	M. Emery's Representative

MINE SAFETY AND HEALTH ADMINISTRATION

Richard J. Kline *	Assistant District Manager
Vicki L. Mullins *	MSHA Specialist
Kenny Murray	Accident Investigator –Leader
Ronald W. Stahlhut	Investigator
Michael Finnie	Investigator
Jeffrey Waggett	Investigator
Charles Pogue	Investigator
William J. Francart	Technical Support
Dennis A. Beiter	Technical Support
Daniel M. Barish	Solicitor – U. S. Dept. of Labor

Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
William Tucker	Investigator
Beth Spence	Representative – Governor's office

The following persons were present during the interviews conducted on March 24, 2006.

LOGAN COUNTY OFFICE OF EMERGENCY MANAGEMENT

Roger Bryant *	Director

LOGAN COUNTY 911

Marilyn Crosby *	Director

MINE SAFETY AND HEALTH ADMINISTRATION MINE EMERGENCY TEAM

James W. Langley *	Mine Emergency Team Member

MINE SAFETY AND HEALTH ADMINISTRATION

Luther Marrs *	Assistant District Manager
Kenny Murray	Accident Investigator –Leader
Arlie A. Webb	Investigator
Ronald W. Stahlhut	Investigator
Michael Finnie	Investigator
Charles Pogue	Investigator
William J. Francart	Technical Support
Dennis A. Beiter	Technical Support
Daniel M. Barish	Solicitor – U. S. Dept. of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
William Tucker	Investigator
Steve Cox	Investigator
Beth Spence	Representative – Governor's office

The following persons were present during the interviews conducted on March 27, 2006.

ARACOMA COAL COMPANY, INC.

Jerry Workman *	Longwall Set up/Tear down
Elbert J. Clay *	Headgate Operator
Mark E. Heath	Attorney

CONTINENTAL CONVEYOR AND EQUIPMENT

Michael R. Williams *	Service Representative
Philip J. Carroll III	Attorney

MINE SAFETY AND HEALTH ADMINISTRATION

Kenny Murray	Accident Investigator –Leader
Arlie A. Webb	Investigator
Michael Finnie	Investigator
Ronald W. Stahlhut	Investigator
Charles Pogue	Investigator
Anthony Burke	Investigator
Dennis A. Beiter	Technical Support
Derrick Tjernlund	Technical Support
Daniel M. Barish	Solicitor – U. S. Dept. of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
William Tucker	Investigator
Danny Cook	Investigator
Beth Spence	Representative – Governor's office

The following persons were present during the interviews conducted on March 29, 2006.

ARACOMA COAL COMPANY, INC.

Charles W. Acord *	Move Crew
Roger Ooten *	Beltman
Kevin S. Ferguson *	Mechanic/Beltman
Mark E. Heath	Attorney

MINGO LOGAN COAL COMPANY

Eddie Lawson *	Mine Rescue Captain
Joe Estep	Safety Manager

MINE SAFETY AND HEALTH ADMINISTRATION

Kenny Murray	Accident Investigator – Leader
Anthony Burke	Investigator
Arlie A. Webb	Investigator
Ronald W. Stahlhut	Investigator
Charles Pogue	Investigator
Michael Finnie	Investigator
Jeffrey Waggett	Investigator
Dennis A. Beiter	Technical Support
Derrick Tjernlund	Technical Support
Daniel M. Barish	Solicitor – U. S. Dept. of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
William Tucker	Investigator
Eugene White	Investigator
Beth Spence	Representative – Governor's office

The following persons were present during the interviews conducted on March 30, 2006.

ARACOMA COAL COMPANY, INC.

Brian R. Caserta *	Shield Operator
Brad Maynard *	Utility Man

MINE SAFETY AND HEALTH ADMINISTRATION

Minness C. Justice, Jr. *	Coal Mine Inspector
Kenny Murray	Accident Investigator – Leader
Arlie A. Webb	Investigator
Anthony Burke	Investigator
Charles Pogue	Investigator
Dennis A. Beiter	Technical Support
Jeffrey Waggett	Technical Support
Derrick Tjernlund	Technical Support
Daniel M. Barish	Solicitor – U. S. Dept. of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
William Tucker	Investigator
Eugene White	Investigator
Steve Cox	Investigator
Beth Spence	Representative – Governor's office

The following persons were present during the interviews conducted on March 31, 2006.

ARACOMA COAL COMPANY, INC.

Billy Brown, Jr. *	Longwall Setup
Mark E. Heath	Attorney

LAUREL CREEK COMPANY

Ronnie Ooten *	Riverton Mine Rescue Captain

MINE SAFETY AND HEALTH ADMINISTRATION

Bill J. Gillenwater *	Supervisor
Timothy L. Justice *	Coal Mine Inspector
Kenny Murray	Accident Investigator – Leader
Arlie A. Webb	Investigator
Charles Pogue	Investigator
Dennis A. Beiter	Technical Support
Derrick Tjernlund	Technical Support
Daniel M. Barish	Solicitor – U. S. Dept. of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

William Tucker	Investigator
Beth Spence	Representative – Governor's office

The following persons were present during the interviews conducted on April 11, 2006.

ARACOMA COAL COMPANY, INC.

Gary C. Neil *	Longwall Electrician
Chadwick Evans *	Supply Tractor Operator
David J. Hardy	Attorney

MINE SAFETY AND HEALTH ADMINSTRATION

Arlie A. Webb	Investigator
Anthony Burke	Investigator
Ronald Stahlhut	Investigator
Charles Pogue	Investigator
Michael Finnie	Investigator
William J. Francart	Technical Support
Derrick Tjernlund	Technical Support
Keith Bell	Solicitor – U. S. Dept. of Labor

Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
William Tucker	Investigator
Eugene White	Investigator
Beth Spence	Representative – Governor's office

The following persons were present during the interviews conducted on April 12, 2006.

ARACOMA COAL COMPANY, INC.

Billy J. Maynard *	Continuous Miner Operator
Kevin R. Evans *	Longwall Move Crew
Shawn J. Sturgell *	Roof bolter Operator
Mark E. Heath	Attorney

CONSOLIDATION COAL COMPANY

Dennis C. Perry *	V. P. Eight Mine Rescue Team Captain
Michael Canada	D. Perry's Representative

MINE SAFETY AND HEALTH ADMINISTRATION

Kenny Murray	Accident Investigator - Leader
Charles Pogue	Investigator
Ronald Stahlhut	Investigator
Michael Finnie	Investigator
Anthony Burke	Investigator
William J. Francart	Technical Support
Derrick Tjernlund	Technical Support
Dennis A. Beiter	Technical Support
Keith Bell	Solicitor – U. S. Dept. of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
William Tucker	Investigator
Eugene White	Investigator
Beth Spence	Representative – Governor's office

The following persons were present during the interviews conducted on April 13, 2006.

ARACOMA COAL COMPANY, INC.

Jason T. Adkins *	Continuous Miner Operator
David M. Runyon *	Outby Beltman

MINE SAFETY AND HEALTH ADMINISTRATION

Kenny Murray	Accident Investigator – Leader
Ronald Stahlhut	Investigator
Charles Pogue	Investigator
Arlie A. Webb	Investigator
William J. Francart	Technical Support
Dennis A. Beiter	Technical Support
Derrick Tjernlund	Technical Support
Keith Bell	Solicitor – U. S. Dept. of Labor
Autumn D. Furby-Pritt	Court Reporter

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING

C. A. Phillips	Deputy Director
William Tucker	Investigator
Eugene White	Investigator
Beth Spence	Representative – Governor's office

Attachment A

MINE RESCUE EFFORTS

When mine officials determined that the fire was beyond their ability to control, calls were made for mine rescue assistance. The mine has primary mine rescue coverage by A. T. Massey's Southern West Virginia team and the East Kentucky team. These were the first two teams notified and the first two teams to report to the mine site. Additional teams were requested and they reported to the mine over the next forty-two hours. This report will identify the mine rescue teams and their work in recovering the two victims and in fighting the mine fire.

At approximately 11:37 p.m. on Thursday, January 19, 2006, the first mine rescue teams, Southern West Virginia and East Kentucky, entered the mine. The two teams traveled from the box-cut on the surface into the North Mains area and the mouth of the old 4 Right Panel by diesel mantrip. One team was to remain at the mouth of the 4 Right Panel while the other team explored inby in the 4 Right Panel. There was a belief by many Aracoma management personnel that the two men may have attempted to come outside by way of the 10 Headgate entries. The team had to stop exploring due to heavy smoke and impassable water. Additional information was obtained from the No. 2 section crew by mine management, and mine rescue efforts were then directed toward the fire area. The teams re-assembled at the mouth of the 4 Right Panel and were told to wait there until joined by the Mingo Logan and Riverton Mine Rescue Teams.

Once all four teams were assembled at the mouth of the 4 Right Panel, the four teams were told to advance toward the fire area. Once they had arrived near the fire location, they were instructed to assess the fire's condition. When a determination had been made on the extent and level of the fire, it was decided to proceed with exploration inby in search of the two missing miners. Plans were then made for the Southern West Virginia team to prepare to fight the fire while being backed up by the Riverton team. The East Kentucky team was to prepare to explore the North East Mains inby the fire area to a point near where the section mantrip was abandoned by the No. 2 Section crew on their retreat from the mine; the Mingo Logan team was to serve as their backup. The Southern West Virginia team was preparing to fight the fire but did not have any water to do so. The East Kentucky team attempted to locate the abandoned No. 2 Section mantrip but they were unable to locate it due to the dense smoke and extreme heat in the area.

To aid in the fire-fighting efforts, it was determined that the fresh water pumps located near the mouth of the 4 Right Panel would need to be energized and started. However, the power source for the pumps would actually take power to other areas of the mine because of the power configuration. A decision was made to send Aracoma electricians into the mine and have them separate the power supply at the pumps so no power went farther into the mine. To assist the electricians in this project, the Pinnacle Mine Rescue team was sent underground with them.

Over the course of the next few hours, additional teams were sent underground to assist in the fire fighting and exploration activities. Water was delivered by pressure pumps to the fire area around 10:45 a.m. on January 20, 2006. Water and foam were being applied to the fire by 11:00 a.m. by the Pinnacle team. For approximately the next twenty-eight hours, various teams were involved in fighting the fire at the longwall belt drive and storage unit. In addition, teams were exploring areas of the mine in an attempt to locate the missing miners. Initial efforts for the exploration occurred in the area where the section crew left the mantrip; the next area checked was the No. 2 Section and associated face areas. From here attempts were made to locate the individuals in the 10 Headgate areas. The area immediately inby the fire was one of the last areas checked due to heavy smoke concentrations and extreme heat.

The Southern Coalfields team found the first victim at 2:40 p.m. on January 21, 2006 approximately four crosscuts inby the fire area. This victim was identified as Donald Bragg. The second victim, Ellery Hatfield, was found forty minutes later at approximately 3:20 p.m. by the Consol of Kentucky Mine Rescue team. Mr. Hatfield was found one break inby spad number 3267 between the No. 8 and No. 9 entries of Northeast Mains. Once both bodies were located, the mine rescue teams were told to stop exploration and return to the fresh air bases.

Arrangements were made to transport the victims to the surface of the mine. All rescue teams were brought to the surface with exception of the Lone Mountain and VP-8 Mine Rescue teams. These two teams were left to monitor the fire area. Efforts to monitor the fire continued until sometime during the early hours of January 24, 2006. The fire was extinguished on January 21, 2006 but rescue teams continued to monitor and cool the fire area to prevent restarting through the early hours of January 24, 2006. Additional activities continued by the mine rescue teams of exploring and recovering all areas of the mine.

Mine rescue teams involved in this rescue and recovery are listed below.

The following mine rescue teams responded to the Aracoma Coal Company, Alma No. 1 mine fire.

MASSEY ENERGY
Massey Energy Southern West Virginia Team
Massey Energy East Kentucky Team

FOUNDATION COAL
Riverton Mine Rescue Team
Emerald Mine Rescue Team
Cumberland Mine Rescue Team

ARCH COAL COMPANY
Mingo Logan Mountaineer Team
Lone Mountain Mine Rescue Team

JEWELL SMOKELESS COAL CORPORATION
Jewell Smokeless No. 1
Jewell Smokeless No. 2

CONSOLIDATION COAL COMPANY
Buchanan Mine Rescue
VP-8 Mine Rescue
Consol of Kentucky

EASTERN ASSOCIATED COAL CORPORATION
Harris Southern Appalachian Team
Federal No. 2 Team

EXCEL MINING COMPANY
Excel Kentucky
Excel Illinois

PINNACLE MINING COMPANY
Pinnacle Blue Team
Pinnacle Gray Team

PARAMOUNT COAL COMPANY
Paramount Mine Rescue

DICKENSON-RUSSELL COAL COMPANY
Dickenson-Russell Mine Rescue

MOUNTAINEER NO. 1 MINE RESCUE ASSOCIATION, INC.

MOUNTAINEER NO. 2 MINE RESCUE ASSOCIATION, INC.

SOUTHERN COALFIELD MINE RESCUE ASSOCIATION

POCAHONTAS MINE RESCUE ASSOCIATION, INC.

MINE SAFETY AND HEALTH ADMINISTRATION MINE EMERGENCY TEAM

OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING MINE EMERGENCY TEAM

Attachment B

CO MONITORING SYSTEM

The carbon monoxide or CO monitoring system used at the Aracoma Alma No. 1 mine is a Pyott-Boone system. Since belt air is used in the face ventilation at this mine the CO system must meet the MSHA requirements for using belt air in the face regions. Upon observation of the system master station on January 25, 2006 the computer clock was found to be improperly set. By comparing several wristwatches at the scene it was agreed upon by WVOMHST and MSHA officials that the computer clock was twenty-three (23) minutes fast. This condition must be considered for all times stated in the CO system event log. All times listed are +23 minutes of the actual times. On March 2, 2006 an effort was made to retrieve additional information and it was found that the computer clock had been updated and the event log erased.

EVENT LOG HIGHLIGHTS 1/19/06

TIME	SENSOR	SIGNAL	LOCATION
17:36:34	82	WARNING	STORAGE UNIT
17:36:55	82	ALARM	STORAGE UNIT
17:38:44	81	WARNING	INBY 7 BELT TAIL
17:39:05	81	ALARM	INBY 7 BELT TAIL
18:02:22	Belt Boss –STOP-Remote (from master station)		No. 1 – 2 SECTION BELT
18:02:26	Belt Boss –STOP- Sequence		No. 2 – 2 SECTION BELT
18:02:34	Belt Boss –STOP- Sequence		No. 3 – 2 SECTION BELT
18:33:50	71	WARNING	1200 ft. No. 1 – 2 SECTION BELT
18:34:05	71	ALARM	
18:39:19	73	WARNING	2600 ft. No. 1 – 2 SECTION BELT
18:39:50	73	ALARM	
18:53:19	74	WARNING	3800 ft. No. 1 – 2 SECTION BELT
18:54:35	74	ALARM	
19:03:21	72	WARNING	4500 ft. No. 1 – 2 SECTION BELT
19:31:22	77	WARNING	No. 3 – 2 SECTION BELT
19:31:35	76	WARNING	No. 2 – 2 SECTION BELT
19:32:40	76	ALARM	
19:33:23	77	ALARM	
19:36:33	79	WARNING	No. 3 – 2 SECTION BELT
19:38:18	79	ALARM	

With the time corrected and simplified, events happened as follows:

1. 5:13 p.m. – sensor 82 at storage unit gives warning and alarm
2. 5:16 p.m. – sensor 81 at 7 belt tail gives warning and alarm
3. 5:39 p.m. – 2 section belts were shut down remotely from outside
4. 6:11 p.m. – sensor 71 on no. 1 – 2 section belt gives warning and alarm
5. 6:16 p.m. – sensor 73 on no. 1 – 2 section belt gives warning and alarm
6. 6:30 p.m. – sensor 74 on no. 1 – 2 section belt gives warning and alarm
7. 6:40 p.m. – sensor 72 on no. 1 – 2 section belt gives warning

8. 7:08 p.m. – sensor 76 and 77 at 2 tail and 3 head give warning and alarm
9. 7:13 p.m. – sensor 79 at 2 section tailpiece gives warning and alarm

Warning at (5 ppm) CO Alarm at (10 ppm) CO
Warning and Alarms are given at the surface location.

The use of belt air in the face regions requires a CO sensor to be located at or near the working section tailpiece. An audible and visual alarm of sufficient magnitude to be seen and heard by miners working at the location is also required on the section. This alarm should be activated when any sensor reaches the alarm level (10 ppm), or when any two consecutive sensors reach the warning level (5 ppm).

The No. 2 working section was not provided with the audible/visual alarm.

The 9 Headgate longwall section was provided with an 805C audible/visual alarm and a CO sensor. According to the event log this alarm did not function at the January 19 fire. The sensor and alarm was removed from the mine and tests were conducted by MSHA at the Approval and Certification Center in Triadelphia, WV. It was determined that the battery in the 805C alarm was not connected. Results showed that with the battery disconnected the alarm would give an audible/visual signal but at a much reduced rate. A light meter was used to check the brightness of one of the LEDs used to provide the visual alarm. At the 24-volt level with the battery disconnected and the audible and visual test buttons engaged, 1.12 LUX was measured. At the 24-volt level with the battery connected and the audible and visual test buttons engaged, 69.51 LUX was measured. All LEDs on the alarm appeared to have the same level of intensity.

As noted earlier the CO system did give a warning and alarm for the sensors listed above. However, several problems were found with the system and the requirements to use the system as used at this mine.

1. Miners at this mine were inadequately trained as to the basic operating principle of the AMS or Atmospheric Monitoring System.
2. AMS operators (dispatchers) were inadequately trained as to the proper operation of the AMS.
3. The written record of alerts and alarms does not give all information required. Numerous alarms were not recorded in the log event book
4. Calibrations of CO sensors were inadequate in that the event log does not reflect the proper amount of CO used to calibrate the sensors.
5. Working sections ventilated from a belt air course did not have CO monitors in the primary escapeway.
6. The No. 2 section was not provided with an audible/visual alarm on the CO monitoring system.
7. The 9 Headgate longwall section audible/visual alarm on the CO monitoring system did not activate.
8. The battery was disconnected in the 9 Headgate longwall section audible/visual CO alarm.
9. Miners were not removed from affected areas of the mine during CO alarm conditions that occurred prior to January 19, 2006.

10. The Approved Roof Control Plan for this mine required that a CO sensor be located at the mouth of the panel in each intake entry if the longwall tailgate becomes impassible. The longwall was impassible at this time and no CO sensor was provided in this position.

Currently West Virginia Code does not include provisions that require the CO monitoring system and thus the only violation issued was pertaining to item No. 10 as required in the Approved Roof Control Plan.

Attachment C

LONGWALL BELT AND STORAGE UNIT

The 9 Headgate longwall mother belt is a 60-inch Continental Conveyor system with a Continental Conveyor belt storage unit. Due to adverse roof conditions and a roof fall that covered a large portion of the storage unit, a thorough inspection of the storage unit was not possible. A pinch roller unit is attached to the outby end of the storage unit to assist in removing belt from the storage unit. The 150-horsepower vector motor is connected to a winch at the outby end of the storage unit.

The storage unit is approximately 150-175 feet in length and has a guide on the top rails for the main carriage and drop-off carriages to ride. All carriages are provided with V-groove wheels to ride on this guide. Carriage keeper brackets are bolted to the carriages and extend to the bottom of the rail to prevent the carriages from lifting off the rail. Two of the four carriage keeper brackets for the main carriage are missing. The main carriage is connected to the winch by a 1½ inch wire rope. With the storage unit empty and fully collapsed, the outby drop-off carriage is connected to the main carriage by a latching system and each drop-off carriage is connected to the adjoining drop-off carriage by the same type of latching mechanism. These latches differ in height and must be in the proper order and have the proper trip lever posts in place to unlatch the drop-off carriages in the proper location. A preliminary inspection of the storage unit before the roof collapse revealed that five trip lever posts are missing and one is bent and broken.

The winch maintains a constant tension on the wire rope, the main carriage and the drop-off carriages. As the longwall advances, belt is taken into the unit and the carriages move on the guide rails until the belt is tight or the storage unit is full. At approximately 25-foot intervals, trip lever posts are placed on each side of the storage unit. These posts must correspond to the height of the trip levers on the latching mechanism for the intended drop-off carriage. As the trip levers on the drop-off carriage come in contact with the trip lever posts, the trip levers are raised and unlatched from the adjoining carriage. This should take place at approximately 25-foot intervals until the unit is full and all drop-off carriages are dropped off in their proper location. These drop-off carriages have rollers, which when properly spaced, are intended to keep the belt being stored in the storage unit in alignment and separated.

The 9 headgate storage unit was installed on a 9.32 percent grade that sloped downward toward the face. Upon installation the inby end of the storage unit was raised and metal legs installed to try to compensate for the grade. This sloping condition caused a problem with drifting on the drop-off carriages from their intended location. Continental Conveyor provided a bolt to act as a braking system for the drop-off carriages, but according to testimony, drifting remained a problem with some carriages. Also, according to testimony, the drop-off carriages would have to be chained in place to prevent drifting.

Testimony revealed that the drop-off carriage system was not in working order and that the carriages routinely had to be manually set in the proper location and many times chained in place. Also, according to testimony, the drop-off carriages would unlatch on one side and not on the other side causing the carriage to become cocked in the storage unit and forcing the belt to run out of alignment. According to testimony, at the time of the fire at the storage unit, a drop-off carriage became misaligned when it was unlatched on one side and remained latched on the other side.

As mentioned earlier, during a preliminary inspection of the storage unit before the roof collapse, five trip lever posts were observed missing and one broken and bent. According to testimony, at least three of these trip lever posts were destroyed when the unit was first placed in service in October 2005 and these post were never replaced.

Testimony and evidence indicate that the belt had run out of alignment prior to the January 19 fire. Deep grooves cut into the frame of the drive and storage unit, frayed belt edges, a large pile of belt trimming, bottom belt hangers that had been cut into by belt rubbing, all point to prior alignment problems. Also, testimony revealed and the CO event log confirmed a similar event occurred on December 23, 2005 at the 9 Headgate mother drive location.

Attachment D

WATER SYSTEM

The water system servicing the Aracoma Alma No. 1 mine is supplied from a holding tank located above the Melville box cut portals by a 12-inch steel line from the tank to the portal.

An 8-inch supply line extends underground to the No. 4 seventy-two inch conveyor that follows the belt conveyor for a distance of 4800 feet to the Rum Creek portal. The 8-inch supply line extends along the no. 5 seventy-two inch conveyor belt for a distance of 4800 feet; at that point the supply line branches off to the No. 3 section into a 4-inch line that extends onto the 48-inch No. 1, No.2, and No. 3 conveyor belts for a total length of 5340 feet. The elevation where the supply line enters the mouth of the No. 3 section is a drop of 12 feet outby to the box cut portal. The 8-inch water supply line continues on to the No. 5 seventy-two inch belt conveyor for a distance of 4800 feet. At a location at the mouth of the No. 5 tailgate two 60 horsepower pumps are in line to boost the water pressure inby due to the extreme elevations in the mine terrain.

At this pump location the water supply is directed into a 4-inch line and an 8-inch line that continues inby to the No. 6 seventy-two inch belt conveyor that is approximately 2000 feet in length. The water supply is also branched into a 6-inch line at the No. 1 four-way that supplies the longwall section.

The 8-inch supply line continues along the No. 7 seventy-two inch belt conveyor that extends a distance of 969 feet and is maintained with an 8-inch water supply line up to the point where the tailpiece is located inby spad no. 3249. The No. 7 tailpiece is a 271.24 foot elevation increase from the box cut portal.

The water supply for the fire hose outlets that extends along the No. 9 mother drive belt conveyor is maintained with a 2-inch water supply line that is branched off from the No. 7 belt conveyor 8-inch supply line at the No. 9 mother drive discharge. The 2-inch water supply line that extends inby to the longwall monorail system provides water only for the fire hose outlets along the longwall conveyor and is capped off with a shut-off valve inby the monorail system.

Each conveyor belt drive at this mine is provided with a water sprinkler type fire suppression system that is designed to activate in the event of a fire or rise in temperature.

The water supply lines that extend from the surface along each belt conveyor and to each working section are provided with 1½-inch standard thread fire hose outlets.

Attachment E

ELECTRICAL

The electrical equipment used at the 9 Headgate mother belt area included:
One AEEI 12,470 volt dual line splitter
One AEEI 12,470 to 480 volt power center
One Continental Conveyor belt starter with two 750 horsepower DC motors
One Continental Conveyor single 150 horsepower constant
Tension winch controller with a 150 horsepower vector motor and a 1½ horsepower vector blower motor (cooling motor)
One hydraulic power pack used to operate the pinch roller

The substation at the Melville portal is provided with two high voltage breakers. One breaker supplies the continuous miner sections and the other supplies the 9 Headgate longwall section and 10 Headgate longwall setup. 12,470 volts is supplied to the dual splitter and the power center is supplied by the feed-through connection at the input end of the splitter.

Circuit No. 1 of the splitter supplies the 9 Headgate longwall section and circuit No. 2 supplies the 10 Headgate longwall setup. The power center supplies 480 volts to the belt controller and the constant tension winch controller. Two 500 MCM cables are provided for each of the 750 horsepower belt drive motors as per the electrical print requirements. The vector controller provides power to the 150 horsepower vector motor and the 1½ horsepower vector blower.

The splitter, power center, belt starter, and winch controller were not burned but did receive extensive heat and smoke damage. Little could be done to test the circuitry of these controls but a visual examination was conducted. The ground monitor for the 1½ horsepower vector blower was bridged out with a wire across the relay contacts. Also, the ground monitor for the No. 2 belt drive motor had a short wire installed on one side of the relay contacts that appeared to have at one time been connected to the other side of the relay contacts but was not connected at the time of inspection.

A Pyott-Boone Old Faithful 235 deluge control box was mounted to the side of the belt starter and provided the control and the alarm for the sprinkler system installed at the belt drive.

Attachment F

The accident investigation teams along with mine management personnel conducted several onsite investigations between February 1 and February 8, 2006.

OMHS&T ACCIDENT INVESTIGATION TEAM

C. A. Phillips	Deputy Director
Terry Farley	Health and Safety Administrator
Monte Hieb	Chief Engineer
Dennie Ballard	Assistant Inspector-at-Large, Reg. 3
William Tucker	Assistant Inspector-at-Large, Reg. 4
Richard Boggess	District Inspector
Eugene White	District Inspector
John Kinder	District Inspector
Danny Cook	Electrical Inspector
Steve Cox	Safety Instructor
Willie Barker	Safety Instructor
Timothy Bradford	Attorney

MSHA ACCIDENT INVESTIGATION TEAM

Kenneth Murray	District 6 Manager
Arlie A. Webb	Staff Assistant, District 6
Anthony Burke	Coal Mine Inspector, District 6
Charles Pogue	Roof Control Specialist, District 2
Ronald Stahlhut	Electrical Supervisor, District 8
Michael Finnie	Supervisor, Special Investigations, District 10
Dennis A. Beiter	Supervisory Mining Engineer, Technical Support
William J. Francart	Mining Engineer, Ventilation Div., Tech. Support
Derrick Tjernlund	Senior Fire Protection Engineer, Technical Support
Jeffrey Waggot	Technical Support
Keith Bell	Senior Trial Attorney, U. S. Dept. of Labor
Daniel M. Barish	Senior Trial Attorney, U. S. Dept. of Labor

CAI 2006 27-31

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION
COAL MINE SAFETY AND HEALTH

REPORT OF INVESTIGATION
Fatal Underground Coal Mine Explosion
May 20, 2006

Darby Mine No. 1
Kentucky Darby LLC
Holmes Mill, Harlan County, Kentucky
ID No. 15-18185

Accident Investigators

Thomas E. Light
Assistant District Manager, Technical Programs, District 2, New Stanton, PA

Richard C. Herndon
Special Investigator, District 3, Morgantown, WV

Anthony R. Guley, Jr., P.E.
Supervisory Mine Safety & Health Specialist, District 2, New Stanton, PA

Gerald L. Cook, Sr.
Supervisory Coal Mine Safety & Health Inspector, District 4, Pineville, WV

Mark A. Odum
Supervisory Mining Engineer, District 8, Vincennes, IN

Robert M. Bates, Jr.
Supervisory Electrical Engineer, District 6, Pikeville, KY

Mark E. Schroeder, P.E.
Mining Engineer, Technical Support, Pittsburgh, PA

Charles D. Campbell, P.E.
Mining Engineer, Technical Support, Pittsburgh, PA

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Training Specialist, Educational Field Services, Pikeville, KY

Originating Office
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Coal Mine Safety and Health
1100 Wilson Boulevard
Arlington, Virginia, 22209
Kevin G. Stricklin, Acting Administrator
2007

AB58-COMM-11-6

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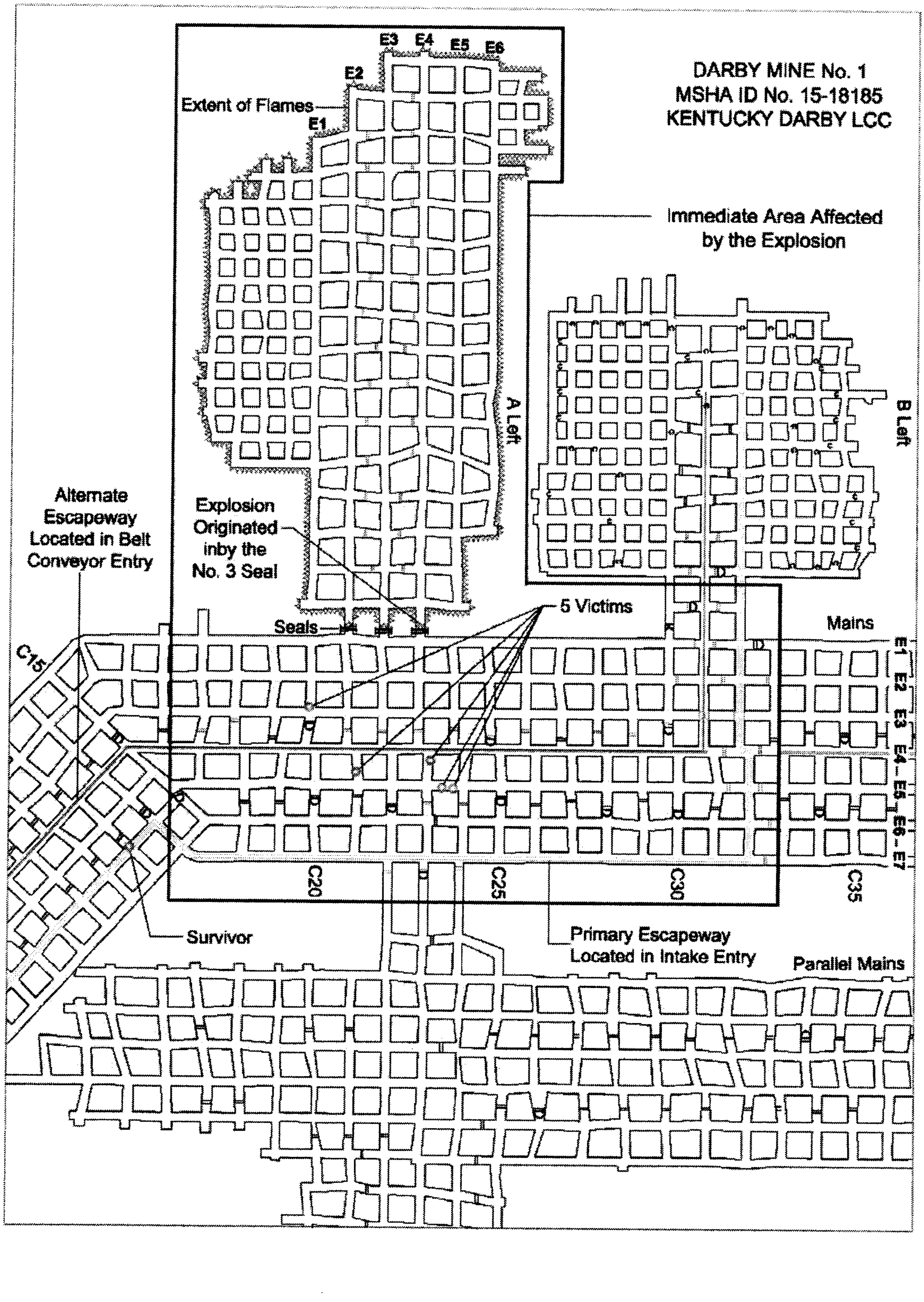


DARBY MINE No. 1
MSHA ID No. 15-18185
KENTUCKY DARBY LCC
E1
E2
E3
E4
E5
E6
Extent of Flames
Immediate Area Affected by the Explosion
A Left
B Left
Alternate Escapeway Located in Belt Conveyor Entry
Explosion Originated inby the No. 3 Seal
Seals
5 Victims
Mains
C15
C20
C25
C30
C35
E7
Survivor
Primary Escapeway Located in Intake Entry
Parallel Mains

OVERVIEW

On Saturday, May 20, 2006, an explosion occurred at approximately 1:00 a.m. in the sealed A Left Section of the Kentucky Darby, LLC, Darby Mine No. 1, resulting in fatal injuries to five miners and injuries to one miner. At the time of the explosion, six miners were underground during a non-producing shift. Appendix A lists miners injured or fatally injured as a result of the accident.

Prior to the explosion, four miners were on the B Left Section preparing to perform routine maintenance work on equipment. Two miners from the B Left Section who had worked the afternoon shift remained after their shift and traveled to the seals which were constructed to isolate the abandoned A Left Section from the active mine. The two miners rode a non-permissible battery-powered personnel carrier (buggy) down the return airway with a set of oxygen - acetylene torches for the purpose of removing metal roof straps from the roof that intersected the No. 1 and No. 3 Seals. One of these miners was the afternoon shift section foreman. A methane explosion occurred behind the seals at A Left, which was caused by the cutting of a metal roof strap that passed through the No. 3 Seal. The forces from the explosion resulted in fatal injuries to the two miners and complete destruction of the seals. Forces from the explosion also damaged conveyor belt structure, roof supports, and ventilation controls.

The four miners who were working in the B Left Section attempted to evacuate and encountered thick smoke approximately four crosscuts outby the section power center. At this point they donned their CSE SR-100 self contained self rescue (SCSR) devices and attempted to continue their evacuation. During the evacuation, at least two of the miners intermittently removed their SCSR mouthpieces to communicate. The miners eventually became separated from each other. One miner survived and three died due to carbon monoxide poisoning with smoke and soot inhalation.

The accident occurred because the operator did not observe basic mine safety practices and because critical safety standards were violated. Mine management failed to ensure that proper seal construction procedures were utilized in the building of the seals at the A Left Section. Mine management also failed to ensure that safe work procedures were used while employees attempted to make corrections to an improperly constructed seal. Furthermore, mine management failed to adequately train miners in proper SCSR usage and escapeway routes.

In addition to a 103(k) Order, the company was cited for six conditions and/or practices which contributed in some way to the accident. An additional thirty-seven citations and orders were issued during the investigation, but were not considered to have contributed to the accident.

GENERAL INFORMATION

Darby Mine No. 1 (Darby) is an underground coal mine located approximately 26 miles east of Harlan, Kentucky, on State Route 38. The mine is operated by Kentucky Darby, LLC, of Middlesboro, Kentucky, under contract with Jericol Mining, Inc., of Cumberland Gap, Tennessee. The Kentucky Darby, LLC articles of organization list Ralph Napier, John D. North, and Connie G. Napier as members of the limited liability company. The principal official at the mine is Ralph Napier, who is the superintendent and the person in charge of health and safety.

The mine began production on May 28, 2001, in the Darby coal seam, which has an average thickness of 56 inches. The Owl coal seam, which has an average thickness of 36 inches, is above the Darby seam and was mined with the Darby seam in various locations. The resulting mining height varied from approximately 40 inches to 144 inches. At the time of the last regular health and safety inspection, the daily methane liberation rate was 38,707 cubic feet.

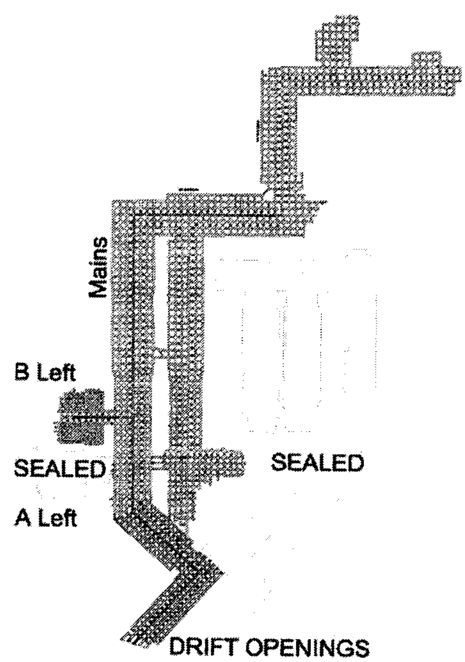


Figure 1 - Map of Darby Mine No. 1

The mine had one advancing room and pillar section, designated as B Left. Figure 1 provides an overview of the mine with a detailed map of the mine shown in Appendix B. Production equipment used on the section included a continuous mining machine, two shuttle cars, a battery-powered scoop, and a roof bolting machine. Coal was transported from the coal producing section to the surface stockpile using a series of four conveyor belts. Coal was loaded onto trucks and transported to the Sigmon Coal Company, Inc., preparation plant in Keokee, Virginia, where it was processed and shipped to various consumers.

At the time of the accident, the mine employed 31 persons underground and three persons on the surface. The mine normally conducted two production shifts and one maintenance shift daily and operated six days per week. The total coal production reported for the first quarter of calendar year 2006 was 60,058 tons. At the time of the accident, the employees of the mine were not represented by a labor union or other bargaining unit.

The last complete quarterly safety and health inspection conducted by the Mine Safety and Health Administration (MSHA) was concluded on March 30, 2006. During this inspection, the operator received a total of seven citations, five of which were designated as significant and substantial. The most recent safety and health inspection was started on April 7, 2006, and was in progress at the time of the accident. Twenty-one citations were issued during this inspection prior to the accident, nine of which were designated as significant and substantial. Table 1 summarizes the enforcement actions taken by MSHA during the last six inspection quarters.

An examination of the inspection records of the most recent on-going regular inspection as well as the sworn testimony of the inspector conducting the inspection show that the A Left Seals had not been examined prior to the explosion of May 20, 2006. The inspector conducting the inspection had not yet examined the A Left Seals, the return or traveled with the mine examiner during the weekly examination for hazardous conditions when the seals would have been examined.

Table 1 - MSHA Enforcement Actions

Fiscal Year	Inspection Quarter	Citations, Orders, and Safeguards			Total Issuances
		S&S	Non-S&S	Other	
2005	2	2	11	0	13
2005	3	9	22	2	33
2005	4	7	7	0	14
2006	1	5	7	0	12
2006	2	5	2	0	7
2006	3*	9	12	0	21

* Through May 19, 2006.

Prior to the fatal accident that occurred on May 20, 2006, the mine had not reported a lost-time accident in over two years. The last accident resulting in days away from work or restricted duty occurred on April 4, 2004. Table 2 summarizes the fatal and non-fatal incidence rates at the mine for the last five years.

Table 2 - Incidence Rates

Calendar Year	Quarter(s)	Darby Mine No. 1		National	
		NFDL	Fatal	NFDL	Fatal
2001	1-4	17.83	0	7.13	0.0760
2002	1-4	9.25	0	7.13	0.0329
2003	1-4	6.26	0	6.31	0.0330
2004	1-4	5.49	0	5.68	0.0356
2005	1-4	0	0	5.15	0.0325
2006	1	0	0	5.62	0.1696

DESCRIPTION OF ACCIDENT

Approximately two months prior to the accident, the company completed mining in the A Left Section and built three seals, constructed of Omega 384 blocks, to seal off the worked-out area. The seals were built over the course of three working shifts under the supervision of Amon Brock, afternoon shift foreman, and Mark Sizemore, day shift outby foreman. After construction, the seals were referred to as the "return seals" to differentiate them from another set of seals located off the intake air course. The return seals were also referred to by number, with the No. 3 Seal being the furthest inby of the three.

On May 19, 2006, the weekly examination for hazardous conditions was conducted on the day shift by Mark Sizemore. During this examination, Sizemore was accompanied by Mitchell (Tom) Lunsford, mine examiner, and the two traveled to the areas requiring examination by non-permissible battery-powered personnel carrier. At approximately 9:00 a.m., they arrived at the No. 3 Seal in the return air course and Sizemore performed a visual examination and tested for methane with a hand-held instrument. The maximum methane concentration was reported to be 0.1 percent, and no hazards were noted by Sizemore.

At approximately 3:45 p.m., the afternoon shift crew entered the mine to begin the scheduled production shift. The crew consisted of Amon Brock; Jimmy Lee, shuttle car operator; Travis Blevins, shuttle car operator; Randy Fields, continuous mining machine operator; Jeff Coker, roof bolting machine operator; Clark Cusick, roof bolting machine operator; James Philpot, miner helper; and Patrick Cupp, belt attendant. The shift progressed normally until the conveyor chain on the continuous mining machine broke. A new link was installed in the conveyor chain and the crew continued mining throughout the remainder of the shift.

At approximately 11:00 p.m., the midnight (maintenance) shift began. The midnight shift crew consisted of George (Bill) Petra, foreman; Roy Middleton, electrician; Paris Thomas, mechanic; and Paul Ledford, roof bolting machine operator. Petra and Middleton traveled by battery-powered personnel carrier to the working section. Shortly after this, Thomas and Ledford traveled underground on a separate personnel carrier to the No. 4 Belt Drive (see Appendix B) where they discussed the status of the conveyor belts with Cupp. After this discussion, they separated to observe the conveyor belt drives for the remainder of the afternoon shift. Ledford traveled to the No. 3 Belt Drive and Cupp went to the No. 2 Belt Drive. Thomas remained at the No. 4 Belt Drive area.

At approximately 12:35 a.m., Ledford returned to the No. 4 Belt Drive. He and Thomas then traveled to the working section. Cupp concluded his activities at the No. 2 Belt Drive and exited the mine at approximately 12:40 a.m.

At approximately 12:45 a.m., the afternoon shift crew, with the exception of Brock and Lee, boarded a battery-powered mantrip and traveled toward the surface. They passed the oncoming midnight shift crew in the vicinity of the section power center. Brock and Lee boarded a personnel carrier loaded with an oxygen cylinder, an acetylene cylinder, a cutting torch, and other tools. They traveled in the return air course to the A Left Seals.

The physical evidence suggests that Brock and Lee arrived at the area of the return seals and commenced to cut metal roof straps (see Figure 2) that had been placed in the area as roof support but which had not been removed when the seals had been built. The acetylene cylinder and cutting torch were found in the area as was a piece of roof strap that gave indications that it had been cut with a torch. Brock had a methane detector with him but it is clear that it was not being used to check continuously for methane given that it was found in his pocket after the explosion. The detector was functional since it was giving off an alarm when the body was found. There is no indication that any test for methane was made behind the seals before the cutting commenced. There was no means available to sample the atmosphere behind the No. 3 Seal. Therefore, a cutting torch should not have been used in the vicinity of the seals.

The afternoon shift crew arrived safely on the surface at approximately 1:00 a.m. A few seconds after exiting the mine, they were buffeted by a gust of air, dust, and debris coming out of the portals of the mine. Initially they believed that either a massive roof fall or a collapse of the highwall had occurred. The crew concluded that an explosion had occurred when the odor of burned coal reached the portals.

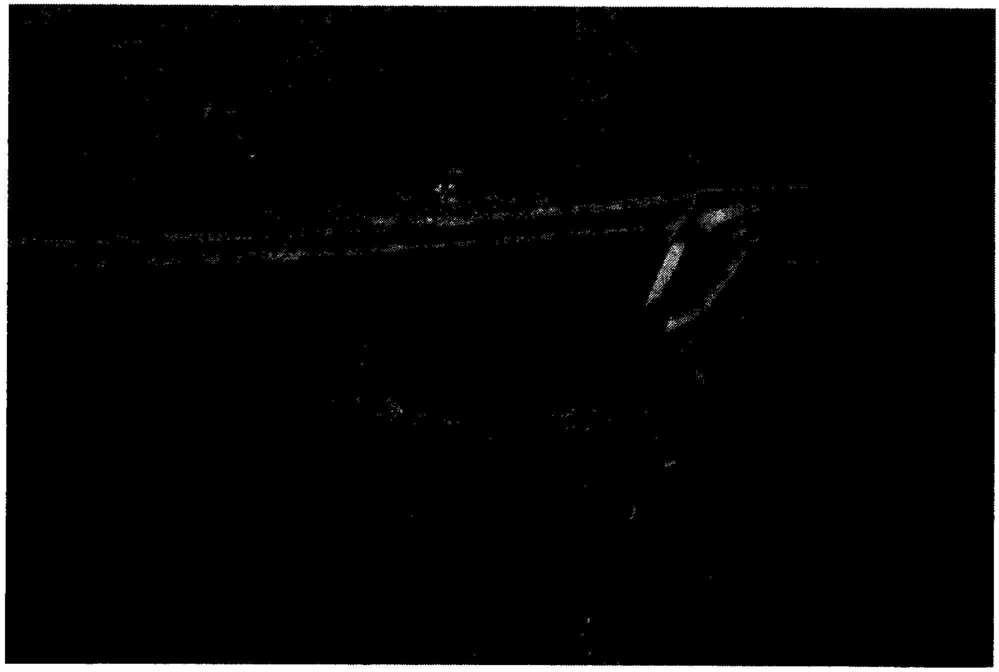


Figure 2 - Roof Straps at the No. 3 Seal Location for A Left

Meanwhile, after the afternoon shift crew departed from the working section, Petra began examining the face areas for hazardous conditions. Middleton, Ledford, and Thomas dispersed to perform other duties on the section. While on the working section, they also heard the explosion. Petra gathered the crew together and informed them that an explosion might have occurred because Brock and Lee had taken tanks and a cutting torch into the return. The crew boarded two personnel carriers and began traveling in the outby direction in the intake travelway, which was the primary escapeway. They encountered dense smoke approximately four crosscuts outby the section power center, at which point they stopped and donned SCSRs. They boarded a single personnel carrier and continued traveling in the outby direction. The crew did not have a detector capable of detecting carbon monoxide.

After traveling approximately 300 feet, the personnel carrier became lodged on debris from an overcast that had been extensively damaged by the force of the explosion (see Figure 3). The crew got off of the vehicle and proceeded on foot until they reached the power center located one crosscut inby the No. 4 Belt Drive. Somewhere near this point, Ledford and Middleton removed their SCSR mouthpieces and discussed how they should exit the mine. Ledford informed Middleton that he had located the high-voltage power cable and that he intended to follow it to the surface. Middleton told Ledford that he was going back to find the power center (see Figure 4). After another short discussion, Ledford began walking outby in the No. 5 Entry, using the high-voltage power cable as a guide. Ledford had no further contact with the other miners.

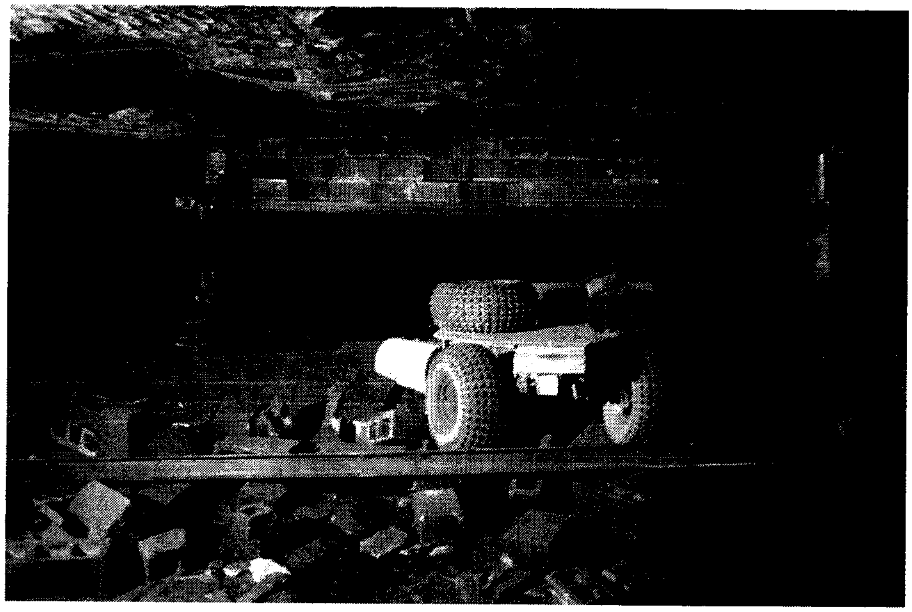


Figure 3 - Personnel Carrier Lodged on Overcast Debris

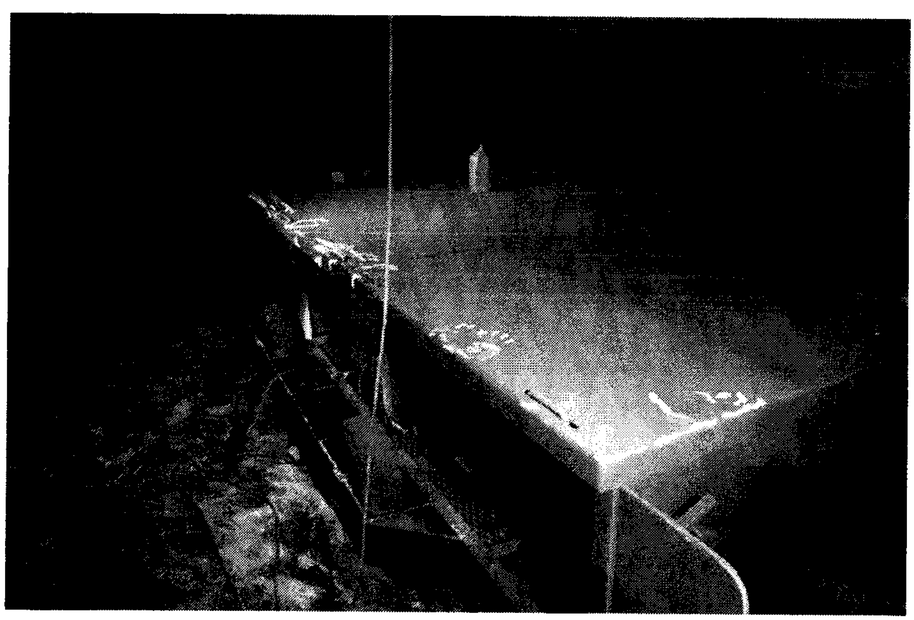


Figure 4 - Power Center at No. 4 Belt Drive

Ledford traveled approximately 1,050 feet in the No. 5 Entry until he reached a point just inby the No. 3 Belt Drive, where he collapsed and lost consciousness. Ledford regained consciousness at approximately 3:05 a.m. and crawled into the No. 6 Entry, where he was discovered by rescuers. Ledford was taken out of the mine on a battery-powered personnel carrier. He was transported to Lonesome Pine Hospital in Big Stone Gap, Virginia, where he was treated.

Petra, Middleton, and Thomas attempted to escape but eventually succumbed to carbon monoxide poisoning at different locations in the mine. Petra was found in the No. 5 Entry approximately 500 feet outby the No. 4 Belt Drive power center. Middleton was found approximately 700 feet outby the No. 4 Belt Drive power center in the left crosscut off of the No. 5 Entry. Thomas was found 800 feet outby the No. 4 Belt Drive power center in the crosscut between the No. 2 Entry and No. 3 Entry in the return air course. Figure 5 shows the distances from where the SCSRs were donned to the location where the miners were found.

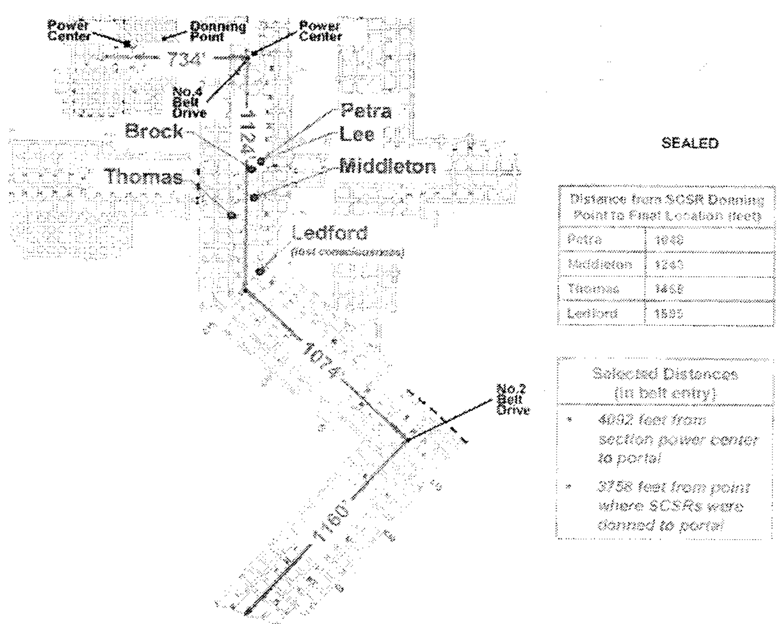


Figure 5 - Distances from SCSR Donning Points to Final Location of Miners

Brock and Lee were located at or near the No. 3 Seal in the return air course when the ignition occurred and were both fatally injured by the forces resulting from the explosion. Brock was found 240 feet from the No. 3 Seal in the crosscut between the Nos. 4 and 5 Entries. Lee was found in the No. 5 Entry, approximately 340 feet from the No. 3 Seal and 20 feet outby where Petra was found.

RESCUE AND RECOVERY OPERATIONS

Actions taken during the initial rescue and recovery operation did not follow accepted past practices that have been developed from previous rescue and recovery operations. Though the intent of these actions was to expeditiously rescue trapped or injured miners, rescuers were also at times exposed to potential danger. The following description of the rescue and recovery operations has been reconstructed based on individual recollections, testimonies, and logs which at times are in conflict. Appendix C is a timeline of the rescue and recovery events with Appendix D listing the personnel involved.

Robert Rhea, MSHA District 7 Harlan, Kentucky, Field Office Supervisor, was notified of the explosion by Napier at approximately 1:05 a.m. Rhea notified John Pyles, MSHA District 7 Assistant District Manager-Inspection Division, who notified Norman Page, MSHA District 7 District Manager, and MSHA headquarters personnel. Rhea notified MSHA Inspectors Kevin Doan, Dale Jackson and Brad Sears about the explosion. Once Rhea arrived at the Harlan field office he notified MSHA Inspector Roger Wilhoit about the event. MSHA's Mine Emergency Unit (MEU) was subsequently notified.

Doan arrived at the mine and verbally issued a 103(k) order at 1:54 a.m. The mine fan was operating. He took tests for carbon monoxide at the fan, as no one at the mine site at this time had a carbon monoxide detector. Doan used a MSA Solaris multiple gas detector and detected 2.6 percent methane and over 500 ppm carbon monoxide at the fan, indicating that significant combustion from an explosion or fire had occurred underground. Doan then took an air sample at about 2:01 a.m. Air sample, D-7889, was later analyzed and found to contain 0.23 percent methane, 19.26 percent oxygen, and 6,162 ppm carbon monoxide. Rhea and Jackson arrived at the mine site at 2:00 a.m. MSHA periodically monitored the fan for explosive and harmful gases. Jackson was informed that the underground mine power was disconnected.

Ronnie Hampton, Supervisor, Kentucky Office of Mine Safety and Licensing (KOMSL), arrived and along with MSHA and Napier, established a command center. Air quality readings were taken at the fan and in all mine openings. The fan readings were 0.20 percent methane, 20.8 percent oxygen and over 500 ppm carbon monoxide. The intake entry had 13 ppm carbon monoxide with no methane and good oxygen. A decision was made by the command center for the rescuers to walk one of the main intake entries barefaced until they encountered 50 ppm carbon monoxide, low oxygen, or an explosive atmosphere. Some of the rescue team members entering the mine were equipped with hand-held radios provided by KOMSL.

Rhea, Jackson, Doan, Inspector Todd Middleton (KOMSL), and Mark Sizemore (Kentucky Darby employee) entered the No. 5 intake entry barefaced at 2:32 a.m., leaving Napier and Hampton in the command center. J.J. White, mine rescue team member, KOMSL, was stationed at the intake portal to relay information from the team to the command center.

Using a MSA Solaris multiple gas detector, the rescuers traveled the No. 5 Entry taking carbon monoxide readings every crosscut and detected 12 to 18 ppm. They arrived at the intake seals and examined all six seals. They took quality readings at all the seals and had 19.8 to 20.8 percent oxygen, 3 to 12 ppm carbon monoxide, and 0 percent methane.

At 3:08 a.m., John Pyles called the command center and was informed that non-mine rescue personnel were underground. Pyles gave instructions for those persons to be withdrawn from the mine. At about the same time, a light was observed in the intake entry, and the rescuers informed the command center that they saw a light and traveled towards it. They found Paul Ledford (survivor) at about 3:10 a.m. with his SCSR donned (without goggles or nose clip in place) in the No. 6 intake entry one crosscut inby survey station No. 494. The rescuers talked to Ledford, who said that the other three miners were approximately three to four crosscuts behind him. Ledford was unable to walk so the rescue team called for a personnel carrier. Jackson and Middleton advanced to crosscut No. 15 where the equipment door between the neutral and intake entries had been blown out by the explosion. Napier and Lunsford arrived with a personnel carrier. Napier transported Ledford outside while Lunsford remained underground. Communication between the command center and the underground personnel was not always maintained.

Jackson, Middleton and Sizemore then walked to the No. 3 Belt Drive. Tests for methane indicated 0 percent. The phone line installed inby that location was disconnected. The mine phone located at the belt drive was then used to establish communications back to the command center.

Ventilation controls were damaged during the explosion at crosscut Nos. 17, 18, and 19 between the belt and return entries. Jackson advanced inby the No. 3 belt entry for about three crosscuts when he encountered carbon monoxide ranging from 80 ppm to off scale. The rescuers retreated to the No. 3 Belt Drive area. A fresh air base (FAB) was established at survey station No. 507 in the No. 6 Entry in the main headings; Jackson advanced in the No. 5 neutral entry about three crosscuts until he encountered approximately 80 ppm carbon monoxide. The rescuers retreated to the FAB.

Communications were established to the command center from the FAB using the mine phone. The FAB was manned by Doan. The rescuers advanced in the No. 7 intake entry to crosscut No. 22 where three entries were mined from the Parallel Mains to connect the Mains. At this time they encountered concentrations of 80 ppm carbon monoxide and retreated back to the FAB.

Hampton and the Harlan KOSML mine rescue team arrived at the FAB. Team members went under oxygen and advanced inby the FAB. The team traveled inby the No. 3 Belt Drive one crosscut and then crossed the belt to get to the return entries, intending to explore in an outby direction or "tie back" to connect to areas previously explored.

When the team reached the return air course, they observed a cap lamp light inby. They traveled toward the light and discovered Paris Thomas, Jr. at approximately 4:30 a.m. He was located one crosscut outby survey station No. 517 in the No. 3 Entry in the crosscut between Nos. 2 and 3 Entries. The team found high concentrations of carbon monoxide (actual value not specified). Thomas was checked for vital signs and none were found. No call was made to the command center at that time to report the carbon monoxide concentration or the identification and location of Thomas.

Several members of the Lone Mountain mine rescue team, accompanied by an MSHA MEU team member, arrived at the FAB. Jim Vicini, Lone Mountain Mine Rescue Team Trainer, was informed by the command center to take charge of the FAB. The FAB was moved from the No. 3 Belt Drive to a location two crosscuts inby survey station No. 506 in the No. 7 Entry of the Mains. Air-quality tests were made inby and the FAB was advanced to the third location at survey station No. 523. The FAB could not be advanced any further due to high concentrations of carbon monoxide migrating out of the cut-throughs between the parallel mains and main entries. Vicini requested curtains be installed across the cut-through entries to advance the FAB.

The Lone Mountain team members that arrived first and an MSHA MEU team member donned apparatus and advanced inby toward the B Left section using 1,000 feet of communication hard line with headsets. The remainder of the Lone Mountain team accompanied by an MSHA MEU team member arrived at the FAB. Until this time, mine rescue teams had been advancing inby the FAB without the presence of backup mine rescue teams at the FAB.

The first Lone Mountain team advanced toward the B Left section and observed one light outby in the No. 5 Entry and two lights inby toward the section. The team explored inby toward the two lights. The tail captain traveled to the end of the communication line at the No. 4 Entry. A personnel carrier with its lights on was found on top of the debris from the destroyed intake overcast. A search was made around the personnel carrier and no persons were found. End caps from two SCSRs were found on the personnel carrier. Footprints indicated someone may have traveled inby in the Mains toward the old works.

The first Lone Mountain team observed a second light inby. They advanced to and found a personnel carrier located at survey station No. 1193 in the No. 3 Entry on the B Left section. A MX250 handheld detector was found in the deck of the personnel carrier and indicated over 20 percent oxygen. The end caps from two SCSRs, one pair of SCSR goggles, and footprints were found one crosscut inby the personnel carrier between the No. 3 Entry and the second room turned right. The footprints indicated someone had traveled into these rooms. The team split up to travel the No. 3 Entry and three of the rooms on the right side to the faces of the B Left entries. The team reported detecting 480 ppm carbon monoxide at the section power center and 70 ppm carbon monoxide at the faces of the B Left entries. No one was found. One team member had approximately 900 psi of oxygen remaining so the team retreated back toward the FAB.

During their retreat, the first Lone Mountain team met Middleton, who was traveling inby. Middleton said that a team member from Harlan KOMSL was advancing inby in each of the seven entries of the Mains toward the B Left section. The first Lone Mountain team accompanied by Middleton then retreated to the No. 5 Entry where they had previously seen a light. The team advanced outby toward the light leaving the low man with the tail captain.

At approximately 5:16 a.m. they found George "Bill" Petra and another victim that could not be identified, located about 35 feet inby survey station No. 526. Petra and the second victim were checked for vital signs, and none were found. The team then retreated to the FAB, called the command center and informed them of the location of both victims, one of which was identified. At this time, three victims had been located.

The Barbourville KOMSL team arrived at the FAB with ventilation curtains. The Harlan team then returned to the surface. Vicini instructed the Barbourville team to install the ventilation controls in the three cut-through entries, at crosscut No. 17 (near survey station No. 505), and in the crosscuts inby, where stoppings had been damaged between the intake and neutral entries. The FAB was then advanced to the fourth location, one crosscut inby survey station No. 559 in the No. 7 Entry.

The Barbourville team advanced from the FAB to the A Left seals and found that the seals had been destroyed. Air quality readings were taken at the seal locations. The team reported readings for the No. 1 seal entry as 19.1 percent oxygen, 1.5 percent methane, and carbon monoxide over range. The team then explored the return entries inby to the mouth of B Left section. They reported what was thought to be a roof fall close to crosscut No. 21 in the belt entry.

The Hazard team traveled underground to the FAB. The team was instructed to travel the return entry toward the surface and meet the Martin KOMSL team that traveled from the outside toward the sealed area.

Vicini instructed three members of the Lone Mountain team to travel outby in the belt entry to check on what was reported as a roof fall. The remaining members were instructed to travel inby in the Mains to the worked out areas. The teams were instructed to check each crosscut as they advanced.

The team traveling outby had two members in the belt entry and one member in the No. 3 return entry. What had been reported as a possible roof fall was actually the belt and structure deposited against the rib. They also found the personnel carrier that Brock and Lee had been using. The wreckage of the personnel carrier was located in the belt entry at survey station No. 525 (see Figure 6). During further exploration the team located the body of Paris Thomas for the second time.

The Lone Mountain team advanced to the No. 3 Belt Drive. They retreated in the No. 5 neutral entry and searched each crosscut for the remaining victims. At approximately 8:45 a.m. one team member found Roy Middleton in crosscut No. 21 between the Nos. 4 and 5 Entries. Middleton was checked for vital signs and none were found. Middleton had his SCSR on with the mouthpiece dislodged from his mouth. He was wearing his goggles, but it is not known if the nose clip was in place. The team retreated to the wreckage of the personnel carrier, examined the crosscut and at approximately 8:45 a.m. found the last victim, later identified as Amon Brock, in crosscut No. 23 between the Nos. 4 and 5 Entries. Vital signs were checked and none were found. At this time, all victims had been located.

The team retreated to the FAB and informed the command center of the location of both victims, one of whom was identified. The entire Lone Mountain team was then instructed to return to the surface.

Pat Turner, Mike Elswick, and Todd Middleton, KOMSL rescue team members, traveled underground to make a ventilation change. A regulator was installed one crosscut inby survey station No. 470 in the No. 7 Entry at the mouth of the Parallel Mains. The stopping line was examined and repaired up to the FAB. This was done to increase the quantity of air to the FAB.

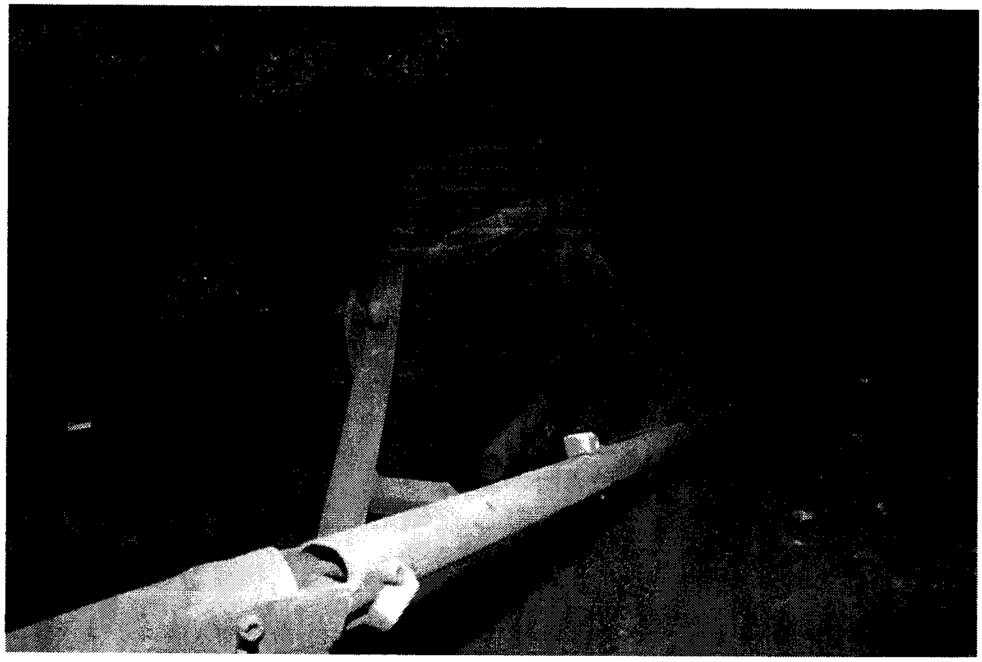


Figure 6 - Damaged Personnel Carrier on top of Conveyor Belt Debris

The Pikeville KOMSL team arrived at the FAB. The Pikeville, Hazard, Barbourville, and Martin teams made the ventilation change and the FAB was relocated to survey station No. 523. The area where the victims were located was then cleared of high concentrations of carbon monoxide. MSHA MEU team members placed the victims in body bags. KOMSL team members transported the victims back to the FAB, where they were transported to the surface. At approximately 10:55 a.m., the victims were brought to the surface and transported to the coroner's office.

The command center made a decision to make another ventilation change. The James River mine rescue team and an MSHA MEU team member traveled underground to the FAB. The James River team advanced inby the FAB toward the second set of cut-throughs located at survey station No. 593 in the No. 7 Entry. Air quality readings were taken in the cut-throughs, in the Parallel Mains entries, and in the Mains inby the cut-throughs. The team reported 0.2 to 0.4 percent methane, 20.0 to 20.3 percent oxygen, and 85 to 150 ppm carbon monoxide. The team retreated to the FAB. A decision was made to allow the mine to ventilate without an air change over the weekend. All mine rescue personnel returned to the surface.

On May 22, 2006 members from the MSHA MEU and Harlan KOMSL teams entered the mine. Quantity and quality readings were taken at specific locations to determine how to re-ventilate the mine.

On May 23, 2006 representatives from KOMSL, the operator, and MSHA traveled to the FAB. MSHA and KOMSL teams explored the A Left section. Air quality checks were made at every crosscut. The lowest oxygen reading obtained was 20.6 percent. The highest methane and carbon monoxide readings obtained were 0.4 percent and 14 ppm respectively. The A Left section was ventilated with approximately 30,000 cubic feet per minute (cfm).

MSHA, KOMSL, and company representatives traveled the worked out areas located in the northern section of the mine. Air quality readings were taken to assure the old works were ventilated. The team encountered 0.5 percent methane and retreated. Ventilation controls were examined and it was determined that the equipment doors located at the top end of the Parallel Mains had been blown out during the explosion. The team returned to the surface. A decision was made to install curtains at these doors and allow the mine to ventilate overnight.

On May 24, 2006, MSHA, KOMSL, and company representatives traveled to the FAB. MSHA and KOMSL explored the B Left section. Air quality checks were made at every crosscut. The lowest oxygen reading obtained was 20.7 percent. The highest methane and carbon monoxide readings obtained were 0.4 percent and 10 ppm respectively. The B Left section and rooms were ventilated with approximately 18,000 cfm.

The worked out areas located in the northern section of the mine were traveled again after the ventilation was established and air quality readings were taken. The lowest oxygen reading obtained was 20.7 percent. The highest methane and carbon monoxide readings obtained were 0.5 percent and 40 ppm respectively. At this point, temporary ventilation controls had been established throughout the entire mine.

INVESTIGATION OF ACCIDENT

On May 23, 2006, MSHA commenced an investigation of the accident pursuant to Section 103 of the Mine Safety and Health of 1977. The Administrator for Coal Mine Safety and Health assigned an investigation team consisting of personnel from MSHA Coal Districts 2, 3, 4, 6, and 8; MSHA Pittsburgh Safety and Health Technology Center; MSHA Educational Field Services, and the Office of the Solicitor, Department of Labor. Thomas Light, Assistant District Manager for District 2, was assigned as the accident investigation team leader.

Preliminary information was gathered and records were obtained from the MSHA District 7 office in Barbourville, Kentucky; the MSHA Field Office in

Harlan, Kentucky; and from the mine operator. The team conducted physical investigations at the mine from May 24 to August 17, 2006. During the on-site investigations, team personnel were accompanied by representatives from Kentucky Darby LLC, the State of Kentucky, the United Mine Workers of America, and other designated miners' representatives. At the time of the accident, the miners were not represented by any labor organization. After the accident, several miners designated the United Mine Workers of America and other parties to act as their representatives.

Persons were identified for the purpose of interviews. Thirty-two interviews were conducted by the MSHA investigation team. The interviews were attended by representatives from Kentucky Darby LLC, the State of Kentucky, the United Mine Workers of America, and other designated miners' representatives. The State of Kentucky also conducted interviews, which an MSHA accident investigation team member and an attorney from the Office of the Solicitor attended.

Other contacts were made and information was obtained from contractors and State and local authorities. Pertinent and relevant records were collected and reviewed during the investigation. Physical evidence such as methane detectors, cap lamp assemblies, cutting torch parts, and various electrical components from the battery powered mantrip were examined or tested as necessary at designated testing facilities. Interested parties were informed of, and allowed to attend, testing. Samples collected during the investigation were analyzed and evaluated through the various testing facilities.

Appendix E lists those persons who participated in the investigation. Physical evidence collected in the accident area is depicted on the map in Appendix F. The A Left Section and the debris field are depicted in Appendices G through M.

DISCUSSION

Mine Development

The mine began production in the Darby Coal Seam on May 28, 2001, using the room and pillar mining method. Mining started in the A Left Section in middle to late October 2005. A Left was developed by three entries driven from the return side of the Mains starting at crosscut No. 21. At the first crosscut in A Left, one additional entry was added to each side of the section. An additional entry was added at the third crosscut on the north side for a total of six entries. Starting at the fifth crosscut, rooms were driven to the left (south). The A Left Section was mined to a distance of approximately 1,130 feet from the Mains. Five entries were driven to the right (north) for rooms near the furthest extent of the section. Mining in the rooms was discontinued on March 3, 2006 and the A Left Section was sealed with three seals constructed between March 18 and 22, 2006. These seals were referred to as the "return seals." No retreat mining was conducted in the A Left Section.

On March 6, 2006, mining started in the B Left Section. B Left was developed by three entries driven from the return side of the Mains starting at crosscut No. 30. Starting at the second crosscut in B Left, rooms were driven on each side of the section. The section had advanced to a distance of approximately 665 feet from the Mains at the time of explosion.

Mine Ventilation

The mine was ventilated by a single, exhaust fan installed on the surface and connected by corrugated ductwork to the No. 1 drift opening. The fan was a Vortex, Model No. 54D-1139, and was belt-driven by a 100 horsepower electric motor. Measurements during the investigation indicated the fan was exhausting 114,206 cubic feet per minute (cfm) of air from the mine at a pressure of 3.2 inches of water. The second return opening had an equipment door to provide access to the return air course and to serve as an explosion-relief door. Overall mine ventilation prior to the accident is depicted on the map in Appendix B.

Air entered the mine through the remaining three drift openings, including the belt entry. The intake, return, and belt air courses were separated by 8-inch hollow-core concrete block stoppings that were dry-stacked and coated with sealant on the high pressure side. The only exception was in the sealed A Left Section where several stoppings were built of Omega blocks instead of concrete blocks. Overcasts were constructed using a combination of concrete blocks, steel plates, and steel beams. The only two overcasts in service in the mine were located at the intersection between the Mains and the B Left Section.

The mine had developed a sixth entry, common with the belt entry, at the second crosscut inside the mine. A seventh entry, utilized as a third return air course, was added near the intake split point for the Parallel Mains, about 1,500 feet into the mine.

In the Mains, a stopping line across the intake and belt entries directed air into the B Left Section. Three entries provided access to the B Left Section. From there, the section expanded into rooms on the left and right sides of the development starting at the third crosscut. On May 3, 2006, during an MSHA inspection, an air quantity of 18,600 cfm was measured in the last open crosscut for the B Left Section.

According to the approved Ventilation Plan, the airflow for the belt entry should have been coursed to the return air courses outby the section belt feeder for the B Left Section. The accident investigation team, however, did not find a regulator to direct the belt air to the return air course. The only regulator shown on the mine map was located in the return air course between the first and second crosscut for the B Left Section and consisted of an equipment door (constructed of two hinged panels) in a stopping.

The return air flow in the Mains ventilated the front of the seals for the A Left area. During the recovery of the mine, line curtain was used to replace some of the damaged ventilation controls to reestablish air flow throughout the mine, including directing the entire Mains return air flow into the formerly sealed A Left area. The accident investigation team measured 51,256 cfm of return air at the mouth of A Left.

Mine Ventilation Plan

The Ventilation Plan in effect at the time of the explosion was approved on September 1, 2005 and included one addendum. The plan addressed specific requirements for the continuous mining machine development section using blowing face ventilation in conjunction with machine mounted scrubber. For extended cut mining, the plan required at least 8,000 cfm of air be provided at the inby end of the line curtain where coal was cut, mined or loaded. The line curtain was required to be maintained a maximum distance of 14 feet from the scrubber discharge.

The plan also addressed specific requirements for the use of Omega block as an alternate method of seal construction (see Appendix N). The plan required that for the use of Omega block seals:

1. Seals will be hitched 6 inches into the bottom and 6 inches into the ribs.
2. An approved bonding and sealant agent (i.e. "BLOCKBOND" or Rite-wall) shall be used between all joints (horizontal, vertical, and in-between blocks) on all surface areas including the inby and outby walls.
3. Seals and pilaster thickness will be indicated in sketches.
4. A gas sampling tube with a shutoff valve will be provided in the highest seal per set of seals.
5. A U-type drain will be provided for water drainage in the lowest seal per set of seals.
6. Seals will be constructed of Omega 384 blocks as per one of the attached three drawings.
7. Omega 384 block seals shall be wedged to the mine roof as indicated in the sketch.

8. All wood will be flush with walls of seal and coated with sealant passing ASTM E162-87.
9. A single layer of 1 inch thick wood planking shall be placed between the top of the seal and the mine roof.
10. When the entrances to worked-out areas are sealed, the seals shall be erected in a sequence such that positive ventilation is furnished to the affected area until the erection of the two (2) final seals, with the last seal to be erected being the furthest upwind.
11. Seals shall be installed at least 10 feet inby rib corners, in solid competent material.
12. Evaluations of the inby areas will continue during seal construction.
13. The middle seal will be constructed first.

The presence of the metal straps made it impossible for wood planking to be placed on the top of the seal between the seal and the mine roof. This would make it impossible to comply with mine ventilation plan seal construction requirements.

Methane Liberation

Vacuum bottle samples and air quantity measurements taken by MSHA on January 31, 2006 revealed a total mine methane liberation of 38,707 cubic feet per day. Vacuum bottle samples and air quantity measurements taken by MSHA on February 13, 2006 in the A Left Section return when coal was being mined revealed a total of methane liberation of 6,797 cubic feet per day.

Vacuum bottle samples and air quantity measurements taken by the accident investigation team in the A Left Section return after the explosion revealed total methane liberation of 4,307 cubic feet per day. The A Left area had been sealed for 63 days. Based on the liberation rate, it is estimated that 271,341 cubic feet of methane had been liberated in the sealed area indicating an average homogeneous methane concentration of 9.6 percent. However, it is unlikely that a homogenous mixture of 9.6 percent was present throughout the sealed area at the time of the explosion.

Barometric Pressure

Records of the barometric pressures for Abingdon, Virginia and London, Kentucky for May 17 through May 20, 2006 were obtained from the National Oceanic and Atmospheric Administration (NOAA) and are depicted in Figure 7.

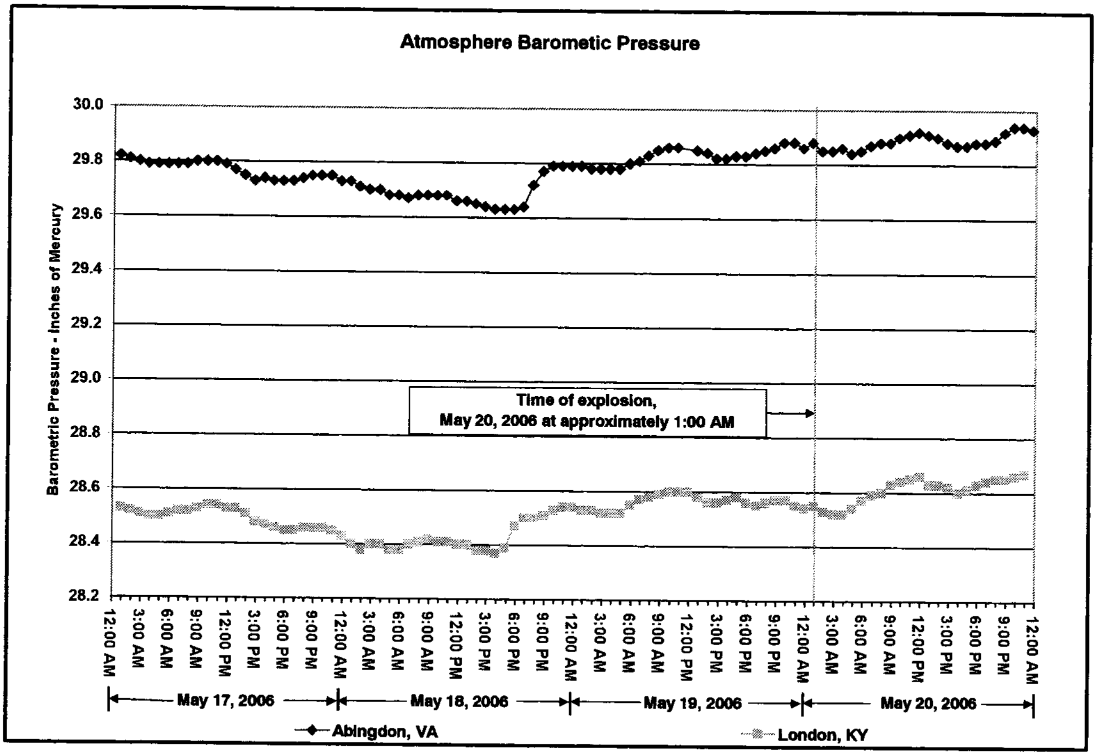


Figure 7 - Graph of Barometric Pressure

In the five hours prior to and after the accident, the barometric pressure fluctuated over a narrow range of 0.05 inches of mercury and appeared to reverse direction and started down near the time of the accident. A decreasing barometric pressure would cause the atmosphere behind the seals to expand in accordance with Boyle's Law, which states that the volume of a gas varies inversely with the absolute pressure. The gas expansion would cause the atmosphere in the sealed area to mitigate towards the seals and into the active workings through any openings.

Roof Control

The Roof Control Plan, approved on October 17, 2001, required, as a minimum, 42-inch fully grouted, 42-inch conventional, or 48-inch tension rebar roof bolts to be installed on 4-foot by 4-foot spacing. Steel roof straps could be used in conjunction with roof bolts and plates to aid in controlling the immediate roof/drawrock. Entries and crosscuts were approved to be developed a maximum of 20 feet wide and centers were to be a minimum of 70 feet by 70 feet in entries. A minimum of 50 feet by 50 feet centers was approved for rooms with 700 feet of cover or less. The maximum depth of cover over the mine was 1,400 feet. The plan required rib bolts to be installed on 4-foot centers when 50-foot centers were used.

In the A Left panel and in the main entries near the A Left panel, 42-inch long, 5/8 inch diameter, grade 60 fully grouted roof bolts were installed using 6 inch by 6 inch plates. Galvanized steel straps, 16-gauge, were installed in-cycle with the roof bolts in a "grid" pattern to help control the immediate roof. Each strap measured approximately 5 inches wide by 54 inches long and had two raised U-shaped ribs or channels, approximately ¼ inch deep, formed along the length of the straps (see Appendix O).

Examinations

Mine examinations were conducted by various certified mine examiners pursuant to the requirements of 30 CFR Sections 75.360, 75.362 and 75.364. The certified examiners included both management and non-management employees.

Section 75.360 requires an examination by a certified person within 3 hours preceding the beginning of any 8-hour interval during which any person is scheduled to work or travel underground. The certified examiner is required to examine for hazardous conditions, test for methane and oxygen deficiency and determine if air is moving in its proper direction at specific locations such as travelways, working sections, and seals along intake air courses. The mine operated two production shifts that began at 7:00 a.m. (day shift) and 3:45 p.m. (afternoon shift). The midnight shift was a maintenance shift that started at 11:00 p.m. Preshift examinations were performed within the required timeframes for these shifts.

The practices adopted by the mine operator for the recording and performance of preshift examinations were examined by the accident investigation team. The foreman working on the midnight shift preshifted the working section between 4:00 a.m. and 5:00 a.m. (for the oncoming day shift) and called out the results of the examination to either the mine superintendent or a surface attendant before 5:00 a.m. A record was made of this call out. The examiner called out the results of the preshift examination of the working section only, yet the records showed that the examination of the entire mine had been completed. At 5:30 a.m. a foreman and a mine examiner, traveling together, would enter the mine to conduct the preshift examination for the outby areas of the mine. Both the foreman and the examiner conducted various parts of the examination. However, only the mine examiner certified that the examination was made. This examination (for the oncoming day shift) included the travelways, intake seals, power centers, scoop battery chargers, and belt drives.

The investigation revealed that the examiners' practice was to examine the intake travelway up to the No. 2 Belt Drive, intake seals, and the No. 2 Belt Drive power center and then wait for the dayshift production crew to travel to the working section. The crew would travel through an area of the mine that had not been preshifted. The production crew would call and instruct the examiners to turn on the water pressure pump for the section. After starting the pump, the mine examiners would examine the other areas that were required to be examined during the preshift examination.

The day shift section foreman preshifted the working section for the afternoon shift. The preshift examination was conducted between 1:30 p.m. and 2:00 p.m. and the results called out to the surface attendant usually between 2:00 p.m. and 2:30 p.m. The mine examiner conducted the preshift examination for the outby areas. However, the mine examiner did not conduct a complete preshift examination along the entire length of the belt lines where miners would be required to work. He only examined at the belt drives and power installations. The mine examiner would travel outside and make a record of his examination.

The section foreman working on the afternoon shift preshifted the working section for the midnight shift maintenance crew. The afternoon shift foreman generally conducted the preshift between 9:00 p.m. and 10:00 p.m. and called out the results of the examination to the surface attendant usually at 10:20 p.m. The called out results were inaccurate in that the examiner stated the examination of the entire mine was completed when it was not. Consequently, the required records of the examinations were also incorrect. The maintenance foreman who worked the midnight shift would enter the mine before the midnight shift started and conduct the preshift examination of the outby areas which the second shift production foreman did not examine. No records were made of these examinations. On May 19, 2006 there was no record that a preshift examination had been conducted of the outby areas which included the travelways, intake seals, power centers, scoop chargers, and belt drives prior to the afternoon shift miners traveling underground to work.

Miners said their job assignments on a routine basis were to clean and maintain the conveyor belt lines. This would require them to travel along the belt lines between belt drives in order to perform their duties. The preshift record book indicates, and the mine examiners stated preshift examinations were being conducted only at the belt drives and power centers. Additionally, miners stated on two different dayshifts, they were assigned to work on completing the construction of the A Left No. 3 Seal. There was no record of any preshift examination having been made prior to the miners entering the area.

Interviews indicated that Brock and Lee were staying behind at the end of the afternoon shift on May 19, 2006. Statements from miners who worked on Brock's crew indicated Brock never left the section that afternoon. Evidence indicated that Brock traveled with Lee to the A Left No. 3 Seal together. Brock's notebook, which was found near the No. 3 Seal, included an entry referring to cutting metal straps. There was no record of a preshift examination having been made prior to Brock taking Lee to the No. 3 Seal.

Two mine examiners testified they would not always record small percentages of methane detected during required examinations. Zero percent methane was routinely entered into the record book.

Section 75.362(b) requires during each shift that coal is produced, a certified person shall examine for hazardous conditions along each belt conveyor haulageway where a belt conveyor is operated. This examination may be conducted at the same time as the preshift examination of belt conveyors and belt conveyor haulageways, if the examination is conducted within 3 hours before the oncoming shift. The mine produced coal on the day shift and afternoon shift. Mine Examiner Lunsford conducted the on-shift examinations on all the conveyor belts for the day shift. The record of these examinations included notations of hazardous conditions. The record book also indicated that on-shift examinations were being conducted on the afternoon shift along the conveyor belts up until June 15, 2005. No records were made after that date for the afternoon shift.

Lunsford testified that he was originally the mine examiner conducting the on-shift conveyor belt examinations on the afternoon shift. He performed this function until about June, 2005, when he was asked to move to the day shift by Ralph Napier. No one was designated to replace Lunsford.

Section 75.364 requires a weekly examination at least every seven days of worked-out areas, the bleeder system, an examination for hazardous conditions at specific locations that include at least one entry of the intake and return air courses in their entirety, at each seal along a return or bleeder entry, and measurements of air volume and tests for methane at specific locations. A foreman and a mine examiner routinely traveled together and jointly conducted the weekly examinations.

Documentation in the Weekly Examinations for Methane and Hazardous Conditions Record Book stated the first weekly examination for the A Left seals was conducted on March 27, 2006. The record indicated that the methane concentration was 0 percent, the oxygen content was 20.8 percent and no hazards were noted. Subsequent examinations were recorded as being conducted on April 3, May 5, May 12, and May 19, 2006. These records indicated consistently that there were no hazardous conditions, that the methane concentration was 0 percent and that the oxygen content was 20.8 percent. The records also revealed that the A Left seals were not examined for four consecutive weeks. The examinations were required by April 10, 17, 24, and May 1.

On the dayshift of May 19, 2006, the A Left seals were examined as a part of 75.364 examination of the mine. Sizemore conducted the examination. He utilized his methane and oxygen detector and traversed the perimeter of each seal checking for methane and oxygen deficiency. During these examinations no methane or low oxygen was detected. He did not observe any unusual features of the seals and no hazards were found. The record made in the weekly examination book reflected this.

The accident investigation determined that proper 75.364 examinations were not being performed. Evidence and testimony indicates that several worked out areas in the mine were not being examined to the point of deepest penetration and portions of some air courses were not being examined.

Emergency Mine Evacuation

The Emergency Temporary Standard (ETS), entitled "Emergency Mine Evacuation", became effective on March 9, 2006. The ETS required underground mine operators to conduct emergency escapeway drills at periods of time so as to ensure that all miners participated in such drills at intervals of not more than 90 days. Miners were required to travel the primary or alternate escapeway to the surface. An evacuation drill was not to be conducted in the same escapeway as the immediately preceding drill. Mine operators were to provide lifelines in the escapeways, an additional SCSR for each miner, training as to the locations of these devices, and training in donning of SCSRs. In accordance with the ETS preamble, MSHA accepted purchase orders or contracts to buy lifelines and/or SCSRs as a means of temporary compliance with the ETS. However, MSHA expected all other requirements of the ETS to be complied with immediately. The ETS required the operator to submit a revised Mine Emergency Evacuation and Firefighting Program of Instruction (Program of Instruction) by April 10, 2006.

The investigation revealed that Kentucky Darby had valid purchase orders for lifelines and additional SCSRs for the mine. The accident investigation revealed that a revised Program of Instruction was not received by MSHA prior to the date of the accident.

Escapeways And Emergency Evacuation

Escapeway Drills/Fire Drills

Section 75.380 requires that two separate and distinct escapeways be provided from the working section. One escapeway must be ventilated with intake air and be designated as the primary escapeway. The other escapeway is designated as the alternate escapeway (sometimes referred to as the secondary) and it can be ventilated with intake or return air. The two escapeways must be separated from each other for their entire lengths.

The ETS required escapeway drills every 90 days for all miners. During drills required, miners are required to travel either the primary or alternate escapeways to the surface. The escapeway drills are to be alternated between the primary and alternate escapeways. The ETS required that the mine operator certify in a record book that the drills were held. The names of miners participating in the drills are required to be listed.

The third shift crew began evacuation of the mine immediately after the explosion by first attempting to escape out the intake travelway (primary escapeway). After their personnel carrier became stuck on top of a damaged overcast, the crew attempted to escape out the No. 5 Entry following the high-voltage line rather than the adjacent belt entry located in the No. 4 Entry which was designated as the alternate escapeway. Ledford traveled out the high-voltage line entry for approximately 1,050 feet and then eventually crawled over to the intake entry where he was later found by rescue personnel. The other three miners apparently traveled in the high-voltage line entry before succumbing to carbon monoxide poisoning with smoke and soot inhalation at different locations in the mine.

The mine operator kept a record book entitled "Fire Drill Record" of fire drills held approximately every 90 days with miners on each shift. During these fire drills, miners were instructed in some general firefighting procedures. These instructions were given in a "safety talk" fashion and included procedures to follow if a fire were to occur on various pieces of machinery or equipment. As part of the evacuation instructions given to miners, the crew was told, in case of emergency, to evacuate the mine through the primary escapeway. Typically, miners then loaded onto personnel carriers and rode out of the mine through the main travelway (primary escapeway). Proper training in the use of the alternate escapeways was not given.

According to the record book and testimony, the emergency escape/fire drills were not properly conducted. The drills were not alternated between the intake and the alternate escapeways. The record book did not reflect that any miners ever traveled out the alternate escapeway during drills. The drills were mostly limited to section personnel.

Given that the miners had to escape on foot due to the explosion, the lack of practice relating to the alternate escapeway, more likely than not, added to the delay in evacuation of the mine. The lack of training in the location of the alternate escapeway and the unfamiliarity with the alternate escapeway most likely affected the miners' response to the emergency of May 20, 2006. The miners did not use the designated alternate escapeway and at least one of the miners had to turn back to gain orientation. Had the miners been more familiar with the alternate escapeway, it is reasonably likely that the miners would have fared better in their escape attempt from the mine.

Escapeway Maps

Regulations requires a map showing designated escapeways to be posted and kept up to date on working sections and on the surface. Any changes in route of travel, locations of doors, or directions of airflow are to be shown on the maps by the end of the shift on which the changes are made, and the miners must be informed of the changes prior to entering the underground areas of the mine.

The accident investigation revealed that maps designating the escapeways from the B Left working section were not provided on the surface and for miners who worked on the B Left working section (MMU 001). Two maps were posted in the mine office on the surface and a map was located on the working section. Neither the maps on the surface nor the map on the section clearly identified the escapeways or distinguished the escapeways from other available entries. Several entries were color-coded with markers or highlighters but none of these entries were labeled as escapeways or otherwise clearly designated as escapeways. The map provided on the B Left Section did not accurately show active workings of the B Left Section.

None of the maps designated the escapeways and properly distinguished them from other available entries. The investigation revealed that miners were unclear as to where the alternate escapeway was actually located. Some miners thought that the alternate escapeway was in the high-voltage line entry and at least one miner testified that he thought the alternate escapeway was located in the return.

Mine Emergency Evacuation and Firefighting Plan

The Mine Emergency Evacuation and Firefighting Program of Instruction (Program of Instruction), required by Section 75.1502(a), was approved by the District Manager on February 6, 2003. The plan contained several requirements whereby all miners were to be instructed in firefighting and evacuation procedures. Among the requirements, the plan required miners to travel the intake or secondary (alternate) escapeways from the working section to the main escapeway every 90 days. Additionally, two miners and a supervisor were to travel the intake or alternate escapeways every six weeks alternating between the two escapeways. Escapeway maps were required to be posted on sections and on the surface and were to reflect any changes made in escapeway routes. Miners were to be notified of any changes to escapeways prior to their entrance into the mine or immediately after changes were made. The plan included instruction that during emergency evacuation SCSRs were to be donned immediately upon encountering smoke.

Several items of The Program of Instruction, approved February 6, 2003, had not been followed by the mine operator. Escapeway drills were not alternated between the primary and alternate escapeways and required escapeway maps were not provided.

Rock Dusting and Cleanup

A program for the regular cleanup and removal of accumulations of coal and coal dusts, loose coal, and other combustibles must be established and maintained by the mine operator. Rock dust is required to be applied in all underground areas of the mine to maintain specified percentages of incombustible content.

Darby employed some methods to provide for cleanup and removal of accumulations of coal dust and for rock dusting the mine workings. The company employed an outby crew on the day shift that was responsible for maintaining the outby areas of the mine which included rock dusting. They used a scoop-mounted rock dusting machine to rock dust outby areas. This equipment was also used to rock dust the working section on idle shifts. The crew on the working section hand dusted the face areas as coal was being mined through the week. Rock dust was purchased in 50-lb bags.

Additional dust control measures were required by the Ventilation Plan. The Ventilation Plan described the dust control practices to be implemented and maintained for conveyor belt transfer points, loading points, belt haulage systems, all roadways, roof bolting machine dust collecting systems, and the continuous mining machine. The dust control measures included water sprays, water application, maintaining permissible dust collecting systems, and using rock dust.

Thirteen violations of section 75.400 were issued during the 12-month period preceding the accident. Two of these citations were not terminated at the time of the accident.

According to statements of miners, the return entries from near the working section to outby the A Left return seals were recently rock dusted. The incombustible content of mine dusts was determined by analyses of samples collected mine-wide after the explosion. Analyses revealed that 84.3 percent of the samples collected were below the required amount of incombustible content.

<u>Mine Dust Analysis</u>

A mine dust survey was conducted to assist in determining the cause and origin of the explosion and to determine the incombustible content throughout the affected and other areas of the mine. The incombustible content of the combined coal dust, rock dust, and other dust must be maintained to at least 65 percent in the intake air courses, and at least 80 percent in the return air courses, in the absence of methane, to meet the regulatory requirements.

A total of 363 samples were collected during seven different time periods from June 6 to June 22, 2006 as the underground portion of the investigation progressed. The type of samples collected included band samples, taken around the perimeter at each location, floor-only samples, roof-rib samples, and rib-floor samples. The samples were transported to MSHA's laboratory in Mt. Hope, West Virginia for analysis.

A total of 146 samples were collected throughout the affected area which included A Left Section and a portion of the Mains. In the Mains, samples were collected from survey station No. 506 to one crosscut inby survey station No. 559 in the No. 7 Entry. Of these samples, 129 (88.4 percent) were below an incombustible content of 65 percent in the intake air courses and 80 percent in the return air courses.

A total of 217 samples were collected from remaining areas of the Mains, Parallel Mains, Old East Mains, Old North Mains, and the B Left Section. A total of 54 samples were collected on the active B Left Section and in rooms off B Left. Of these, 50 (92.6 percent) were below an incombustible content of 65 percent in the intake air courses and 80 percent in the return air courses. A total of 163 samples were collected in the remaining areas of the Mains, Parallel Mains, Old East

Mains, and Old North Mains. Of these, 128 (78.5 percent) were below an incombustible content of 65 percent in the intake air courses and 80 percent in the return air courses. It is unlikely the samples in these areas were affected by the explosion.

Sloughage is a result of coal and rock breaking and falling from the ribs and accumulating on the mine floor. Because of the characteristics of the coal and the mining method, some sloughage was present throughout the mine. This would have had very little effect on the sample results. Virtually all of the sloughage material was too large to be included in the mine dust samples because it would not pass through a No. 10 mesh sieve.

Samples of the rock dust used at the mine were collected for analysis. All of the analysis results conformed to the 30 CFR 75.2 standard except that only 63 percent passed through the No. 200 mesh sieve. The particle size of the rock dust would not change the incombustible content of any sample. However, the purpose of fine rock dust is to provide protection from explosions involving float coal dust. With only 63 percent of the rock dust passing through a No. 200 mesh sieve, the explosion protection provided by the rock dust was not as high as it should have been. A copy of the laboratory analysis is included in Appendix P.

Three rock dust surveys were conducted by MSHA within the 12-month period prior to the explosion. Two of the three surveys indicated noncompliance with standards of 30 CFR 75.403. The last rock dust survey taken in A Left was on March 6, 2006. Two samples were taken in each of the 6 entries plus crosscuts, beginning at survey station No. 148 in the No. 4 Entry, and ending one crosscut outby survey station No. 189 in the No. 4 Entry. One of the eighteen samples analyzed was below the minimum level for incombustible content. The previous survey taken in this area was on November 11, 2005. One sample was taken in each of the 6 entries where A Left Section turned off the Mains. One out of six samples analyzed was below the minimum level for incombustible content.

Construction of Seals

The Ventilation Plan, approved by the District Manager on September 1, 2005, specified the construction sequence and installation procedures for Omega 384 blocks to be used as an alternative method of seal construction (see Appendix N).

The A Left Section had been developed off the left side of the Mains such that Nos. 1 through 3 Entries were the return air course, belt entry, and intake air course respectively. The section was advanced 1,130 feet and stopped on March 3, 2006 due to bad roof and water. The section equipment was removed from A

Left on Saturday, March 4, and moved to the B Left Section. Mining started in B Left on March 6.

Based on the results of the investigation, it appears that seal construction was started on Saturday, March 18. Miners were all assigned at some point to work on the construction of the seals using Omega 384 blocks. Testimony given by the miners indicated Brock directed the miners on how to construct the seals and the sequence in which to build them. He directed personnel to install the air sampling tube in the No. 1 Seal and the water trap in the No. 3 Seal. In testimony, Ralph Napier stated that he gave Brock and Sizemore a copy of the approved sealing plan prior to the construction of the seals.

The sealing of the A Left Section began with the construction of the No. 1 Seal. The construction of the No. 1 Seal left the entire A Left Section inby the construction site unventilated. Based on information obtained through the accident investigation; a one inch or inch and a half diameter PVC pipe with a brass valve was installed in the No. 1 Seal to serve as a sampling tube. The No. 2 Seal was constructed next, across the belt entry. These seals were sprayed by TC Spray on the front and back sides. According to statements, several courses of block were laid for the No. 3 Seal but the seal was not completed due to the ending of the shift.

Normal operations resumed at 11:00 p.m. on Sunday, March 19, with the maintenance crew going to work, and the production shifts following on day and afternoon shifts on Monday, March 20. Testimony from miners indicated that they completed installing the Omega blocks in the No. 3 Seal during the day shift on Tuesday, March 21. Sizemore directed the miners on how to construct the seal. Pyrochem TC spray was reported to have been applied to the outby side of the No. 3 Seal on Wednesday, March 22. A metal pipe was installed in the No. 3 Seal to serve as a water trap.

Sizemore testified that he was in contact with Ralph Napier while the seal was being built. Coal was being mined in the B Left Section during the construction of the No. 3 Seal. The A Left Section was left unventilated and unsealed from March 18, 2006 until the following Wednesday, March 22, while miners were permitted to work in the mine other than those involved in the intentional ventilation change.

Testimony from miners who built the seals as directed and evidence obtained during the investigation revealed that the approved plan was not being followed. The following deficiencies were identified:

a. The Omega blocks were dry stacked with no mortar between the joints.

b. The seals were not hitched 6 inches into the solid rib and floor for the entire perimeter.
c. The seals had been spray coated with a bonding and sealing agent not approved for this purpose.
d. The pilaster was not properly constructed as it did not extend inby the seal as depicted in the plan and was only one 16 inch block wide.
e. A single layer of 1 inch wood planking was not provided between the Omega block and the mine roof.
f. The No. 3 Seal was located 6 to 7 feet from the outby rib corner whereas the plan requires a minimum distance of 10 feet.
g. One metal roof strap extended through the No. 1 Seal and four metal roof straps extended through the No. 3 Seal. The use of Omega 384 block for seal construction was tested and approved by MSHA without any metal straps passing through the seal. The metal straps interfered with the installation of wood planking on the top of the seal. The wood planking could not be positioned flush with the mine roof. Figure 8 is a sketch of the metal roof straps at the No. 3 Seal.
h. The seals were not built in the approved sequence.

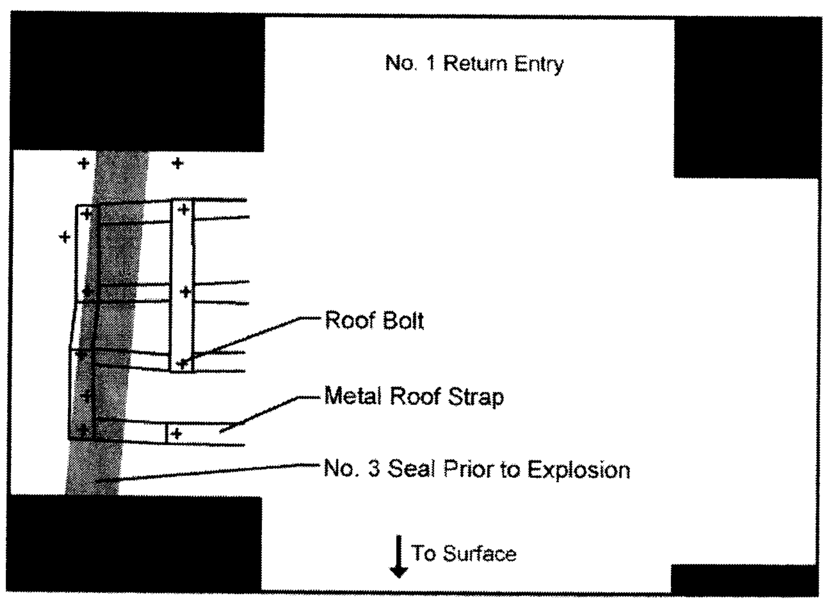


Figure 8 - Sketch of Metal Roof Straps at the No. 3 Seal

The A Left seals were not the only set of Omega block seals constructed underground. During 2003, six seals were constructed across the Mains just inby where a new set of Mains was turned off to the left. This set of seals was commonly identified by mine personnel as the "intake seals." A miner stated that he helped build these seals and that the seals were constructed in the same manner as the A Left seals.

After the explosion, seven solid concrete block seals were constructed which complied with 75.335(a)(1) to replace the Omega seals at the intake seals. The plan approved by the District Manager for the construction of the new seals required that the existing No. 4 Seal (Omega) be breached prior to completing the solid concrete block seal that would replace it. Figure 9 is a picture of the No. 4 Intake Seal prior to being breached.

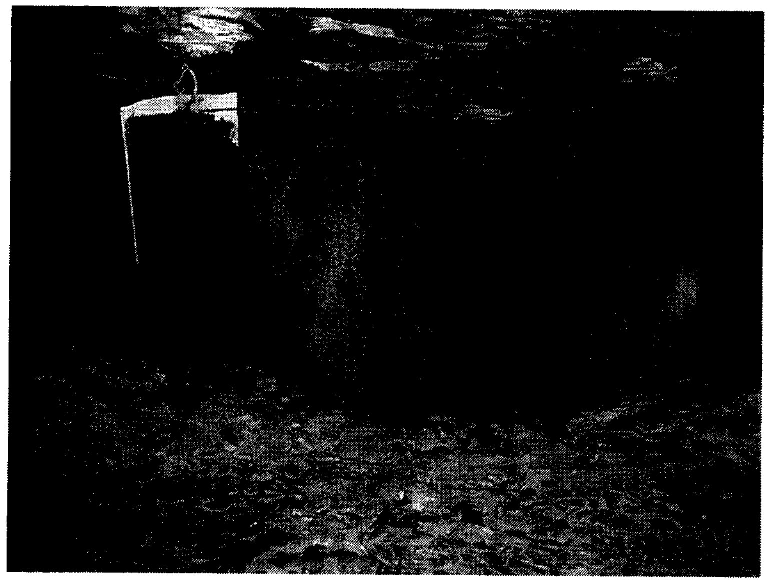


Figure 9 - No. 4 Intake Seal

On June 7, 2006, team members of the MSHA's Mine Emergency Unit, while under apparatus, breached this seal. The team observed the following deficiencies:

1. The thickness of the seal was 16 inches and not 24 inches as approved.
2. The blocks were dry stacked with no mortar between the joints.
3. The mine floor and ribs were not hitched.
4. The pilaster was undersized and did not extend to the inby side of the seal.
5. The outer wall was coated with Pyrochem TC spray. This product is not approved for use on Omega block seals.
6. The inner wall was not coated with any sealant.
7. Cap block and wedges were installed on top and sides of the seal and were in direct contact with the Omega block.

Self Contained Self Rescuers

Darby provided miners with the CSE SR-100 Self Contained Self Rescuer (SCSR). The SR-100 self contained oxygen breathing apparatus utilizes a bi-directional rebreathing system in which exhaled gas makes two passes through a carbon dioxide (CO_2) absorption/oxygen generation canister before the gas returns to the user. Potassium super oxide (KO_2) and lithium hydroxide ($LiOH$) are used to produce oxygen (O_2) and remove or scrub exhaled CO_2. The unit produces approximately 100 liters of oxygen. The unit is NIOSH/MSHA approved as a one-hour SCSR in accordance with 42 CFR, Part 84.

SCSR – As Deployed

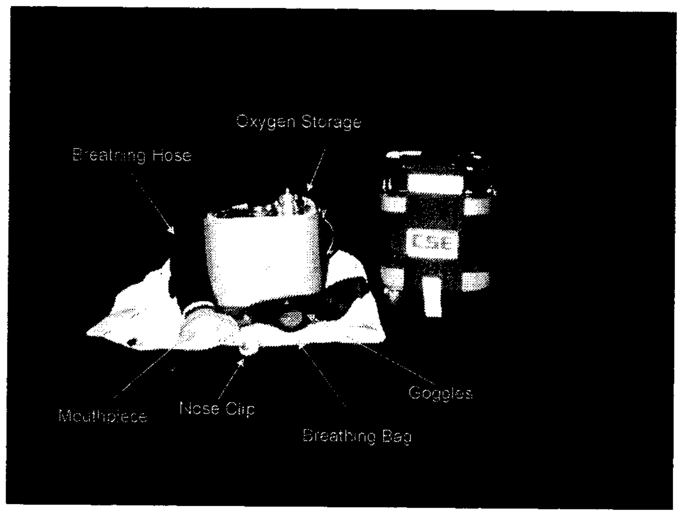


Figure 10 - SCSR Deployed

Of the four miners who donned SCSRs, only one miner survived. Accident survivor Paul Ledford donned CSE SR-100 serial number 93609. Accident victims Roy Middleton, Paris Thomas and Bill Petra, donned CSE SR-100 serial numbers 84784, 89692, and 105936, respectively.

National Institute for Occupational Safety and Health (NIOSH) collaborated with MSHA in the post-incident evaluation of the five SCSRs recovered from the Darby Mine No. 1. NIOSH generated a report ("Investigation of Self-Contained Self-Rescuers (SCSRs) Recovered from the Darby Mine Disaster", NIOSH Report to MSHA, January 2007) summarizing the SCSR evaluation. Four of these five SCSRs were used by miners during evacuation of the mine. These four SCSRs exhibited conditions consistent with partial use. The single intact SCSR failed visual inspection. A dent in the bottom case lid crossed the location of the moisture indicator. The indicator was dislodged and the case open to the external atmosphere, a condition that causes it to fail visual inspection. However, it is not possible to know that the SCSR would have failed the visual inspection prior to the explosion, or if the damage observed occurred as a result of the explosion. In either event, it is in a condition that makes it unsuitable for use.

The evaluation of the recovered SR-100's was conducted at NIOSH, National Personal Protective Technology Laboratory (NPPTL) facilities in Bruceton, Pennsylvania. The evaluation was conducted by NIOSH and MSHA. Past experience with accident investigations has revealed that one of the most important products of the evaluation is an accurate visual record of the evidence. To this end NIOSH and MSHA cataloged and created a complete visual record using digital photographs and video tape. Photographs were made of all SCSRs, as received, and the inspection of the SR-100's was recorded on video tape. During this inspection, examiners assessed the condition of both external and internal system components. To the greatest extent possible, examiners inspected each SCSR according to the manufacturer's approved visual inspection criteria. It was not possible to follow the manufacturer's inspection procedure completely since the units had already been opened for use and the lids were separated from the SCSRs along with the closure straps which contain the serial number and manufacturing date, but all observable aspects of the manufacturer's visual inspection were noted. All crucial steps and observations were also documented with digital photographs.

Table 3 - Results of Quantitative Analysis of SCSRs by NIOSH*

Exhibit No.	Location of SCSR	Serial No.	MFR. Date	Dust Shield Cracked	Canister Dented	Notes	Startup Oxygen Activated	Spent KO_2	Evidence of Oxygen Production
D-01 Paul Ledford	Outside	93609	07/02	Yes	YES	Bottom Bushing out of place, "Jim Lewis" on dust cover. (Survivor)	[redacted]	[redacted]	Yes
D-02 Roy Middleton	In Mine	84784	06/01	No	Yes	No Comments	[redacted]	[redacted]	Yes
D-03 Paris Thomas	In Mine	89962	01/02	YES	No	"Pariss" on dust cover	[redacted]	[redacted]	Yes
D-04 George Petra	In Mine	105936	07/04	Yes	No	Goggles have smoke residue and scratch	[redacted]	[redacted]	Yes
D-05 Amon Brock	In Mine	84698	06/01	Yes	N/A	Unopened SCSR. Pulled freely from pouch, bottom moisture indicator dented into lid, unit open to atmosphere, dents in corner lids, Dent in middle of bottom lid. Did not attempt to open SCSR pending future tests	[redacted]	[redacted]	

* From NIOSH's "Investigation of Self-Contained Self-Rescuers (SCSRs) Recovered from the Darby No. 1 Mine Disaster". Names have been added to the table for clarification.

Independent testing of the Darby SCSRs was conducted by Alternative Testing laboratories, Inc. located near Uniontown, Pennsylvania. Personnel representing MSHA and NIOSH observed all tests. A chemist from CSE witnessed the tests to make sure the lab followed the proper procedures. Alternative Testing laboratories, Inc. had their Technical Director and a chemist participate.
The chemical analysis revealed that Paul Ledford used approximately 30 percent of the available KO_2 within the SCSR. Roy Middleton, Paris Thomas and Bill Petra used approximately 23 percent, 48 percent and 10 percent respectively. The approximate percentage used was determined by an average derived from the results of the chemical analyses performed by both laboratories. Based on the statement of the lone survivor Ledford, SCSRs were not donned at the time that the explosion occurred, but were donned after the crew began exiting the mine via a battery-powered personnel carrier and encountered smoke in the intake.

Table 4 – Comparison of Percent KO2 Used

Exhibit #	S/N	Miner SCSR	Visual Estimate	CSE Lab. Analysis	Independent Lab. Analysis	Average Lab. Analysis	Location	Notes
D-01	93609	Yes	45%	30%	29%	30%	Paul Ledford	
D-02	84784	Yes	40%	25%	20%	23%	Roy Middleton	
D-03	89962 (89692)	Yes	75%	42%	53%	48%	(Paris Thomas)	Use visual estimate - fused bed
D-04	105936	Yes	15%	10%	9%	10%	Bill Petra	
D-05	84698	Yes	Not Used	#N/A	#N/A	#N/A	Amon Brock	

The four men donned their SCSRs and began traveling to the surface via the personnel carrier until their route was obstructed by a fallen overcast and they were forced to abandon the ride and start walking. The four men discussed their options and decided to follow the high-voltage cable due to the presence of thick, dense smoke that considerably reduced visibility. Ledford and Middleton were in the lead with Petra and Thomas following. At some point, Middleton told Ledford that he was going back to find the power center. Ledford told Middleton that they had to exit the mine. Ledford then followed the high-voltage cable to exit the mine. Ledford related that he crawled for a while then stopped and rested because he became exhausted and would have to rest. Ledford stated that when he arrived at the No. 3 coal conveyor belt head that he lost consciousness due to exhaustion. Ledford stated that after regaining consciousness he crawled into the intake entry where he saw lights and was able to signal rescuers.

Ledford sustained first and second degree burns to his chest, which he believed were caused by the SCSR.

All self contained self rescue devices are required to be examined for damage and for the integrity of the seal after each time worn or carried by a person. During the interviews with mine personnel, it became apparent that this was not done regularly.

An examination of the operator's records of the 90-day testing and evaluation of the SCSRs at the mine revealed that the operator conducted the required examinations with an Acoustic Solids Movement Detector (ASMD); however the method used was not the method described in section four of the manufacturer's instructions. The manufacturer prescribed that the unit be moved in an up and down motion while conducting the test. The mine personnel used a horizontal motion while conducting the test. This horizontal motion is not a reliable method of checking that the chemical bed is intact. The records of the quarterly examinations of the SCSRs indicated that units that did not pass the ASMD test were removed from service and replaced. An examination of the operator's records indicated that at least thirteen SCSR units had been removed from service during the eighteen month period prior to the explosion.

Personnel at Darby were instructed in the operation and maintenance of the CSE SR-100 SCSR by a contract safety instructor during their annual retraining class using an actual training SCSR. For training conducted at the mine site, miners were trained using an expired or damaged SCSR that had been removed from service. This SCSR was found hanging in the mine storage room and did not have its top and bottom covers, goggles, or security band. Because of the lack of these parts, miners were unable to simulate the removal of the security band and the opening of the device. These steps are part of proper SCSR donning procedures as instructed by the manufacturer and required by the standard.

The instructions provided with the SR-100 SCSR state that there are several factors of concern regarding the usage of the SCSR. Persons are to be instructed that after the unit has been started, they should not remove the mouthpiece to talk. The removal of the mouthpiece would likely lead persons to breathe contaminated air. The removal of the mouthpiece typically allows the breathing bag to deflate. If it deflates, the uncontaminated oxygen is lost. Persons exposed to carbon monoxide that are actively exerting themselves or panicking will have a more rapid increase of carbon monoxide in their bloodstreams. Increased workload such as walking or carrying items will result in symptoms of exposure sooner, and at lower concentrations. Carbon monoxide levels in normal nonsmokers are approximately zero to three percent of total hemoglobin. Persons who smoke can have levels of carbon monoxide ranging from four to nine percent of total hemoglobin.

The medical examiner's report revealed that Middleton, Petra, and Thomas, succumbed to carbon monoxide poisoning with smoke and soot inhalation. The carbon monoxide saturation in their bloodstreams was 55 percent, 46 percent and 45 percent, respectively. The carbon monoxide saturation in the blood of the only survivor Paul Ledford was 29.4 percent as measured at the hospital. The analysis of the SCSRs worn by Middleton, Petra and Thomas showed that the SCSRs had sufficient breathable oxygen capacity left to allow the miners to escape the mine. These factors indicate that proper SCSR usage procedures were not followed.

Paul Ledford stated during his interview with MSHA that SCSRs were not donned until they encountered smoke, and not immediately after they had realized that an explosion had occurred. Ledford stated that the mouthpieces of the SCSRs were removed when he and Middleton were talking during their escape from the mine.

The evidence indicates that elevated levels of carbon monoxide in the bloodstream may be accounted for because of the following factors: (1) The SCSRs were not donned until the miners encountered smoke at which time the atmosphere may have already become contaminated. (2) The removal of the mouthpiece to talk would have allowed the miners to breathe contaminated air. (3) Reports from mine rescue personnel indicate that the three deceased victims were found without nose clips on. The examination of the SCSRs indicated that the nose clips were still attached to the breathing hoses of each unit. Paul Ledford, although found wearing the SCSR, was observed by rescuers not having the nose clip in place. Without nose clips on, they would have breathed an atmosphere contaminated with carbon monoxide.

An Emergency Temporary Standard (ETS) became effective on March 9, 2006. That standard requires mine operators to have at least two SCSRs for every miner underground during any shift, requires outby caches of additional SCSRs in both the primary and alternate escapeways at specific distances, and requires coal mine operators to install lifelines in the escapeways at their mines. It also mandates that flame resistant lifelines are to be equipped with cones or devices, whereby a person can distinguish the proper direction of travel to safety, even with reduced visibility. The ETS allows operators to show evidence that additional SCSRs and lifelines had been ordered, recognizing that there would be a problem in material availability.

A deadline of April 10, 2006, was set forth in the ETS preamble to require the mine operators to show that the material had been ordered. Darby had ordered lifeline supplies on March 8, 2006. The additional supplies of SCSRs were ordered April 24, 2006.

Origin, Flame and Forces

Origin

During any underground coal mine explosion investigation, it is necessary to locate the origin of the explosion. Identifying the origin is essential in determining the circumstances surrounding the accident and to help prevent similar, future occurrences. The ignition source and the fuel are located at the origin of the explosion. Ignition sources that are not located at or near the origin can be eliminated as potential ignition sources. The origin would be identified as the location from where primary explosion forces propagated in all directions.

Evidence was observed in the underground areas affected by the explosion at Darby Mine No. 1. This evidence was evaluated by MSHA investigators and it was used to establish the point of origin, the extent of flame, and the direction of the primary explosion forces. Appendix Q is a mine map that details the extent of flame and the direction of the primary explosion forces.

The sealed area designated as A Left was sealed through the installation of only three alternative-type seals constructed of Omega blocks. During MSHA's investigation, the locations of these three seals were meticulously evaluated, along with extensive areas on both sides of these seal locations. The direction of primary explosion forces, as shown on the mine map in Appendix Q, indicates that the explosion was initiated at the No. 3 Seal. Primary forces propagated away from the location of the No. 3 Seal in all directions, thus identifying this location as the origin of the explosion.

Flame

At the time the explosion occurred, there is no reason to believe that any coal dust would have been in suspension on either side of the A Left Seals. When the minimum explosive concentration of coal dust is suspended, the cloud is so dense that vision or breathing is impossible. Suspension is a necessary component of explosion propagation. Methane is naturally suspended as it enters the mine workings. Research has shown, as documented in MSHA Informational Report 1119, that the ignition of as little as 13 cubic feet of methane, diluted to within the explosive range, would be sufficient to suspend and ignite a coal dust cloud. Although methane provided the primary fuel for the explosion, MSHA investigators believe that coal dust became involved to a limited degree throughout the sealed area as the flame propagated further inby into the sealed area. The extent of flame is shown on the mine map in Appendix Q.

A mine dust survey was taken after the explosion. A total of 146 samples were taken on approximately 100 foot centers in the affected area which included A Left Section and a portion of the Mains. Sampling the mine dust on 100 foot intervals or less minimizes the effect of any dust transport that may occur during the explosion. The samples were all sent to MSHA's Mt. Hope Laboratory for analysis. Each sample was subjected to an Alcohol Coke Test and each was analyzed for incombustible content. The results of the mine dust survey are recorded on the mine map in Appendix R. The results of the Alcohol Coke Test are summarized in Table 5. The results of the Alcohol Coke Test indicate the quantity of coke in each sample as either none, trace, small, large, or extra-large. MSHA has used these results to identify the extent of flame that has occurred during underground coal mine explosions.

Table 5 - Alcohol Coke Test Results

Location	Number of Samples	No Coke	Trace Coke	Small Coke	Large Coke	Extra Large Coke
A Left	66	0	0	3	34	29
B Left	57	57	0	0	0	0
Mains	149	127	21	1	0	0
Parallel Mains	42	40	2	0	0	0
Old East Mains	27	27	0	0	0	0
Old North Mains	22	22	0	0	0	0

Areas containing large or extra-large quantities of coke in the post-explosion analysis are indicative of explosion flame. However, it is possible for mine dust samples within the flame zone to show none, trace, or small quantities of coke. There are a variety of reasons that this may occur. For example, the explosion flame can travel at a velocity that is too fast to allow sufficient time for coal to coke. The entire area inby the location of the three seals was involved in the flame of the explosion. Flame did not extend beyond the seals into the active workings.

The flame of the explosion can be extinguished due to a lack of fuel, heat, oxygen, suspension, confinement, or a combination of these five factors. Explosion propagation occurred in the inby direction in No. 4 Entry, inby No. 3

Seal. As the explosion neared the inby end of the sealed area, the flame speed began to decrease. When the speed of an explosion is reduced to below approximately 150 feet per second, the explosion loses its ability to further suspend mine dust from the roof, ribs, and floor. Although coal dust was not able to be continually suspended in sufficient quantities to fuel an explosion, the explosive methane continued to be consumed as the explosion propagated inby. Therefore, the lack of sufficient suspended fuel did not help to extinguish the explosion in this case.

Methane requires about 1,000 degrees Fahrenheit to ignite, whereas a suspended cloud of coal dust requires about 834 degrees Fahrenheit to ignite. Explosion flames easily exceed these temperatures. Sufficient heat remained within the area of the flame front to continue propagation for the duration of the explosion. The explosion flame was not extinguished because of a lack of heat.

Coal dust and methane require 13 percent and 12 percent oxygen respectively to become, or to remain involved in, any combustion process. Since flame evidence existed throughout the sealed area, it is certain that oxygen concentrations at or above these minimums existed behind the destroyed seals. Also, the active workings would have contained an oxygen concentration of about 21 percent before and during the explosion. Although oxygen concentrations prior to the explosion would have been between 12 percent and 21 percent, the flame of the explosion would have consumed most of the oxygen present as it burned. The flame of a methane explosion would not be able to burn back through the same area because of the lack of oxygen immediately after the explosion. Expected oxygen concentrations after a typical methane explosion would be approximately 4 percent or less, depending on the initial methane concentration. The explosion flame propagated inby from the point of origin at the No. 3 Seal until it encountered the solid faces. As the flame front progressed inby, it consumed the available oxygen. The flame could not travel through the same area twice during the explosion because of the lack of oxygen. The lack of oxygen did not cause extinguishment of the propagating flame. The flame could not travel in the outby direction from the faces because oxygen levels were insufficient.

In order for an explosion to propagate, the fuel must be suspended. Coal dust can become suspended when overpressures occur. Coal dust can remain in suspension only when sufficient flame speeds continue during an explosion. When the flame speed decreases, the ability of the explosion to suspend coal dust diminishes. Methane is naturally suspended as a gas. Methane provided the primary fuel for the explosion and remained in suspension for the duration of the explosion. The lack of suspension was only responsible for extinguishment of that portion of the flame attributed to coal dust.

The flame did not pass out of the sealed area into the active workings. Confinement within the sealed area remained constant. The flame remained totally confined for its entire duration. Therefore, the lack of confinement was not responsible for the extinguishment of the explosion flame.

In summary, the explosion flame began at the location of the seals and propagated inby to the solid block of coal. There was an insufficient quantity of methane present outby the seals to support combustion. Extinguishment occurred because the flame could no longer propagate in the inby direction. After it reached the solid block of coal, the flame could not travel in the outby direction because oxygen levels were insufficient

Forces

Explosion flame heats the mine atmosphere as it propagates. This action results in rapid expansion of the mine atmosphere and the generation of forces. As the flame speed increases, the magnitude of the explosion forces increases. Explosion forces affect a larger portion of the underground workings than the flame. Forces from the explosion damaged conveyor belt structure, roof supports, and ventilation controls. The force of the explosion caused the No. 3 personnel carrier to tumble approximately 260 feet, eventually coming to rest against the rib in the No. 4 Entry. The direction of the primary explosion forces are shown on the mine map in Appendix Q.

The explosion flame and forces initially propagated inby from the No. 3 Seal in the No. 4 Entry of A Left and continued to the most inby locations of the sealed area. Evidence indicated that explosion flame and forces split from the No. 4 Entry into both the No. 3 Entry and the No. 5 Entry as it propagated inby. The explosion flame immediately engulfed the Nos. 1, 2, 3, and 5 Entries and rapidly traveled throughout the entire sealed area.

In order for any explosion resistant seal to withstand the forces generated during an explosion, the seal must be properly constructed. Prior to this incident, all explosion resistant seals which were allowed to be constructed in underground coal mines had passed explosion testing to 20 pounds per square inch and had been deemed suitable for the intended purpose. Properly constructed Omega block seals have been subjected to explosion pressures of up to 27 pounds per square inch without failure occurring. However, explosion resistant seals must be constructed in the same manner as those that passed explosion testing. Any deviation from this manner of construction results in an untested seal with dubious explosion resistance.

The Omega block seals constructed underground for A Left were not constructed according to the manner in which those seals passed explosion testing. For example, there is no evidence of a complete hitch being cut from the floor and from both ribs into which these seals were to be set. Hitching is an essential characteristic of properly constructed 24-inch thick Omega block seals. Additionally, the blocks from these seals were reportedly stacked dry, without any mortar between the joints. This is a serious deviation from the manner in which those Omega block seals previously tested had been constructed. Also, only one mortar, BlocBond, is currently allowed for the construction of Omega block seals. Although a face mortar was applied, in construction of the return seals, the mortar was not BlocBond, and therefore, was not suitable for this particular application. Also, a full, interlocking pilaster must be incorporated into this type of seal. Such a pilaster was reportedly not built into the center of any of the three Omega seals that failed. Each of these construction deficiencies resulted in seals with questionable ability to withstand explosion forces.

Each of the three A Left Omega seals was completely destroyed during the explosion. Observations were made by MSHA investigators concerning the damage to the remnants of the Omega blocks. Many Omega blocks were reduced to small pieces of block and fine powder. The amount of pressure needed to cause this damage is not specifically known because the damage may be related to the strength of the mortar used for construction. Tests conducted at NIOSH's Lake Lynn Experimental Mine confirmed that structures in the path of a propagating explosion cause the primary forces of the explosion to be reflected. If the structures fail, the magnitude of the force is reduced. The total pressure reduction is dependent on the strength of the structure. For example, an explosion against a properly constructed 40-inch thick Omega block seal at NIOSH's Lake Lynn Experimental Mine resulted in pressures outby the seals decreasing from 51 to 6 psi and from 93 to 8 psi. However, an explosion against weaker structures, such as dry-stacked concrete block stoppings, resulted in pressures outby the stopping decreasing from 12 to 4 psi and from 8 to 6 psi.

The personnel carrier that was parked at the No. 3 Seal at the time of the explosion was displaced a distance of approximately 260 feet. This distance includes a deflection of 30 feet to the left after the personnel carrier collided with a coal pillar. Utilizing information regarding the dynamic pressure, it was estimated that the minimum explosion pressure exerted on the carrier appeared to be at least 22 psi. This calculation was determined in a report by MSHA entitled "Dynamic Calculations of the Explosion Pressures Exerted on the Personnel Carrier at the Darby Mine No. 1". This calculated explosion pressure was based on the total displacement distance of the personnel carrier. The total distance would have been greater if the personnel carrier had not impacted a coal pillar. This would have resulted in a calculated pressure greater than 22 psi.

Calibration and Maintenance of Handheld Detectors

Several different types of multiple gas detectors were utilized at this mine site. They consisted of Industrial Scientific CMX270 and MX250; CSE 301, 102, and 102LD; CD210; and MSA Solaris. These detectors were used when making the required preshift, on-shift, weekly examinations, and the required methane test in the face area while mining coal on the producing section.

Mine management statements and records provided by the contractor who performed calibration tests, revealed that the detectors were not being calibrated at least once every 31 days. The only calibration test performed on the detectors occurred when they were sent in for repairs.

A MX250 detector was found on one of the personnel carriers used by the miners located on B Left Section at the time of the explosion. This detector was tested at MSHA's Approval and Certification Center. The test results showed that when the detector was turned on, it had a low battery warning signal. After the detector was charged, calibrating gas was applied through the Horiba gas analysis machine using a MX250 calibration cup at the recommended flow rate of 0.5 liters per minute (lpm). After applying methane to the detector, the readout indicated 0.1 percent regardless of the concentration of methane being applied. It was determined that the span on methane had been turned down and the electric zero was turned up.

Several tests were conducted on the MX250 using the Industrial Scientific calibration kit following the same procedure as above. The span potentiometer (pot) was returned to its original position and calibration gas was applied. The span pot was then turned 9.75 turns clockwise resulting in readings of 2.5 percent methane and 20.9 percent oxygen. These tests indicated that the MX250 was functional but was adjusted such that it would not properly detect methane.

This problem with the MX250 was not an isolated incident. Four to five out of every 10 detectors sent to be repaired by Darby were found to be out of calibration. Similar to this detector, some detectors were so far out of calibration that regardless of how much methane was applied the detector would only indicate 0.0 or 0.1 percent. Information obtained during the accident investigation revealed that some of the methane detectors had been rendered in such a way that an accurate reading was not possible. An examination of the methane detector that was carried by Amon Brock on the day of the explosion showed that the detector, although reading high, was functioning properly but it did not appear to have been deployed continuously at the time of the explosion. Due to the fact it was found in his pocket, it could not have been deployed continuously at the time of the explosion.

Through interviews, information was obtained that miners performing some of the required methane tests had not demonstrated to an authorized representative of the Secretary that they were qualified to properly test for methane.

<u>Ignition Sources Considered</u>

Oxygen/Acetylene Torch

The accident investigation team recovered several components of an oxygen/acetylene torch assembly from the debris field created by the force of the explosion (see Appendix S). The team also recovered a 251 cubic-foot oxygen cylinder, a 140 cubic-foot acetylene cylinder, and approximately 50 feet of 3/8 inch diameter torch hose from the scene of the accident. These pieces of physical evidence, along with information acquired during the formal interview process, clearly indicate that the oxygen/acetylene torch was located at or near the No. 3 Seal at the mouth of A Left Section at the time of the explosion.

The torch handle (Victor Model WH36FC) was equipped with valves to control the flow of oxygen and acetylene to the cutting attachment. When the torch handle was found by investigators, the oxygen valve appeared to be open and the acetylene valve appeared to be closed. The cutting attachment (Victor Model CA35) was also equipped with a valve to control the flow of oxygen to the cutting tip. This valve appeared to be closed when found by investigators.

The oxygen cylinder valve was still attached to the oxygen tank when found by investigators and it was determined onsite that this valve was in the open position. The acetylene cylinder valve was sheared off during the explosion and was separated from the tank. This valve was also determined to be in the open position by onsite investigators. The pressure regulators for the oxygen and acetylene lines were heavily damaged in the explosion and no determination could be made regarding their individual settings.

The torch handle, cutting attachment, regulators, and cylinder valves were taken into custody by MSHA and transferred to MSHA Approval and Certification Center for examination and testing. The valves on the torch handle and cutting attachment were individually tested by applying compressed air (40 psi for the oxygen valves and 5 psi for the acetylene valve) to see if the valves were open or closed. The results of this test confirmed the assessment made by onsite investigators, with the exception of the acetylene valve on the torch handle, which leaked slightly when the compressed air was applied.

Further testing was conducted using compressed air and a flow meter to determine how small changes in valve position affected flow rate. These tests were conducted using a new cutting torch identical to the one involved in the accident. When compressed air was applied to each of the oxygen valves, approximately 90 percent of full flow was developed by turning the valves one quarter turn counterclockwise from the off position. When the acetylene valve on the torch handle was tested, approximately 56 percent of full flow was developed by turning the valve one quarter turn counterclockwise from the off position.

The new torch assembly was then connected to compressed oxygen and acetylene tanks in order to determine the minimum valve settings required to sustain a neutral flame. Pressures were regulated to 5 psi for acetylene and 40 psi for oxygen. With the oxygen valve on the torch handle fully open and the acetylene valve opened 3/16 of one turn, a neutral flame was obtained when the oxygen valve on the cutting attachment was opened 1/8 of one turn.

These tests demonstrated that very small changes in valve position can have a substantial affect on flow rate. The oxygen/acetylene torch found at the mine site was subjected to a violent explosion. As a result, the torch components traveled several hundred feet and inevitably contacted the mine roof, floor, and ribs many times before being deposited along the debris path. It is highly likely that the valves on the torch handle and the cutting attachment were altered to some degree by the violent motion resulting from the explosion. Therefore, the exact position of the torch valves at the instant the explosion occurred could not be determined with certainty.

Four galvanized steel roof straps had been installed in the mine roof over the No. 3 Seal. Each strap was 54 inches in length and contained two "U" shaped grooves. The straps were oriented perpendicular to the seal and intersected the seal to varying degrees. A section, approximately 25 inches in length, was missing from the middle of the strap installed closest to the left rib (facing inby toward the A Left section). The remaining pieces of this strap were still attached to the mine roof when observed by investigators. This strap appeared to have been cut with an oxygen/acetylene torch at the point where the strap intersected the outby edge of the seal. The strap also appeared to have been severed (partially cut, partially torn) at a point approximately 25 inches outby the edge of the seal. A section of roof strap, roughly matching the dimensions of the missing piece, was found in the No. 5 Entry approximately 550 feet from the No. 3 Seal. This section of roof strap also appeared to have been cut with a torch and was partially covered with the type of sealant used during the construction of the seals.

The section of roof strap found in the No. 5 Entry was taken into custody by MSHA and designated as Exhibit P13. A portion of the inby section of the severed roof strap was removed from the mine roof and taken into custody by MSHA. This piece was designated as Exhibit P43. The outby portion of the severed roof strap could not be retrieved because it was essentially covered by the roof bolt bearing plate. A diagram depicting the sections of the roof strap is included in Appendix T.

Exhibits P13 and P43 were transferred to MSHA Approval and Certification Center for analysis and testing. Microscopic analysis of the edges of the straps revealed that one of the edges of Exhibit P13 had been completely cut with an oxygen/acetylene torch and the other edge had been partially cut with a torch and partially severed by some other means. It was also determined that one edge of Exhibit P43 ("outby edge of No. 3 Seal" as noted in Appendix T) had been completely cut by a torch.

During the course of the investigation, a small notepad, identified by mine employees as belonging to Brock, was discovered lying on the mine floor in the main return just outby the location of the No. 3 Seal. The phrase "Cut straps & 2 Buckets sealant" was written on the first page of the notepad. A photograph of this page of the notepad is included in Appendix U.

The most likely ignition source for the explosion was the heat generated in the process of cutting the metal roof strap. Tests were conducted by engineers from NIOSH and MSHA Approval and Certification Center in which metal roof straps were cut with a torch while temperature recordings were made with an infrared camera system (see Appendix V). These tests demonstrated that the torch flame and the hot metal slag ejected during the cutting process were well above the ignition temperature of methane. This test also demonstrated that sparks and slag could be projected through the channels in the metal roof straps. The temperature of the metal edges created by the cut remained above the ignition temperature of methane for up to 20 seconds after the cut was completed.

Roof Falls

A roof fall can ignite an explosive methane-air mixture either by generating frictional heat or by the release of piezoelectric energy. The rocks comprising the immediate and main roof rub against one another as the roof breaks and falls. The friction from rubbing or from impact can result in temperatures above the ignition temperature of methane. The United States Bureau of Mines (USBM) has conducted rubbing friction and impact friction experiments. Under carefully controlled laboratory experiments, the USBM was only able to ignite methane-air mixtures in a small percentage of tests, even when the methane concentration was optimum for ignition.

An ignition can also be generated by piezoelectric discharges during certain roof falls. This situation is usually found with rock containing crystalline structures such as tourmaline, quartz, topaz, and Rochelle salt. These crystals produce electric charges on parts of their surface when they are rapidly compressed in particular directions. In coal mining, the most notable crystal formation found is the quartz content of sandstone.

The immediate and main roof of the Darby Mine No. 1 was comprised of sandstone and shale; however, there was no evidence of roof falls in the A Left area. Therefore, roof falls were eliminated as an ignition source.

Lightning

A lightning strike analysis was performed by Vaisala, Inc., of Tucson, Arizona, to address the possibility of lightning as an ignition source. The geographic center point of the analysis was specified as 36.8786°N, 82.9525°W, which corresponds to the digitizing coordinate nearest to the A Left Section on the mine map. A 5-mile radius and a 12-hour time period, from 6:00 p.m. on May 19 to 6:00 a.m. on May 20, were selected for the analysis.

The resulting report, entitled STRIKEnet® Report 162412 (see Appendix W), clearly shows that there were no lightning strikes within a 5-mile radius of the mine at the time of the explosion. The closest lightning strike, with respect to time, occurred approximately 1.5 hours before the explosion, and was 12.5 miles from the specified location on the mine map. This strike had a peak current of 5,100 amperes. The closest strike, with respect to geographic location, occurred approximately 2.5 hours after the explosion, and was 1.4 miles from the specified location on the mine map. This strike had a peak current of 7,900 amperes. Based on this information, it was concluded that lightning did not contribute to the explosion.

Mine Electrical Distribution System

Power was supplied to the main substation through a 34.5-KV service drop from the utility company. At the substation, the voltage was transformed from 34.5 KV to 4.16 KV by a bank of three 500-KVA transformers connected in a delta-wye configuration. The wye-connected secondary side of the transformers was grounded through 96-ohm, 25-amp grounding resistor. A 600-amp oil circuit breaker (OCB) was installed in the main substation to provide protection for the 4,160-volt circuit supplying power to both the surface and underground areas of the mine. A gang-operated disconnect switch was installed on the primary side of the transformers to allow the utility power to be disconnected. Lightning arrestors were installed on the line side of the gang-operated disconnect switch.

Power exited the substation on a set of uninsulated overhead lines. A high-voltage branch circuit was established at a totally-enclosed switch house located on the surface between the Nos. 3 and 4 Portals. The switch house contained a vacuum circuit breaker (VCB) and a visible disconnect switch to isolate and protect the #2/0 AWG mine power feeder cable, which entered the mine at the No. 4 Portal and supplied power to all underground circuits. Lightning arrestors were installed on the surface approximately 80 feet from the point where the underground circuit branched off of the main 4,160-volt line.

The underground mine power feeder cable was installed in the entry adjacent to the conveyor belt entry, which was identified as No. 4 for the first 1,500 feet and as No. 5 thereafter. The mine power feeder cable terminated at the B Left Section power center, approximately 4,100 feet from the point where it entered the mine.

There was no evidence to indicate that the high-voltage distribution system contributed in any way to the occurrence of the explosion. The mine power feeder cable was, at the closest point, at least 300 feet from the A Left seals.

Section Electrical Equipment

The following pieces of mobile mining equipment were located on the B Left working section at the time of the accident:

1) One continuous mining machine (Joy, Model 14CM-10A).
2) Two shuttle cars (Joy, Model 21SC).
3) One battery-powered scoop (Long Airdox, Model 601).
4) One coal conveyor belt feeder (Stamler, Model BF-17).
5) One roof bolting machine (Fletcher, Model HDDR-13CF).

The electrical equipment on the B Left working section was ruled out as a possible ignition source based on the distance from the origin of the explosion. The face of the B Left working section was approximately 1,500 feet from the seals located at the mouth of the A Left Section at the time of the explosion. A map of the location of all electrical equipment in the mine at the time of the explosion is included in Appendix X.

Outby Electrical Equipment

The mine had three underground conveyor belt drive installations, designated as No. 2, No. 3, and No. 4. The drives received power from 300 KVA power centers positioned near each of the respective belt drive installations. Two battery charging stations were present underground: one located near the No. 4 Belt

Drive, and the other located two crosscuts inby the portal in the intake air course. A permissible pump was positioned in the No. 1 Entry, 13 crosscuts inby the portal. A 25 hp pressure pump was installed approximately one crosscut outby the No. 2 Belt Drive in the No. 3 Entry. A battery-powered scoop (S&S, Model 488) was parked at the charging station near the No. 4 Belt Drive at the time of the explosion.

All of these potential ignitions sources were also ruled out based on the distance from the origin of the explosion. The No. 4 Belt Drive, located approximately 750 feet from the mouth of the A Left Section, was the unit of outby electrical equipment nearest to the point of origin of the explosion.

Battery-Powered Personnel Carriers

There were four battery-powered personnel carriers underground at the time of the explosion, none of which were approved as permissible. Two of the personnel carriers, designated as "No. 1" and "No. 2", were located just outby the B Left Section power center. A three-wheeled personnel carrier, referred to as the "maintenance buggy", was parked three crosscuts from the face in the B Left working section. The other personnel carrier, designated as "No. 3", was located at or near the No. 3 Seal and was heavily damaged in the explosion.

The electrical components from the No. 3 personnel carrier, with the exception of the batteries (which were completely destroyed in the explosion), were recovered from the mine and taken to MSHA Approval and Certification Center for analysis.

The vehicle was manufactured by Johnson Industries of Pikeville, Kentucky, and the model was specified only as "super car". There was no visible serial number printed or stamped on the frame of the vehicle. The unit was equipped with a 5 horsepower, totally enclosed, direct current motor, which received power from a set of six, 6-volt, deep cycle, 260 ampere-hour batteries connected in series (36 volts). The motor was controlled by a solid state controller in conjunction with forward and reverse contactors. A potentiometer operated by the foot pedal provided speed control for the vehicle. A single light, operated by a toggle switch, was mounted on the front of the vehicle.

The force of the explosion caused the No. 3 personnel carrier to tumble approximately 260 feet, eventually coming to rest against the rib in the No. 4 Entry. The motor and one of the contactors separated from the vehicle and were found lying approximately 30 feet from the personnel carrier (see Appendix F).

The motor was disassembled at MSHA Approval and Certification Center and examined for indications that an ignition occurred inside of the enclosure. No evidence of flame or burning of any kind was found inside of the motor enclosure. The enclosed solenoid was also disassembled and examined for signs of ignition. None were found. The remaining components were thoroughly examined and no evidence was found to indicate that the No. 3 personnel carrier caused an ignition of methane. Furthermore, it is unlikely that an explosive mixture of methane and air would have been present at the probable location of the vehicle at the time of the explosion, due to the ventilating current in the main return and the fact that the water trap valve in the seal was closed. The three personnel carriers located on or near the B Left Section were ruled out as possible ignition sources due to their distance from the point of origin of the blast.

Battery-Powered Cap Lamps

At the time of the explosion, there were two Koehler battery-powered cap lamps in use at or near the No. 3 Seal at the mouth of the A Left Section. The components of these cap lamps were found deposited at various locations along the debris path created by the force of the explosion, indicating that the lamps were being worn by Amon Brock and Jimmy Lee at the time of the accident.

The cap lamp components recovered from the mine included portions of two headpieces, two cap lamp cables, two plastic battery covers with electrical accessory receptacles, and one intact battery. The battery for the other cap lamp was not recovered from the mine because only a portion of the external shell was located by the investigation team. The cap lamp components taken into custody by MSHA were analyzed at MSHA Approval and Certification Center in an effort to determine if they contributed to the ignition.

The examination of the cap lamp cables revealed no short circuits or other conditions indicating the cables were the source of a spark or thermal ignition. The electrical accessory receptacle (PTO) on one of the battery covers had been altered in such as way as to permit external access to both the positive and negative contacts. Battery-powered cap lamps are required by 30 CFR Part 19 to be constructed such that both polarities of the battery are not accessible externally. While this alteration was a violation of 30 CFR 75.507-1(a), it could not be determined whether or not the PTO was used in a manner that contributed to the explosion, though the low voltage of the lamp made it an unlikely ignition source.

One of the headpieces, designated as Exhibit P-18, contained a short circuit within it, but it was not possible to determine if the condition was caused by the explosion or if it was pre-existing. This type of headpiece, when maintained in permissible condition, was previously found to be capable of containing an ignition when filled with an explosive mixture and ignited with an external source. The bulb ejection mechanism on the other headpiece, designated as Exhibit P-39, did not initially function due to dust on the interior of the socket. However, after the mechanism was operated several times, the bulb would eject properly from the socket. The dust was most likely deposited in the socket as a result of the explosion.

Due to the condition of the headpieces recovered from the accident site, it was not possible to conclusively rule them out as possible ignition sources. Bulb filaments are capable of causing a thermal ignition of an explosive methane-air mixture under certain conditions. However, in order for a bulb filament to present an ignition source in an assembled cap lamp, the following sequence of events must occur: (1) the bulb filament must be energized; (2) the lens must be broken; (3) the bulb envelope must be broken; and (4) the ejection mechanism must fail or the lens must be broken in a manner that retains the bulb in the socket.

The cap lamp battery recovered from the mine was subjected to spark ignition testing in an 8.3 percent methane-air mixture, with a cadmium disc, and two #24 AWG wire electrodes. The battery underwent 800 cycles of spark testing using the ISIB spark test apparatus. The battery was fully charged at the beginning of the test and was charged for one hour every 200 cycles during the testing to restore it to a fully charged condition. There were no ignitions of the methane-air test gas within the spark test apparatus throughout the testing process.

Hand-held Methane Detector

Following the accident, an Industrial Scientific, Model MX250 (MSHA Approval # 8C-59), was found in the right front pocket of the pants worn by Amon Brock. The unit was taken into custody by MSHA at the Harlan Funeral Home and transferred to MSHA Approval and Certification Center for examination and testing. The detector was checked for calibration and functionality, which is discussed elsewhere in this report, and as a possible ignition source.

The worst-case short circuit current was calculated based on open-circuit battery voltage and internal resistance. The results clearly indicated that the 4.8-volt, nickel-cadmium battery pack could not produce a spark with sufficient energy to ignite an explosive mixture of methane and air.

The two internal backlight bulbs, with glass envelopes intact, were temperature tested after being energized continuously for two hours. The temperature of both bulbs was found to be less than 30 degrees Celsius at the end of the two-hour period. The minimum ignition temperature of methane is approximately 537 degrees Celsius. A visual examination of the unit revealed no evidence of faults or overheated components within the detector that would be the source of a spark or thermal ignition.

Finally, the unit was energized and placed in a 7.7 percent methane-in-air mixture for 2.5 hours to see if the catalytic sensor would become hot enough to cause an ignition. The detector did not cause an ignition in the test mixture.

Training

Training records were reviewed for all underground and surface miners who were employed at the mine at the time of the accident. Approved Part 48 training plans with lesson plans and training material used to conduct training were also reviewed. Darby employees received their annual refresher training at the Sigmon Training Center. The annual refresher training classes were conducted by George Carr.

Experienced miner training was conducted at the mine by Ralph Napier, a certified MSHA Instructor. Brock also conducted experienced miner training. The mine map was reportedly reviewed with participants regarding the colors on the map used to indicate the escapeways. Napier stated that when he went over the color code with the employees, they often forgot by the next day what the colors indicated. The mine map did not clearly distinguish which of the entries were designated as escapeways. Company health and safety rules were discussed with a tour of the mine at completion of the class.

Management and non-management personnel conducted task training at the mine. Task and hazard training were both recorded on the same MSHA form 5000-23. An explanation of the types of training required and the proper method of recording that training was given to the operator, who did not differentiate the types of training required for persons specified by Part 48.2 (a)(1) and 48.2 (a)(2). Part 48 training was recorded on MSHA form 5000-23 for the annual refresher training.

A CSE SR-100 SCSR specially designed by the manufacturer to be a training model was not provided at the mine. The operator used a SCSR that had been taken out of service to train miners. The unit could not be donned using the 3+3 method because the end caps and goggles were missing. The unit was normally stored in the changing room, hanging on the wall in an open position. Because of this, miners received inadequate SCSR training during hazard, new miner, and experienced miner training sessions. However, this unit was not used to train the miners who died as a result of the accident as those miners received their training at another facility.

The annual refresher training the miners received on December 10, 2005, was significantly deficient. Training in the Mine Emergency Evacuation and Firefighting Plan did not include the use of non-verbal communication techniques when using a SCSR device. In addition, the SCSR 3+3 donning procedures training did not include complete donning procedures where the miners assumed a donning position and opened the device.

ROOT CAUSE ANALYSIS

An analysis was conducted to identify the most basic causes of the accident that were correctable through reasonable management controls. During the analysis, root causes were identified that, if eliminated, would have either prevented the accident or mitigated its consequences. The following root causes were identified as a result of the investigation. In each case, an effective management system, procedure or policy was not in place to assure compliance with the regulation or safe mining procedure.

1. Root Cause: Mine management failed to ensure that prudent seal construction procedures were utilized in the building of the seals at the mouth of A Left Section. The top of the No. 3 Seal at A Left was intersected in several locations by metal roof straps. The metal straps interfered with the installation of wood planking on the top of the seal. The wood planking could not be positioned flush with the mine roof. The metal roof straps each contained longitudinal channels which, under certain conditions, could create a conduit for gases to flow from the sealed area into the active workings. It is most likely that such a conduit was created on May 20, 2006, when one of the metal straps was cut with an oxygen/acetylene torch, allowing an explosive mixture of methane and air to come into contact with either the torch flame or materials heated by the torch flame. One metal roof strap extended through the No. 1 Seal and four metal roof straps extended through the No. 3 Seal. The use of Omega 384 block for seal construction was tested and approved by MSHA without any metal straps passing through the seal.

   Corrective Action: Mine management should assure either the straps are removed prior to seal construction, or seals are located to avoid contact with straps.

2. Root Cause: Mine management failed to ensure that safe work procedures were used while employees attempted to make corrections to an improperly constructed seal. On May 20, 2006, an oxygen/acetylene torch was used to cut through a metal roof strap installed at the No. 3 Seal at the mouth of A Left Section. Mine management allowed the use of the torch in an area where there was an obvious ignition hazard. In addition to this, proper tests for methane were not continuously made while the torch was being used. A proper test for methane would have included testing on both sides of the seal. A gas detecting instrument was available at the time the cutting was performed, but evidence indicates that it remained in the pants pocket of the afternoon shift foreman.

Corrective Action: Mine management should consider hazards and select safe work practices, such as the use of non-sparking cutting tools where methane hazards may exist. Management should assure that welding, burning or cutting operations are not performed where proper tests for methane cannot be conducted. Because of the inability to conduct adequate tests for methane inby the No. 3 Seal, there would have been no safe mechanism for cutting the metal strap intersecting the No. 3 Seal.

3. Root Cause: Proper SCSR usage procedures were not followed while four miners attempted to escape from the mine following the explosion that occurred on May 20, 2006. After the devices were donned, at least two of the miners removed their mouthpieces for some period of time in order to communicate verbally. Evidence indicates that the miners did not immediately don the SCSR units after the explosion, but waited until smoke was encountered several minutes later. Three of the four miners eventually succumbed to carbon monoxide poisoning with smoke and soot inhalation. The fourth miner survived the incident, but required medical treatment for carbon monoxide poisoning. Tests conducted on the SCSR units used by the victims indicated that the units were capable of providing sufficient oxygen to allow unimpaired miners to escape from the mine.

   Corrective Action: Management should train and retrain miners, in realistic conditions, to increase the likelihood that they will react and perform properly should an actual emergency occur underground.

4. Root Cause: Management failed to provide adequate training regarding escape procedures. Escapeway drills were not properly conducted, in that, alternate escapeways were never traveled. Maps serving as escapeway maps, required to be used for training miners, did not identify the escapeways or show the current working section. This lack of training and familiarity with the alternate escapeway most likely delayed the escape of the miners following the explosion.

   Corrective Action: Management should train and retrain miners to assure that they are familiar with all emergency escape procedures, and requirements.

The mine did not resume production following the accident. On November 14, 2006, MSHA personnel confirmed that the mine was sealed. The mine was placed in abandoned status on November 15, 2006.

CONCLUSION

An explosion occurred at approximately 1:00 a.m. on May 20, 2006, inby the A Left No. 3 Seal. The explosion resulted in the immediate deaths of two miners who were located at the seal. Three of four miners evacuating from the B Left Section succumbed to carbon monoxide poisoning with smoke and soot inhalation.

The accident occurred because the operator did not observe basic mine safety practices and because critical safety standards were violated. Mine management failed to ensure that proper seal construction procedures were utilized in the building of the seals at the A Left Section. Mine management also failed to ensure that safe work procedures were used while employees attempted to make corrections to an improperly constructed seal. Furthermore, mine management failed to adequately train miners in escapeway routes and proper SCSR usage.

Approved by:

Kevin G. Stricklin
Acting Administrator for
Coal Mine Safety and Health

4/12/2007
Date

ENFORCEMENT ACTIONS

In addition to a 103(k) Order, the company was cited for six conditions and/or practices which contributed in some way to the accident. Thirty-seven other citations and orders were issued during the investigation, but were not considered to have contributed to the accident.

1. 104(d)(1) Citation No. 7061230, 30 CFR 75.333(h), S&S, Reckless Disregard

Condition or Practice: "On May 20, 2006 the integrity of the No. 3 Seal in A Left was compromised when a metal roof strap intersecting the seal was cut with a torch. As a result of the cutting of the metal strap, this seal was not being maintained for its intended purpose of separating the sealed area in A Left from the active portion of the mine. This resulted in methane from behind the seal coming into contact with the ignition sources that resulted from the cutting of the metal strap. The resulting methane explosion contributed to the deaths of five miners."

2. 104(d)(1) Order No. 7061231, 30 CFR 75.1106, S&S, Reckless Disregard

Condition or Practice: "Evidence indicates that adequate tests for methane were not continuously performed during the cutting operation of a metal roof strap at the No. 3 Seal of the A Left section. A methane explosion occurred resulting in five fatalities. Four metal roof straps extended through the No. 3 Seal. On May 20, 2006 cutting of a metal roof strap located at the No. 3 Seal in A Left was performed with an acetylene/oxygen torch adjacent to an atmosphere containing an explosive mixture of methane and oxygen."

3. 104(d)(1) Order No. 7061232, 30 CFR 75.370 (a)(1), S&S, Reckless Disregard

Condition or Practice: "Results of a fatal accident investigation revealed that the three Omega block seals installed to seal the A Left Section from the active workings were not constructed to comply with page 14 "Omega Block Seals" of the Ventilation Plan approved September 1, 2005. This portion of the approved plan specifies specific construction procedures to meet the requirements of 30 CFR 75.335 "Construction of Seals". Omega blocks were used to construct the seals, but the construction did not follow the plan as follows:

a. The Omega blocks were dry stacked with no mortar between the joints.
b. The seals were not hitched 6 inches into the solid rib and floor for the entire perimeter.
c. The seals had been spray coated with a bonding and sealing agent not approved for this purpose.

d. The pilaster was not properly constructed as it did not extend inby the seal as depicted in the plan and was only one 16 inch block wide.
e. A single layer of 1 inch wood planking was not provided between the Omega block and the mine roof.
f. The No. 3 Seal was located 6 to 7 feet from the outby rib corner whereas the plan requires a minimum distance of 10 feet.
g. The Omega 384 lightweight block were approved to be used for underground mine ventilation seals without any metal roof straps or other extraneous metal passing through the seal. The metal straps interfered with the installation of wood planking on the top of the seal. The wood planking could not be positioned flush with the mine roof."

4. 104(d)(1) Order No. 7488601, 30 CFR 75.383(a), S&S, High Negligence.

Condition or Practice: "On May 20, 2006, an explosion occurred at the No. 3 Seal for the A Left worked out area which resulted in the deaths of five miners. Two of the miners died immediately from the force of the explosion and three miners died while attempting to escape from the mine. The accident investigation revealed that escapeway maps showing the designated escapeways were not provided on the surface and for miners who worked on the B Left working section (MMU 001). Two maps were posted in the mine office on the surface and a map was located on the working section. Neither the maps on the surface nor the map on the section clearly identified the escapeways or distinguished the escapeways from other available entries. The map on the working section did not show the active workings of the B Left Section."

5. 104(d)(1) Order No. 7488603, 30 CFR 75.383(b)(1) S&S, High Negligence

Condition or Practice: "On May 20, 2006, an explosion occurred at the No. 3 Seal for the A Left worked out area which resulted in the deaths of five miners. Two of the miners died immediately from the force of the explosion and three miners died while attempting to escape from the mine. The accident investigation revealed that during the emergency evacuation drills, escapeways were not alternated so that the alternate escapeway was traveled by miners. The records indicated and testimony revealed that miners only traveled out the intake escapeway during drills."

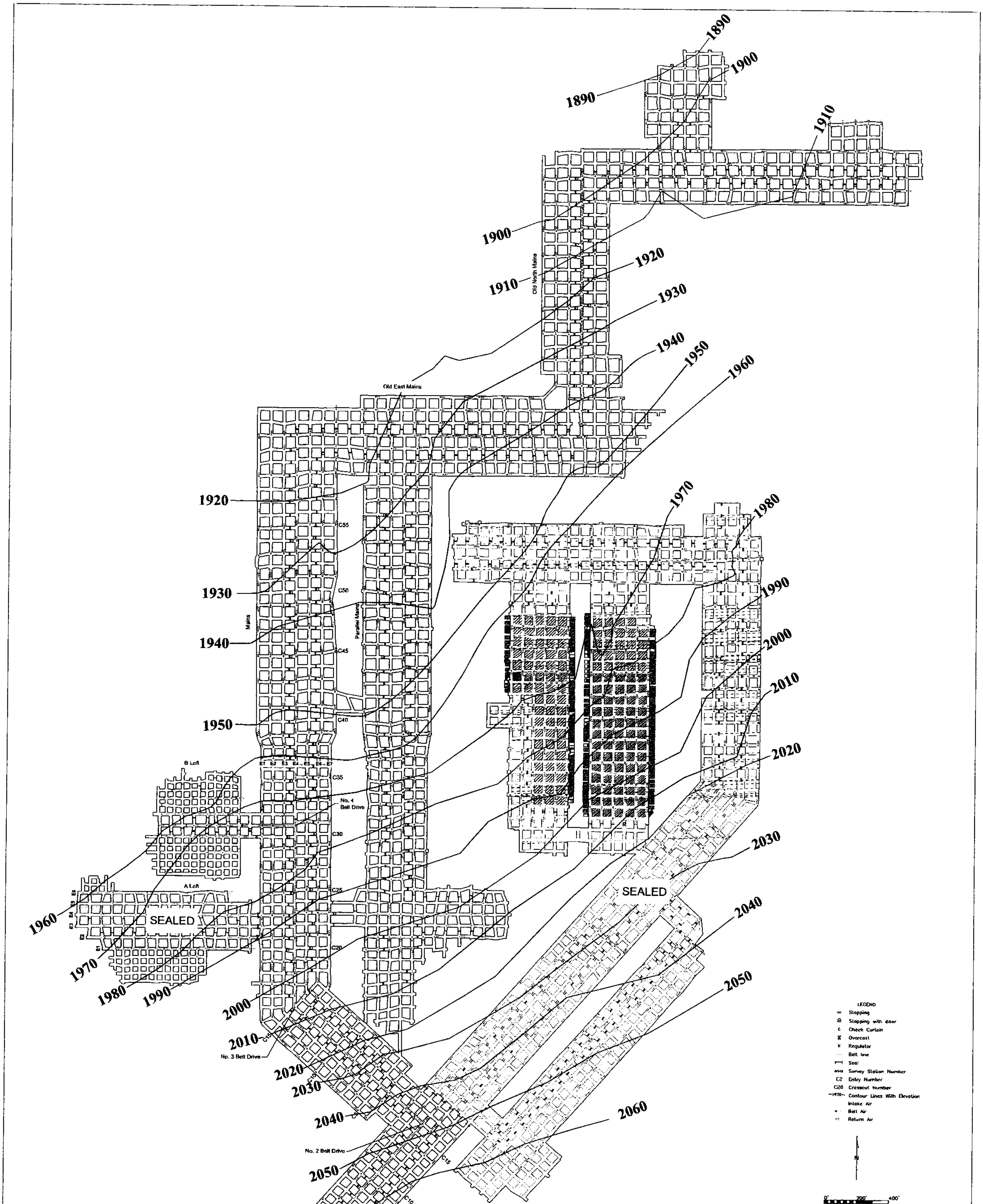
6. 104(d)(1) Order No. 7168187, 30 CFR 48.8(b)(8); S&S, High Negligence

Condition or Practice: "On May 20, 2006, an explosion occurred at the No. 3 Seal for the A Left worked out area which resulted in the deaths of five miners. Two of the miners died immediately from the force of the explosion and three miners died while attempting to escape from the mine. Based on information gathered during the course of a fatal accident investigation, it was determined that the annual refresher training the miners received on December 10, 2005, was significantly deficient. Training in the Mine Emergency Evacuation and Firefighting Plan did not include the use of non-verbal communication techniques when using a SCSR device. During evacuation following the explosion, at least two miners removed the mouthpieces of their SCSRs to verbally communicate. In addition, the SCSR 3+3 donning procedures training did not include complete donning procedures where the miners assumed a donning position and opened the device."

Appendix A

List of Injured Miners

Amon "Cotton" Brock	Multiple Blunt Force and Thermal Injuries (Deceased)
Jimmy Lee	Multiple Blunt Force and Thermal Injuries (Deceased)
Roy Middleton	Carbon Monoxide Poisoning w/ Smoke and Soot Inhalation (Deceased)
George William Petra	Carbon Monoxide Poisoning w/ Smoke and Soot Inhalation (Deceased)
Paris Thomas, Jr.	Carbon Monoxide Poisoning w/ Smoke and Soot Inhalation (Deceased)
Paul Ledford	Burn to Chest; Carbon Monoxide Poisoning and Smoke Inhalation (Survivor)



APPENDIX B
MINE MAP
DARBY MINE No. 1
MSHA ID No. 15-18185
KENTUCKY DARBY LLC

Active Underground Areas

Appendix C – Timeline of Rescue/Recovery Events

May 20, 2006

01:05 a.m.---MSHA and the Kentucky Office of Mine Safety and Licensing (OMSL) were notified by Ralph Napier, superintendent, about an accident at the mine.
01:54 a.m.---MSHA personnel arrived at the mine site and a 103(k) order was issued.
02:00 a.m.---The Lone Mountain Mine Rescue team was notified about the explosion and was dispatched to the mine site.
02:01 a.m.---MSHA personnel using a MSA Solaris (Solaris) multiple gas detector took quality readings at the mine fan and had 20.8 percent oxygen, 2.6 percent methane, and over 500 ppm CO.
02:05 a.m.---MSHA was informed by the company that the underground power had been disconnected. Readings at the fan were 20.8 percent oxygen, 2.2 percent methane, and over 500ppm CO.
02:15 a.m.---OMSL personnel arrived at the mine. MSHA, OMSL, and company personnel established a command center in the mine office.
02:30 a.m.---Quality air readings were taken. At the fan the readings indicated 20.8 percent oxygen, 0.2 percent methane, and over 500 ppm CO. At the portals the readings indicated 20.8 percent oxygen, 0 percent methane, and from 13-24 ppm CO.
02:32 a.m.---The first response personnel traveled the main intake airway toward the active section. Communications were maintained by using hand held radios.
02:50 a.m.--- The James River Coal mine rescue team was notified about the explosion and was dispatched to the mine site.
03:00 a.m.--- The Lone Mountain mine rescue team arrived at the mine site and was briefed at the command center.
03:10 a.m.---Paul Ledford was found at crosscut No. 13 in the main intake entry. Ledford could not walk. A call was made to the outside to bring a personnel carrier (buggy) to this location in order to transport Ledford to the surface.
03:30 a.m.---Ledford arrived on the surface.
03:31 a.m.---Examinations were made in the area of the No. 3 Belt Drive and three breaks inby in the belt and neutral entries.
03:40 a.m.---The phone line inby the No.3 Belt Drive was disconnected. The mine phone was utilized for communications outby the No. 3 Belt Drive. A fresh air base (FAB) was established at crosscut No. 17 in the No. 6 Entry at survey station No. 507.
04:00 a.m.---The Harlan OMSL mine rescue team started underground and traveled to the FAB. They donned their apparatuses and traveled to the return entries.
04:15 a.m.---When the team arrived in the return a light was observed and they advanced toward the light. Paris Thomas, Jr. was found in the crosscut between the No. 3 and No. 2 Entries at crosscut No. 20.
04:32 a.m.---Part of the Lone Mountain mine rescue team (designated as first) accompanied by a MSHA Mine Emergency Unit (MEU) team member traveled to the FAB.
04:40 a.m.---The second team from Lone Mountain accompanied by a MEU team member traveled to the FAB.
04:46 a.m.---The FAB was advanced to crosscut No. 22 in the No. 7 Entry.

04:50 a.m.---The first Lone Mountain team donned apparatuses and advanced toward the active section. They communicated using 1,000 feet of hard line (communication cable with headsets).

05:05 a.m.---The first Lone Mountain team observed a light outby in the No. 5 Entry and another one inby toward the section. The team advanced toward the inby light. A buggy with its lights on was found on the debris from the blown out intake overcast. The top and bottom lids for two SCSRs were found on the buggy.

05:10 a.m.---The team retreated and then traveled to the light located outby in the No. 5 Entry.

05:16 a.m.---Bill Petra was found between crosscuts No. 23 and 24 in the No. 5 entry. Approximately 20 feet outby this location another victim was found (later identified as Jimmy Lee).

05:25 a.m.---Lone Mountain team members accompanied by a MEU member advanced toward the B Left Section. The team observed a light in the direction of the section. A second buggy was found at the second crosscut on the section with the lights on. One crosscut inby the buggy, the top and bottom lids for two SCSRs were found.

05:43 a.m.---The Lone Mountain team traveled in four entries and advanced to the faces.

05:45 a.m.---The Barbourville OMSL mine rescue team traveled to the FAB.

06:19 a.m.---The Barbourville team advanced to the location of the A Left Seals. **07:05 a.m.**---Hazard OMSL mine rescue team traveled to the FAB.

07:08 a.m.---All seals were blown out. Quality readings at the No. 1 seal location were 19.1 percent oxygen, 1.5 percent methane, and CO was off scale.

07:30 a.m.---The FAB was advanced to the No. 31 crosscut in the No. 7 Entry.

07:35 a.m.---The Barbourville team advanced in the return entries from the A Left Seals to the B Left section.

07:50 a.m.---Seven members of the Lone Mountain team advanced inby toward the main headings and three members of the team advanced outby in the belt entry to locate the remaining missing miners.

08:00 a.m.---The James River Coal mine rescue team arrived at the mine site and was briefed by the command center.

08:25 a.m.---The Hazard OMSL team advanced from the return seals location outby in the return airways. The Martin OMSL team advanced in the return airways from the outside. These two teams traveled the entire return searching for the remaining miners.

08:45 a.m.---The three members from the Lone Mountain team found Roy Middleton in the crosscut between the No. 5 and No. 4 Entries at crosscut No. 21.

08:50 a.m.---In the crosscut between the No. 5 and No. 4 entries at crosscut No. 23 a body was found (later identified as Amon Brock).

10:55 a.m.---The victims were transported to the surface.

Note: Times are estimates based on interviews and notes.

Appendix D – List of Persons Participating in Mine Rescue and Recovery

Initial Rescue Effort

Robert Rhea, MSHA
Kevin Doan, MSHA
Dale Jackson, MSHA
Brad Sears, MSHA
Todd Middleton, OMSL
Ralph Napier, Kentucky Darby
Mark Sizemore, Kentucky Darby
Mitchell Lunsford, Kentucky Darby

Subsequent Recovery Efforts

Kentucky Office of Mine Safety and Licensing Mine Rescue

Ronnie Hampton
Sherril Fouts
Charles Kirk
Todd Middleton
Jim Owens
Ronald Patrick Turner
Ricky Johnson
George Hollis
Michael Partin
Ralph Crawford
Randy Partin
Kenneth Morgan
David Mullins
Bob Banks
Randy Campbell
Daniel Bentley
Mike Eldridge
Martin Holbrook
Randall Smith
Ricky Blackburn
Jerome Howard
Freddie Moore
Earl Martin
David Slone
John Ferrari
Mike Elswick
Tony Casebolt
Chester Flint
Freddie Lewis
Randy Bentley
Glenn Mace
E.B. Sanders
James Tackett
Keith Conley

Lone Mountain Processing, Inc. Mine Rescue

Ronnie Smith
Greg Brashears
John Rutherford
Freeman Crosby
Jim Vicini
Jude Johnson
Tim Gooden
B.J. Foster
David Shackleford
Ronnie Biggerstaff

James River Coal Mine Rescue

Lou Mills	Pearl Farler
Pat Schoolcraft	Johnny Riley
Jeff Roberts	Buddy Howard
Mike Sharp	Clifton Priest
Rick Wallen	Scott Daniels
Steve Shell	Craig Lewis

MSHA Mine Emergency Unit

Virgil Brown	Robert Clay
Tony Sturgill	Greg Ison
Otis Matthews	Gerald Cook
Chuck Barton	Jim Langley

Kentucky Darby LLC

James Philpot	Jeff Coker
Jamie Johnson	

Appendix E - Persons Participating in the Investigation

Kentucky Darby LLC

Elmer D. Burgan	General Laborer
Jamie H. Johnson	Section Foreman
Mitchell T. Lunsford	Mine Examiner
Gabriel S. Middleton	Continuous Mining Machine Operator
Ralph Napier	Superintendent
James C. Roark	General Laborer
Mark Sizemore	Outby Foreman

United Mine Workers of America

Max W. Kennedy	UMWA International Representative
Edgar Oldham	UMWA International Representative

Designated Miners' Representatives

Kenney Johnson	Representative
Tony Oppegard	Attorney

Kentucky Office of Mine Safety and Licensing

Timothy Fugate	Mine Inspector
Ronnie Hampton	Supervisor
Earnest Hawkins	Underground Mine Safety Analyst
Ronald Hughes	Director, Division of Investigation
George Johnson	Inspector Principal
Todd Middleton	Mine Inspector
Tracy Stumbo	Chief Accident Investigator
Ronald Patrick Turner	Roof Control Specialist

MSHA Accident Investigation Team

Robert M. Bates, Jr.	Supervisory Electrical Engineer
Mary Beth Zamer Bernui	Attorney
Charles D. Campbell	Mining Engineer
Gerald L. Cook, Sr.	CMS&H Specialist
Anthony R. Guley, Jr.	Supervisory CMS&H Specialist
Richard C. Herndon	Special Investigator
Thomas E. Light	Assistant District Manager, District 2
Mark Malecki	Attorney

Mark A. Odum	Supervisory Mining Engineer
Michael E. Pruitt	Training Specialist
Mark E. Schroeder	Mining Engineer

National Mine Health Safety Academy

Lynn Carr	Photographer

Pittsburgh Safety and Health Technology Center

Scott K. Johnson	Mining Engineer
Thomas A. Morley	Mining Engineer
Gary J. Shemon	Mining Engineer
Clete R. Stephan	Principal Mining Engineer
Richard T. Stoltz	Supervisory Mining Engineer
John E. Urosek	Chief, Ventilation Division

MSHA District 5

Robert D. Clay	Supervisory CMS&H Inspector
Fred R. Martin	CMS&H Inspector

MSHA District 6

Greg Ison	Supervisory CMS&H Inspector
Tony Sturgill	CMS&H Inspector

MSHA District 7

Roy T. Cornelius	Engineering Technician
Kenny Dixon	CMS&H Inspector
Kevin L. Doan	CMS&H Specialists
Shelby Fields	CMS&H Inspector
Anthony Lucas	CMS&H Inspector
Clayton E. Sparks	CMS&H Inspector

Approval and Certification Center

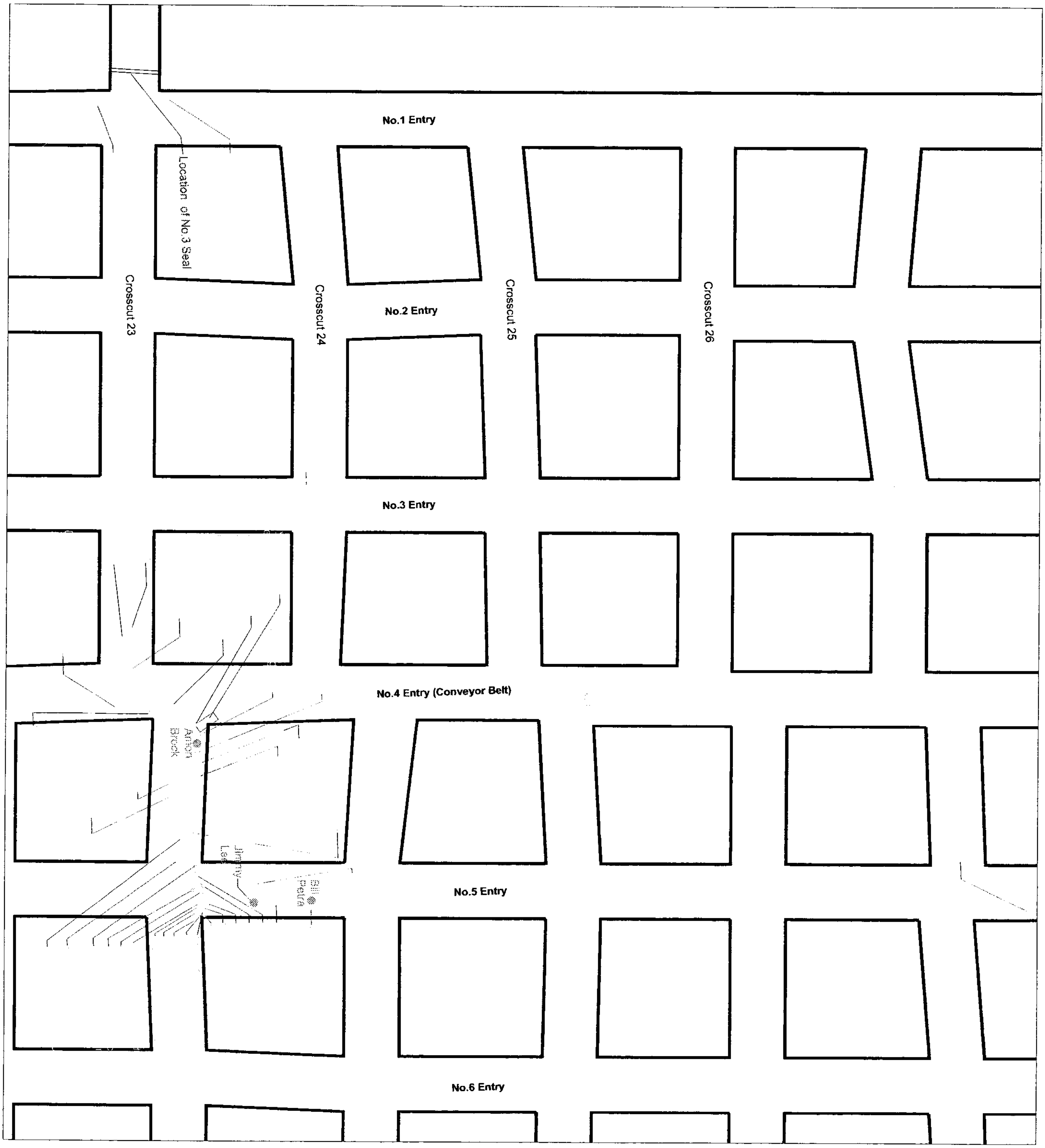
Jim Angel	Mechanical Engineer
Kevin Dolinar	Electrical Engineer
Michael A. Hockenberry	Fire Protection Engineer
Chad D. Huntley	Electrical Engineer
Stephen M. Murtaugh	Electrical Engineering Technician

Donald P. Pieffer	Physical Scientist
Frank J. Prebeg	Electrical Engineer

NIOSH

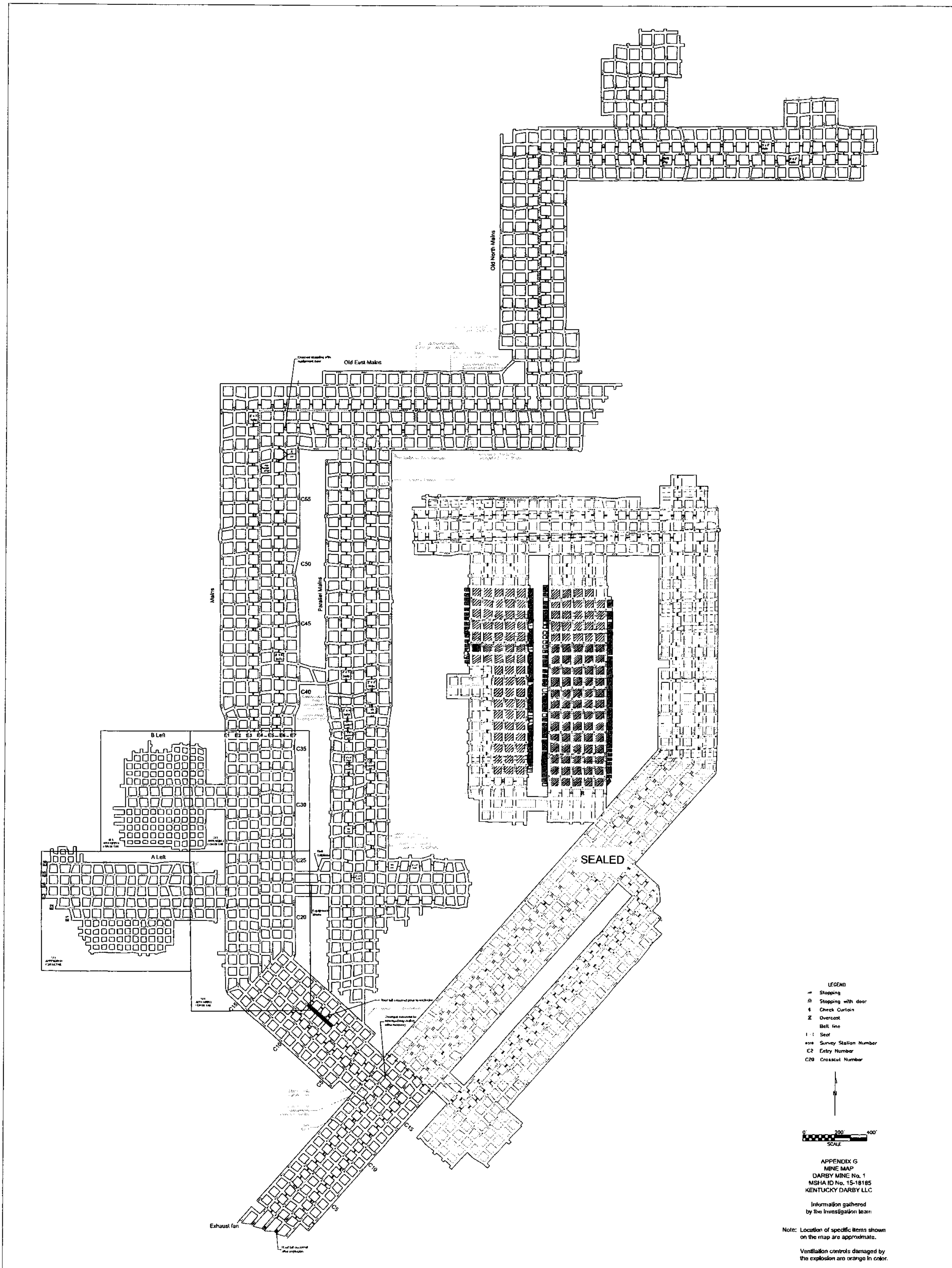
William D. Monagham	Electrical Engineer
Donald Sellers	Physical Science Technician

Appendix F - Map of Evidence Collected During Investigation



Scale 1"=50'

Note - The location of specific items shown on the map are approximate. This map shows evidence collected in this immediate area only.

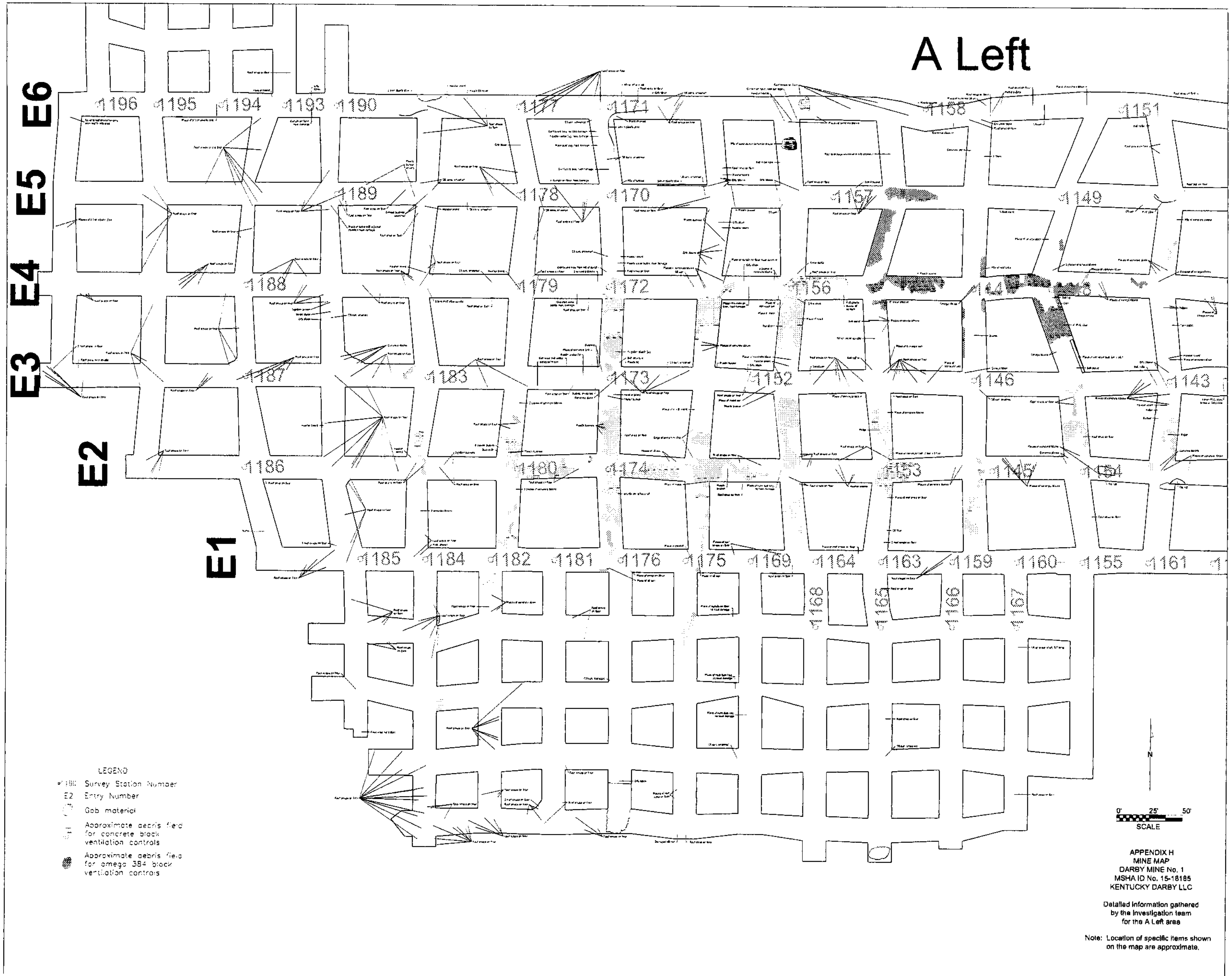


APPENDIX G
MINE MAP
DARBY MINE No. 1
MSHA ID No. 15-18185
KENTUCKY DARBY LLC

Information gathered
by the Investigation team

Note: Location of specific items shown on the map are approximate.

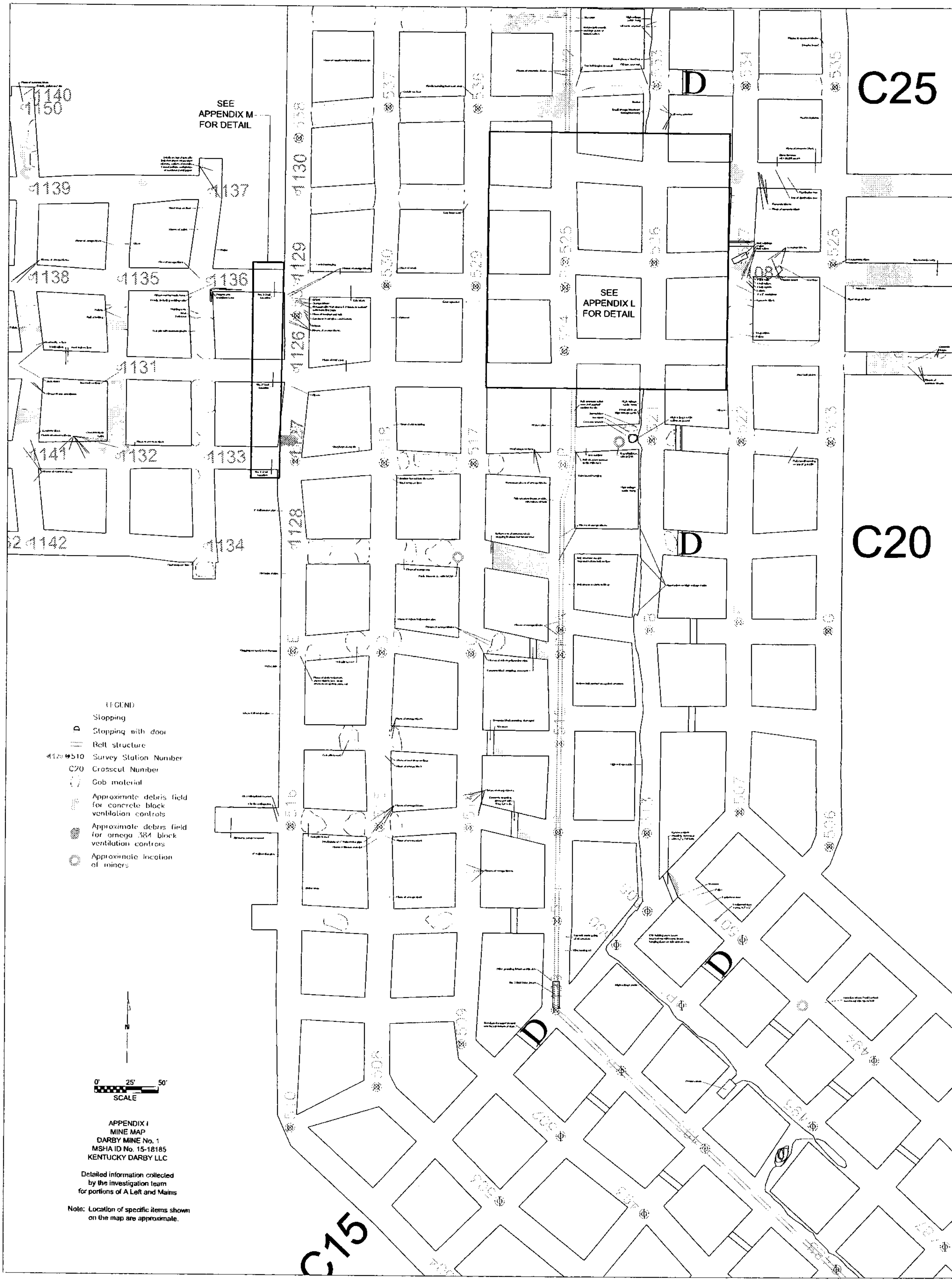
Ventilation controls damaged by the explosion are orange in color.



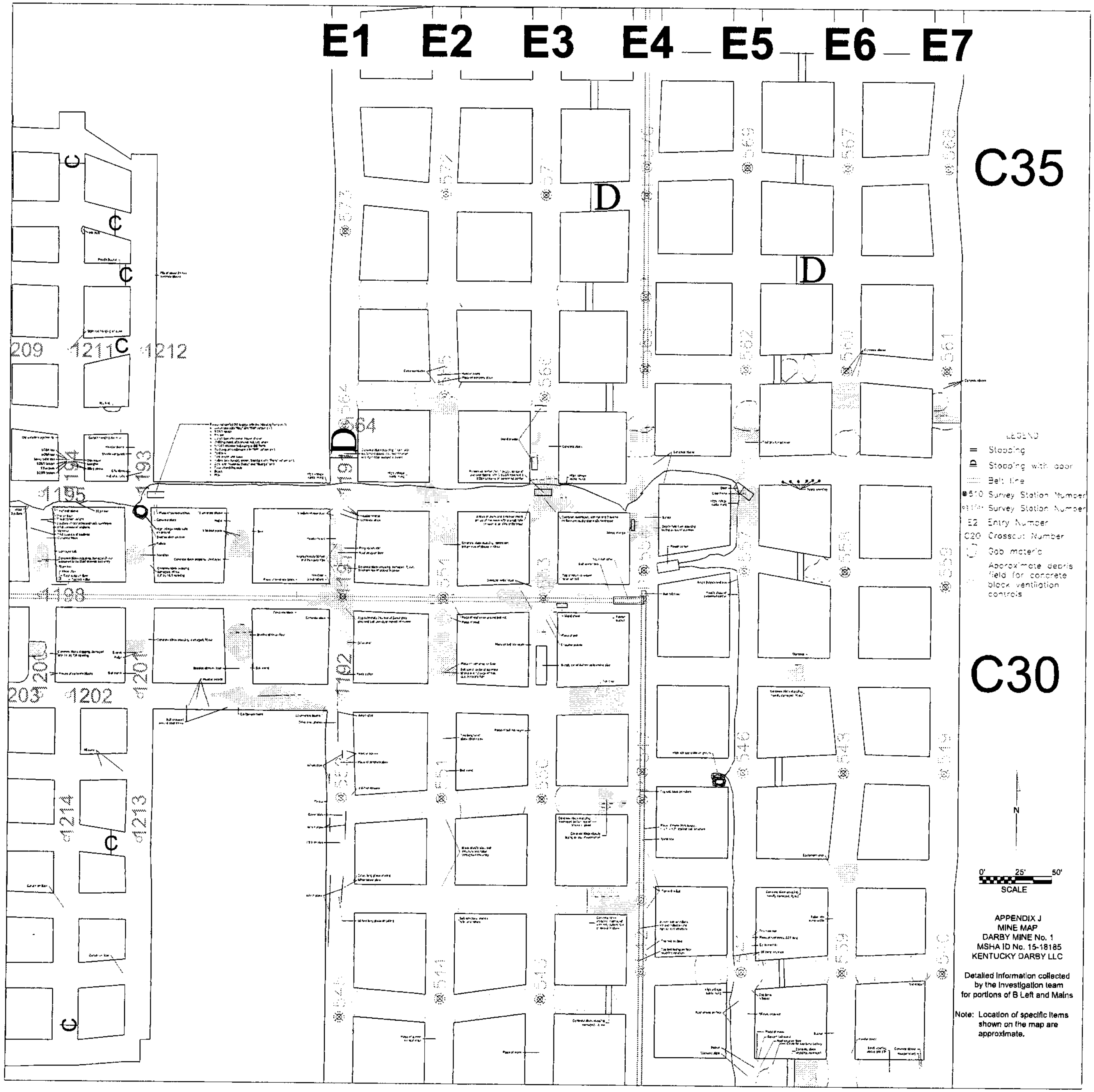
APPENDIX H
MINE MAP
DARBY MINE No. 1
MSHA ID No. 15-18185
KENTUCKY DARBY LLC

Detailed information gathered by the investigation team for the A Left area

Note: Location of specific items shown on the map are approximate.

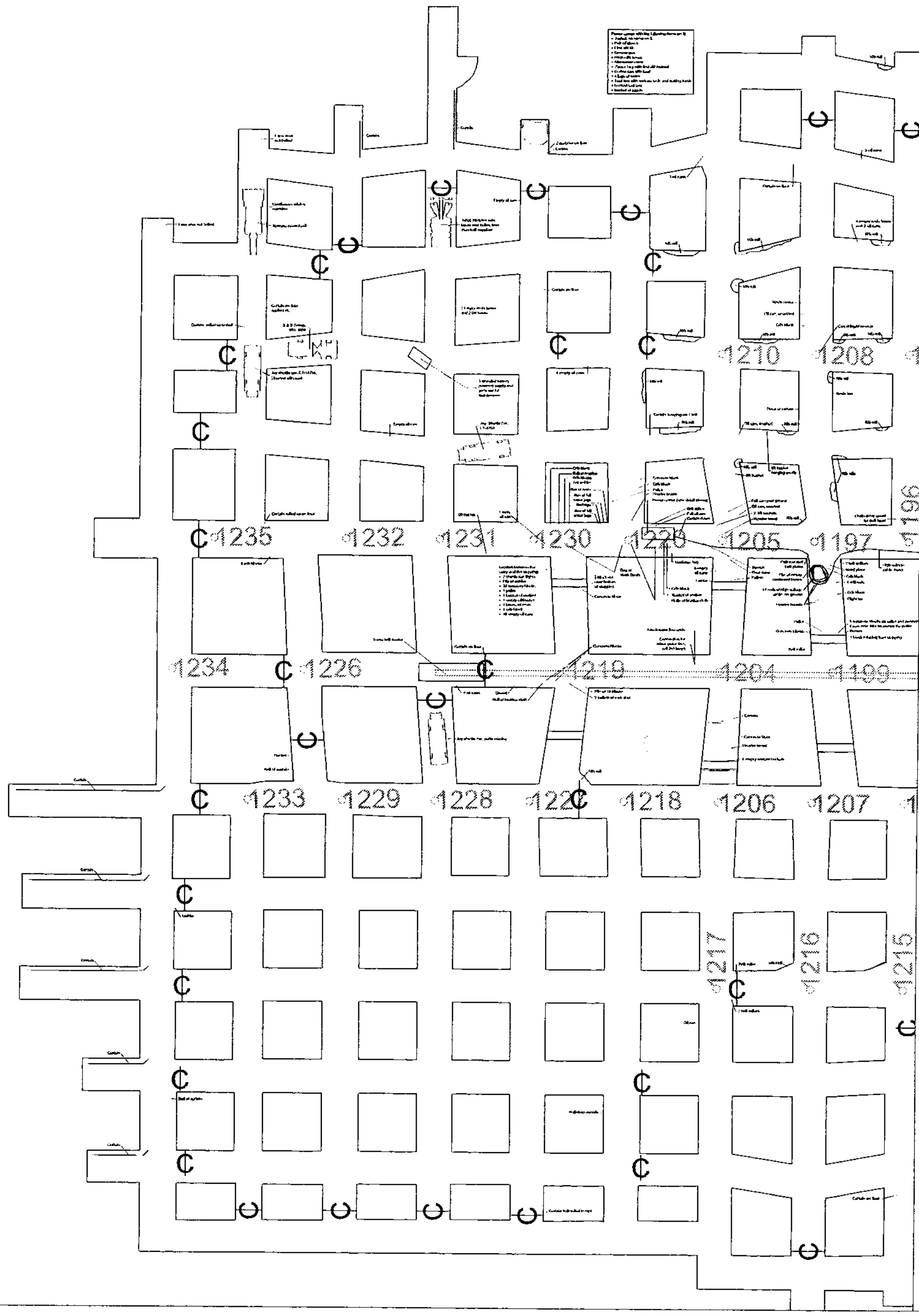


SEE APPENDIX M FOR DETAIL
SEE APPENDIX L FOR DETAIL
C25
C20
C15
1140
1150
1139
1137
1138
1135
1136
1131
1141
1132
1133
1142
1134
1130
1129
1126
1128
LEGEND
Stopping
Stopping with door
Belt structure
Survey Station Number
Crosscut Number
Gob material
Approximate debris field for concrete block ventilation controls
Approximate debris field for omega 384 block ventilation controls
Approximate location of miners
N
0' 25' 50'
SCALE
APPENDIX I
MINE MAP
DARBY MINE No. 1
MSHA ID No. 15-18185
KENTUCKY DARBY LLC
Detailed information collected by the investigation team for portions of A Left and Mains
Note: Location of specific items shown on the map are approximate.



E1
E2
E3
E4
E5
E6
E7
C35
C30
D
C
LEGEND
Stopping
Stopping with door
Belt line
510 Survey Station Number
Survey Station Number
E2 Entry Number
C20 Crosscut Number
Gob material
Approximate debris field for concrete block ventilation controls
N
0' 25' 50'
SCALE
APPENDIX J
MINE MAP
DARBY MINE No. 1
MSHA ID No. 15-18185
KENTUCKY DARBY LLC
Detailed information collected by the investigation team for portions of B Left and Mains
Note: Location of specific items shown on the map are approximate.

B Left



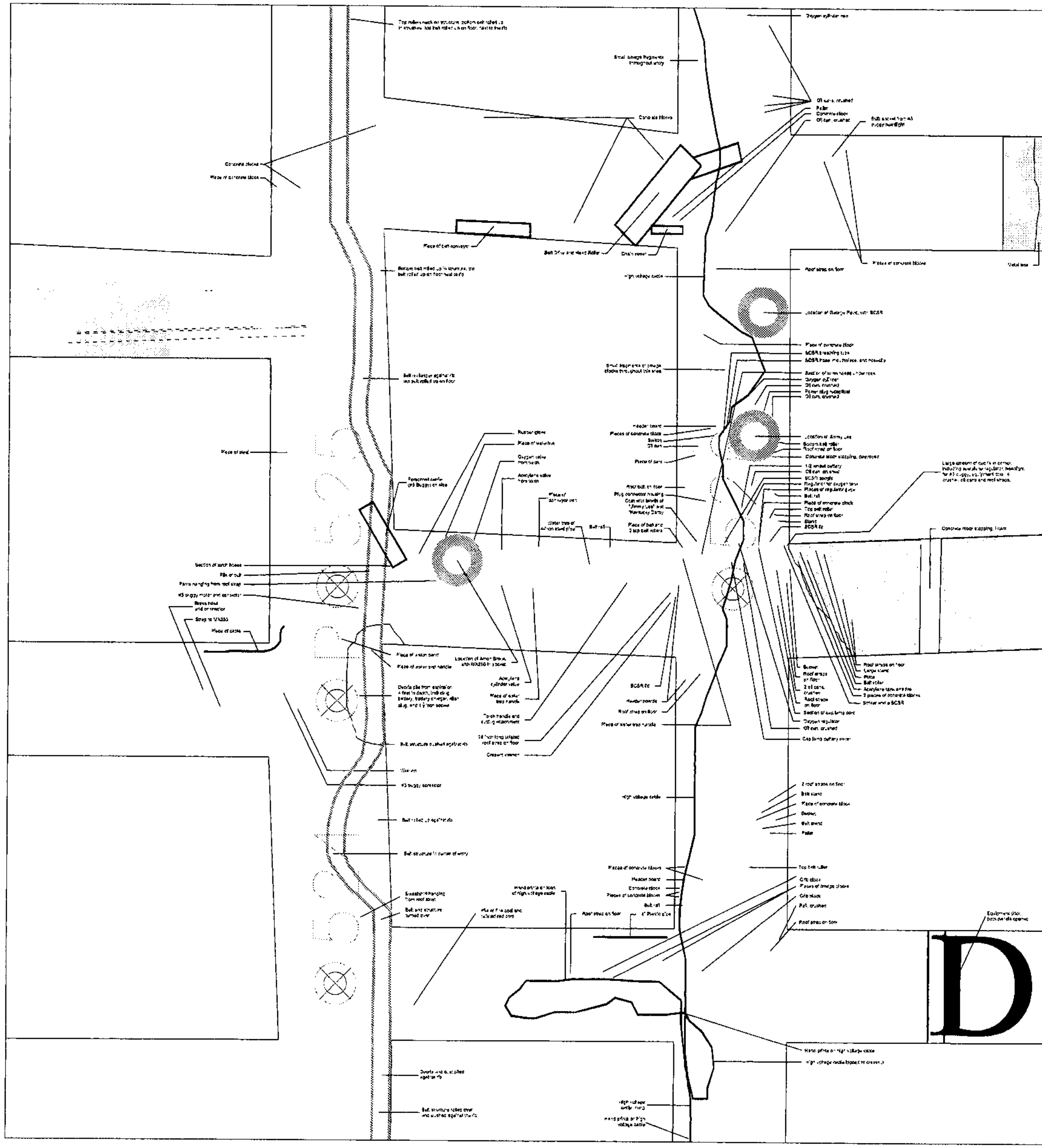
LEGEND
Stopping
Stopping with door
Check Curtain
Belt line
1250 Survey Station Number
Gob material

0' 25' 50'
SCALE

APPENDIX K
MINE MAP
DARBY MINE No. 1
MSHA ID No. 15-18185
KENTUCKY DARBY LLC

Detailed Information collected by the information team for B Left Section

Note: Location of specific Items shown on the map are approximate.



LEGEND

- Stopping
- Stopping with door
- Belt structure
- Gob material
- Approximate debris field for concrete block ventilation controls
- Approximate location of miners

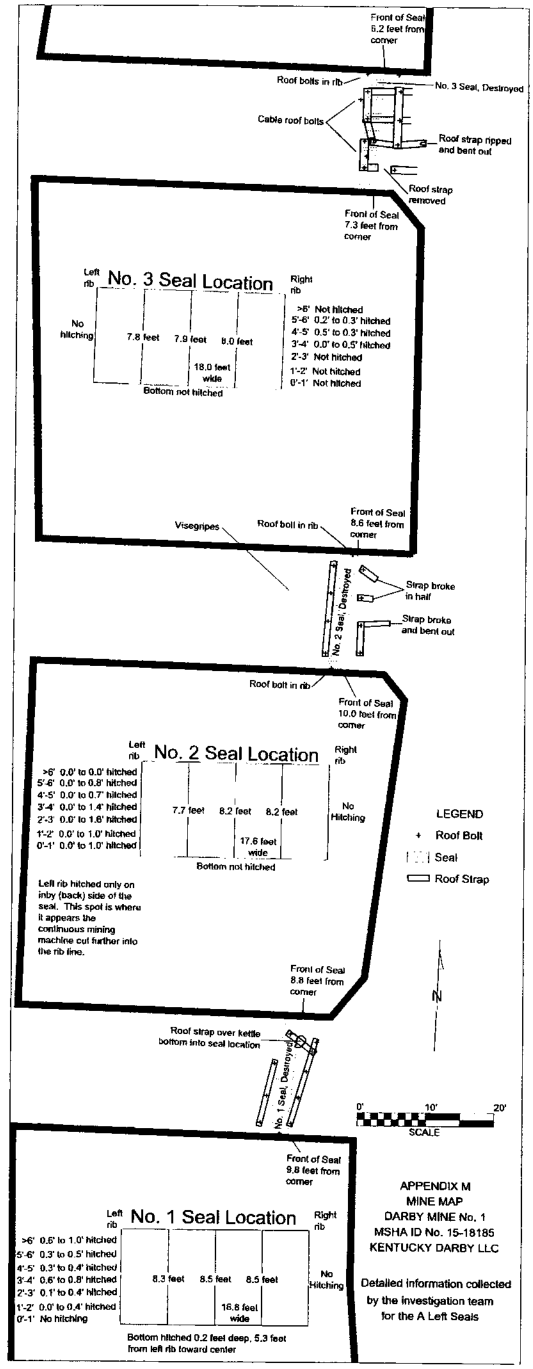
N

0' 10' 20'
SCALE

APPENDIX L
MINE MAP
DARBY MINE No. 1
MSHA ID No. 15-18185
KENTUCKY DARBY LLC

Detail information collected by the investigation team for portion of Mains near A Left seals

Note: Location of specific items shown on the map are approximate.



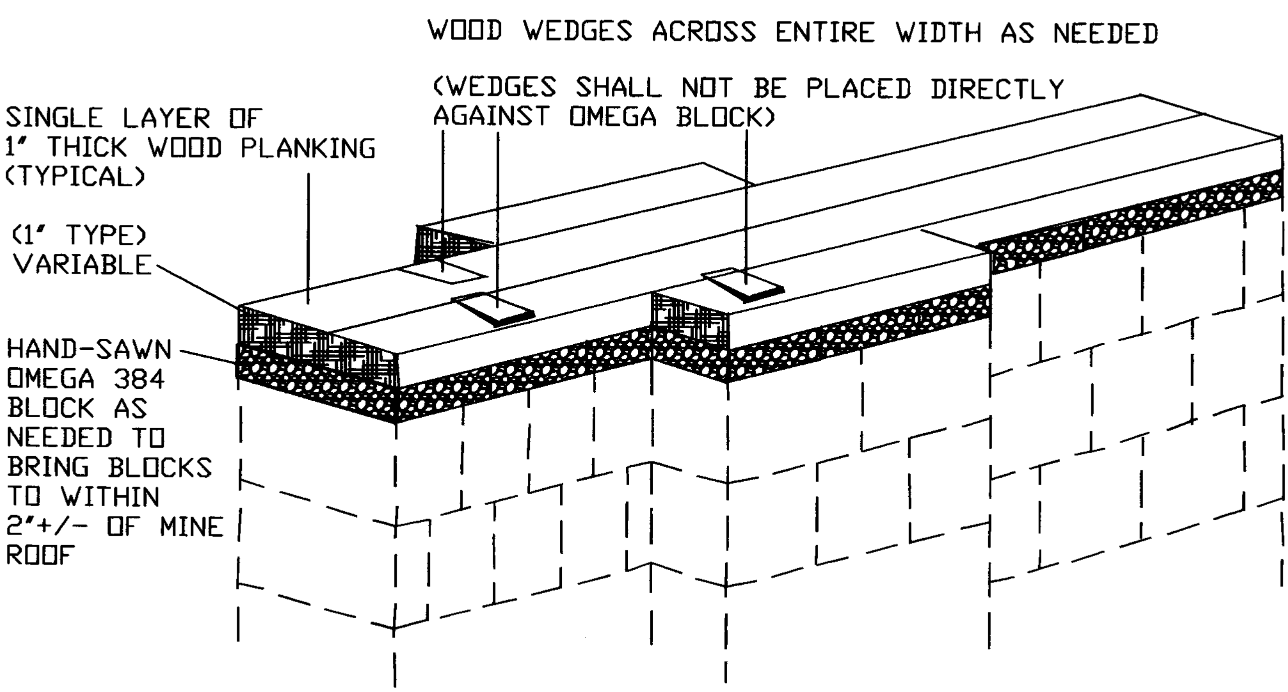
Front of Seal
6.2 feet from
corner
Roof bolts in rib
No. 3 Seal, Destroyed
Cable roof bolts
Roof strap ripped
and bent out
Roof strap
removed
Front of Seal
7.3 feet from
corner
Left rib
No. 3 Seal Location
Right rib
No hitching
7.8 feet
7.9 feet
8.0 feet
18.0 feet wide
Bottom not hitched
>6' Not hitched
5'-6' 0.2' to 0.3' hitched
4'-5' 0.5' to 0.3' hitched
3'-4' 0.0' to 0.5' hitched
2'-3' Not hitched
1'-2' Not hitched
0'-1' Not hitched
Visegripes
Roof bolt in rib
Front of Seal
8.6 feet from
corner
No. 2 Seal, Destroyed
Strap broke
in half
Strap broke
and bent out
Roof bolt in rib
Front of Seal
10.0 feet from
corner
Left rib
No. 2 Seal Location
Right rib
>6' 0.0' to 0.0' hitched
5'-6' 0.0' to 0.8' hitched
4'-5' 0.0' to 0.7' hitched
3'-4' 0.0' to 1.4' hitched
2'-3' 0.0' to 1.6' hitched
1'-2' 0.0' to 1.0' hitched
0'-1' 0.0' to 1.0' hitched
7.7 feet
8.2 feet
8.2 feet
17.6 feet wide
Bottom not hitched
No Hitching
Left rib hitched only on
inby (back) side of the
seal. This spot is where
it appears the
continuous mining
machine cut further into
the rib line.
LEGEND
+ Roof Bolt
Seal
Roof Strap
Front of Seal
8.8 feet from
corner
N
Roof strap over kettle
bottom into seal location
No. 1 Seal, Destroyed
0'
10'
20'
SCALE
Front of Seal
9.8 feet from
corner
Left rib
No. 1 Seal Location
Right rib
>6' 0.6' to 1.0' hitched
5'-6' 0.3' to 0.5' hitched
4'-5' 0.3' to 0.4' hitched
3'-4' 0.6' to 0.8' hitched
2'-3' 0.1' to 0.4' hitched
1'-2' 0.0' to 0.4' hitched
0'-1' No hitching
8.3 feet
8.5 feet
8.5 feet
16.8 feet wide
No Hitching
Bottom hitched 0.2 feet deep, 5.3 feet
from left rib toward center
APPENDIX M
MINE MAP
DARBY MINE No. 1
MSHA ID No. 15-18185
KENTUCKY DARBY LLC
Detailed information collected
by the investigation team
for the A Left Seals

Note - The location of specific items shown on the map are

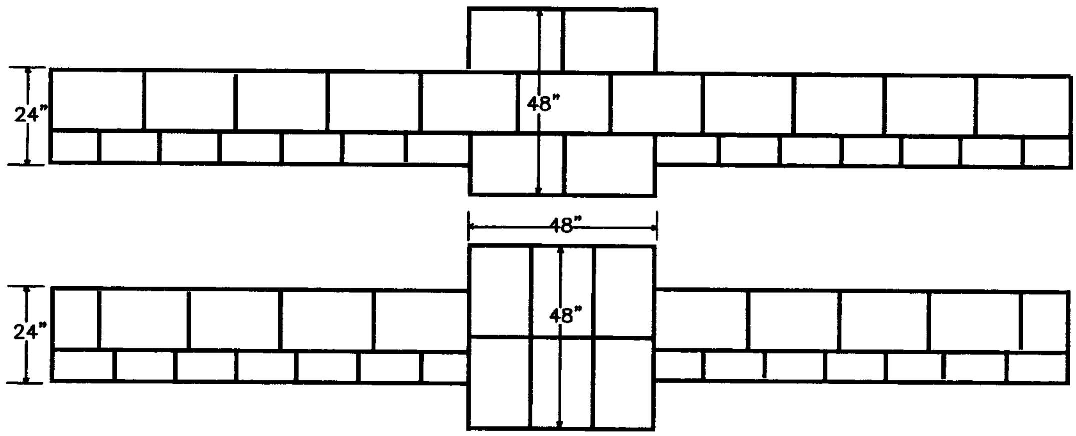
Appendix F - Map of Evidence Collected During Investigation

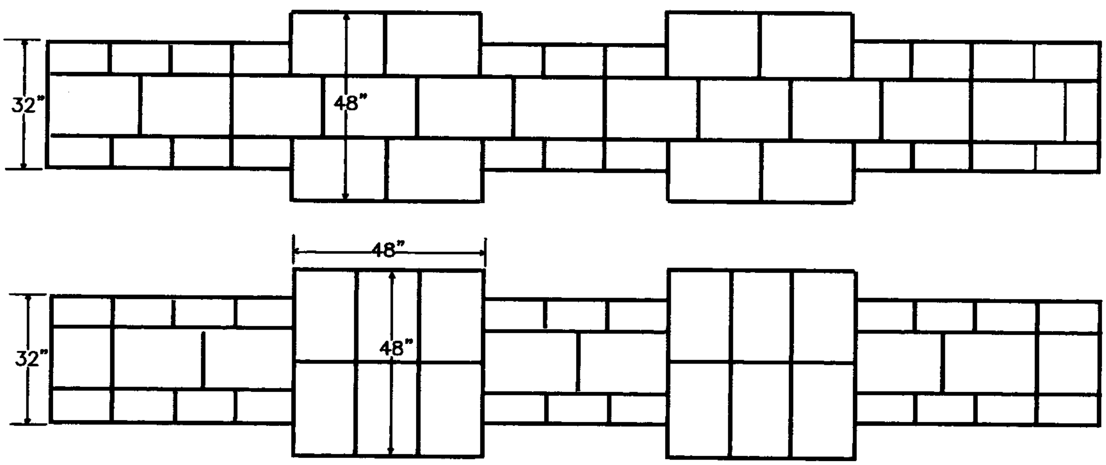
OMEGA BLOCK SEALS

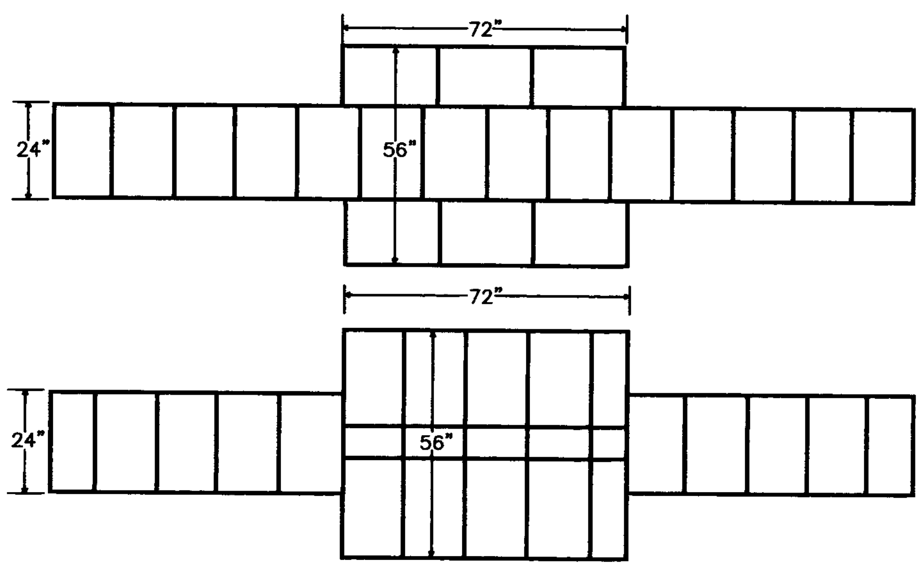
1. Seals will be hitched 6 inches into bottom and 6 inches into the ribs.
2. An approved bonding and sealant agent (i.e. 'BLOCBOND' or Rite-wall) shall be used between all joints (horizontal, vertical, and in-between blocks) on all surface areas including the inby and outby walls.
3. Seals and pilaster thickness will be as indicated in sketches.
4. A gas sampling tube with a shutoff valve will be provided in the highest seal per set of seals.
5. A U-type drain will be provided for water drainage in the lowest seal per set of seals.
6. Seals will be constructed of Omega 384 blocks as per one of the attached three drawings.
7. Omega 384 block seals shall be wedged to the mine roof as indicated in the sketch below.
8. All wood will be flush with the walls of seal and coated with sealant passing ASTM E162-87.



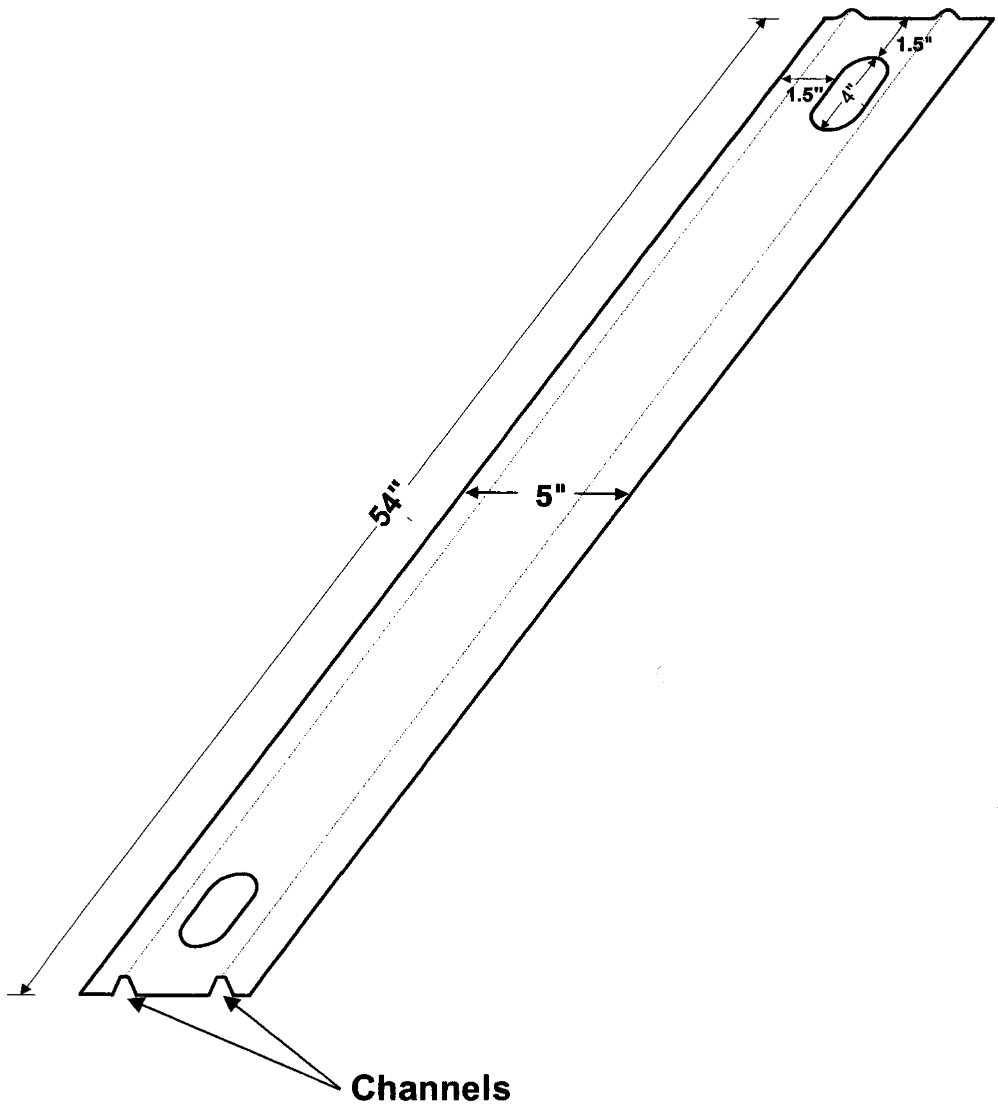
OMEGA 384 BLOCK SEAL
ALTERNATING COURSES







Appendix O - Typical Roof Strap
(not to scale)



United States Department of Labor
Mine Safety and Health Administration
National Air and Dust Laboratory
100 Bluestone Road Mount Hope, West Virginia 25880
Phone: 304-877-3900 Fax: 304-877-3927

MOUNT HOPE NATIONAL AIR AND DUST LABORATORY
REPORT OF ANALYSIS

COLLECTED BY: Jerry Cook
FIELD OFFICE CODE: 20702
FIELD OFFICE NAME: Harlan, KY
DATE OF SAMPLING: August 22, 2006
SAMPLING AREA: Rock dust used at mine.

MINE ID: 1518185
MINE: Darby Mine #1
COMPANY: Kentucky Darby Coal

LAB NUMBER: S06001 (REF: 699797)

RECEIVED: August 22, 2006

SIZE DISTRIBUTION ANALYSIS:
Through 20 Mesh ....100 %
Through 200 Mesh ....63.1 %

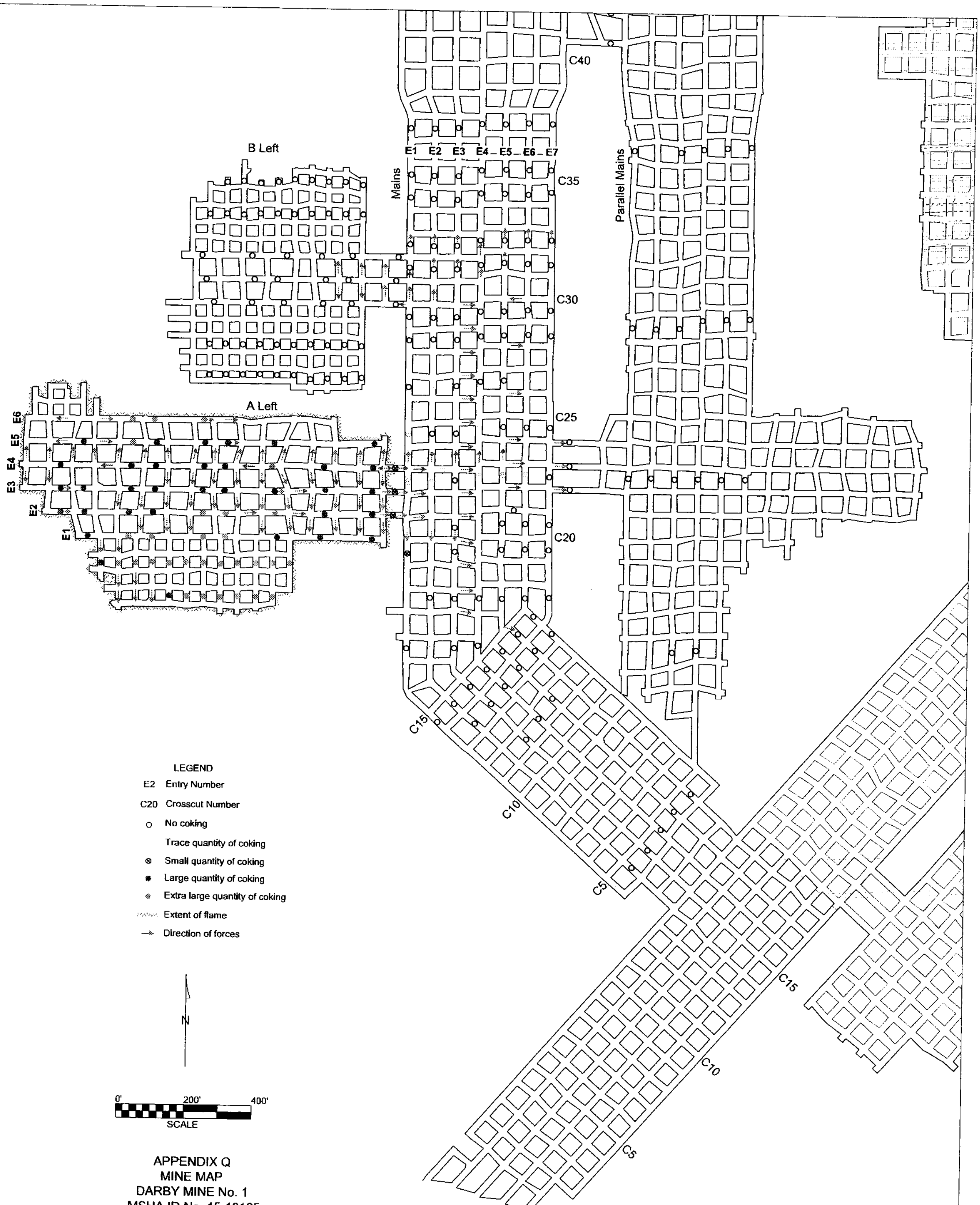
INCOMBUSTIBILITY ANALYSIS: 99.7 % Incombustible

FREE AND COMBINED SILICA: 0.77 %

Terry G. Montgomery

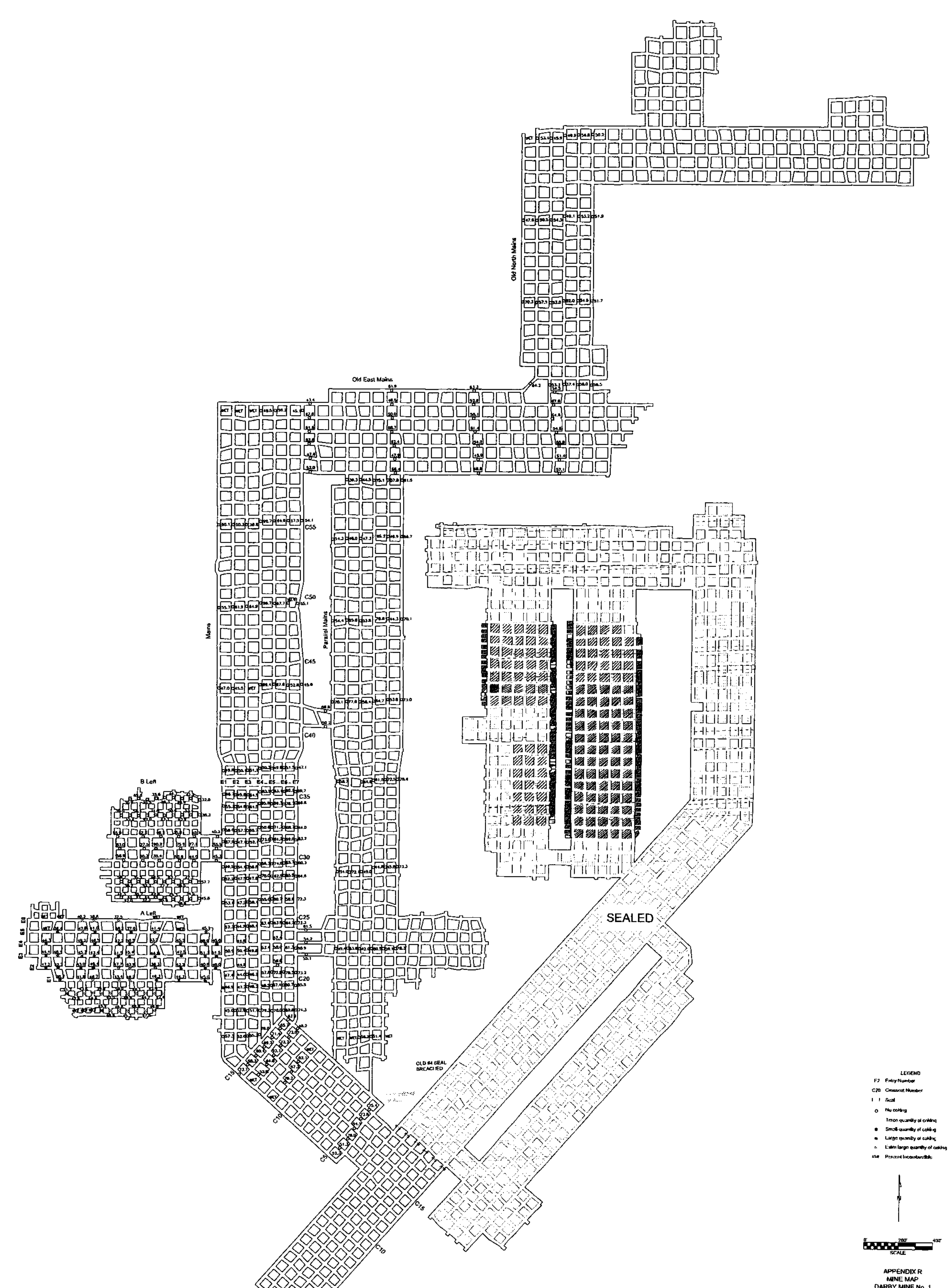
Terry G. Montgomery, Chemist
MSHA National Air and Dust Laboratory

United States Department of Labor
MSHA
Mine Safety and Health Administration



APPENDIX Q
MINE MAP
DARBY MINE No. 1
MSHA ID No. 15-18185
KENTUCKY DARBY LLC

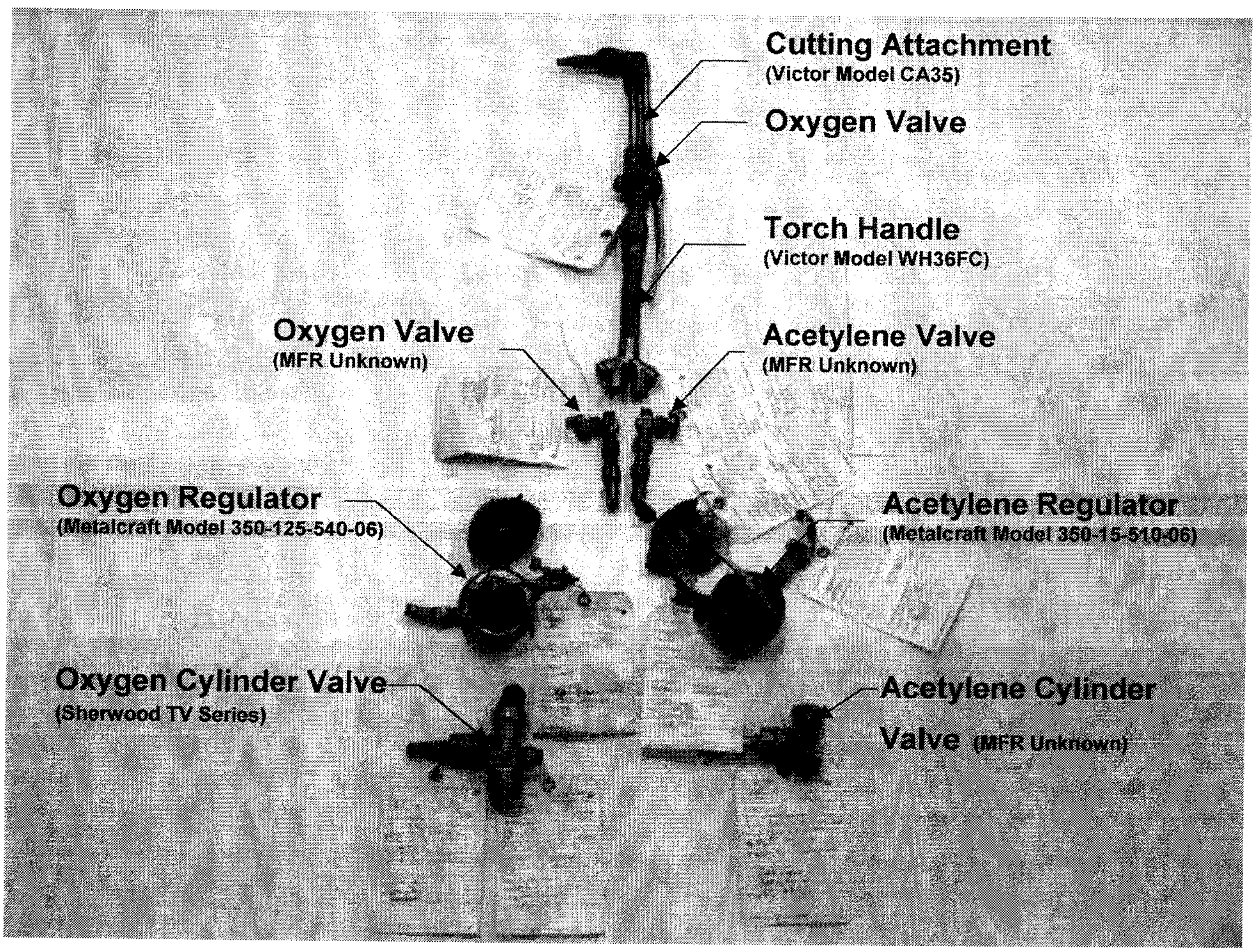
Flame and Forces from the Explosion



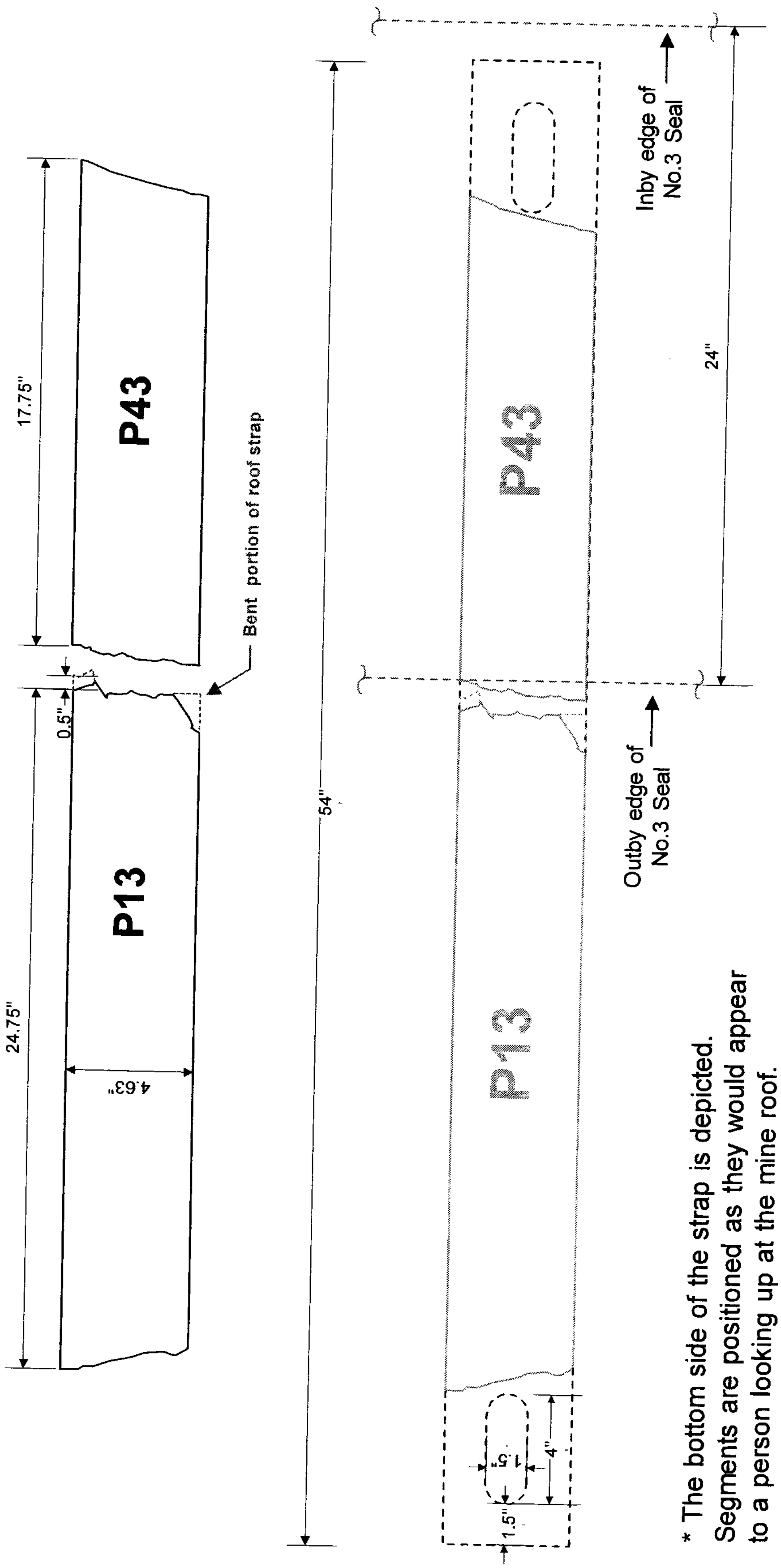
APPENDIX R
MINE MAP
DARBY MINE No. 1
MSHA ID No. 15-18185
KENTUCKY DARBY LLC

Results of Testing on
Mine Dust Samples

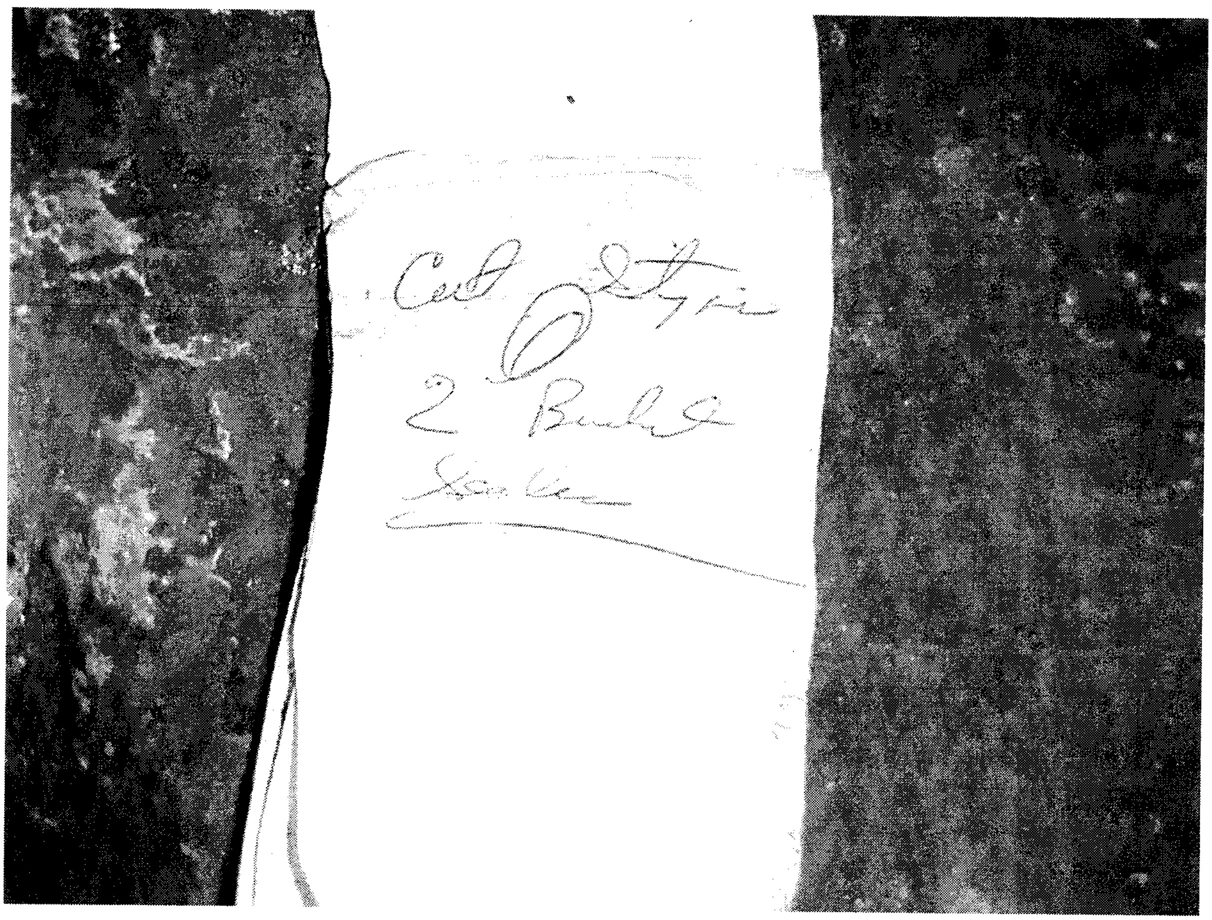
Appendix S – Torch Components Recovered from the Accident Scene



Appendix T - Roof Strap Segments P13 and P43 Recovered from Darby Mine No.1



Appendix U – Photograph of Amon Brock's Notepad



Roof Strap Flame Cutting Experiments at the National Institute for Occupational Safety and Health Lake Lynn Experimental Mine

William D. Monaghan
Pittsburgh Research Laboratory

National Institute for Occupational Safety and Health
626 Cochrans Mill Road
Pittsburgh, PA 15236

Introduction

Flame cutting experiments were conducted on a metal roof strap (figure 1) on August 22, 2006 at the National Institute for Occupational Safety and Health (NIOSH), Lake Lynn Experimental Mine (LLEM) by NIOSH researchers. These experiments were requested by the Mine Safety and Health Administration (MSHA). The objectives of these experiments were to determine the temperatures histories of hot particles and hot metal strips during and after flame cutting. The instrumentation used in these experiments was an AGEMA Thermovison 550 infrared camera (IR) system and a laptop computer running the software ThermaCam™ Researcher 2001.

FIGURE 1. MSHA EMPLOYEE HOLDING METAL ROOF STRAP

Emissivity Experiments at PRL

In order to get accurate temperature measurements from the metal roof strap flame cutting experiments, emissivity experiments were conducted on samples of each metal roof strap that was flame cut at LLEM at NIOSH Pittsburgh Research Laboratory (PRL). The samples were painted (approximately 50 % of the area) with high temperature black paint. These strips were placed on a hot plate and heated until thermal equilibrium was reached. The IR camera emissivity was set to 1.0 and the black painted area temperature was measured and recorded. The temperature of the unpainted area was then measured and recorded. The emissivity was then readjusted so that the unpainted area temperature was equal to the initial temperature of the black painted area. Figure 2 show the experimental setup and Table 1 shows the results of these experiments. The average emissivity of the unpainted metal strips was 0.87. This value was used for analysis of the thermal data from the LLEM flame cutting experiments.

FIGURE 2. EXPERIMENTAL SETUP TO OBTAIN EMISSIVITY VALUE OF A METAL ROOF STRAP

Cut Metal Roof Strip ID	Emissivity	Painted Temperature ° F	Adjusted Emissivity	Unpainted Temperature ° F
4	1.0	717	0.85	715
6	1.0	700	0.85	700
7	1.0	694	0.8	690
9	1.0	722	0.9	720
10	1.0	670	0.88	670
11	1.0	753	0.95	750
Average	1.0	709	0.87	708

Table1. Emissivity Experimental Results

Omega Block/Steel Strap Experiments at LLEM

In these series of experiments, an Omega block was placed on top of the metal roof strap and an infrared camera was positioned on the opposite side of the Omega block where the flame cutting was performed (figure 3). The metal strap was cut from underneath. A NIOSH employee performed the flame cutting. Some of the hot particles traveled thru the two troughs located on the metal roof strap (figure 4), underneath the Omega block to the other end metal roof strap, and fell to the mine floor. The thermal histories of several hot particles, shown in figure 5, were recorded with the thermal imaging camera. In figure 5, the hot particles are identified as AR01-ARO6. The maximum temperatures are shown in table 2 and ranged from 931 °F – 1403 °F. The maximum temperature observed was 1403 °F for the particle identified as AR05.

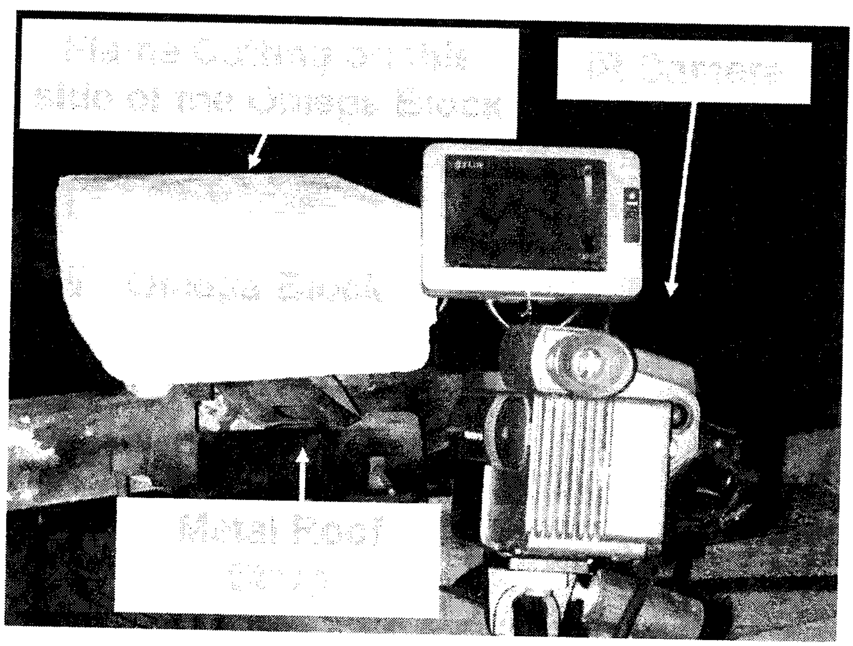


FIGURE 3. EXPERIMENTAL SETUP OF OMEGA BLOCK AND METAL ROOF STRAP

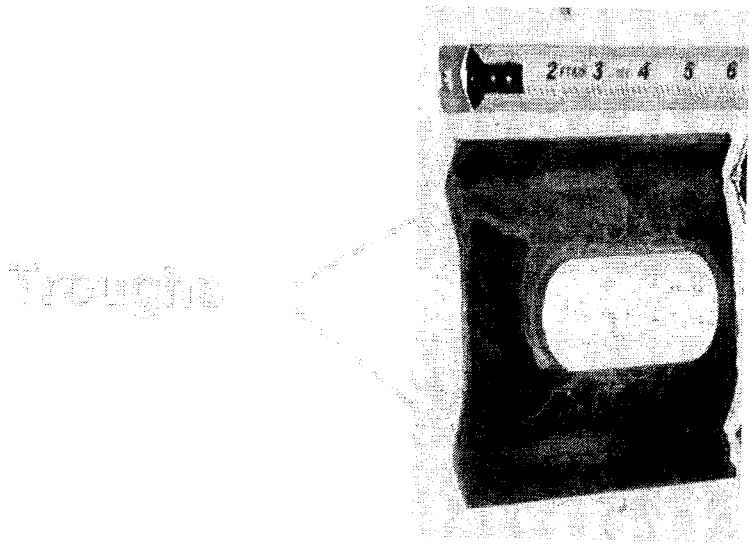


FIGURE 4. TROUGHS LOCATED IN THE METAL ROOF STRAP

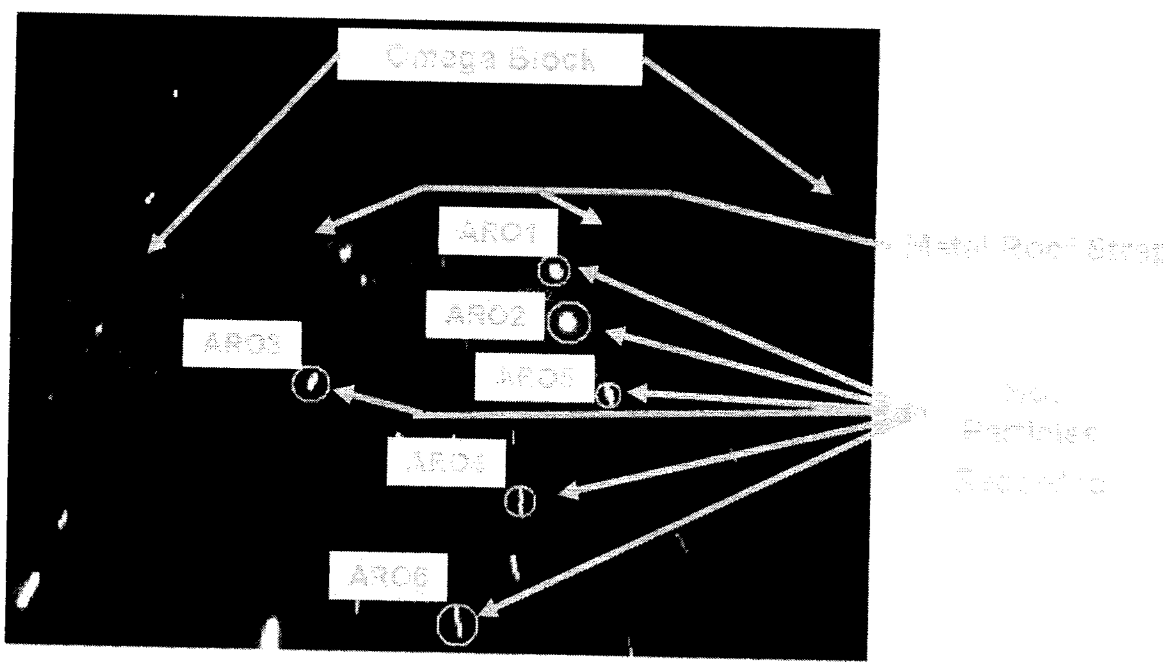


FIGURE 5. HOT PARTICLES TEMPERATURE THAT WERE RECOREDED

Particle ID	Maximum Temperature °F
AR01	1378
AR02	1369
AR03	1400
AR04	931
AR05	1403
AR06	1088

Table 2. Maximum Temperatures of the Hot Particles Areas 1 - 6

Hot Metal Strip Experiments

In these experiments, metal strips ranging from ½ -in to 1.5-in were flame cut from a metal roof strap (figure 6). The infrared camera was positioned to view the hot metal strips being cut (figure 7). The time-temperature was recorded every 200 milliseconds during these experiments. The temperature history of a 1.5-in hot metal strip that was cut at a normal cutting speed is shown in figure 8. The temperature of the strip remained above 1000 °F for 19 seconds. Figure 9 shows the time-temperature history of a ½" hot metal strip cut at a slower cutting speed. In this experiment, the temperature remained above 1100 °F for 10.5 seconds. Figure 10 shows all strips cut from a metal roof strap.

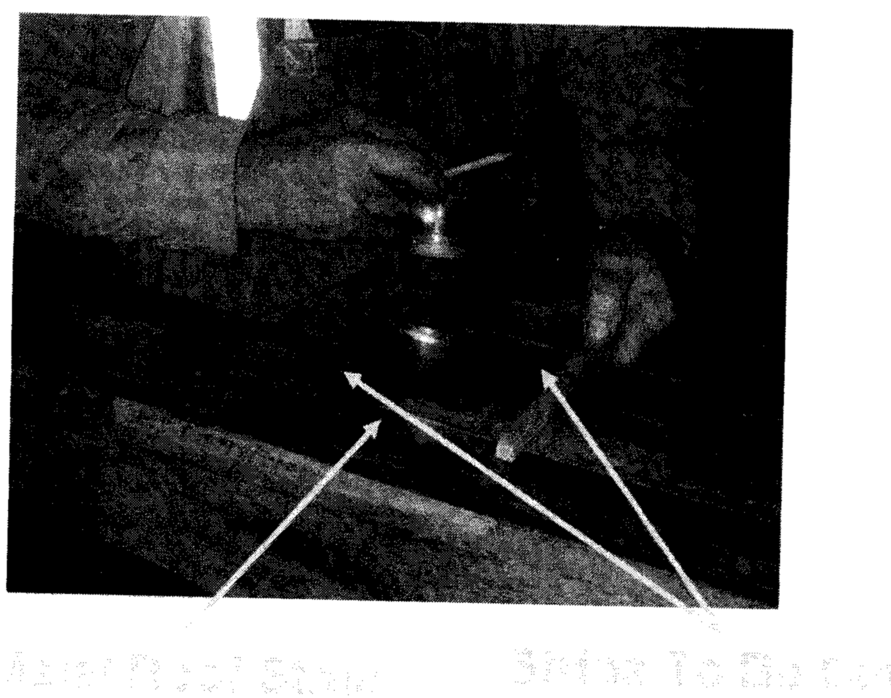


FIGURE 6. METAL STRIPS BEING MARKED

FIGURE 7. INFRARED CAMERA POSITIONED TO VIEW METAL ROOF STRIPS TO BE CUT

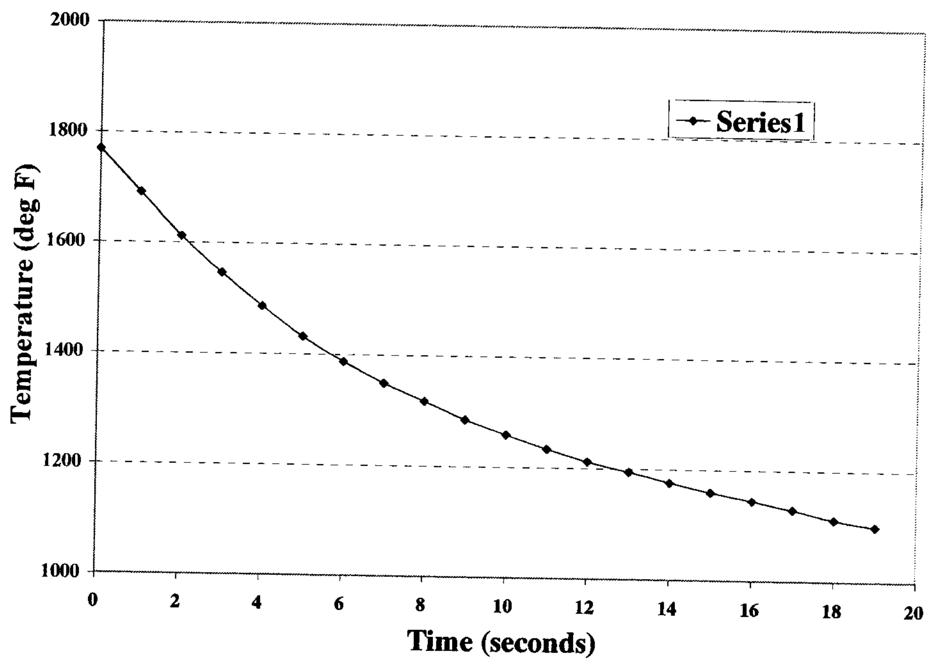


FIGURE 8. TEMPERATURE VERSUS TIME FOR A 1.5-in METAL ROOF STRIP

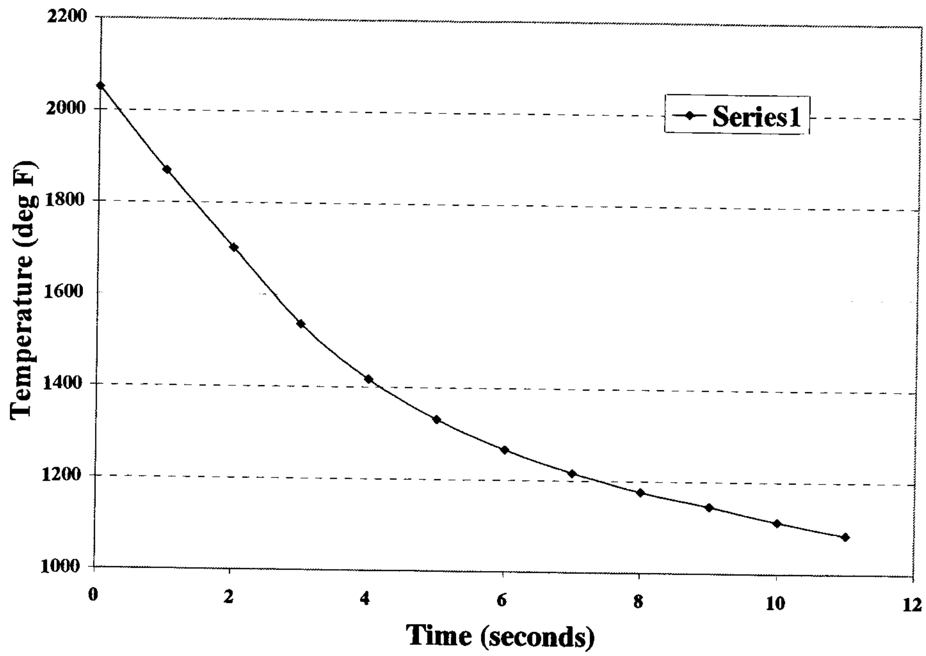


FIGURE 9. TEMPERATURE VERSUS TIME FOR A ½-in METAL ROOF STRIP

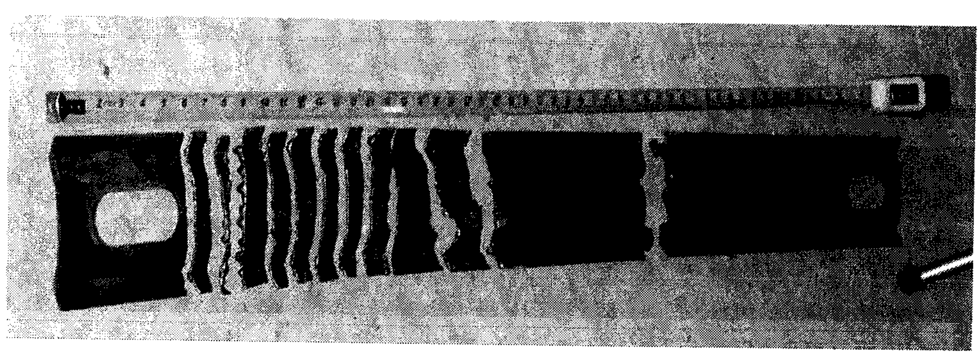


FIGURE 10. STRIPS CUT FROM THE METAL ROOF STRAP

Summary

Flame cutting experiments were performed on a metal roof strap to determine the time-temperature histories and maximum temperatures of hot particles and hot metal strips during the flame cutting operations. In the hot particle experiments, maximum hot particle temperatures ranging from 931 °F to 1403 °F were observed. In the hot metal strip experiments, temperatures of the hot metal strips remained above 1100 °F for 10.5 to 19 seconds depending on the size of the metal strip and the rate at which it was cut.

STRIKEnet®

Jun 22 2006 7:27:57 PM

Robert Bates

Thank you for using Vaisala's STRIKEnet® to validate the referenced claim. Your report was generated using data from Vaisala's National Lightning Detection Network®, the most comprehensive archive database in North America.

STRIKEnet Report 162412

Claim Number:	N/A
Insured/Claimant Name:	N/A
Approx. Claim/Loss Value:	
Items Damaged/Loss Type:	
Claim Address:	
Search Period:	May 19 2006 6:00:00 PM US/Eastern May 20 2006 5:59:00 PM US/Eastern
Search Center Point:	36.878600° N (Latitude), 82.952500° W (Longitude)
Search Radius:	5 mi/8 km around the given location.

Comments: 4 strikes were detected by the National Lightning Detection Network for the given time period and location.

Thank you again for selecting STRIKEnet. If you have any questions please contact us at 1 800 283 4557 or thunderstorm.support@vaisala.com.

Best Regards,

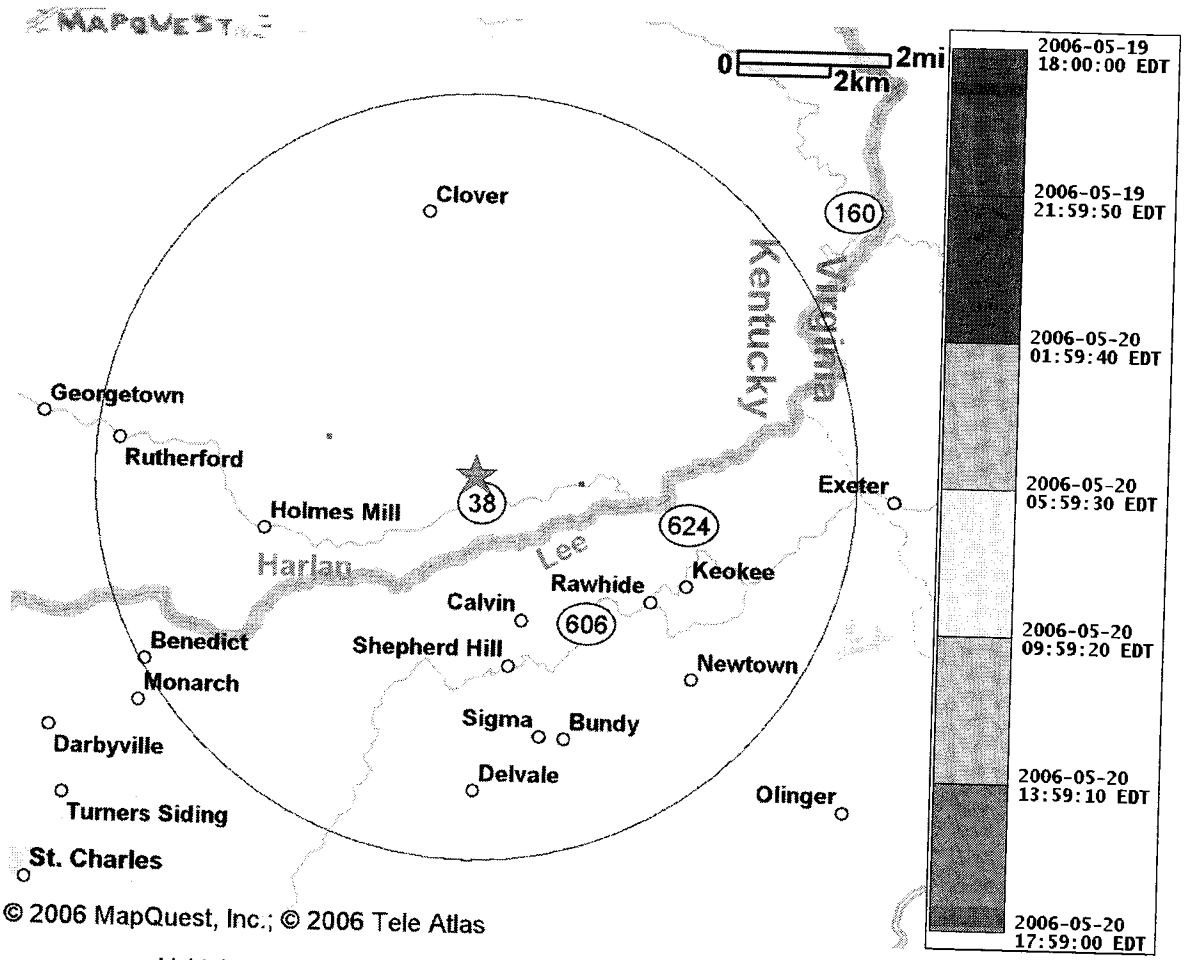
The Vaisala STRIKEnet Team

STRIKEnet®

STRIKEnet Report 162412

Report Title: Holmes Mill, KY
Total Lightning Strokes Detected: 4
Lightning Strokes Detected within 5 mi/8 km radius: 2
Lightning Strokes Detected beyond 5 mi/8 km whose confidence ellipse overlaps the radius: 2
Search Radius: 5 mi/8 km
Time Span: May 19 2006 6:00:00 PM US/Eastern to May 20 2006 5:59:00 PM US/Eastern

Location Points For Lightning Strokes



Lightning data provided by Vaisala's NLDN® and/or Environment Canada's CLDN.

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Tucson, AZ 85706, USA
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thunderstorm.sales@vaisala.com

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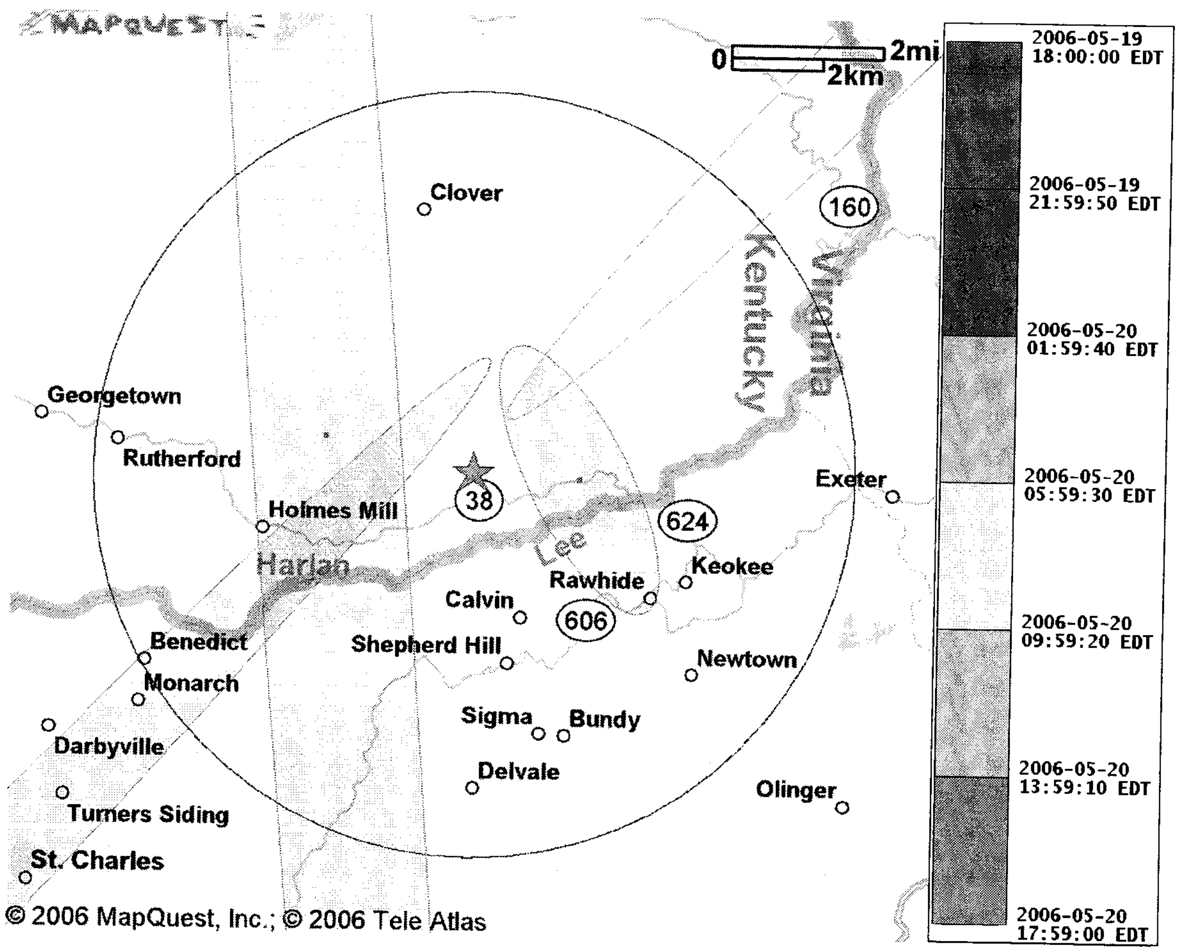
VAISALA Reliable.

STRIKEnet Report 162412

Report Title: Holmes Mill, KY
Total Lightning Strokes Detected: 4
Lightning Strokes Detected within 5 mi/8 km radius: 2
Lightning Strokes Detected beyond 5 mi/8 km whose confidence ellipse overlaps the radius: 2
Search Radius: 5 mi/8 km
Time Span: May 19 2006 6:00:00 PM US/Eastern to May 20 2006 5:59:00 PM US/Eastern

Confidence Ellipses For Lightning Strokes



Lightning data provided by Vaisala's NLDN® and/or Environment Canada's CLDN. Note: These ellipses indicate a 99% certainty that the recorded lightning event contacted the ground within the bounds of the ellipse.

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thunderstorm.sales@vaisala.com

Jun 22 2006 7:27:57 PM GMT

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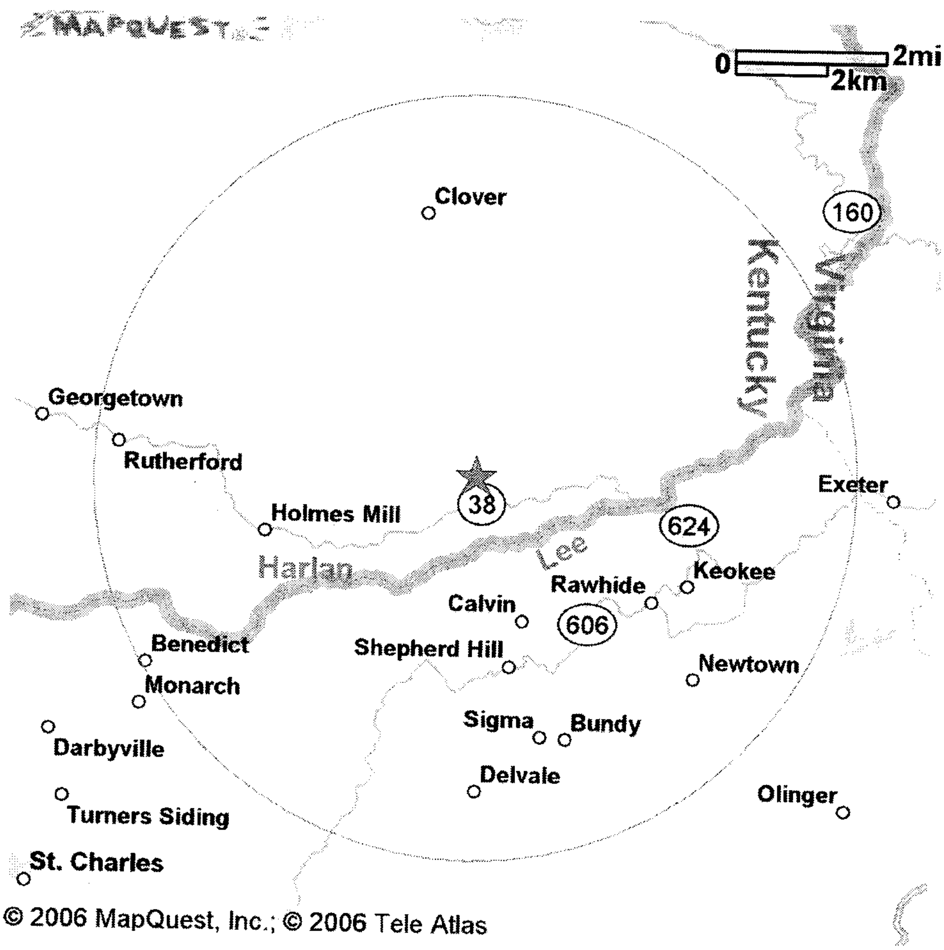
STRIKEnet Report 162412

Area Of Study With Center Point



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Lightning Strokes Detected within 5 mi/8 km radius: 2
Lightning Strokes Detected beyond 5 mi/8 km whose confidence ellipse overlaps the radius: 2
Search Radius: 5 mi/8 km
Time Span: May 19 2006 6:00:00 PM US/Eastern to May 20 2006 5:59:00 PM US/Eastern

Lightning Stroke Table (Note: All events shown. Events ordered by time.)

Date	Time	Peak Current (kA)	Distance From Center (mi/km)	Latitude	Longitude
May 19, 2006	11:33:55 PM	-5.1	12.5/20.2	37.0102	-82.7961
May 20, 2006	3:02:25 AM	-4.7	12.0/19.3	36.7621	-83.1136
May 20, 2006	3:31:17 AM	-6.0	2.0/3.2	36.8856	-82.9877
May 20, 2006	3:38:28 AM	-7.9	1.4/2.2	36.8777	-82.9279

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Lightning Stroke Table (Note: All events shown. Events ordered by distance.)

Date	Time	Peak Current (kA)	Distance From Center (mi/km)	Latitude	Longitude
May 20, 2006	3:38:28 AM	-7.9	1.4/2.2	36.8777	-82.9279
May 20, 2006	3:31:17 AM	-6.0	2.0/3.2	36.8856	-82.9877
May 20, 2006	3:02:25 AM	-4.7	12.0/19.3	36.7621	-83.1136
May 19, 2006	11:33:55 PM	-5.1	12.5/20.2	37.0102	-82.7961

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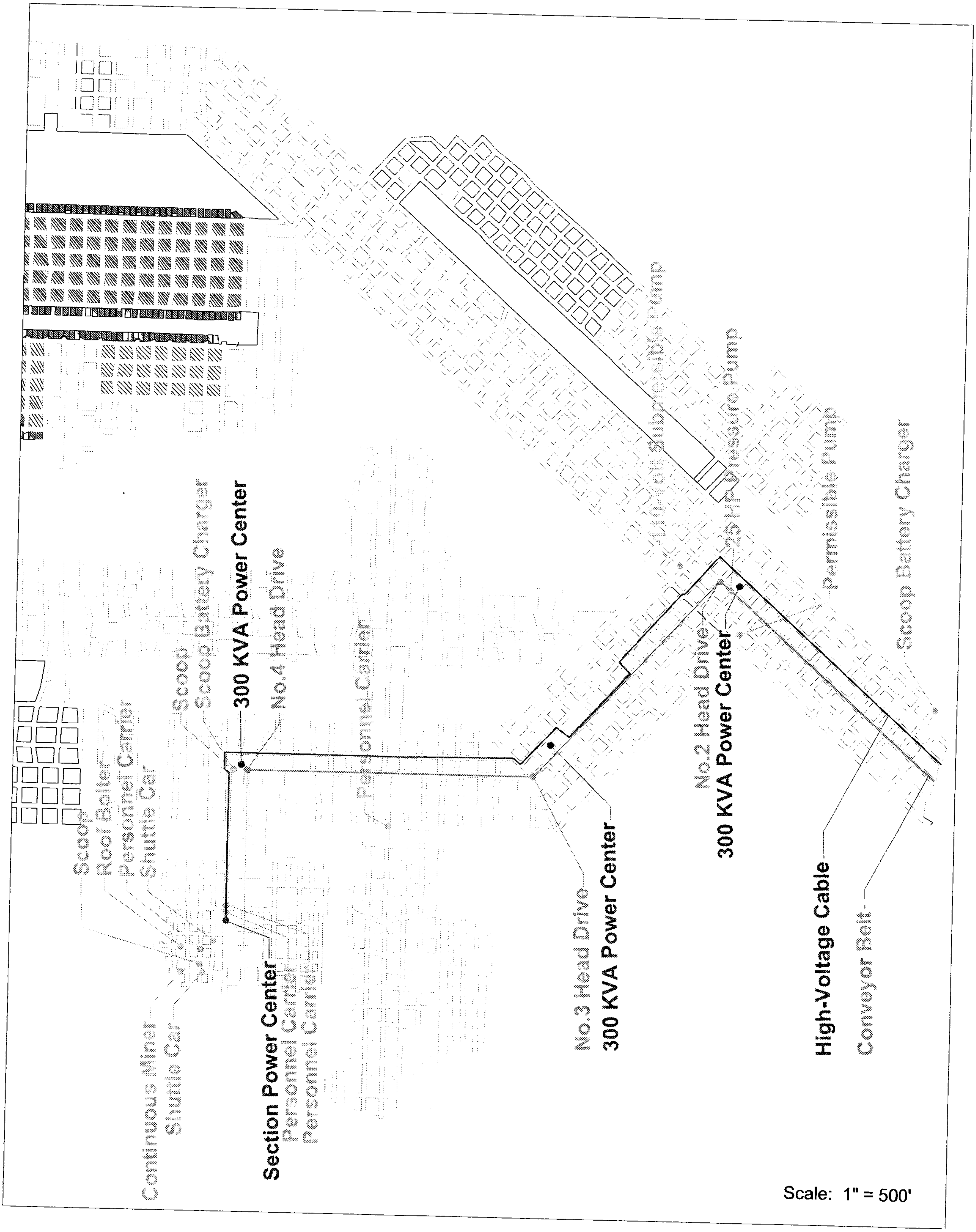
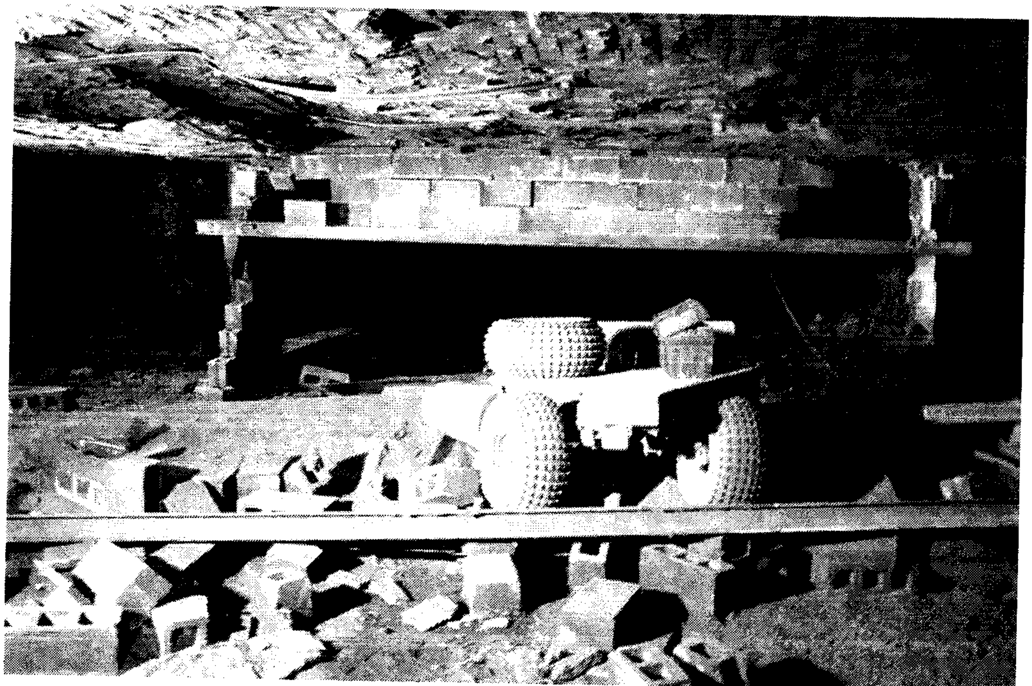
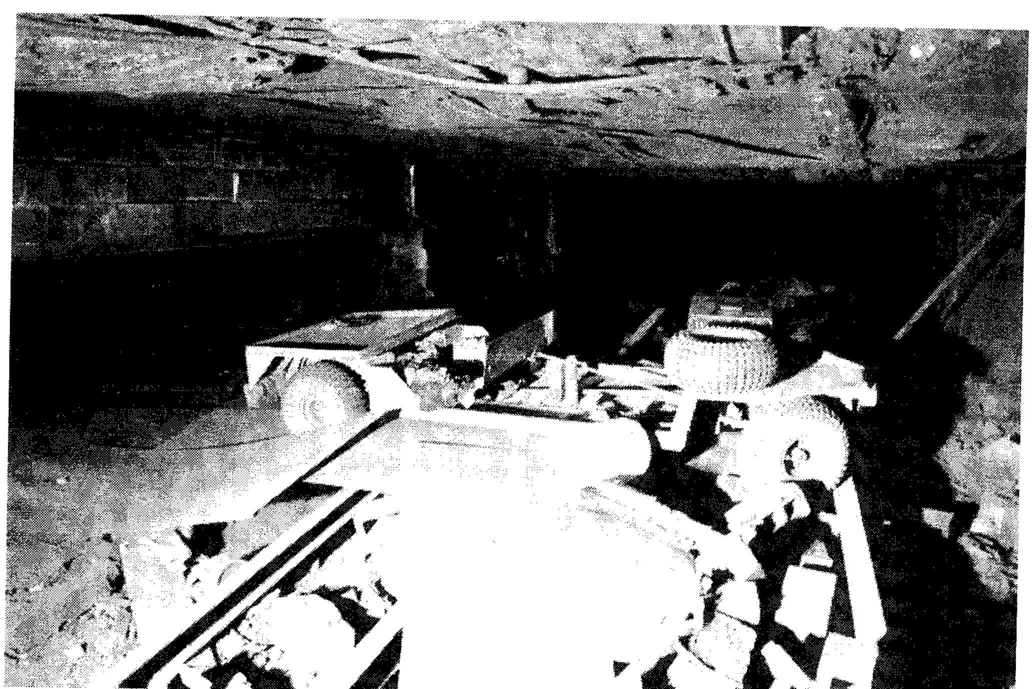
Appendix F - Map of Evidence Collected During Investigation



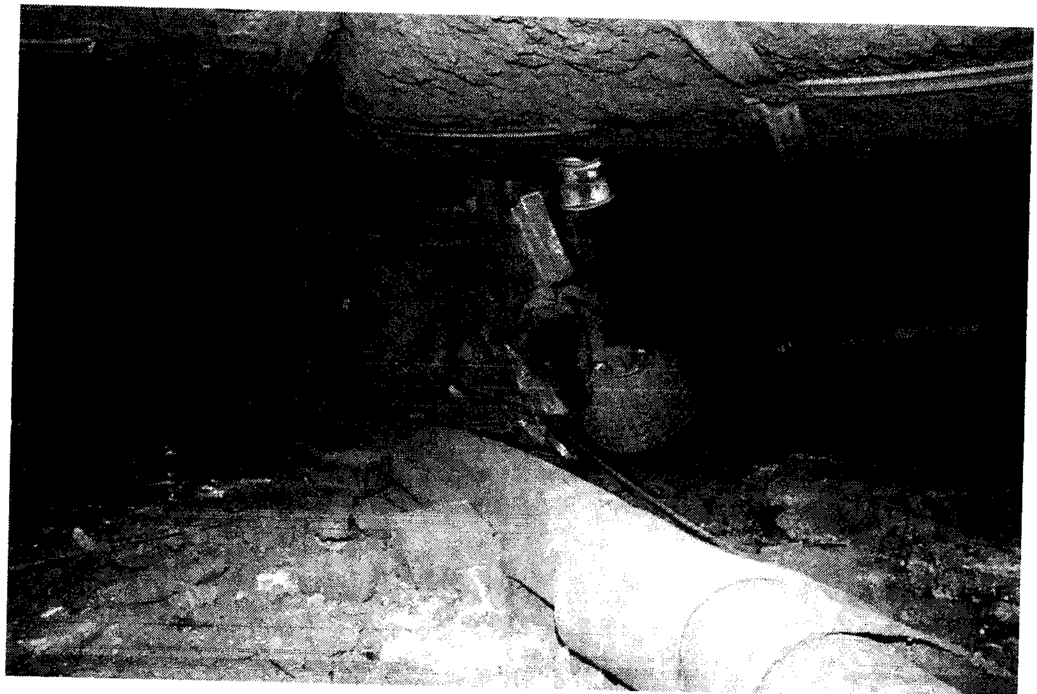
Appendix Y – Selected Photographs



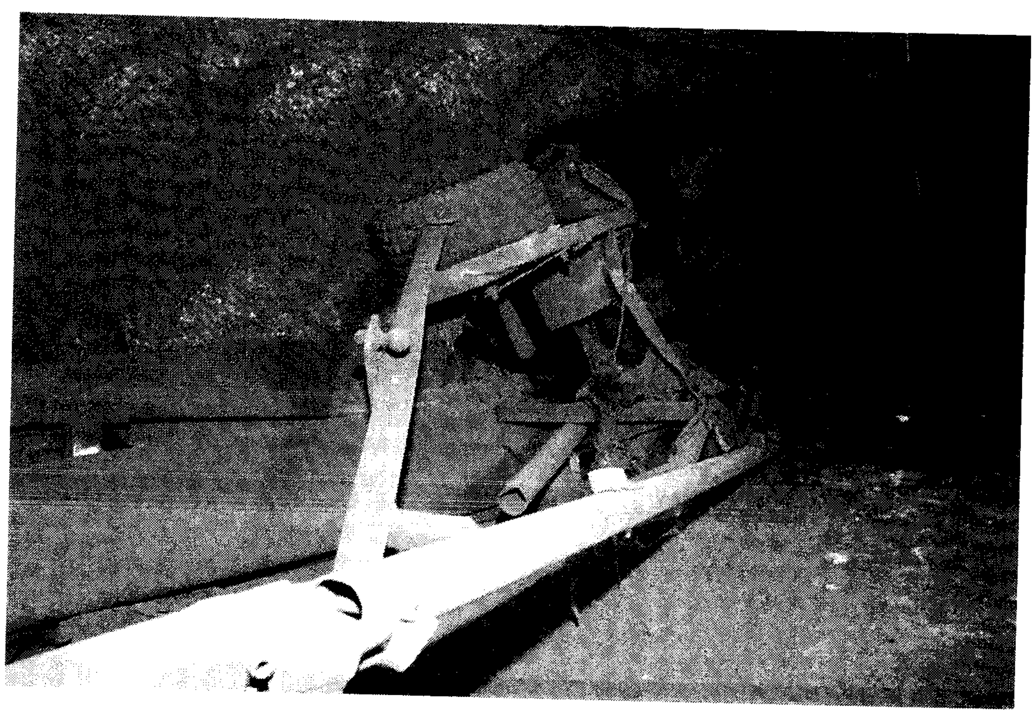
Photograph 1 – No.1 personnel carrier on damaged overcast



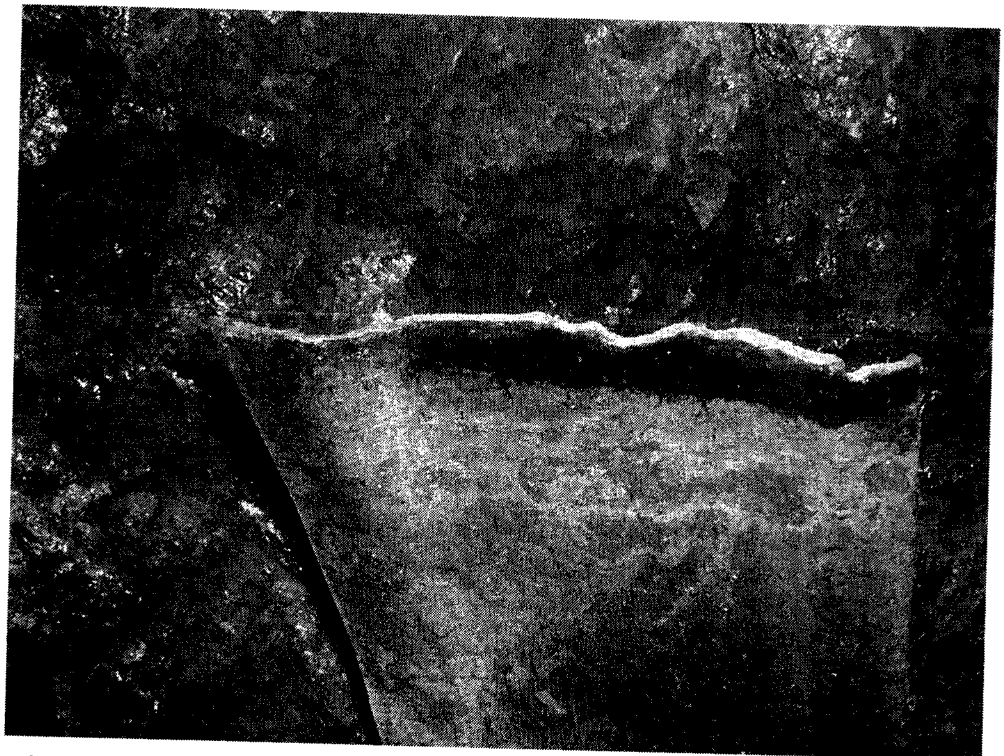
Photograph 2 – No.1 personnel carrier on damaged overcast



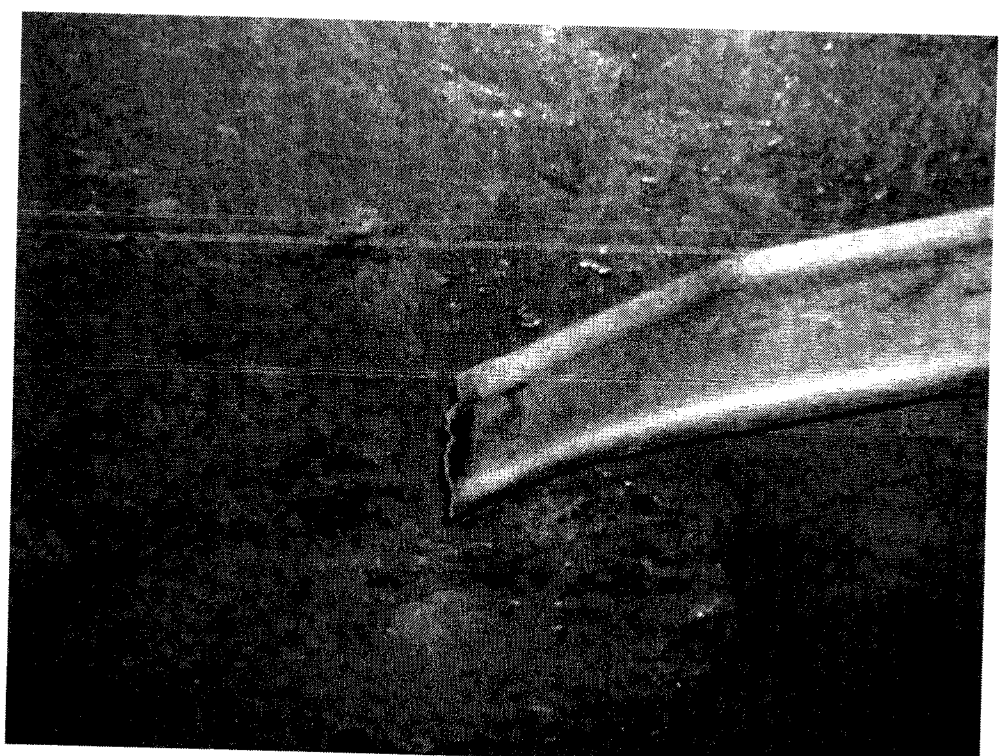
Photograph 3 - No. 3 personnel carrier in the No. 4 Entry



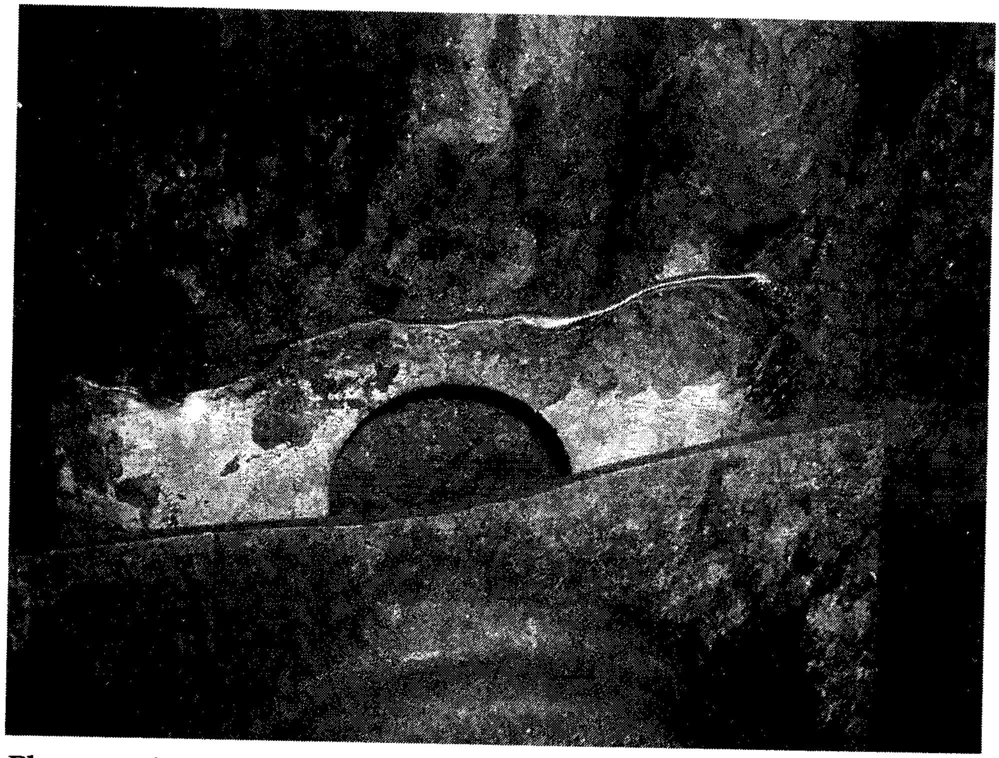
Photograph 4 - No. 3 personnel carrier in the No. 4 Entry



Photograph 5 – Inby segment of roof strap at A Left No. 3 Seal

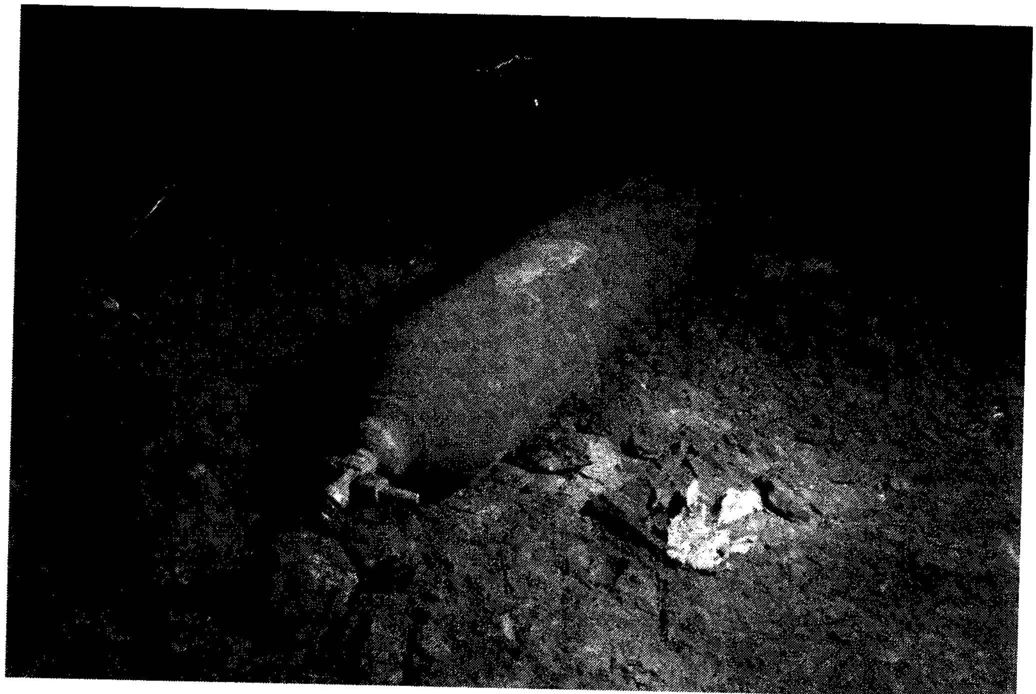


Photograph 6 – Inby segment of roof strap at A Left No. 3 Seal

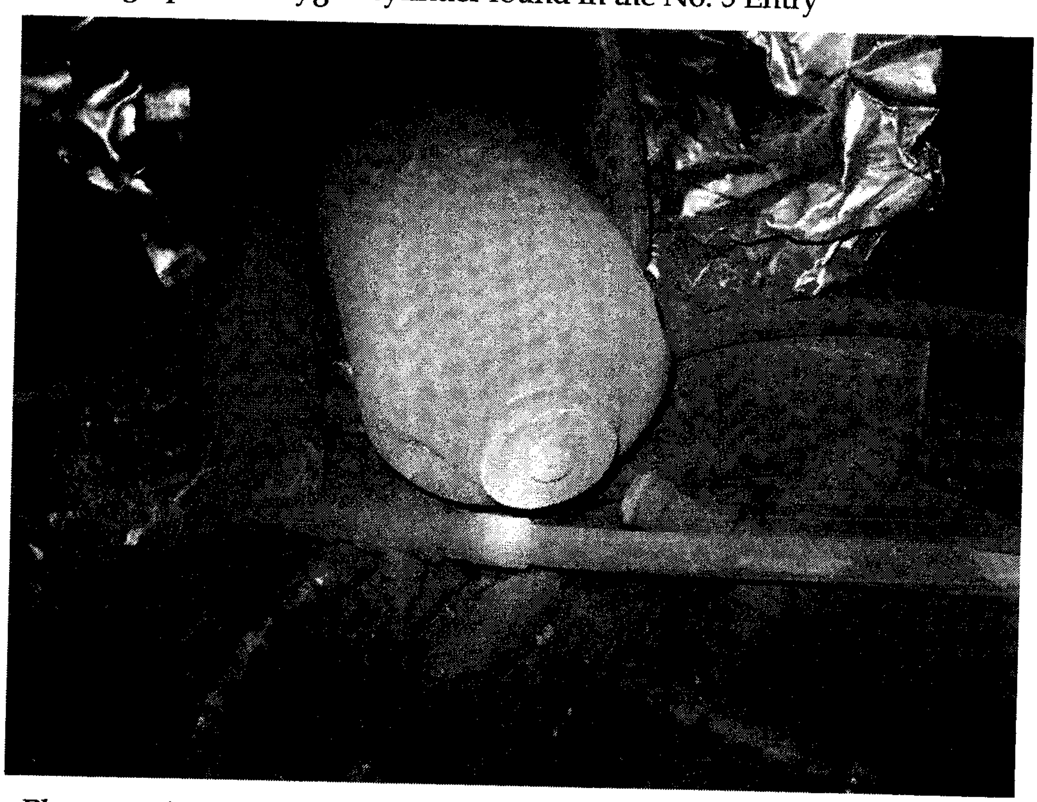


Photograph 7 - Outby segment of roof strap at A Left No. 3 Seal

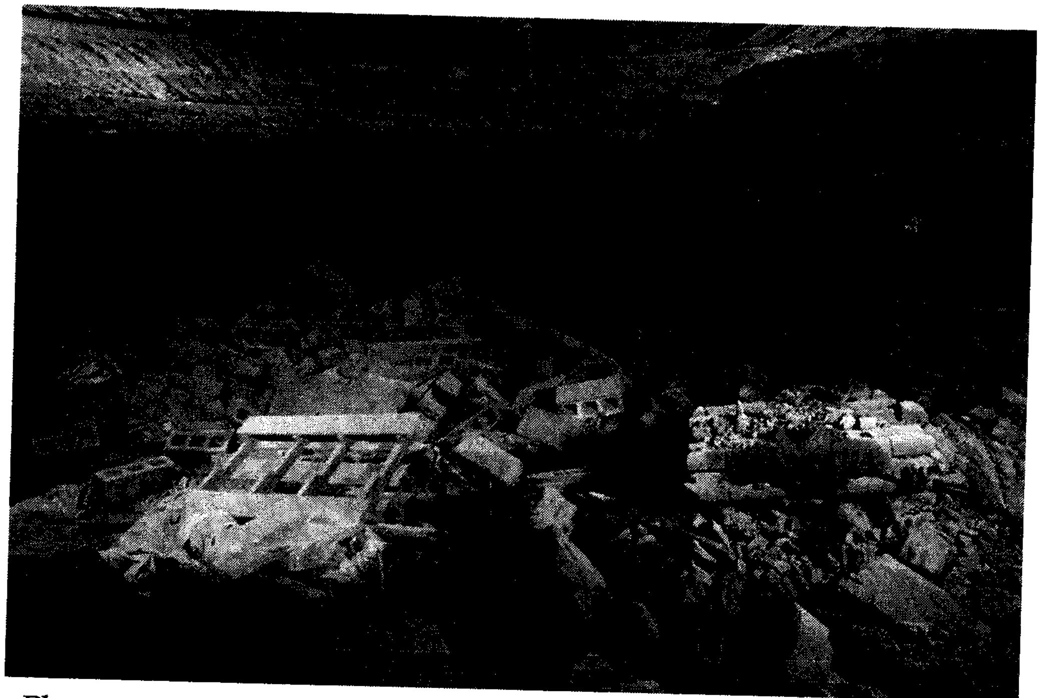
Photograph 8 - Middle segment of roof strap found in No. 5 Entry



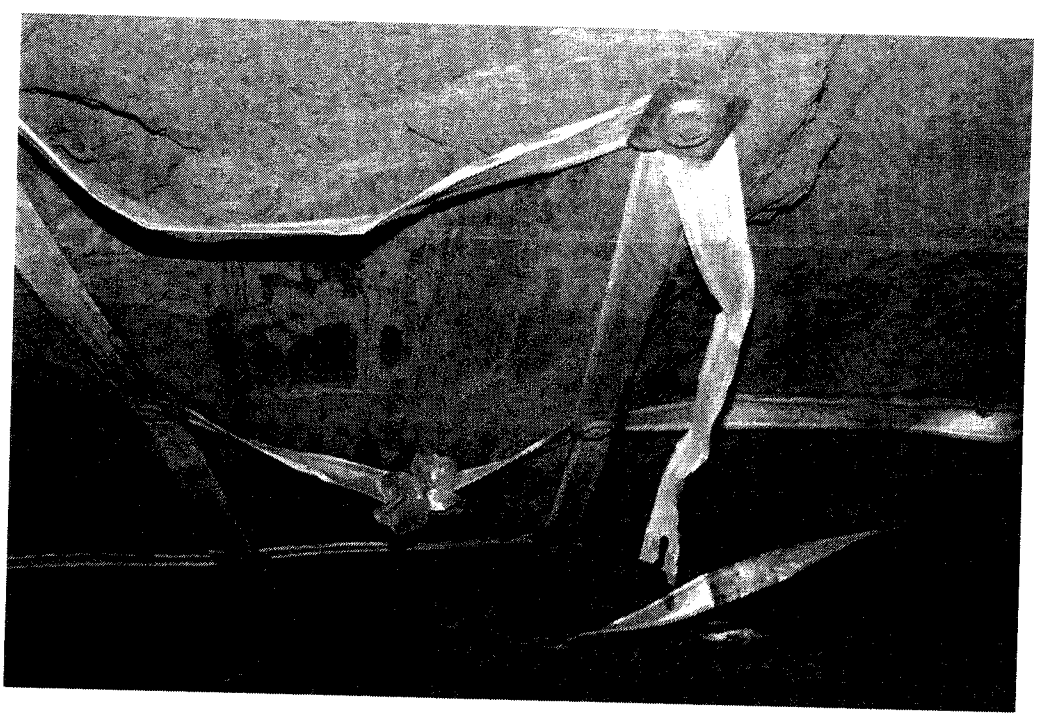
Photograph 9 – Oxygen cylinder found in the No. 5 Entry



Photograph 10 – Acetylene cylinder found in the No. 5 Entry



Photograph 11 – Debris from stopping near B Left Section



Photograph 12 – Damaged roof straps near A Left No. 3 Seal

Accident Investigation Data - Victim Information

Event Number: 4 2 4 0 1 0 5

U.S. Department of Labor
Mine Safety and Health Administration

Victim Information: 1

1. Name of Injured/Ill Employee: *Amon Brock*
2. Sex: *M*
3. Victim's Age: *51*
4. Last Four Digits of SSN: *6174*
5. Degree of Injury: *01 Fatal*
6. Date(MM/DD/YY) and Time(24 Hr.) Of Death: a. Date: *5/20/2006* b.Time: *1:00*
7. Date and Time Started: a. Date: *5/19/2006* b.Time: *15:45*
8. Regular Job Title: *049 Afternoon Shift Foreman*
9. Work Activity when Injured: *087 Supervising*
10. Was this work activity part of regular job? Yes X No

11. Experience

	Years	Weeks	Days
a. This Work Activity:	29	0	0
b. Regular Job Title:	29	0	0
c. This Mine:	4	44	5
d. Total Mining:	37	0	0

12. What Directly Inflicted Injury or Illness? *045 Explosion Forces and Heat*
13. Nature of Injury or Illness: *370 Multiple Injuries*
14. Training Deficiencies: Hazard: New/Newly-Employed Experienced Miner: Annual: Task:
15. Company of Employment:(If different from production operator) *Operator*
Independent Contractor ID: (if applicable)
16. On-site Emergency Medical Treatment: Not Applicable: First-Aid: CPR: EMT: Medical Professional: None: X
17. Part 50 Document Control Number: (form 7000-1)
18. Union Affiliation of Victim: *9999 None (No Union Affiliation)*

Victim Information: 2

1. Name of Injured/Ill Employee: *Jimmy D. Lee*
2. Sex: *M*
3. Victim's Age: *33*
4. Last Four Digits of SSN: *5022*
5. Degree of Injury: *01 Fatal*
6. Date(MM/DD/YY) and Time(24 Hr.) Of Death: a. Date: *5/20/2006* b.Time: *1:00*
7. Date and Time Started a. Date: *5/19/2006* b.Time: *15:45*
8. Regular Job Title: *150 Shuttle Car Operator*
9. Work Activity when Injured: *093 Cutting with Acetylene Torch*
10. Was this work activity part of regular job Yes X No

11. Experience

	Years	Weeks	Days
a. This Work Activity:	15	0	0
b. Regular Job Title:	15	0	0
c. This Mine:	3	6	0
d. Total Mining:	15	0	0

12. What Directly Inflicted Injury or Illness? *045 Explosion Forces and Heat*
13. Nature of Injury or Illness: *370 Multiple Injuries*
14. Training Deficiencies: Hazard: New/Newly-Employed Experienced Miner: Annual: Task:
15. Company of Employment: (If different from production operator) *Operator*
Independent Contractor ID: (if applicable)
16. On-site Emergency Medical Treatment: Not Applicable: First-Aid: CPR: EMT: Medical Professional: None: X
17. Part 50 Document Control Number: (form 7000-1)
18. Union Affiliation of Victim: *9999 None (No Union Affiliation)*

Victim Information: 3

1. Name of Injured/Ill Employee: *George W. Petra*
2. Sex: *M*
3. Victim's Age: *49*
4. Last Four Digits of SSN: *6664*
5. Degree of Injury: *01 Fatal*
6. Date(MM/DD/YY) and Time(24 Hr.) Of Death: a. Date: *5/20/2006* b.Time: *1:00*
7. Date and Time Started a. Date: *5/19/2006* b.Time: *23:00*
8. Regular Job Title: *049 Foreman*
9. Work Activity when Injured: *022 Attempting to escape from the mine*
10. Was this work activity part of regular job? Yes No X

11. Experience:

	Years	Weeks	Days
a. This Work Activity:	0	0	0
b. Regular Job Title:	4	0	0
c. This Mine:	4	5	3
d. Total Mining:	26	0	0

12. What Directly Inflicted Injury or Illness? *045 Smoke, Carbon Monoxide*
13. Nature of Injury or Illness: *280 Carbon Monoxide Poisoning*
14. Training Deficiencies: Hazard: New/Newly-Employed Experienced Miner: Annual: Task:
15. Company of Employment:(If different from production operator) *Operator*
Independent Contractor ID: (if applicable)
16. On-site Emergency Medical Treatment: Not Applicable: First-Aid: CPR: EMT: Medical Professional: None: X
17. Part 50 Document Control Number: (form 7000-1)
18. Union Affiliation of Victim: *9999 None (No Union Affiliation)*

Accident Investigation Data - Victim Information

Event Number: | 4 | 2 | 4 | 0 | 1 | 0 | 5 |

U.S. Department of Labor

Mine Safety and Health Administration

Victim Information: 4

1. Name of Injured/Ill Employee: Roy Middleton
2. Sex: M
3. Victim's Age: 35
4. Last Four Digits of SSN: 6466
5. Degree of Injury: 01 Fatal
6. Date(MM/DD/YY) and Time(24 Hr.) Of Death: a. Date: 5/20/2006 b.Time: 1:00
7. Date and Time Started: a. Date: 5/19/2006 b.Time: 23:00
8. Regular Job Title: 020 Electrician
9. Work Activity when Injured: 022 Attempting to escape from the mine
10. Was this work activity part of regular job? Yes | | No | X |

11. Experience

	Years	Weeks	Days
a. This Work Activity:	0	0	0
b. Regular Job Title:	2	46	2
c. This Mine:	2	31	1
d. Total Mining:	12	0	0

12. What Directly Inflicted Injury or Illness? 045 Smoke, Carbon Monoxide
13. Nature of Injury or Illness: 280 Carbon Monoxide Poisoning
14. Training Deficiencies: Hazard: | | New/Newly-Employed Experienced Miner: | | Annual: | | Task: | |
15. Company of Employment:(If different from production operator) Operator

Independent Contractor ID: (if applicable)

16. On-site Emergency Medical Treatment: Not Applicable: | | First-Aid: | | CPR: | | EMT: | | Medical Professional: | | None: | X |
17. Part 50 Document Control Number: (form 7000-1)
18. Union Affiliation of Victim: 9999 None (No Union Affiliation)

Victim Information: 5

1. Name of Injured/Ill Employee: Paris Thomas
2. Sex: M
3. Victim's Age: 53
4. Last Four Digits of SSN: 8431
5. Degree of Injury: 01 Fatal
6. Date(MM/DD/YY) and Time(24 Hr.) Of Death: a. Date: 5/20/2006 b.Time: 1:00
7. Date and Time Started: a. Date: 5/19/2006 b.Time: 23:00
8. Regular Job Title: 004 Mechanic
9. Work Activity when Injured: 022 Attempting to escape from the mine
10. Was this work activity part of regular job: Yes | | No | X |

11. Experience

	Years	Weeks	Days
a. This Work Activity:	0	0	0
b. Regular Job Title:	23	0	0
c. This Mine:	3	33	0
d. Total Mining:	23	0	0

12. What Directly Inflicted Injury or Illness? 045 Smoke, Carbon Monoxide
13. Nature of Injury or Illness: 280 Carbon Monoxide Poisoning
14. Training Deficiencies: Hazard: | | New/Newly-Employed Experienced Miner: | | Annual: | | Task: | |
15. Company of Employment: (If different from production operator) Operator

Independent Contractor ID: (if applicable)

16. On-site Emergency Medical Treatment: Not Applicable: | | First-Aid: | | CPR: | | EMT: | | Medical Professional: | | None: | X |
17. Part 50 Document Control Number: (form 7000-1)
18. Union Affiliation of Victim: 9999 None (No Union Affiliation)

Victim Information: 6

1. Name of Injured/Ill Employee: Paul E. Ledford
2. Sex: M
3. Victim's Age: 35
4. Last Four Digits of SSN: 4645
5. Degree of Injury: 03 Days away from work only
6. Date(MM/DD/YY) and Time(24 Hr.) Of Death:
7. Date and Time Started: a. Date: 5/19/2006 b.Time: 23:00
8. Regular Job Title: 047 Roof Bolter Operator
9. Work Activity when Injured: 022 Escaping from the mine
10. Was this work activity part of regular job? Yes | | No | X |

11. Experience:

	Years	Weeks	Days
a. This Work Activity:	0	0	0
b. Regular Job Title:	14	3	0
c. This Mine:	2	39	0
d. Total Mining:	16	3	0

12. What Directly Inflicted Injury or Illness? 045 Smoke, Carbon Monoxide
13. Nature of Injury or Illness: 280 Carbon Monoxide Poisoning
14. Training Deficiencies: Hazard: | | New/Newly-Employed Experienced Miner: | | Annual: | X | Task: | |
15. Company of Employment:(If different from production operator) Operator

Independent Contractor ID: (if applicable)

16. On-site Emergency Medical Treatment: Not Applicable: | | First-Aid: | | CPR: | | EMT: | X | Medical Professional: | | None: | |
17. Part 50 Document Control Number: (form 7000-1)
18. Union Affiliation of Victim: 9999 None (No Union Affiliation)

REPORT ON THE

OF JANUARY 2, 2006

AB58-COMM-11-7

TABLE OF CONTENTS

United Mine Workers of America

CECIL E. ROBERTS
INTERNATIONAL PRESIDENT

TELEPHONE
(703) 208-7220
FAX (703) 208-7132

UNITED MINE WORKERS' HEADQUARTERS
8315 LEE HIGHWAY
Fairfax, VA
22031-2215

At approximately 6:30 am on January 2, 2006, an explosion occurred at the Sago mine in Upshur County, West Virginia. Fifty-two hours later, the bodies of 12 miners had been recovered from the mine and one unconscious survivor had been transported to the hospital.

Those 12 men did not have to die. But they did, as a result of a series of decisions that were made by the mine's owner, and allowed by the state and federal agencies that are charged with mine safety.

Some of those decisions were made in the weeks and months immediately prior to the explosion and in the hours immediately after it. Sadly, some of those decisions were made many years prior to the explosion.

But whenever they were made, all of those misguided decisions contributed to this preventable tragedy. And without immediate action by mine operators and regulatory agencies across America to reverse the effects of these decisions, more tragedies are inevitable.

The mine's owner, the International Coal Group (ICG), has advanced the theory that the explosion was caused by a natural event it could do nothing to prevent—a lightning strike. ICG touts this theory even though the lightning struck over two miles away and there was no conduit for an electrical charge from that lightning to get into the sealed area of the mine where the explosion occurred. Though it cannot adequately explain why, the West Virginia Office of Miners' Health, Safety and Training agrees with that theory.

The UMWA does not agree with that unprecedented theory, and this report lays out the reasons why. We find it is much more likely that the explosion was triggered by frictional activity in the roof, roof support or support material, which created an electrical arc underground that ignited an explosive methane-air mixture in the sealed area.

Although it is important to know how the methane ignited, it is not really material to the subsequent deaths of the 12 miners. The conditions in the mine at the time of the ignition caused these 12 tragic deaths. The fact is that the tragedy that morning was preventable and should never have occurred. What adds insult to injury is that at least 11 of those 12 miners survived the explosion, and when miners survive an explosion underground, those miners should come out of the mine alive.

The reasons why these 12 men are dead—when they should not be—must be the focus of efforts to improve mine safety from this point forward. And we must start with this: The will and intent of Congress when it first passed the Coal Act in 1969 and then the Mine Act in 1977 has been diluted, modified and subverted by the federal Mine Safety and Health Administration (MSHA) and mine operators to the point where some practices and policies in place today offer miners little more protection than they had before those laws were passed. The various state safety and health agencies are also culpable for failing to protect miners.

1. When MSHA decided to ignore Congress' mandate to build "bulkhead seals" and began allowing substandard seals, including seals from foam material called Omega Block, we began down the path to the Sago tragedy. Had the seals in the Sago mine been constructed in such a manner as Congress intended, it is very likely all the miners killed at Sago would have survived.

2. When the coal companies and the regulatory agencies decided not to pursue enhanced two-way communications underground, even though the UMWA and others raised this as a problem even before 1968, it ensured that no one would be able to talk to the trapped Sago miners in 2006 to let them know their way out of the mine was not blocked.

3. When MSHA decided to mitigate the law as passed by Congress and not require that there be a sufficient number of mine rescue teams available at all times when miners are underground at every mine in America, it meant that ICG was free to contract out its mine rescue functions to an inexperienced mine rescue team that was not on site and had to be gathered from the far corners of Upshur County before it could begin any type of rescue operation. There was no team available to immediately respond at Sago, perhaps rescuing all the miners who survived the explosion instead of just one.

4. When Sago mine management submitted and MSHA approved a ventilation plan that would course fresh air past the sealed area, and this contaminated air was separated from the working section's intake air supply by only one brattice wall which was destroyed in the explosion, it meant that the trapped miners were doomed to a continuous flow of carbon monoxide and other deadly gases that eventually killed all but one of them.

5. The lack of additional oxygen supplies and the poor performance of the self-contained self-rescue (SCSR) units, along with the failure by MSHA over the past 30 years to require the development of a new generation of SCSRs, meant that these trapped miners were left gasping for their final breaths.

6. When MSHA decided not to follow up on Congress' mandate in 1969 to require safety chambers in mines, that meant the miners at Sago were left with hanging a ventilation curtain as their only option in a futile attempt to keep the deadly gases away.

7. When MSHA did not require the use of tracking devices to locate trapped miners underground, even though such technology has been available for over 30 years and is used widely in other countries, the mine rescue teams that finally did enter the Sago mine did not have any idea where to look for the trapped miners, further delaying the rescue efforts.

All of these issues are examined in depth in this report. The UMWA also makes recommendations in this report that, if enacted and enforced, will make a real difference, not just in the ability of miners to survive explosions and other incidents underground, but to keep these events from happening in the first place.

The truth is that ICG failed the miners at Sago, and so did our government. And when our government failed those miners it failed all miners. The company and the government agencies forgot the words of Congress, stated in the preamble of the Mine Act: "Congress declares that the first priority of all in the coal or other mining industry must be the health and safety of its most precious resource—the miner."

The UMWA has not forgotten those words. We believe they must be in the forefront of our nation's focus as we move forward to improve safety in America's coal mines. The 12 who died needlessly at Sago and the 35 others who perished at coal mines throughout the United States in 2006 deserve no less.

Cecil E. Roberts
International President

Daniel J. Kane
International Secretary-Treasurer

DEDICATION

The United Mine Workers of America dedicates this report to the entire mining community: the men and women who work in the industry, their families and friends and the miners who courageously arrive at the mine to offer assistance when tragedy strikes.

History will judge 2006 to be a tragic and difficult year for the nation's mining community. By the end of the calendar year, the coal industry claimed the lives of 47 miners. The fatal accident numbers of the previous years have been surpassed, making it the worst year since 1995, when there were also 47 fatal accidents. But numbers do not tell the entire story: indeed they dehumanize the message and make it easier to accept. These miners must not be remembered merely as numbers. Theirs was a life of hard work, sacrifice and dedication. These miners were:

Miner	Date	Age	Mine	Mine Controlling Company
Terry Helms	1-2-06	50	Sago	International Coal Group
Marty Bennett	1-2-06	51	Sago	International Coal Group
Thomas Anderson	1-2-06	39	Sago	International Coal Group
James Bennett	1-2-06	61	Sago	International Coal Group
Jerry Groves	1-2-06	56	Sago	International Coal Group
Jesse Jones	1-2-06	44	Sago	International Coal Group
Junior Hamner	1-2-06	54	Sago	International Coal Group
Martin Toler	1-2-06	51	Sago	International Coal Group
David Lewis	1-2-06	28	Sago	International Coal Group
Jack Weaver	1-2-06	51	Sago	International Coal Group
Fred Ware	1-2-06	59	Sago	International Coal Group
Marshall Winans	1-2-06	50	Sago	International Coal Group
Cornelius Yates	1-10-06	44	Mine #1	Maverick Mining Company
Don Bragg	1-19-06	35	Aracoma Alma Mine #1	Massey Energy Company
Ellery Hatfield	1-19-06	47	Aracoma Alma Mine #1	Massey Energy Company
Shane Jacobson	1-29-06	37	Aberdeen	Andalex Resources, Inc
James Thornburry	1-23-06	72	No. 4	Sassy Coal Company
Edmund Vance	2-1-06	46	#18 Tunnel Mine	Long Branch Energy Corp.
Paul Moss	2-1-06	58	Black Castle	Massey Energy Company
Timothy Caudill	2-16-06	33	HZ4-1	TECO Energy
Willard Miller	2-17-06	35	Mettiki Mine	Alliance Coal, LLC
Jackie Toler	4-7-06	53	Candice 2	Rainbow Trout Coal, LLC
Robert Runyon	4-7-06	48	No. 1 Mine	Southern WV Resources
Garry Jones	3-29-06	57	No. 4 Mine	Jim Walter Resources, Inc.
David Bolen	4-20-06	28	No. 1	Tri Star Coal LLC
Rick McKnight	4-21-06	45	Huff Creek No. 1	Arch Coal, Inc.

Miner	Date	Age	Mine	Mine Controlling Company
Jimmy Lee	5-20-06	33	Darby Mine No. 1	Kentucky Darby LLC
Amon Brock	5-20-06	51	Darby Mine No. 1	Kentucky Darby LLC
Roy Middleton	5-20-06	35	Darby Mine No. 1	Kentucky Darby LLC
Bill Petra	5-20-06	49	Darby Mine No. 1	Kentucky Darby LLC
Paris Thomas, Jr.	5-20-06	35	Darby Mine No. 1	Kentucky Darby LLC
Steven Bryant	5-23-06	23	Risner Branch #1	Miller Bros. Coal Inc.
Todd Upton	5-24-06	34	Sycamore Mine #2	International Coal Group
Edward R. Fitzgerald	7-7-06	35	East Volunteer	Alliance Coal, LLC
Jason Mosley	7-18-06	28	Smith Branch #1	Hendrickson Equipment Inc.
John May	7-20-06	39	Slate Branch	CAM Mining LLC
Jeremy Heckler	7-30-06	30	Star Bridge Prep Plant	Circle M Enterprises Inc.
Richard Cox	5-4-06	40	Buchanan Mine #1	Consolidation Coal Co.
Joseph Seay	10-6-06	56	Mine No. 2	D & R Coal Co., Inc.
Jerry McKinney	10-11-06	56	No. 7 Mine	Jim Walter Resources, Inc.
Thomas Channell	10-20-06	49	Whitetail Kittanning	Alpha Natural Resources, LLC
Dale Reighter	10-23-06	43	R & D Coal Co	R & D Coal Co.
Brett Gibson	10-30-06	31	Double Bonus Coal Co.	Bluestone Industries, Inc.
Tony Swiney	11-4-06	44	Mine #23	James River Coal Co.
Howard Harvey	11-5-06	52	Kayenta Mine	Peabody Western Coal Co.
Mario Corriveau	11-28-06	50	Spring Creek Coal Co.	Rio Tinto Energy America
John Elliot	12-17-06	26	Prime No. 1	Dana Mining Co., Inc.

On behalf of the United Mine Workers of America, we wish to express our deepest sorrow and heartfelt sympathy to the families of these brave men over the untimely death of their loved ones. The passing of each is not only a shocking loss to their families, but to all miners and the members of the UMWA. Their deaths are a reminder of how tragically short life can be and how dangerous coal mining can be, especially if safety laws are not followed by coal operators and enforced by government regulators.

Words alone cannot atone for the tremendous loss their families have sustained, but we trust that in their hour of bereavement they and all members of their families will obtain some solace in knowing that others share their sorrow and weep with them in their misfortune.

The Union offers a special thanks to the wives, the sons, the daughters and all the family members who, after their tragic loss, found the strength of will to fight for those who still work in the nation's mines. When you put your grief aside and testified in Congress and state legislatures, spoke out in the media, participated in public hearings and spoke truth to power, you brought a powerful and eloquent message on behalf of all miners to those who might otherwise ignore it. Though you do not know most of them, you saw the struggle miners were facing and made it your own. You gave them a voice, and today they are safer because of your efforts. Thank you on behalf of the nation's miners for all you do for them.

We must also recognize those who willingly enter burning, smoky and unstable mines to try to rescue those who cannot escape on their own. We owe each of you a deep debt of gratitude. When conditions are at their worst and most would judge the situation to be too dangerous, members of the nation's mine rescue teams are ready to offer assistance to their brothers and sisters in harm's way. Each of you plays a significant role in protecting and saving the lives of countless miners every day. You share in the joy when your efforts are successful, but suffer a unique and painful sense of loss when your efforts are met with tragedy. The difficult task you take upon yourselves does not get easier with time or better with experience; it remains a challenge that is ever-changing and dangerous.

The facts are simple: You are the first to enter and the last to leave a disaster site. You witness the happiness of families and friends as their loved ones emerge from the mine because of your efforts. You witness the horror of the industry and feel the loss as few others can understand. And you return each time you are called, because it is who you are. Thank you on behalf of this nation's miners, their families, their friends and the United Mine Workers of America.

Finally, we must also recognize all the men and women who have lost their lives to build and energize the nation. When tragedy strikes, whether it is one miner or many in a single moment, we feel the loss and pain as only miners can.

We dedicate this report to each of you, and to your families. More importantly, we pledge to continue the fight for even greater protections. Because like every American worker, coal miners must be secure in the knowledge that they will return safely to their loved ones at the end of every shift.

Executive Summary and Recommendations

Based on information gathered during the investigation of the January 2, 2006, explosion and subsequent fatalities at the Sago mine, the United Mine Workers of America (UMWA) issues the following report.

Though the miners at the Sago mine were not members of the UMWA or any other union, the UMWA was designated under federal regulations as a miners' representative after this incident.

The explosion may have claimed one life immediately. Over the course of the next several hours eleven of the men died as a result of these conditions. The lone survivor, Randall McCloy, Jr. was rescued approximately 40 hours after the explosion.

The Union believes that there is absolutely no clear evidence to support the theory that lightning was the cause of the explosion. Further, there is no evidence that lightning striking the ground near a mining operation has ever traveled into the underground area of a mine, without the presence of a conduit from the surface into the mine, and then caused an ignition or explosion of gas or dust.

The Union has determined that the most likely cause of the explosion was conditions contained solely within the sealed area of the mine where the explosion occurred. The lightning strike theory is based entirely on circumstantial evidence and is so remote as to be practically impossible.

The UMWA concludes that the most likely cause of the explosion was frictional activity from the roof, roof support or support material which ignited the methane-air mixture.

The union firmly believes that 12 men are dead today who should not be. The UMWA believes that if the mine's operating company, the International Coal Group (ICG) had put safety ahead of profit and if the Mine Safety and Health Administration (MSHA) had followed the mandates established by Congress in the 1969 Coal Act and the Federal Mine Safety and Health Act of 1977, all 12 of the trapped miners would have survived and given the circumstances it is likely all 13 would be alive today.

The Agency's decisions over the past several decades to promulgate regulations, grant petitions for modification and create policies that contradict the intent of Congress by reducing or eliminating the legislated protections played a major role in the tragic events of January 2, 2006.

Likewise, decisions Sago mine management made in operating the mine, including ventilation plans, roof control plans and its extremely rare practice of second mining created conditions in the mine that were inherently risky. The Union believes that the company's flawed plans and mining practices contributed to the devastating events of January 2, 2006.

Knowing the cause of the explosion is important so that steps can be taken to prevent a similar situation from happening again. However, regardless of the cause of the explosion in this instance, had MSHA followed the mandates of Congress, and had ICG operated the mine with an eye firmly focused on miners' safety, there is every reason to believe that every person underground that day would have survived.

MSHA's responsibilities under the law

The 1969 Coal Act and the 1977 Mine Act followed years of neglect and indifference to coal mine safety. In 1969, following the 1968 Farmington explosion that claimed the lives of 78 miners, 19 of whom are still entombed in the mine, Congress for the first time demanded that miners be afforded safer working conditions. In 1977, Congress expanded upon those protections and created MSHA to enforce these directives.

However, in the nearly three decades since 1977, the Agency has routinely ignored the wishes of Congress and in many instances created regulations, granted petitions and established policies directly opposite to its mandate. These actions by MSHA contributed to the events of January 2, 2006. These failures by the Agency include:

Requirements for seals. Had MSHA required Sago mine management to build the seals to the requirements of the Mine Act, the seals would have contained the explosion and the noxious gases it generated sufficiently to permit the safe escape of all the miners.

Congress mandated in the 1977 Mine Act that "explosion-proof seals or bulkheads" be used to isolate abandoned or worked out areas of the mine from active workings.

In subsequent years MSHA has promulgated regulations regarding seals that are much less protective than what Congress mandated. The current law simply requires that seals withstand static pressure of 20 pounds per square inch (psi) in order to be approved for installation in the mine.

At Sago, ICG requested and MSHA approved the use of Omega Block—blocks made of foam—to seal an area instead of the explosion-proof seals or bulkheads required in the Mine Act. Use of Omega Blocks directly contributed to the effects of the explosion and the deaths of all the miners.

Mine Rescue Teams. The need for well trained, well equipped and readily available mine rescue teams has been understood for many years. In 1977, Congress ordered MSHA to propose regulations requiring teams be available at every mine in the event of an emergency.

In July 1980, MSHA promulgated a rule for the creation and deployment of mine rescue teams. The regulation required that two mine rescue teams must be available at all times when miners are underground. Generally larger mine operators established several teams within a mine or throughout a company to meet these requirements. Smaller operators were permitted to contract with these teams to cover their operation.

The Union has historically criticized the contract team concept because there were no regulations to ensure these teams would be able to reach the operation in a reasonable time or be familiar with the operation once they arrived.

Since 1980, MSHA has used policy directives to erode the effectiveness of the mine rescue team rules. These policies permit mine operators to rely on geographically distant contract teams. MSHA also allowed "composite" teams, with miners from several different operations. Often, these composite team members have not trained together as a unit, and may not have ever trained at all the mines they were responsible for.

The adverse consequences of this flawed mine rescue system played a significant role in the response to the Sago mine. The first team, a composite contract team, did not arrive on the property until approximately 4-1/2 hours after the explosion. Other teams arrived later that morning and afternoon. This delay contributed to the ultimate outcome of the disaster.

Had mine rescue teams been immediately available and on-site more quickly, the tragic outcome may have been averted.

Emergency Shelters. Had MSHA required the installation of properly equipped emergency shelters, as it was given the authority to do in the 1977 Mine Act, the miners at Sago could have survived for hours, if not days, underground.

In the decades since Congress passed the Mine Act very little has been done to develop and deploy these chambers despite repeated instances where miners were trapped underground. The Sago miners represent but one example where miners were forced to retreat to an area of the mine to build a barricade and hope for rescue. Technology exists today to correct this situation, yet operators in this country—including ICG—have refused to utilize it and MSHA fails to require it.

Communications. Not until 1969 did Congress mandate two-way communications from the surface of the mine to all active working sections. In 1969 communications were facilitated by the use of a "twisted pair" of wires connected to battery-powered phones. Thirty-eight years later this primitive communication system is still the primary source of communications in the industry.

Yet Congress specifically directed MSHA to promulgate regulations that will spur the development of new technology. The Agency has failed to do that in many ways, including failing to require state-of-the-art communications systems. Despite the requirements of the Mine Act to, "conduct such studies, research, experiments and demonstrations as may be appropriate...to develop new and improved methods of communication from the surface to the underground area of a coal or other mine," the Agency did little to fulfill this mandate.

Had MSHA pursued new technologies as Congress directed, there is every reason to believe that a system could have been in place that would have permitted the trapped miners to communicate from the 2nd Left Parallel Section and facilitate their rescue.

MSHA's responsibilities as a watchdog for safety

MSHA has ignored the mandates of Congress by promulgating inadequate regulations and setting disastrous policies on several occasions. These actions have negatively impacted miners' safety and health for years. Moreover, MSHA has not learned from tragic events that occurred in the past.

The mine explosion at Farmington in 1968 and the fire at Wilberg in 1984 took the lives of 105 miners. The lives of each of these miners and many others lost to their families are a tragedy that cannot be forgotten. These events should have pushed everyone to address the shortcomings and needs of the industry and make it safer for all miners.

These two disasters alone demonstrated that miners trapped in the aftermath of a fire or explosion need an adequate supply of oxygen to sustain them until rescue, and that locating trapped miners quickly is crucial to their survival. They also demonstrated that if sufficiently protective regulations are promulgated and enforced, a miner who survives the initial disaster should come out of the mine alive, even after an extraordinary event such as a fire, inundation or explosion.

Tracking devices. Since before the Farmington disaster, one of the greatest impediments to mine rescue has been locating the trapped miners. Having the ability to immediately send mine rescue personnel to the location of trapped miners after a disaster is key to their survival. The U.S. Bureau of Mines tested a system capable of locating trapped miners in 1970 and published its successful results. It was not until after the Sago tragedy that any real movement has been made in this country to create an effective tracking device for implementation into the mining environment.

The facts here are simple: Had miners at Sago been outfitted with tracking devices that would show their location both pre-and-post accident they could have been saved. The Agency, by not promulgating technology-driving regulations as Congress intended, failed these miners.

Oxygen. There was not a sufficient supply of oxygen to sustain each miner trapped at Sago until mine rescue teams could reach them in the hours after the explosion.

The Union has consistently argued that, in the event of a disaster, sufficient oxygen must be available to every miner that will allow that miner to travel from the deepest penetration of the mine to the surface.

In the early 1980's MSHA finally required mine operators to supply miners with 1 hour of oxygen in the form of a Self-Contained Self-Rescuer (SCSR) to begin an escape.

While not enough, this was an important step forward. However, since the mid-1990's SCSR technology has stagnated. The Agency has not pushed for SCSR advances and those who perished at Sago were carrying rescue devices that rely on technology over a decade old.

Moreover, MSHA did not require additional units to be available for miners who could not reach the surface of the mine from their workplace in the limited time the oxygen in a single SCSR provides.

At the time of the Sago tragedy, ICG satisfied only the minimal requirement of one SCSR per miner.

Some operators, however, provided additional oxygen to underground miners.

At Sago, some SCSRs did not even function as intended. Units failed outright and others did not produce sufficient on-demand oxygen to allow the miners the best possible chance for escape.

The mine operator's responsibilities

Decisions of mine management at Sago played a large role in the tragedy that unfolded at the mine on January 2, 2006.

The company submitted and MSHA approved a ventilation plan just weeks before the explosion that would course fresh air past the sealed area. This contaminated air was separated from the working section's intake air supply by only one brattice wall, which was designed to withstand minimal pressure. This brattice wall was destroyed in the explosion with disastrous consequences.

The extremely rare practice of "second mining" that was employed at Sago created entry heights in excess of 18 feet in some areas, which is inherently dangerous because it increases hazards associated with roof falls and rib rolls.

In addition, the height of the entry permits methane to accumulate in the area at volumes much greater than would normally be the case. When the methane in these areas is ignited, as was the case at Sago, the forces from the explosion are compressed as they radiate outward into the entries that were not part of second mining.

This compression, commonly referred to as "piling", increases the magnitude of the forces, creating much greater than normal pressure from the original explosion.

Mine management is responsible for its contributions to this tragedy. It is not sufficient for the company to merely rely on MSHA approvals of flawed plans the company submitted. Mine management is responsible for the operation of a mine. Management at the Sago mine failed the miners.

The events that led to the explosion were rooted in flawed decisions. These decisions were made not only in the months leading up to the explosion, but also over the many decades that MSHA has ignored the mandates of Congress and needs of miners.

Summary of the events of January 2, 2006

The explosion occurred inby an area of the mine that had been recently sealed as a result of very poor mining conditions. The seals, which were completed on December 12, 2005, were constructed using Omega Blocks. This was the first time such seal material had been used at this operation. Previously, seals constructed at this operation were solid concrete block or packsetter-type construction.

There were roof falls above the bolt anchorage point in the 2nd Left Mains Section before and since December 2005, when the area was sealed. The investigation revealed that roof conditions continued to deteriorate after the area was sealed.

Studies completed by MSHA and the West Virginia Office of Miner's Health, Safety and Training (WVOMHST) determined the approximate area of and the methane liberation within the sealed area. Based on this data an explosive methane-air mixture would have been created approximately 14 days after completion of the seals, on December 26, 2005. Had there been no interruption, the methane-air mixture within the sealed area would have remained in the explosive range until about January 22, 2006, when the atmosphere would have passed through the explosive range, and become inert.

Permitting these conditions to continue without being actively monitored created an extremely hazardous situation.

The explosive forces of the blast traveled from its epicenter in the sealed area outward in all directions. These forces generated significant heat and pressure waves within the sealed area. They struck the inby sides of the Omega Block seals, pushing them outward toward the working area of the mine, completely obliterating nine seals. The remaining seal, located in the #1 entry, failed catastrophically and was blown against the adjacent rib-line.

When the explosion occurred, there were 29 miners underground in various locations. Terry Helms, mine examiner/beltman, had completed his preshift examination and was located near the 2nd Left switch. Before the explosion, Fred Jamison, mine examiner/beltman had completed his preshift examination, entered his findings in the examination book on the surface and walked back underground to his work location along the beltline.

The 2nd Left Parallel Crew

The 2nd Left crew had entered the mine at approximately 5:55 am and proceeded to the Section. They were moving towards their work stations in the Section when the blast occurred at 6:26 am. The forces from the explosion traveled from the seals and entered the active workings of the mine. The forces continued to travel several thousand feet, destroying communication devices, ventilation controls and other equipment. The force of the blast struck Terry Helms.

The forces from the explosion entered the 2nd Left Parallel Section, damaging communication devices and ventilation controls and immediately filled the area with smoke, dust and noxious gases. The 12-man crew proceeded to the mantrip and attempted to evacuate the Section. Smoke and dust in the mine atmosphere severely limited their visibility and worsened as they moved toward the mouth of the Section. They proceeded outby until they were stopped by debris on the track and zero visibility, interfering with their further escape.

The crew exited the mantrip and walked into the intake escapeway. There are conflicting reports about when the crew members donned their self-contained self-rescuers (SCSRs), but from the location of the discarded cases it seems they performed this task once they entered the intake entry.

An attempt was made to walk out the intake escapeway, but smoke and gases from the explosion were blowing directly onto the crew. They then proceeded to the face of the #3 entry and built a barricade to isolate themselves from the smoke and noxious gases. Two members of the crew made a second attempt to find a safe escape route, but were turned back by heavy smoke and gases.

Over the course of the next several hours, members of the 2nd Left Parallel crew followed the established procedures for barricaded miners by pounding on a roof bolt at their location. During this process, they would pound several times on the roof bolt and wait for a response in the form of a shot set off on the surface. However, no one on the surface was listening because seismic equipment was never deployed, so the trapped miners never received a response. Over the course of the next several hours, 11 of the 12 miners from 2nd Left Parallel crew died from the poisonous mine atmosphere.

The 2nd Left Parallel crew:

Martin Toler Section Foreman	victim
Marshall Winans Scoop Operator	victim
Jerry Groves Roof Bolter Operator	victim
James Bennett Shuttle Car Operator	victim
Marty Bennett Continuous Miner Operator	victim
Fred Ware Continuous Miner Operator	victim
Jesse Jones Roof Bolter Operator	victim
Thomas Anderson Shuttle Car operator	victim
Jack Weaver Electrician	victim
David Lewis Roof Bolter Operator	victim
Junior Hamner Shuttle Car Operator	victim
Randall McCloy, Jr. Roof Bolter Operator	survivor

The 1st Left Crew

The 1st Left crew had entered the mine at approximately 6:10 am. They dropped off John Boni, pumper, at the 1st Right pumper shanty and Pat Boni, beltman, at the No. 4 belt drive. The 13-member crew then proceeded inby to the Section. At the mouth of 1st Left Section, Roger Perry, miner operator, threw the track switch to enter the Section, returned and sat down on the mantrip when the explosion occurred.

Immediately after the explosion, these miners felt a strong gush of air and visibility was virtually zero in the track heading. Miners from the 1st Left crew and outby areas immediately began to evacuate the mine through the track heading and intake escapeway. By 7:30 am, fifteen of the miners outby the 1st Left Section, including John and Pat Boni and Fred Jamison, had reached the surface and only Owen Jones, 1st Left Section foreman, remained underground.

Mine Management

Jones was met in the track heading by Jeff Toler, Superintendent; Al Schoonover, Safety Director; Denver Wilfong, Maintenance Superintendent, and Ernest Hofer, Maintenance Foreman, who entered the mine immediately after the explosion, at about 6:45 am. The five men traveled up the track and intake entries, repairing damaged ventilation controls as they proceeded. They reached 58 block of No. 4 belt, located at the mouth of 2nd Left Parallel Section. They encountered heavy smoke and carbon monoxide, which stopped them from advancing any further. They shouted towards the Section, but received no response. They decided to exit the mine and call for mine rescue teams. They reached the surface at approximately 10:30 am.

Twelve members of the 2nd Left Parallel crew and Terry Helms were underground and unaccounted for. There had been no contact with any of these miners since they entered the mine at about 5:55 am.

Initial Response

There was no attempt by mine management to immediately implement the mine's emergency evacuation plan or contact the appropriate regulatory agencies. Despite a call to the surface by Jones at approximately 6:35 am for help ("We had...an explosion...get the people in here."), attempts to contact MSHA and the WVOMHST were not initiated until 7:20 am, nearly one hour after the explosion. The decision to notify the agencies was made by Jeff Toler while underground attempting to rescue the 2nd Left Parallel crew. Those remaining on the surface after the explosion failed to take charge of the situation. The chaos that followed continued during the entire rescue and recovery operation.

Officials from ICG, MSHA and WVOMHST arrived at the mine by 10:30 am. Control orders were placed on the mine by the regulatory agencies to prepare for mine rescue teams to arrive and begin their activities. The first rescue teams arrived at approximately 11:00 am on January 2, 2006, and other teams that were contacted arrived throughout the rest of the morning and into the afternoon.

There was little control over who entered mine property. Deliberations and plan decisions on rescue efforts were done in unsecured areas. Information that was not verified for accuracy was communicated from the mine site to the families, media and general public. Further chaos was created by ICG's failure to provide adequate accommodations for mine rescue teams as they arrived.

The first rescue plan from ICG was not submitted for approval until 1:00 pm and simply requested

The 1st Left crew:

Owen Jones	Section Foreman
Gary Rowen	Roof Bolter Operator
Randy Helmick	Roof Bolter Operator
Alton Wamsley	Roof Bolter Operator
Joe Ryan	Roof Bolter Operator
Roger Perry	Miner Operator
Denver Anderson	Utility Man
Chris Tinney	Utility Man
Ron Grall	Mine Examiner
Eric Hess	Scoop Operator
Paul Avington	Equipment Operator
Hoy Keith	Mechanic
Gary Carpenter	Continuous Miner Operator

continued monitoring of the gases exiting the mine. Because of indecisiveness and inexperience on the part of ICG, rescue teams did not enter the mine until after 5:00 pm to begin their rescue efforts. Neither of the regulatory agencies ever moved to take control of the rescue operation.

Terry Helms was located by Ron Hixson, a member of the MSHA mine rescue team, at 58 block in the track heading of No. 4 belt at 5:15 pm on January 3, 2006. His body remained in the mine until the early morning hours of January 4, 2006, when the recovery effort was completed.

Mine rescue teams moved into the 2nd Left Parallel Section and, after several hours, a decision was made to break protocol and move immediately to the face area of the Section. Jimmy Klug, Captain of the McElroy Mine Rescue Team, heard someone moaning from the area where the miners had barricaded. Team members called for assistance and immediately began to assess the miners' condition.

An overstretched communication system, resulting from the decision to move to the face, contributed to a problem with unverified information from the face area being communicated through the mine and to the surface. Normal procedures for checking and double-checking information were disregarded. Inaccurate and unverified information that 12 miners were found alive was immediately spread to family members and the nation.

At approximately 12:15 am of January 4, 30 minutes after the initial report to the families and the nation that 12 miners were found alive, mine rescue teams underground informed the command center that the initial information was incorrect. They reported that eleven of the miners were deceased. However, no one in the command center took action to notify the families or anyone else of the error of the earlier report about 12 survivors.

For almost three hours, the families and the nation were not informed that 11 of the miners were actually deceased. After being trapped for more than 40 hours, a single miner, Randall McCloy, Jr., was rescued.

UMWA Findings on the Seals

In late 2005, Sago mine management determined that mining conditions in the 2nd Left Mains Sections had become too dangerous to justify continuing advance development of the area. In sworn testimony given to MSHA and WVOMHST, several miners and management employees cited poor roof conditions and water accumulation as the reasons for abandoning the area.

The Company then initiated a second mining of the Section and began making preparations to permanently seal the area. In September, management sought approval from MSHA to use Omega Blocks to seal the area.

Approval was received from MSHA for the use of non-hitched Omega Block seals on October 24, 2005. Construction of the seals began on the same day and was completed on December 12, 2005. The Company submitted an amendment to use Omega Blocks with a pilaster in the center of the seals for areas in the mine over eight feet in height, as required by MSHA policy. MSHA approved their use on December 8, 2005.

The testimony of miners who built the seals raises serious questions regarding the actual construction of the seals. To begin with, it is apparent that miners were not properly trained in how to construct seals with Omega Block. Miners indicated that the seals were not always anchored to the roof as required because there was not sufficient room to install the wedges. Wedges were used on some of the seals to tighten them from rib to rib, potentially causing weakness in the perimeter of the seal. Whether the bonding agent was applied properly cannot be determined. Miners testified that the bonding cement was poured onto the horizontal layers of the Omega Blocks and applied with both trowels and gloved hands.

The integrity of the seals cannot be verified, because at no time in the installation process or at the completion of their construction were they properly inspected by mine management or officials of the regulatory agencies. In fact, no one from either mine management or the regulatory agencies observed the construction long enough to ensure compliance with the approved plan. *Note: Since the tragedy, MSHA has placed a moratorium on the use of Omega Blocks, and a new minimum 50 psi requirement has been instituted for seals.*

UMWA RECOMMENDATIONS

1. Training of all miners who work on seal construction must be given by a certified person with knowledge of why each construction requirement is necessary to the process. All information in the approved plan must be passed on during the training session.

2. "Tailgate" or descriptive training cannot be permitted for these types of tasks. Training must be comprehensive and clear. The trainer and trainee(s) must also be required to sign documentation that proper training was completed.

3. Inspections of the construction of seals must be conducted by a certified engineer. The inspection must include monitoring the construction for a sufficient time, as well as evaluating the completed seal, to insure each seal is properly installed. The certified engineer should record the findings in an appropriate book.

4. The regulatory agencies should routinely inspect the seal during the construction and at the completion of each seal. Sufficient time for this inspection must be permitted to determine that all seals are properly constructed.

5. The use of Omega Blocks should not be permitted as a ventilation control in any underground mining operation.

6. The National Institute for Occupational Safety and Health (NIOSH) recently released a draft report entitled, "Explosive Pressure Design Criteria for New Seals in U.S. Coal Mines." The UMWA fully endorses the report and its recommendations, as follows:

   a. For unmonitored seals where there is a possibility of methane-air detonation behind the seal, seals should be designed and built to withstand a pressure of 640 psi.

   b. For unmonitored seals with little likelihood of detonation, seals should be designed and built to withstand a pressure of 120 psi.

   c. For monitored seals where the amount of potentially explosive methane-air is strictly limited and controlled, seals should be designed and built to withstand a pressure of 50 psi, if monitoring can assure that the maximum length of explosive mix behind a seal does not exceed 15 feet and that the volume of the explosive mix does not exceed 40 percent of the total sealed volume.

7. The method of seal construction submitted by the operator in the ventilation plan and approved by the agencies must include:

   a. Seals must be hitched into the ribs and bottom a minimum of 6 inches.

   b. A method to continually monitor the atmosphere inby the seals from a remote location on the surface.

   c. Sealed areas must be treated as an integral part of the mine's overall ventilation system, and be specifically designed and approved for each installation at each mine. The seal requirements must be based on several factors, including area to be sealed, special conditions within the area to be sealed and methane liberation.

   d. Seals must be constructed of solid, incombustible material as prescribed in the 1977 Mine Act.

8. The agencies should no longer permit areas of the mine that are sealed to self-inert without continuous monitoring as recommended by NIOSH.

9. Areas of the mine that are to be sealed must be free of all debris that is not permanently installed during the mining process. Materials and supplies such as unused roof support material, posts, oil and hydraulic containers, cables, equipment, belt structure, message or other cables and electrical components or cables must be retrieved and placed in a safe area outside the seals.

UMWA Findings on Methane Accumulation

Information from surveys conducted by MSHA and WVOMHST indicates the sealed area of 2nd Left Mains encompassed approximately 4 million cubic feet. Further testing by the agencies showed that the area liberated about 14,400 cubic feet of methane every 24 hours.

Methane in sealed areas should follow a trend and produce accumulations similar to what is described below. Based on this data from the agencies, and understanding barometric and fan pressures, the relative tightness of the seals to resist leakage and other factors that can affect methane accumulation in the sealed area, the following general assumptions can be made:

December 26, 2005, 14 days after the completion of the seals; the atmosphere in the sealed area would have entered the explosive range with a reading of approximately 5 percent methane.

January 2, 2006, 21 days after the completion of the seals; the atmosphere in the sealed area would have reached approximately 7 - 8 percent methane. This is when the explosion occurred. This concentration is extremely significant based on studies performed by the U. S. Bureau of Mines in 1960. Report of Investigation 5548 (RI 5548) determined that frictional sparking, created by roof strata and roof support material, would cause methane concentrations to ignite. The report also concluded that methane concentrations at about 7 percent would more readily ignite than higher or lower concentrations *(RI 5548 at page 9)*.

Given this basic information, had there been no explosion on January 2, 2006, the methane in the sealed area would have continued to trend upward and oxygen would have decreased until it passed through the explosive range. Using the regulatory agencies' data, that level would not have been achieved until January 22, 2006, a total of 42 days from the completion of the seals. This would have permitted an explosive methane-air mixture to exist in the sealed area for about 28 days (trending graph attached as Appendix 15).

UMWA RECOMMENDATIONS

1. Seals in worked-out or abandoned areas of the mine should be visually inspected and tested each shift with an approved methane detector to insure their structural integrity and to check for methane leakage.

2. Seals that do not pass this inspection must be immediately leak-tested utilizing the same methodology currently used for this purpose at NIOSH's Lake Lynn experimental mine. Any leaks or damage to the seal must be repaired immediately.

3. Adequate rock dusting of the area prior to sealing must be required. Operators must be required to bulk dust each entry and crosscut prior to the start of the sealing process. The final seals should not be installed until the area is inspected and the agencies are satisfied the area has been sufficiently rock dusted.

4. The agencies should consider future sealing methods that require approval of smaller, more manageable areas of the mine. These smaller sequentially sealed areas will eliminate large areas where enormous volumes of explosive gases can accumulate, allowing better control within the area. Successively sealing these areas will afford additional protections to miners.

5. The agencies should not approve ventilation plans that utilize blowing ventilation where active working areas are inby.

UMWA Finding on Second Mining

The mine operator submitted and MSHA approved a plan at the Sago mine to conduct second mining. Second mining is so unusual that many people in the industry are unaware of its practice. The Sago mine is located in an area where the upper and lower benches of the Kittanning Coal seam are located in close proximity to each other. The lower bench lies directly underneath the upper bench and is separated by a binder that ranges from 1-1/2 to 10 feet thick. The upper bench, which varies in thickness from six to nine feet, is mined while the sections are advancing. When advance mining ceases, the binder between the coal benches is removed and the lower coal bench is mined.

This process creates areas in the mine where the distance from the mine roof to the floor can be several times higher than when advance mining occurred. This second mining at Sago created entry heights in excess of 18 feet in many areas. This practice increased the hazards associated with roof falls and rib rolls.

The practice also created a unique problem in the sealed area of the mine. The height of the entries permitted methane to accumulate in the area at volumes much greater than would normally be the case. When the methane in this area was ignited, the forces from the explosion compressed as they radiated outward into the entries that were not part of the second mining. This compression, commonly referred to as "piling," increased the magnitude of the forces, creating much greater-than-normal pressure from the original explosion.

The pressures that struck the seals from the blast at the Sago mine, though yet undetermined, were in excess of what investigators had witnessed at other similar events. There is no doubt that this "piling" contributed to the extensive damage underground.

UMWA RECOMMENDATION:

1. The practice of second mining should not be approved.

UMWA Findings on Forces

The explosion in the sealed area produced heat and extreme forces. These factors pulverized nine of the ten Omega Block seals. The remaining seal, located in the #1 entry, failed catastrophically.

UMWA RECOMMENDATIONS

1. The Union calls for the immediate and permanent ban on the use of all Omega or similar-type blocks and material in any underground area of all coal mines.

2. MSHA should rescind its regulation that permits alternative materials and methods for constructing seals, and immediately require that all seals be explosion-proof seals or bulkheads, as is required by Section 303(y)(2) and (3) of the Federal Mine Safety and Health Act of 1977.

3. The Union believes the current protocol used for testing and approving seals is flawed. The National Institute of Occupational Safety and Health (NIOSH) recently issued a draft report entitled "Explosion Pressure Design Criteria for New Seals in U.S. Coal Mines." The report addresses two critical issues:

   a. What explosion pressures can develop during an explosion within a sealed area, and

   b. What are the appropriate design criteria for seals that will withstand these pressures?

   The UMWA recommends that MSHA promulgate a regulation that would require the construction of seals that meet the mandates of Congress outlined in the 1977 Mine Act and the recent recommendations of NIOSH's draft report on mine seals.

UMWA Findings on the Escape Attempt of 2nd Left Parallel Section Crew

The ventilation plan submitted by the operator and approved by the agencies after the completion of the 2nd Left Mains seals was inadequate. The intake air coursed up the #9 entry and then split to ventilate the seals as well as the 2nd Left Parallel Section, placing miners at great risk. The only safety protection offered to miners from contaminated air entering the Section once the seals failed following the explosion were a few ventilation controls. These controls were not designed to withstand even the limited pressures MSHA requires for seals.

The ventilation controls were immediately compromised by the explosion, and the blowing-type ventilation system pushed the contaminated air directly into the Section. This ventilation scheme compromised the miners' escape route. MSHA headquarters must stop its current practice of approving plans based on industry-wide standards. The unique conditions of each mine must be assessed by the appropriate MSHA District Office and a determination to approve or deny a plan should be made at the District level.

Based on our investigation, the Union determined that the miners in 2nd Left Parallel Section, with their 245 collective years of experience, performed as a cohesive group, with a good understanding of appropriate emergency response. Immediately after the explosion, the crew gathered themselves together and went to the mantrip. They attempted their first escape, but were stopped by debris on the track and zero visibility. They exited the mantrip and immediately entered the intake escapeway, where they donned their SCSRs. Evidence in the mine indicates they then attempted to exit the mine in the intake escapeway, but because of the design of the ventilation system, the gases and smoke from the explosion continued to be forced directly into their faces. The crew then moved inby to the face area and, as they were instructed in their training, barricaded themselves in an isolated location and prepared for rescue.

UMWA RECOMMENDATIONS

1. Mine ventilation systems must be designed to offer miners the greatest possible protection to enhance their ability to escape. Air used to ventilate seals must be coursed away from working sections, and immediately to the return. This is necessary to insure that the integrity of the intake escapeways are not compromised.
2. All mandoors must be clearly marked on both sides.

UMWA Findings on Destruction of Infrastructure

The forces of the explosion in the 2nd Left Mains Section traveled into both active working sections. These forces destroyed the communication system and ventilation controls.

UMWA RECOMMENDATIONS

1. Current communication systems must be hardened (reinforced to withstand the forces of an explosion) to increase their survivability.
2. A second (redundant) communication system, independent of the mine's current primary system, must be installed in a separate isolated entry. This second communication system must run from the surface to additional phones completely separate from the phones currently underground and must be hardened to increase survivability.
3. Current communication technology, including one-way text messaging and two-way wireless systems, must be immediately installed in all mines. Any system that can increase the ability for miners to escape a mine emergency, even if it is limited in scope, must be utilized.
4. MSHA must be required to pursue new technologies that will increase the effectiveness of wireless two-way communication in underground mines. As new technology becomes available, mine operators must be required to install it in all their operations.
5. MSHA and NIOSH must be mandated to fund and direct continued studies and research to develop a new generation of wireless communications technology.
6. Flame-resistant reflective directional lifelines must be required from the face areas in both the primary and secondary escapeways. These lifelines should direct miners from their workplace to the nearest surface escape, shaft, slope or capsule.
7. Tethers for linking miners together when necessary during escape should be available in every section at the inby end of the lifeline. They should be of sufficient length to eliminate the possibility that miners will become entangled while they are walking or crawling to safety. Additional tethers should be located at strategic locations throughout the mine.

UMWA Findings on Donning and Use of SCSRs

With all their escape routes cut off and left with no other alternatives, as a last resort the crew returned to the face area to barricade. Randall McCloy, Jr., reported that soon after donning their self-rescuers, four of the miners could not get their units to function properly. He testified that they tried several times over the next few hours to activate the devices, by both turning the brass valve to start the "candle" and manually breathing into them, but neither method proved effective.

UMWA RECOMMENDATIONS

1. Additional oxygen devices must be readily available where miners are working to ensure there is an adequate supply to begin an escape in an emergency situation. Oxygen must be available for all miners to effectively escape from the deepest penetration of the mine to the surface.
2. Additional oxygen devices in protective cases must be stored at strategic locations in both the primary and secondary escapeways for miners

to access as they travel out of the mine. These caches must be placed at a distance not to exceed 30 minutes normal walking distance.

3. Flame-resistant directional reflective lifelines must intersect every oxygen storage location in the escapeway.

4. SCSR storage caches should include a communication system to the surface, first aid supplies and tethers as well as oxygen.

5. SCSRs currently deployed in the nation's coal mines must be immediately subjected to random testing to ensure they are working effectively. MSHA, with the assistance of NIOSH, should immediately begin a random testing of all units currently deployed in the field.

6. MSHA, with the assistance of NIOSH, should conduct a mandatory random sampling of all SCSRs deployed in the field annually. The annual sample size should be no less than three percent of all units deployed in the industry.

7. The cost of SCSR replacement units selected for testing must be borne by the mine operator as a normal cost of business.

8. The test protocol for approval of SCSRs must be reevaluated and changed to ensure the adequacy and duration of the units. Testing of devices must take into consideration the temperature, age or other condition that may affect the unit's performance

9. Shelf life of stored and carried SCSRs must be reevaluated and if necessary shortened, so that each unit can be relied upon to perform in an emergency.

10. Current SCSR technology is almost 20 years old. The federal and state governments, through MSHA and NIOSH, should actively pursue new SCSR technology. All stakeholders must be closely involved in the design, development and testing of these devices. The new generation of SCSRs must be longer-lasting, more reliable units that require single donning with dockable oxygen canisters. This will eliminate the chance of breathing contaminated irrespirable air when changing units.

11. New SCSRs should be positive-pressure units with full face masks.

12. Training for SCSR donning and escape must be wholly separate from all other types of training miners currently receive. This training must be repeated every 90 days.

13. SCSR and escape training must be done in actual conditions underground and, to the extent possible, reflect real-life emergency situations. Miners must don the SCSR training model and walk at least a portion of the escapeway. The training model must duplicate the characteristics of the working units, including restrictive breathing and heating. The Union opposes the practice of co-mingling or mixing different SCSRs at a single operation.

UMWA Findings on Barricading and Tracking Devices

The 2nd Left Parallel Crew completed a barricade in the face of #3 entry. They then followed correct barricade protocol to signal rescuers, but no rescue was facilitated.

Barricade procedures are taught to all miners in their initial and annual retraining. While barricading has proven to be effective in a few instances, had tracking devices been available they may have facilitated the rescue of the miners. Unfortunately, requiring this technology has never been a priority for the agencies, nor of interest to the industry.

UMWA RECOMMENDATIONS

1. Tracking devices that can identify the location of miners at all times underground must be required at all operations. Such technology is currently available and MSHA must require mine operators to provide these devises to all miners working underground. Any system that can increase the ability for miners to escape a mine emergency, even if it is limited in scope, must be utilized.

2. MSHA and NIOSH must be mandated to fund and continue to pursue technology to greatly increase the capabilities of wireless tracking devices. The goal of the agencies must be to cre-

ate a unit that will allow pre- and post-accident tracking of all miners underground.

3. MSHA and NIOSH must update and test new, easily deployable, reliable and accurate seismic-type devices to locate trapped miners. At least one of these devices should be maintained in each MSHA District office.

   In the event the agencies do not move forward with this recommendation, the Union demands miners be informed that, when barricading, their signaling will not likely be detected on the surface.

4. "Safety chambers" and "safe havens" should be required in all mining operations. The Union notes that these are two distinct systems and they cannot be used interchangeably.

   Each operator must be required to submit a plan that dramatically increases the possibility of survival of miners who are unable to escape an emergency situation. The plan must include the use of both safety chambers and safe havens.

   Safety chambers must be explosion-and fire-resistant, mobile either by means of track wheels or skids and be located no further than 600 feet from the nearest working face of the section in the intake entry. The location of all safety chambers in the mine must be noted on the mine map on the surface. Additional chambers must be located at strategic locations throughout the mine to accommodate outby workers or miners who become trapped during an evacuation attempt. Lifelines from working areas of the mine must intersect each additional chamber in the escape route. The chamber must contain sufficient supplies to sustain the lives of all miners who may have to access it for a period of not less than five full days. The chamber must contain:

   a. adequate oxygen to sustain trapped miners;

   b. first aid supplies to deal with injuries that could be sustained in an emergency;

   c. potable drinking water sufficient to allow one gallon per person per day;

   d. food sufficient to sustain miners in a healthy condition for five days;

   e. sanitary facilities to accommodate trapped miners for the duration of the event;

   f. a separate communications line located in a separate isolated entry, or through a borehole from the surface to the chamber;

   g. devices to monitor the mine atmosphere outside the chamber at all times;

   h. an alarming device that indicates to the mine rescue team that miners have entered the chamber;

   i. activities that will allow miners to avoid, to the extent possible, stress and panic; and

   j. other life-saving or life-sustaining technology that becomes available in the future.

   Training on when to access the chamber and how to utilize its life-saving equipment will be essential to enhancing miners' health and safety. This training must be separate from the current annual retraining under Part 48. It must be comprehensive and frequent to be successful. The Union recommends that it be done at least every six months and should coincide with the emergency response plan review by the Secretary.

   MSHA must drive the industry to improve technology and to require the use of these devices in the nation's mines. Any Program Policy Letter (PPL) or any future rules must be prescriptive in nature, demanding mine operators be proactive to enhance miners' health and safety on a continuous basis, including the use of safety chambers.

   Safe Havens are relatively permanent structures of the mine. The location of all safe havens in the mine must be noted on the mine map on the surface. They must be designed to offer protection and temporary sanctuary to miners as they exit the mine during an emergency. These areas would contain many of the same items required in the safety chambers, but are not designed for the same purpose.

   Rather, they would be a temporary stop to establish communication with the surface, refresh the miners' oxygen supply and offer help to those in need of first aid before continuing to the surface.

The safe haven itself must be constructed of explosion-proof bulkhead seals with submarine type doors for access from either side. The area inside the seals must be ventilated with positive pressure from a surface borehole and with a separate communication line to the surface. Directional lifelines from the working areas of the mine or other inby safe havens or safety chambers must intersect each additional safe haven in the escape route.

UMWA Findings on Notification of Regulatory Agencies and Mine Rescue

The first call from the Sago mine notifying the regulatory agencies or rescue personnel occurred at about 7:20 am. The calls made approximately 50 minutes after the explosion to MSHA, WVOMHST and Barbour County Mine Rescue initially went unanswered. The necessary information was finally passed between the parties when phone messages were returned or additional calls were made.

UMWA RECOMMENDATIONS

1. Mine management must be required to contact the proper regulatory authorities and the mine rescue teams for their operation immediately, but at least within 15 minutes of the onset of the emergency. The operator should have enough responsible people physically on the mine site or immediately available by phone to handle these duties without delay.

   It is the Union's position that the 15-minute notification should not be interpreted to permit an operator an excessive amount of time to assess an emergency. This would only serve to delay rescue and recovery operations.

2. MSHA must create a Mine Emergency Response Office (MERO) within the Agency. The MERO must be staffed 24 hours a day, seven days a week, by experienced full-time MSHA employees with extensive mining knowledge. Emergency contact to MSHA by mine management personnel should be available using a toll-free phone number.

3. The federal and state agencies should be responsible for immediately notifying and deploying all government rescue personnel, equipment and other necessary assets to the mine site after being notified that an emergency situation exists.

4. Every effort should be made to coordinate the emergency response of the federal, state and local agencies.

5. Mine rescue teams required to be first responders must be notified immediately, but at least within 15 minutes of the onset of an emergency. This notice should be made by mine management personnel immediately after notifying the regulatory agency.

6. Mine management must ensure that appropriate arrangements have been made to guarantee their designated mine rescue teams are available 24 hours a day, seven days a week, to cover any situation that may require their services.

7. Two (2) mine rescue teams designated as first responders must be employees of the mining company who routinely train together at the affected mine, but under no circumstance less than four times per year. These teams must be readily available at all times when miners are underground.

   As additional mine rescue teams are needed, they should be from the operations nearest the affected mine. Under no circumstances should a contract or composite mine rescue team be permitted.

UMWA Findings on the Failure to Secure Evidence and Control the Mine Site

The scene on the surface at the Sago mine, even after the arrival of MSHA, the WVOMHST and ICG corporate officials, was chaotic. There appeared to be no one in charge, causing in some cases inaccurate information to be inappropriately disseminated beyond the confines of the command center and rescue teams. This confusion wasted valuable time and complicated rescue efforts.

ICG's first plan was not submitted to the agencies for approval until 1:00 pm, nearly 6-1/2 hours after the explosion. That plan only requested that gases at the pit mouth be monitored, a practice that had already been ongoing for several hours.

It was not until several hours later that ICG submitted a plan requesting the Tri-State A Mine Rescue Team—a contract team—be permitted to enter the mine and begin rescue activities. The plan was later modified to have the more experienced Consol Energy Robinson Run Rescue Team enter the mine first; however, that did not occur until about 5:10 pm, over 10-1/2 hours after the explosion, already too late for some of the miners.

Also, the regulatory agencies have many responsibilities with regard to mine emergencies, including requiring that the operator secure the mine site and manage the accident scene. They failed to adequately fulfill these responsibilities.

Further, it is the responsibility of MSHA to secure evidence obtained during the investigation of any serious non-fatal accident, fatal accident or disaster. This evidence must be immediately recorded and a chain of custody established to ensure it is not tampered with by any individual(s).

During the Sago investigation a pump and pump cable were discovered in the sealed area and retrieved by the WVOMHST. They were removed from the mine and placed on the surface. The equipment was allowed to remain on Sago mine property unattended for several days before government personnel transported it to a federal facility for testing. This break in the chain of custody renders the pump and pump cable unreliable as evidence. Test performed on the unsecured equipment is not credible and will not withstand reasonable scrutiny in the court of public opinion, let alone a court of law.

UMWA RECOMMENDATIONS

1. MSHA must take immediate control of all aspects of the rescue and recovery. It must create plans and implement them to facilitate the immediate use of all mine rescue assets as soon as possible. MSHA should exercise the authority mandated by Congress and not delay before implementing a plan to safely enter the mine and facilitate rescue activity.

2. Representatives of the miners must be afforded full rights to participate in all aspects of the rescue and recovery operations and the subsequent accident investigation.

3. The mine operator must be on-site to provide logistical and general mine information necessary to facilitate rescue and recovery operations.

4. The federal and state regulatory agencies must secure the surface area of the mine and limit access by individuals who have no right to enter the property or are not involved in the rescue efforts. This will ensure rescue teams, fire crews, police, miners' representatives and other necessary personnel understand their roles in the disaster response and are not delayed in beginning the rescue effort.

5. Communications with family members, the press and general public should be handled by an independent arm of the federal government, much like the National Transportation Safety Board (NTSB) and Surface Transportation Board (STB) do with air, rail or highway incidents. They should also make necessary arrangements for family members as they arrive at the site. These requirements should be specifically laid out in the mine emergency response plan.

6. Information from the command center to any sources not immediately involved in the rescue efforts should be carefully monitored and verified to ensure accuracy. In the event miscommunications occur, they must be immediately corrected.

7. All mobile equipment entering the mine during rescue and recovery efforts must be equipped with two- way communications.

8. All evidence or materials that may become part of the official investigation must be secured immediately by MSHA.

9. MSHA must establish a rigid chain of custody for all evidence and see that it is followed to ensure accurate and credible results are obtained during testing procedures.

UMWA Findings on National Mine Rescue Preparedness

Given the demands on the current mine rescue preparedness system, it is questionable how much longer it can be expected to function at its current level. The industry and agencies have known for years that the number of experienced mine rescue teams was continually decreasing, placing ever-greater pressure on those remaining. Many of these teams are made up of highly skilled and motivated individuals who offer their expertise and experience to help miners who are in dire need of assistance. With fewer teams covering an expanding industry, the need for teams to work longer hours in difficult conditions places them at unnecessary risk.

MSHA policy has further eroded the number of mine rescue teams. Permitting mine operators to create unrealistic schemes to cover their mines in the event of an emergency has served to undermine the program. Well-established mine rescue teams train together and participate in mine rescue contests which are supervised and evaluated by the regulatory agencies. This establishes a continuity that leads to a more effective and successful rescue and recovery operation. Most composite and contract teams do not do any of the above, which makes them, at times, ineffective. MSHA must require realistic training that simulates mine emergencies for all mine rescue teams.

Many mine operators consider mine rescue teams a drain on their financial resources rather than a safety enhancement. They refuse to maintain their own teams because they see this practice as an excessive cost rather than a safety protection. They associate rescue team training, and the purchase and maintenance of equipment, simply as a loss of man-hours and profits. This gives companies who refuse to participate in this important process an unfair competitive advantage over other operators.

MSHA's current policy regarding mine rescue teams should be rescinded immediately.

UMWA RECOMMENDATIONS

1. Steps must be taken immediately to significantly increase the number of qualified mine rescue teams nationwide.
2. MSHA should immediately require all mine operators to have two rescue teams readily available at all times when miners are underground. These teams should be made up of miners working at the operation who are familiar with the mine layout and conditions and those team members must perform all required training together.
3. Training for mine rescue teams should be required frequently, but at least every quarter (three months). Training should be done at each mine the rescue team is charged with covering. This will require surface as well as underground exercises to ensure the team members are familiar with the facility.
4. Mine rescue teams should be certified by MSHA to ensure competence. Certification should be directly tied to the team's demonstrating proficiency and skill in all aspects of mine rescue. Teams that do not pass the certification may continue to practice, but shall not be permitted to perform any actual mine rescue.
5. All mine rescue teams should be required to participate in at least two mine rescue contests every year. Failure to participate must result in the team's certification being revoked.
6. Composite and contract mine rescue teams should not be permitted under any circumstances.
7. A member of the mine rescue team actively working in a mine or acting as backup should be immediately available when requested in the command center.
8. The agencies must immediately take enforcement action against any operator that does not comply with the mine rescue team requirements. This action should include issuance of a closure order that stops production at all affected operations. Facilities so affected should not be permitted to resume operations until all aspects of the mine rescue team requirements are met.

UMWA Findings about MSHA

The UMWA has become increasingly concerned in recent years with the direction of MSHA as a regulatory agency. In 1969 and again in 1977, the U.S. Congress assessed the conditions in the coal industry and determined that mine operators were unable to self-regulate. It decided that having statutory language and strictly enforced regulations were the only way to ensure the lives of miners would be protected.

There has been a marked shift in MSHA's priorities from enforcing health and safety regulations to "compliance assistance." MSHA has become unduly concerned with the expense that regulations may have on the operators' bottom line. In some instances, it actively pursues and promulgates regulations operators want that increase production even when they decrease health and safety. The regulation allowing the use of belt air is but one example.

MSHA has greatly expanded its compliance assistance program to get along with the operators, while enforcement activity has taken a back seat. The number of coal mine inspectors has reached an historically low level, although that issue is being addressed thanks to the efforts of Senator Byrd, who led the charge to appropriate $25.6 million in supplemental funding to train 170 additional coal mine inspectors.

The Mine Act and MSHA were created as a result of numerous tragedies in the coalfields. For years, the Agency has come under the influence of operator interests, run by men and women from the highest levels of industry. This is not what Congress intended.

UMWA RECOMMENDATIONS

1. MSHA must re-establish itself as the government's advocate for miners.
2. MSHA must immediately hire and train a sufficient number of inspectors to fill vacant positions and better prepare for the retirement of its aging workforce.
3. Former coal industry executives should not be permitted to hold the highest offices within MSHA.
4. Future regulations must focus first on the health and safety benefits they afford miners. Considerations regarding cost benefits should not in any way negatively impact the protections miners enjoy.
5. In addition to the recommendations already made in this report and the MINER Act, MSHA must immediately take the following actions:
   - Repeal the belt-air regulation;
   - Require flame resistant conveyor belts in all mines;
   - Move to increase the number and skill level of mine rescue teams;
   - Lower the maximum exposure limit for respirable coal mine dust and silica;
   - Update and expand training and retraining of miners;
   - Develop a public hearing- style investigation process;
   - Update the penalty and assessment scheme;
   - Modify the conferencing process;
   - Improve the certification and approval process;
   - Assist NIOSH in developing the next generation SCSRs;
   - Update permissible exposure limits for contaminants in the mine environment;
   - Improve atmospheric monitoring systems;
   - Develop a nationwide emergency communications system;
   - Develop air quality, chemical substances and respiratory protection standards; and
   - Address issues related to working in confined spaces.

The UMWA made many of these same recommendations after the September 23, 2001, Jim Walter #5 disaster. Had they been implemented, the events at Sago, Alma and Darby may have been avoided. MSHA has a responsibility to move forward with these recommendations immediately. The United Mine Workers of America and the nation do not intend to see more miners die as a result of regulatory inaction at any level of the government.

EVENTS OF JANUARY 2, 2006

Prior to preshift examination

On Tuesday, January 2, 2006, three individuals arrived at the Sago mine to perform their required duties prior to the start of production by the dayshift crews. Fred Jamison, beltman and outby fireboss, and Terry Helms (victim), beltmen and fireboss, arrived to perform the preshift examination of the underground areas of the mine. William Chisolm, dispatcher, was the responsible person on the surface.

The testimony of Jamison (*January 17, 2006*) and Chisolm (*February 15, 2006*) to the Mine Safety and Health Administration (MSHA) and the West Virginia Office of Miners' Health Safety and Training (WVOMHST) conflict in several areas. The most notable difference between the testimony is in regard to the time at which certain events took place on the morning of January 2, 2006.

Jamison testified when asked what time he arrived at the mine that, "It was probably a quarter after 2:00 am." (*Jamison page 22 at line 23*) Further, he testified in response to a question about what time he entered the mine that, "It was close to three o'clock..." (*page 48 at line 19*)

Chisolm testified that, "I arrived at the mine site probably 3:30 because Fred Jamison and Terry Helms had to go under and fireboss, so I had to be there in time to start by 4:00." (*Chisolm page 29 at line 2*) Further, he testified that, "My usual shift is 6:00 in the morning till 6:00 in the afternoon. I was to come in at 4:00 in the morning so the firebosses could go under, and then continue working my shift." *(Chisolm page 41 at line 2)*

However, both Jamison and Chisolm reported they had spoken to one another before the fireboss run began. Chisolm also testified that he had a conversation with Helms prior to his entering the mine to begin his preshift examination.

Considering the layout of the mine, the duties each fireboss was assigned to perform and the distance they would be required to travel, these discrepancies can be crucial in determining the events leading up to the explosion. At the time this report was written, the timing discrepancy could not be resolved.

Preshift examination

[Note: for clarity, this section of the report relies on times noted by Fred Jamison, but does not concede their accuracy.]

Fred Jamison arrived at the mine and reported to the bathhouse at approximately 2:15 am and began changing into his work clothes for the start of his shift. Terry Helms arrived shortly after Jamison, and the two discussed what areas of the mine each would examine. Helms told Jamison they would be doing their regular fireboss runs. Jamison's normal examinations included numbers 1, 2 and 3 track and belt. The two then proceeded to the foreman's room to review and countersign the preshift examination books. Helms went out to talk with William Chisolm, Dispatcher, then he and Jamison went down the hill into the pit to get a mantrip.

Helms and Jamison rode into the mine to the first derail switch. Jamison threw the derail, crossed over the track and walked inby in the belt entry. He reached 11 block and heard Helms approaching in the mantrip. He entered the track entry, opened the airlock door, threw the second derail switch and got into the mantrip with Helms and the two proceeded to the No. 3 belt drive. Jamison exited the mantrip at No. 3 belt drive and began walking the belt entry inby towards No. 4 belt drive. During the examination he noticed that a pump at 22 block of No. 3 belt was not operating. The breaker would not reset, so he continued up the belt entry. Helms continued to travel inby to examine 1 Left Section. Prior to leaving, he asked Jamison to examine 2nd Left Parallel Section for him. (Jamison does not normally fireboss face areas of the mine. He reported this was only the second time he firebossed a working section at this operation.)

Jamison arrived at No. 4 belt drive, exited onto the track and took the mantrip Helms left at 1st Left switch to the 2nd Left Parallel Section. Jamison arrived at 2nd Left Parallel at approximately 4:00 am, parked the mantrip at the switch and walked the belt entry into the Section. He entered the Section and crossed into #1 entry, finding no methane and 11, 241 cubic feet per minute of air. He ran all the faces 1 through 8 and found nothing to report. Jamison exited the Section in the track entry and examined the Section power center and charging station.

At the mouth of 2nd Left Parallel, Jamison took the mantrip to 1st left. He called outside to Chisolm and told him he was leaving Helm's bucket and coat at the 2nd Left Parallel Switch. He proceeded to 22 block of the No. 3 belt and attempted to reset the pump again. He was unable to do so and continued to the outside. Jamison told investigators that he recorded this problem on his note pad and informed John Boni, the pumper, when he was on the surface. The note book he refers to has not been found. Jamison arrived on the surface sometime between 5:30 am and 5:40 am and placed the mantrip on charge.

Jamison filled out the 2nd Left Parallel preshift book on the surface, indicating that nothing unusual was found. He also reported talking with the oncoming 2nd Left Parallel Section foreman Martin Toler, telling him that, "The section looked good and...your miner is in number one." *(Jamison page 96 at line 4)* Toler countersigned the preshift report.

Jamison then signed the belt/track preshift book. It specifically noted that Nos. 1-3 track and 1-3 belt were clear. It also noted that Nos. 4, 5 and 6 track were clear. The report stated that areas of Nos. 4, 5, and 6 belts needed rock dust and that No. 7 belt had a water accumulation that needed to be pumped at 20 block. The preshift examination report for Nos. 1, 2 and 3 track as well as Nos. 4, 5 and 6 belt were reported by Terry Helms to John Boni, as was the practice at the mine. Boni would record all the track and belt preshift examinations in the appropriate record book and the examiners would sign the reports at the end of their shift.

On January 2, 2006, Jamison went to the surface prior to the start of the production shift and signed for his examination. It must be assumed that Helms would sign at the end of the shift as he had in the past.

There is no way to corroborate the times stated by Jamison. The dispatcher's report kept on the surface contained insufficient information.

Indications are that Helms completed the preshift examination of 1st Left Section at approximately 4:50 am. He walked to the mouth of the Section, picked up his bucket and walked to 2nd Left Parallel belt drive to complete his preshift examination.

Sometime after 5:00 am, Helms called outside to Owen Jones, 1st Left Section foreman, to report his findings. The evidence shows that: Helms reported that 1st Left Section and charger were safe at the time of the examination, between 4:20 and 4:50 am; he also informed Jones that #2 and #3 entries were not bolted, and 5, 6 and 7 entries needed to be cleaned.

The report does not indicate what time the call was received on the surface; however, Jones stated he did not arrive at the mine until after 5:00 am. There is no way to determine the time Helms made his report. Jones did not record the time on the preshift report and it is not clarified in his testimony. Helms also relayed the belt/track preshift examination report to John Boni at about the same time.

Start of production shift to time of explosion

Shortly before 6:00 am, Owen Jones and his brother Jesse Jones, roof bolter operator (victim), proceeded to the pit and began preparing mantrips for entry into the mine.

The 2nd Left Parallel crew loaded up in the first mantrip and entered the mine at about 5:55 am. It was the practice at the mine to have the 2nd Left Parallel crew enter first because they were the inby Section.

The crew traveled to the 2nd Left Parallel Section, exited the mantrip, and began their normal routine.

Fred Jamison completed his paperwork on the surface and re-entered the mine after the 2nd Left Parallel mantrip departed, at approximately 6:00 am.

The 1st Left crew was delayed entering the mine because the mantrip was not large enough to carry everyone. The trip was switched out and the crew entered the mine on a larger mantrip at approximately 6:05 am, about 10 minutes behind the 2nd Left Parallel crew.

The mantrip proceeded to 1st Right pumper shanty and John Boni exited the trip. The crew continued inby to No. 4 belt drive, where Pat Boni exited the trip and entered the No. 4 belt drive.

The production crew continued inby to the 1st Left switch. Roger Perry, miner operator, got off the mantrip and threw the track switch towards the Section. Perry returned to the mantrip and, immediately upon his sitting down, the explosion occurred. At this time, 29 miners were underground in the mine in various locations.

The explosion and its effects

The explosion was initiated behind the newly-constructed Omega Block seals and blew outward in all directions from its epicenter. No one can conclusively determine the exact point of origin of the explosion. However, based on the damage, it is clear that the sealed area contained sufficient gases to propagate the forces of the explosion a great distance and with extreme force.

The pressure forces (both static and dynamic) and the heat from the blast struck the inby sides of the Omega Block seals, pushing them outward into the active area of the mine. These forces were so great that nine of the seals were completely obliterated. The remaining seal, located in the #1 entry, suffered catastrophic failure and was blown against an adjacent rib-line.

The forces traveled into the 2 North Mains area of the mine outby in the sealed area, destroying communications and ventilation controls up to at least 42 block. The forces also traveled into the 2nd Left Parallel Section, destroying communication and ventilation controls. Dust and noxious gases were immediately present in virtually every area of the mine from 37 block of No. 4 belt inby.

Evacuation of mine and initial rescue attempt

FROM 1ST LEFT SECTION OUTBY

The forces of the explosion struck the mantrip carrying the 1st Left crew, immediately engulfing them in smoke and dust. Debris swept up in the blast also struck the mantrip. Owen Jones, section foreman, attempted to operate the mantrip but was blown out of the seat by the forces of the explosion. The forces were so strong he noted that, "...I'm standing there and it's pushing me forward. It's making me walk. And I'm thinking it's absolutely going to pick me up and throw me, I mean, and then it quits." *(Jones page 23 at line 1)*

The 13-member crew immediately exited the mantrip, gathered on the outby end and started down the track toward the entrance of the mine. The dust was so thick, Jones recalls, that, "...You can't even see the ground. You can't even see your feet. We're following the track the best we can down through there..." *(Jones page 23 at line 17)* They continued to follow the track entry to 37 block of No. 4 belt, where a mine phone was located. Jones called outside to the dispatcher and reported that, "...We've had something happen in the mine, an explosion or something, I said, get the people in here..." *(Jones page 26 at line 2)*

Jones remained at the phone. The rest of the crew left the track though a mandoor, traveled across #7 entry through a second mandoor, and entered the #8 intake escapeway entry. As the twelve miners continued to travel outby in the intake escapeway, Ron Grall and Paul Avington moved ahead of the group.

The remaining ten miners continued to follow the escapeway entering #9 entry at 31 block. They proceeded to travel outby to 27 block when they heard a mantrip approach. They exited the escapeway through mandoors at that location and entered the track heading. A mantrip carrying Jeff Toler, Superintendent; Al Schoonover, Safety Director; Ernest Hofer, Maintenance Foreman; Denver Wilfong, Maintenance Superintendent; and John Boni stopped when they encountered the crew. Wilfong, Boni and Hofer were instructed to take the crew out of the mine. Toler and Schoonover remained underground to assess the situation.

The mantrip proceeded in an outby direction until it reached 9 block of No. 4 belt, where they encountered Grall and Avington. The two miners got onto the mantrip and it continued to exit the mine, arriving on the surface at approximately 7:30 am.

The two other miners who entered the mine at the beginning of the shift also exited the mine safely. Jamison exited in the track entry and Pat Boni walked out the escapeway. At that time Toler, Schoonover and Jones were the only men underground outby the 2nd Left area of the mine.

After gathering supplies on the surface, Wilfong and Hofer boarded the mantrip and headed back underground. They met Toler, Schoonover and Jones at 32 block in the track heading. The stopping at this location was damaged, and they repaired it using brattice cloth.

The trip proceeded inby with all five miners repairing stoppings as they went until they reached 42 block and stopped when their handheld gas detectors alarmed, indicating the presence of carbon monoxide.

The mine atmosphere was unstable, so they decided to disconnect the batteries in the mantrip because they presented an ignition source. They then proceeded inby on foot. They repaired damaged ventilation controls between the #6 and #7 entries at crosscuts 42, 43, 45, 46 and 47. Toler traveled through the damaged brattice wall at crosscut 49 across the track entry and retrieved a phone from the 1st Left belt head; he noticed a reading of 700 ppm CO on the track.

Toler extended the phone line and brought some first aid supplies into the crosscut between #6 and #7 entry; they then continued inby after repairing the wall at 49 block. The crew moved inby and repaired damaged ventilation controls at crosscuts 51, 54 and 55. They noticed that the smoke and CO did not dissipate as quickly as it had been and they became concerned that they had missed some damaged ventilation controls along the way. Toler asked Jones and Hofer to take a roll of brattice cloth and check the outby stoppings.

The other three (Toler, Schoonover and Wilfong) advanced to 57 block and hung a curtain in the crosscut. They moved to 58 block and noticed the smoke was extremely dense. Toler noted, "... It seemed that the smoke was just kind of swirling, that it wasn't wanting to dissipate." *(Toler page 36 at line 2)* The three discussed the possibility that they may be pushing fresh air into an ignition source and cause another explosion. They remained in the area for some time trying to contact the 2nd Left Parallel crew, but got no response.

They finally decided they had gone as far as possible under the circumstances and they should retreat from the area. Toler stated that they "...Probably needed to back out and let the professionals come in, the people that were trained in this." *(Toler page 37 at line 8)* They walked outby to crosscut 49 where Toler had moved the phone previously, called the surface and notified the dispatcher of their decision to exit the mine. They walked down the intake escapeway and caught up with Jones and Hofer around 2 Right; they all proceeded out of the mine, reaching the surface at approximately 10:35 am.

The 12 members of the 2nd Left Parallel crew and mine examiner/beltman Terry Helms were the only miners left underground. There had been no contact with them since approximately 5:55 am when they entered the mine.

Evacuation attempt/rescue and recovery

2ND LEFT PARALLEL SECTION

There is limited information on the activity that occurred on the 2nd Left Parallel Section in the hours immediately after the explosion. However, data collected during the investigation, and the testimony of Randall McCloy, Jr., indicate the following events occurred.

The crew felt the blast from the explosion as a strong gust of wind and the Section was immediately filled with dust and smoke. The severity of the blast had destroyed the Section communication system and severely damaged ventilation controls. While it is unclear how far miners in the Section had separated from one another at this point in time, soon after the explosion they all came together and boarded the mantrip in an attempt to exit the Section. As they moved down the track heading, they encountered thicker smoke and dusty conditions. The mantrip was stopped by debris on the track at 10 block.

The crew exited the mantrip and walked in the direction of the intake escapeway. There are conflicting reports about when the crew donned their Self-Contained Self-Rescuers (SCSRs), but it would appear from the discarded SCSR cases that they performed this task at around 11 block in #7 entry. McCloy reports that four of the units did not work despite repeated efforts to activate them.

Dust and smoke continued to enter the Section, and after attempting to exit the mine in the intake escapeway, the crew returned to the Section and entered the face of #3 entry. At this location, they built a barricade to isolate themselves from the dust and noxious gases. Two members of the crew made a second attempt to find a safe escape route, but were turned back by heavy smoke, gases and debris.

Over the course of the next several hours, members of the crew followed the standard procedures for barricaded miners, taking turns pounding on a roof bolt at their location. (A standard procedure in which miners are trained: pound several times on a roof bolt or waterline and wait for a response from the surface. Rescuers on the surface, hearing the miners, are to set off a shot to notify the trapped miners they have been heard.) No response was received by the barricaded miners because the seismic equipment had not been properly maintained by MSHA and therefore could not be deployed. Eleven of the trapped miners later succumbed to the poisonous mine atmosphere.

Regulatory action and rescue/recovery

Shortly after 6:35 am on January 2, 2006, supervisory personnel on the surface at the mine became aware that something catastrophic had occurred underground. They had received word from Owen Jones that, "We had...an explosion...get mine rescue team here." *(Jones page 55 at line 14)* Efforts to contact the regulatory agencies and mobilize the necessary mine rescue teams, emergency personnel and equipment should immediately have been put in motion, but were not.

At about 7:15 am, Johnny Stemple, Assistant Safety Director, was patched into the mine communication system to Jeff Toler. Toler explained the situation and told Stemple that, "Dick Wilfong recommended that we contact a mine rescue team..." *(Stemple page 30 at line 6)* Nearly 40 minutes had passed since Jones first recommended teams be contacted.

The first attempt by mine management to contact anyone outside of the mine was made at approximately 7:20 am when Stemple placed calls to the state and federal regulatory agencies. His initial calls were either not answered or went to answering machines. At 7:50 am John Collins, an inspector from the West Virginia Office of Miners' Health, Safety and Training (WVOMHST), returned the call from Stemple. After getting some information about the incident, Collins contacted Brian Mills, inspector-at-large for WVOMHST, and informed him of the situation. Collins then proceeded to the mine.

Stemple also tried to contact the Barbour County Mine Rescue Team, which was under contract with ICG to provide mine rescue services for the Sago mine. The call went unanswered: the rescue team's "24 hour" answering machine was turned off.

Inspector Collins arrived at the mine at about 8:15 am and discussed the situation with miners from the 1st Left crew. He asked that air readings be taken in the return entry and, based on the levels of CO, issued a control order. Meanwhile, Stemple contacted a member of the Barbour County Rescue Team at home and informed him of the situation.

At 8:30 am, Stemple reached Jim Satterfield, an inspector with MSHA. Satterfield issued a 103(k) order over the phone and informed Stemple that no one was to enter or do any work at the mine. There was no further contact with representatives of MSHA until approximately 10:30 am when Satterfield, Pat Vanover and Ron Postalwait arrived on mine property.

The Barbour County Rescue Teams arrived at the mine at 11:00 am and began preparations to enter the mine, but were placed on stand-by. MSHA contacted Consol Energy and requested it to mobilize its rescue teams and proceed immediately to the mine. ICG chartered a plane to bring its team from the Viper mine in Illinois.

At 1:00 pm, some 6-1/2 hours after the explosion, ICG submitted a plan to MSHA and WVOMHST to continue to monitor gases at the pit mouth, though this was already being done.

The Union is unaware of any previous plans submitted by the company to this point. MSHA and WVOMHST approved the plan, and monitoring continued for several hours.

Finally, at 4:45 pm, a plan was submitted to send the Tri-State Team A underground to explore the first 1,000 feet inby the pit mouth. The team was required to separate the belt structure and rails one crosscut inby the pit mouth. They were also instructed to tie in three entries every 500 feet and take air readings. The plan was approved by the regulatory agencies.

However, before it could be implemented, a modification was requested to permit the more-experienced Consol Energy Robinson Run Team to enter instead of Tri-State. The plan modification was approved at 5:10 pm. The Robinson Run Team entered the mine's intake entry through the fan housing on the surface. The team continued to move methodically through the mine, taking air readings and assessing conditions. At 6:57 pm, water was reported to be accumulating in the return entry at 21 block. Progress was halted until a plan was submitted and approved to start the pump.

The agencies approved a plan to permit the use of battery mantrips to transport mine rescue teams in and out of the mine to block 17 of #3 belt. The teams advanced to 32 block by 8:50 pm. The track was separated in this area to prevent the possibility it would carry a charge into the mine, creating an ignition source. The Robinson Run Team advanced to 34 block and reported seeing a red light in the entry, which they were given permission to investigate. The light was identified as a CO monitor operating on a backup power supply. Because of the potential ignition source the CO monitor presented, all teams were instructed to exit the mine until it could be de-energized. At approximately the same time the light was detected, 2:45 am, a drill rig on the surface began drilling a borehole into the 2nd Left Parallel Section.

At 5:30 am, the borehole punched through into the 2nd Left Parallel Section approximately 300 feet from the face. Air samples indicated levels of CO at 1,300 ppm, or three times the maximum safe level for a one-hour exposure. The drill rig was shut down to listen for signs of life in the area. After about 10 minutes, the drill steel was struck in an attempt to signal the trapped miners, but there was no response.

Rescue teams reentered the mine at 6:30 am on January 3, 2006. At the same time, a camera was lowered through the borehole into the belt entry of the 2nd Left Parallel Section, about where the feeder was located. There was no sign of damage from the explosion at that location, indicating the blast was initiated outby the Section. There was also no indication that the trapped miners had barricaded.

From 7:00 to 8:00 am the rescue teams advanced to 31 block No. 4 belt when MSHA decided to use its V2 mine robot. The robot was offloaded at this location and advanced to 32 block, where it became disabled.

The teams continued to move inby and advanced into the 1st Left Section, a distance of six breaks at block 48. They then proceeded up the mains and established a fresh air base at 57 block, #4 belt. While some rescue team members secured the fresh air base, others explored the entries between 57 and 58 blocks. Ron Hixson, MSHA inspector, discovered a body lying across the track, subsequently identified as Terry Helms. Indications are that he was caught in the direct path of the blast.

The fresh air base was completed at 5:45 pm, and rescue teams began to move inby to take gas readings at the sealed area. The teams continued to advance forward, but did not realize until they called outside with their location and the results of their air readings that they had actually traveled inby the seal locations, at 62 block of the 2nd Left Mains. They retreated out of the area and examined all the headings across 2 North Mains, confirming that all the seals had been completely destroyed. The Omega Block seals had been struck with sufficient force to pulverize them. The damage was so extensive that team members did not realize that they had advanced into the 2nd North Mains Section.

The teams then advanced into the 2nd Left Parallel Section and discovered the ventilation controls from the mouth of the Section to 12 block in the primary intake escapeway were all damaged. They found the Section mantrip at 10 block, and determined the crew must have attempted escape, but were stopped by debris on the track. At 8:00 pm, the rescuers found the discarded cases of twelve SCSRs in the intake escapeway at 11 block of #7 entry.

The process of exploration from the mouth of 2nd Left Parallel Section to just inby the location where the SCSR cases were discovered, about halfway to the faces, had taken rescuers nearly three hours. The determination was made that continuing at this slow pace was unacceptable, and a decision was made to break rescue team protocol and push immediately to the faces. The teams were instructed at about 11:00 pm to disregard normal procedure and advance inby immediately.

This decision stretched the already taxed communication system beyond its capacity and resulted in communication problems; nevertheless rescuers agreed with the decision to advance more quickly. By 11:40 pm, the McElroy Team had reached the faces and split in separate directions to explore each face. Jimmy Klug, McElroy team captain, and Bill Tucker, of WVOMHST, explored the left entries, while Hixson (MSHA) and McElroy team members Mike Clark and Jim Smith explored the right side entries.

As they advanced forward in the #3 entry, Klug and Tucker heard someone gasping for air. They immediately noticed a curtain hanging across the entry and pushed it to the side. The 12 miners were all at this location. Klug moved toward the gasping miner (Randall McCloy), pulling him away from another miner who had fallen on top of him. He immediately activated a CSE SR-100 SCSR and placed it into McCloy's mouth. However, because of the victim's shallow breathing the device could not be properly activated. Tucker stepped back into the entry and called to the other rescue team members that they had found the miners and needed help. In the excitement Tucker yelled out, "They're over here. They're over here and they're alive." *(Tucker page 27 at line 6)*

The message, largely incorrect and yet unverified, was relayed from location to location along the overstretched communications system. The message went outside to the command center and was almost immediately communicated across the mine property and to the families at the Sago Baptist Church.

In the 2nd Left Parallel Section, the initial excitement quickly turned to sadness, as Hixson, Smith and Clark arrived at #3 face and the rescue team examined all the trapped miners. It became obvious that there were no other survivors. Despite this reality, while Klug and others worked on the surviving miner, the remaining rescuers checked each of the other miners and confirmed they were deceased. Rescue workers relayed the new information back through the communications chain, but it is unclear how far the correct information was transmitted.

The rescuers arrived at the fresh air base at the mouth of 2nd Left Parallel Section with McCloy around 12:15 am. They immediately placed the mask of a Draeger BG-4 positive pressure breathing apparatus on him and fitted it to his face. When Klug reached the fresh air base with McCloy, he realized the original miscommunication, regarding the condition of the trapped miners, had never been corrected. He immediately went to the mine phone and contacted the command center and reported, "We got 11 items" *(Klug page 32 at line 2)* ("item" was a code for body that the teams were instructed to use at the request of ICG). The command center personnel did not comprehend the message and finally, after several attempts to make them understand the situation, Klug stated, "There's 11 deceased people." *(Klug page 32 at line 4)* The command center ordered everyone out of the mine.

McCloy was carried to the mouth of 1st Left Section and placed on a mantrip for transport to the surface. The mantrip was delayed when they encountered a motor pulling a supply car into the mine. The miners on the motor acting on the original incorrect information had entered the mine to assist in what they believed was a rescue effort. Mine rescue team members informed them of the situation in the Section and proceeded to the surface with McCloy, arriving at about 1:00 am. The officials at the command center had received news about the fatalities at approximately 12:30 am on January 4, 2006, but no one communicated it from there at that time. The families of the miners continued to celebrate at the church until about 2:45 am when they were informed by mining company officials of the tragic news.

The Viper Mine Rescue Team went back underground at 1:55 am with stethoscopes and body bags to reassess the condition of the miners and remove them from the mine. The members of the team confirmed the information relayed earlier by Klug and began the task of identifying each miner and preparing them for transport. The rescue teams reached the surface with the bodies of the twelve miners at approximately 10:00 am, January 4, 2006.

The rescue and recovery efforts were completed nearly 52 hours after the explosion.

MINE SEAL REQUIREMENTS

Federal Coal Mine Safety and Health Act of 1969 (Coal Act), and

Federal Mine Safety and Health Act of 1977 (Mine Act)

Concerning ventilation, 30 USC § 863(z) requires that:

(2) When sealing [a mined out or abandoned area of the mine] is required, such sealing shall be made in an approved manner so as to isolate with ***explosion-proof bulkheads*** *such areas from the active workings of the mine.*

(3) In case of mines opened on or after the operative date of this title, or in case of working sections opened on or after such date in mines opened prior to such date, the mining system shall be designed in accordance with a plan and revisions thereof approved by the Secretary and adopted by such operator so that, as each working section of the mine is abandoned, it can be isolated from the active workings of the mine with ***explosion-proof seals*** *or* ***bulkheads.***

30 USC §877(k) requires that any inactive areas of the mine "shall be sealed by the operator in a manner prescribed by the Secretary..."

However, by subsequent regulation, 30 CFR §75.335, the Secretary has allowed mine operators to submit ventilation plans which included alternate methods or materials for sealing worked-out or abandoned areas of the mine. This regulation affected all seals installed after November 15, 1992, and allowed the use of other materials, including timber and Omega Blocks, for seals provided they met a 20 psi static pressure test. (The testing of this material by the Mine Safety and Health Administration was completed in 1990, so approval for in-mine use was permitted.)

The initial underpinnings for the regulation rely on a 1971 study by Donald Mitchell, U.S. Department of the Interior, Bureau of Mines at the Lake Lynn Experimental Mine in Pennsylvania. The study, Report of Investigation 7581 (RI 7581) determined that seals placed in mines to isolate worked-out or abandoned areas from working sections need only pass a static pressure test of 20 psi. Previously, the Department of Interior had established a 50 psi static pressure requirement for seals. The lower standard was, however, contingent upon other factors being accounted for and monitored.

There is a marked difference between static pressure cited here as the pounds-per-square-inch a seal must withstand and the forces of an explosion. Static pressure refers to the pressure waves that strike the seal from an explosion as they pass by it or parallel to the seal as it travels down the entry adjacent to the cross-cut. This type of testing does not subject the seal to the direct forces of an explosion, or the dynamic pressure. It is not clear why the tests were performed in this manner, given that the forces from an explosion within a sealed area will push outward in all directions, including directly toward the seals.

Mitchell stated in his opening that, "The Federal Coal Mine Health and Safety Act of 1969 requires that such areas [worked-out or abandoned] be ventilated or sealed with explosion-proof bulkheads, but the present study indicates that bulkheads alone cannot isolate areas in the coal mine in which methane or other dangerous gases have accumulated. Gas-air exchanges between sealed and open areas must be controlled." *(Mitchell RI 7581, page 1)*

The determination that a seal must only withstand a static pressure of 20 psi to be approved by MSHA for use in a coal mine relied on several other factors being controlled by the mine operator. Mitchell concluded that an explosion occurring within a sealed area will never exert more than 20 psi static pressure for a distance greater than 200 feet from where it originates, provided coal dust is not involved. Further, seal leakage must be controlled to ensure the area does not flow in and out of the explosive range of methane. These factors are crucial in determining the effectiveness of the seals.

Mitchell noted that, "A leakage rate as small as 100 cubic feet per minute (CFM) will cause an exchange as great as 1 million cubic feet of atmosphere between open and sealed areas within a week." *(Mitchell RI 7581 at page 3)* In real terms, a sealed area containing 4 million cubic feet of atmosphere, with an inert methane mixture at 20 percent of the total volume, could present a real hazard should it leak into the active area of the mine at a rate of 100 CFM.

In the course of a week, the atmospheric change could reduce the methane accumulation to 15 percent, creating a potentially explosive methane-air mixture. This leakage is affected by several factors, including increase or decrease in fan and barometric pressure. Decreases in the pressure against the seals will allow the seals to out gas into the active mine, changing the methane-air mixture of the sealed area.

Mitchell concluded, "To isolate sealed areas from active workings, pressure within the sealed area must be relieved; gas-air exchanges between sealed and open portions of the mine must be controlled; and gas leakage from sealed areas must be directed into return air courses, preferably through the bleeder entry. **Further, sealed areas should not adjoin intake air courses.** If they must, then atmosphere in the intake air should be continuously monitored by a system that gives warning should harmful gases be detected, or other suitable means that protect the health and safety of the men in the mine." *(Mitchell RI 7581, page 8)*

The Union disagrees with Mitchell's determination that a seal need only withstand 20 psi static pressure in order to be sufficiently protective of miners. Even in isolation, this minimal requirement does not take into account the ever-changing and dynamic atmosphere that exists in the sealed area. The mixtures of gases within the sealed area are, by nature, subject to erratic changes and are free-moving bodies of various gases. It is impossible to determine how close in proximity an explosive mixture is to the seals. Therefore, it is not practical to use the 20 psi at a distance of 200 feet calculation in determining the pressures that may be applied to the seals.

The UMWA also contends that simply looking at static pressure is improper and incomplete. The explosive forces created when a methane-air mixture is ignited also generates extreme dynamic forces that travel in all directions from the epicenter of the blast. This dynamic pressure must be considered when determining minimum standards for seals.

The Union does agree with Mitchell that sealed areas of the mine must be continuously monitored to insure a pro-active plan for controlling gob gases remains in place and is followed as necessary.

The final basis for 30 CFR §75.335 and the inclusion of other seal construction materials, including Omega Block, was completed in 1990 by Clete Stephan, MSHA's Principal Mining Engineer of the Bruceton Safety Technology Center.

Stephan agreed with many of the determinations of Mitchell, including the 20 psi standard, leakage flows from sealed to active workings, the effects of changes in fan and barometric pressure and the need to actively control gob gas exchanges into the open area of the mine.

However, unlike Mitchell, he determined that "§75.329-2, which states that seals...may be constructed of...incombustible material" *(Stephan, Omega 384 Block as a seal construction material at page 4)* is a very stringent test for seal construction material. He defines the incombustible aspect of a seal as, "one that is intended to keep the material used to build a seal from creating a fire hazard or contributing fuel to a fire or explosion." He therefore suggested that, "A less restrictive term... noncombustible," *(Stephan, Omega 384 Block as a seal construction material at page 4)* should be applied to seal testing. In his final determination on the subject he stated that, "Another way to define incombustible for seals is that the total structure is capable of providing a certain fire resistance. The fire resistance rating is essentially the time the wall can be expected to resist the passage of heat, flame or hot gases, any of which could ignite combustible material on the opposite side of the wall when the wall is subjected to heat from a carefully controlled source, such as a furnace." *(Stephan,* *Omega 384 Block as a seal construction material at page 4)* Stephan determined that, "A one hour fire resistance as per ASTM E-119(4) (American Society for Testing and Materials) or equivalent, would be reasonable." *(Stephan, Omega 384 Block as a seal construction material at page 5)*

Based on his decision that incombustible is a fire-resistance definition, Stephan then determined that, "...There are combustible materials, such as wood, which are capable of providing one-hour fire resistance according to ASTM E-119(4). Basically it requires that such a seal be thick enough to prevent passage of flame or hot gases for one hour." *(Stephan, Omega 384 Block as a seal construction material at page 6)*

He then determined that Omega Blocks meet this incombustible requirement and proceeded with explosion-testing of the material, despite the intent of Congress and specific Mine Act language.

The seal testing performed on October 10, 1990, included four Omega Block seals constructed in various configurations. It is important to note that all were hitched six inches into the bottom and ribs. Two were constructed with two pilasters and two were built with a single pilaster. The seals were subjected to a single explosive force of 20 psi static pressure.

The seal descriptions and test results are as follows:

Seal # 2 Crosscut	**Description**	
	Seal Thickness	32 inches
	Number of Pilasters	2
	Pilaster Thickness	48 inches
	Pilaster Width	48 inches
	Keying	Floor (6 inches) and Ribs (6 inches)
	Joints	Staggered
	Bonding Agent	All joints, inby face and outby face with Burrell Bond
	Bond Thickness	1/4 inch minimum
	Wedging	Approximately 6 inches to 1 foot on top
Test Result	Survived Blast	
	Passed Air Leakage	
	APPROVED	

Seal # 3 Crosscut	**Description**	
	Seal Thickness	24 inches
	Number of Pilasters	2
	Pilaster Thickness	48 inches
	Pilaster Width	48 inches
	Keying	Floor (6 inches) and Ribs (6 inches)
	Joints	Staggered
	Bonding Agent	All joints, inby face and outby face with Burrell Bond
	Bond Thickness	1/4 inch minimum
	Wedging	Approximately 6 inches to 1 foot on top
Test Result	Survived Blast	
	Failed Air Leakage	
	NOT APPROVED	

Seal # 4 Crosscut	Description	
	Seal Thickness	24 inches
	Number of Pilasters	1
	Pilaster Thickness	56 inches
	Pilaster Width	42 inches
	Keying	Floor (6 inches) and Ribs (6 inches)
	Joints	Staggered
	Bonding Agent	All joints, inby face and outby face with Burrell Bond
	Bond Thickness	1/4 inch minimum
	Wedging	Approximately 6 inches to 1 foot on top
Test Result	Survived Blast	
	Passed Air Leakage	
	APPROVED	

Seal # 5 Crosscut	Description	
	Seal Thickness	24 inches
	Number of Pilasters	1
	Pilaster Thickness	48 inches
	Pilaster Width	48 inches
	Keying	Floor (6 inches) and Ribs (6 inches)
	Joints	Staggered
	Bonding Agent	All joints, inby face and outby face with Burrell Bond
	Bond Thickness	1/4 inch minimum
	Wedging	Approximately 6 inches to 1 foot on top
Test Result	Survived Blast	
	Passed Air Leakage	
	APPROVED	

The Union has never agreed with several of the determinations by Stephan. We believe that his redefinition of "noncombustible" coupled with the 20 psi standard put forth by Mitchell is a significant reduction in miners' health and safety. Considering the potential forces from a gob gas explosion, permitting the use of lighter and therefore less substantial materials for seal construction reduces their effectiveness. The Union contends that the forces needed to cause the catastrophic failure of an Omega Block is substantially less than previously approved seal material, and that it cannot be classified as a reliable sealing material.

Likewise, Stephan's determination that the mandate of Congress when it required "noncombustible" was not what it intended, but was something less, is not appropriate. This redefinition flies in the face of the "no less protection" standard MSHA is required to meet when promulgating regulations.

Finally, it is important to note that the requirements for seal construction today are significantly reduced beyond even what was outlined by Mitchell and Stephan. In practice, Omega Block seals are not required to be built with any pilasters unless they reach a height of over 8 feet. Neither does the agency require hitching of the seals into the bottom or ribs. There can be no doubt that these types of applications will not even provide the minimal protection to miners outlined in the 1990 tests cited above.

With regard to implementing the minimal monitoring of seals, both inby and outby, as advocated by both Mitchell and Stephan, the Agency has failed the nation's miners. The approval process has become a rubber stamp for the 20 psi requirement and no other protections. More often than not, MSHA and mine operators treat the areas beyond the seals as if they are not a part of the mine. Because mine operators are not even required to do routing leakage tests to determine the effectiveness of the seals, there is no process by which they can determine the relative safety of the sealed area.

Since the disaster, MSHA initially placed a moratorium on the use of Omega Blocks for seal construction. The Agency has reassessed its position and determined that seals must withstand at least 50 psi of static pressure. The Agency did not limit any type of material currently used in the industry, including Omega Blocks. MSHA has made this determination despite ongoing testing to determine the potential pressure seals must withstand in the event of an explosion.

This practice does not enhance miners' health and safety, and MSHA should revert back to the Congressional mandate outlined in the 1969 Coal Act and reiterated in the 1977 Mine Act by requiring the use of explosion-proof seals or bulkheads in areas of the mine that are permanently abandoned and/or worked out.

The seals must be examined each shift to ensure their integrity. Further, mine operators must be required to continuously monitor the atmosphere inby the seals from locations on the surface.

The Union believes the current protocol used for testing and approving seals is flawed. The National Institute of Occupational Safety and Health (NIOSH) recently issued a draft report entitled "Explosion Pressure Design Criteria for New Seals in U.S. Coal Mines." The report addresses two critical issues:

a. What explosion pressures can develop during an explosion within a sealed area, and;

b. What are the appropriate design criteria for seals that will withstand these pressures?

The UMWA recommends that MSHA promulgate a regulation that would require the construction of seals that meet the mandates of Congress outlined in the 1977 Mine Act and the recent recommendations of NIOSH's draft report on mine seals.

MINE SEALS (2ND LEFT MAINS)

As noted previously in this report, based on conditions encountered in the 2nd Left Mains Section of the mine, a decision was made to abandon and seal the area from the active workings of the mine. According to Jeff Toler, Superintendent, mining ceased, "...around the 1st of October..." *(Toler page 145 line 17).*

Shortly after mining ceased in 2nd Left Mains, a decision was made to submit a plan to utilize Omega Blocks to seal the area. In response to questions by MSHA regarding the decision to request plan approval for Omega Blocks rather than using packsetter seals (as had been previously done), Toler stated, "I have some history. I've built a few seals in my career, and if I'm building the seal, I would prefer an Omega seal." *(Toler page 122 at line 10)*

The request for approval for Omega Block seals in excess of eight feet was reportedly done for seals to be built in 1st Left Section, at a later date. These seals required additional support in the form of pilasters—a single pilaster for seals over eight feet, but less than ten feet and two pilasters for seals over ten feet but less than 12 feet. The #1 seal located in #1 entry of the 2nd Left Mains Section exceeded eight feet in height for a distance of seven feet on the left side looking inby, but was not constructed with a pilaster as required.

Jeffrey Snyder, Outby Foreman, was assigned the task of building the seals by Jeff Toler, Superintendent. Snyder stated that Toler indicated on the mine map where the seals were to be placed, and then they reviewed the seal plan. Though the effectiveness of training miners on new tasks is extremely important, there is some question as to the training received in this instance based on the testimony of Snyder. He states, "It (the training) was kind of a before the shift started kind of thing, where the office is kind of chaotic and you're trying to get ready for the day." *(Snyder page 29 at line 22)* Snyder was then given a copy of the seal plan.

Construction of the 2nd Left Mains seals began on October 24, 2005, the same day the approval was received from MSHA. Snyder was assigned to supervise the construction with a crew that generally consisted of three miners, including Jeremy Toler, Casey Short and George Brooks. Prior to constructing the seals, the crew removed the roof mesh as required. During construction, four other miners, Marty Conrad, Mike Trippett, John Jackson and Harmon Jordan, would occasionally help. None of the crew, including Snyder, had ever installed Omega Block seals previously. Snyder stated in his testimony that he reviewed the sealing plan with the members of his crew. He does not remember if he instructed the other miners who helped. In his testimony he noted, "I went over it with everybody that was helping me in charge. I don't think I covered it with every individual, the seal plan. I tried to, but I may have missed one or two, maybe three, I don't know." *(Snyder page 77 at line 7)*

The first seal to be built was located in the #8 entry. The crew completed it to a height of about four or five feet when Toler discovered it did not meet the requirements of the plan and had to be moved. Snyder stated, "...I didn't have it in the right spot and the superintendent came up and we had it over halfway built and he made us tear it down and put it in the right spot." *(Snyder page 46 at line 4)* The seal was moved approximately four feet further inby the edge of the rib and the crew started rebuilding the seal to a distance ten feet inby the rib as required by the approved plan. This seal was constructed using at least some of the Omega Blocks that had been used previously, according to Snyder. He also testified that during construction, the crew was not always able to seal all the joints with b-bond or place the required number of wedges on the middle board on the top of the wall.

SUBMISSION AND APPROVAL OF OMEGA BLOCK SEALS

1. October 12, 2005
   Anker West Virginia Mining Company
   Sago Mine Ventilation Plan Changes

   To: Mr. Kevin Stricklin, District Manager, MSHA District 3
   Request to add Omega Concrete Block Seal Method, non-hitched style to the Ventilation Plan.
   Joe Myers for Al Schoonover, Safety Director

2) October 19, 2005
   Guidelines for installation of Omega Block Concrete Seals
   Stamp of receipt from MSHA District 3
   (noted as revision in approval letter)
   Unsigned

3) October 24, 2005
   U.S Department of Labor
   Mine Safety and Health Administration, District 3

   To: Jeffrey Toler, Superintendent, Anker West Virginia Mining Company
   Requests of October 12, 2005, and revision of October 19, 2005, to add alternative method of seal construction is approved.
   Kevin Striklin, District Manager, MSHA District 3 (stamped)

4) October 28, 2005
   Anker West Virginia Mining Company
   Sago Mine's Seal Proposed Plan Amendment

   To: Mr. Kevin Stricklin, District Manager, MSHA District 3
   Request to amend the proposed mine seal plan submitted September 29, 2005, to permit the use of Omega Block mine seals, with pilasters, in areas that exceed 8 feet in height. (*The UMWA is not in receipt of this document*)
   John Stemple, Assistant Director of Safety and Employee Development

5) October 31, 2005
   U.S Department of Labor
   Mine Safety and Health Administration, District 3

   To: Jeffrey Toler, Superintendent, Anker West Virginia Mining Company
   Requests of October 31, 2005, to add alternative method of seal construction is approved.
   Kevin Striklin, District Manager, MSHA District 3 (stamped)

All correspondence relating to the above matters are included at the end of this report as Appendices 9-12.

With the exception of the day Toler made them move the initial seal, Snyder does not remember any specific time he or the Mine Foreman, Crumrine, were in the area. He notes they occasionally came to the area, but did not offer any specific comments or instructions.

Snyder ceased working on the seals on November 9, 2005, when he was reassigned to another job in the mine. He was replaced by James Scott, a certified foreman working at the Sago mine as a contract miner with Garrett Mining Service (GMS). He had been at the operation in that capacity for about two years at the time of the explosion.

There are discrepancies between the testimony of Scott and Snyder, and while that is not uncommon, it is also important to highlight the more notable ones. Snyder stated of the ten seals constructed, he helped build the first seven before Scott took over. However, Scott states, "The last five (seals) I built." *(Scott page 25 at line 2)* There were ten seals in all. Scott also stated that both he and Snyder received the seal plan training from Toler at the same time. As noted previously, Snyder said he received the training from Toler at the start of the shift, and when asked if anyone else was present, stated, "I don't recollect anyone else standing in." *(Snyder page 29 at line 21)*

Scott supervised the construction of the final seals, including the #1 seal that contained the water trap and #10 where the sampling tube was located. George Brooks and Casey Short, who were assigned to Scott, were new contract miners from GMS; their first day underground was October 31, 2005. Like the previous crew assigned to build the seals, none had any experience with Omega Blocks.

Scott's crew constructed the seals in generally the same manner as the previous ones. They testified that they were not able to get b-bond into all the joints, and that it was often too difficult to place all the required wedges on the middle board at the top of the seal. In fact, when asked if all the seals were built with three boards on top as required, Casey stated, "No. Like I was telling you earlier, the best you could do, they said, you know, you need to use three if you can." *(Short page 106 at line 9)* They also reported that they used wedges between the Omega Blocks and the ribs to keep the wall tight from side to side, and that pieces of wood and paper were used to fill gaps between the rib and blocks.

The seals were completed, according to Scott, on December 12, 2005. He then finished making the required air changes. The 2nd North Mains sealed area was left to self-inert.

The questionable construction of the seals seems obvious when looked at in their entirety. Missing fly boards, the inability to wedge the center of the structures, unapproved material being used to secure the seals rib-to-rib and serious questions about the application of the bonding material all raise concerns about their integrity and effectiveness in separating the active area of the mine from the sealed area. However, even if the seals had been constructed according to the approval, they would have failed catastrophically against the explosive forces on January 2, 2006.

Nevertheless, there are questions with regard to these particular seals that must be viewed as systemic problems at the mine, including lack of experience, poor training and inadequate oversight. The failure to correct these was inexcusable.

The discrepancy between Scott's and Snyder's testimony is problematic, but not the real issue. The real problem is not whether their training session occurred together or separately, but the implications are extremely important because it indicates that training for new tasks was not given a high priority. The real concern must be the extent of the training, especially given the fact that no one working this assignment had any experience with these types of seals. In fact some of the laborers had very limited mining experience at all.

Where experience is lacking, as was the case here, training and supervision of the task must be done in such a way as to ensure miners thoroughly understand the construction process and the importance of their work in the overall operation of the mine's ventilation system. Scott's recollection that training on the seals occurred with Snyder present and Snyder's statements that the training happened between shifts when it was chaotic indicate the information was not passed on in a methodical or instructive manner. Further, the foremen assigned to the task cannot say with any certainty that everyone who assisted them in the seal construction was ever trained in the job task. In fact, one foreman noted during questioning that, "They're seals. If you can build one, you can build them all." *(Conrad page 35 at line 4)* The training that was given to some of the crew was done underground immediately before they began work on the seals.

This type of casual instruction is unacceptable. In many instances, miners' lives depend on training. This is not limited only to evacuation and SCSRs, but includes equipment operation and systems' construction. The operator failed to properly execute training in this case.

By all accounts, oversight of the seal construction process was almost non-existent. From the testimony, there does not appear to have been anyone from middle or upper management or the regulatory agencies who spent any substantial time in the area during the construction of the seals. This should never be the practice during a project that plays such a key role in the mine's ventilation system. However, considering that the location of these seals was immediately outby the mouth of an active working section in a blowing ventilation system, it was even more crucial to have proper oversight of the construction.

Based on these findings, the Union does not believe that adequate steps were taken to ensure proper construction. Therefore, setting aside the fact that Omega Blocks seals should not have been approved, what went wrong during seal construction was the result of inadequate training and insufficient oversight.

It must also be pointed out that the approval of this seal design is not realistic from a construction standpoint. Miner after miner noted that because of the thickness of the Omega Block wall and the limited distance between the seal top and the roof, placing wedges on the middle "fly board" was almost impossible. The Union submits that construction requirements of the approved plan for these types of seals were practically impossible to adhere to, and should not have been approved.

The facts noted above are important to evaluate the overall effectiveness of training and oversight at the mine, however, they do not address the real problems with these seals. Omega Blocks are not designed to withstand the forces that can be generated in the underground areas of a coal mine. This is obvious by the pulverization of nine of the ten seals at the Sago mine. Unfortunately, it is not the only time they have proven to be inadequate for use in the mining industry. Recent events at Drummond Coal's Shoal Creek mine in Alabama and Kentucky Darby's Darby Mine No.1 are other examples of the Omega Block failures.

The UMWA urges MSHA to return to the mandates set out in the 1969 Coal Act and the 1977 Mine Act and require the use of explosion-proof seals or bulkheads and implement the recent recommendations of NIOSH's draft report on mine seals to separate mined-out or abandoned areas from the active workings of the mine.

Roof Control

Coal mine operators are required to submit a roof control plan that outlines the minimal requirements for supporting the mine roof to the federal and state regulatory agencies for approval prior to initiating any mining activity. The agencies are responsible for reviewing these plans at least every six months thereafter. Roof control plans usually remain unchanged unless mining conditions warrant modifications. These modifications can be requested by the operator or required by the agencies depending on the circumstances. The modifications are submitted to agencies and generally amend certain specific sections of the approved plan. Submission of a new plan can be initiated by either the mine operator or requested by either agency and usually occurs when modifications are so numerous that the plan becomes confusing.

The last complete copy of the Roof and Ground Control Plan for the Sago Mine was submitted on September 16, 2004, by Al Schoonover from the Safety Department of Anker West Virginia Mining Company, Inc.

The plan indicates that the immediate roof in the mine consists of 20 feet of gray shale, and above that, the main mine roof is sandstone. Entry and crosscut widths are not to exceed 20 feet, and crosscuts may be turned off the entry between 48 and 110 foot centers. The distance between crosscuts is generally dictated by the roof conditions encountered in a particular area of the mine.

The roof was to be primarily supported by the use of either 5-foot fully grouted (glued) tension bolts or by a combination of 4- and 6-foot fully grouted bolts installed in a staggered pattern. This would be considered the normal bolting pattern for the mine. The use of 10-foot non-tensioned cable bolts were to be installed as supplemental and only as needed. The specific installation requirements were contained in the plan. There were also additional requirements for when unexpected adverse mining conditions would be encountered.

In addition to the general information, the plan requires that supplemental roof support be used for the development of mains and sub-mains at the Sago mine. This required that screen wire, with openings no greater than 4 inches by 4 inches, be bolted to the roof in the track and belt entries. The primary escapeway and one return aircourse were required to have one of the following supplemental support systems installed: roof sealant, roof bolt plate at least 17 inches square, wire screen with openings no greater than 4 inches square or two rows of posts no greater than six feet apart. The plan was approved by MSHA District 3 on October 4, 2004.

The 2nd Left Mains Section was one of the areas of the mine that required supplemental roof support to be installed. The use of these supplemental materials demonstrates the Section was encountering adverse roof conditions. The application of the minimum supplemental support indicates that the operator expected to encounter difficulty supporting the immediate roof.

The mine encountered several roof control problems over the next ten months that required modifications be made to the roof control plan, including the use of truss bolts and tunnel arches. The use of these supports indicates that problems were being encountered beyond the anchorage point of the bolts. This would affect the main mine roof, generally causing roof falls above the anchor points of the bolting pattern.

The first modification of the roof control plan specifically identifying the 2nd Left Mains Section was submitted by the operator on or around August 16, 2005. The new plan required screen wire, with openings no greater than 4 inches by 4 inches, to be installed in the primary escapeway in addition to the track and belt entries. This type of requirement indicated that the local roof conditions were bad enough to require a specific type of supplemental support at all times.

The roof conditions continued to deteriorate, and the operator made a second request to modify the roof control plan sometime between August 22–26, 2005. Based on the conflicting dates on the documents, it appears information was being passed between the operator and MSHA to address the situation (this is a standard and accepted practice in the industry). The first modification submitted by the operator *(Roof Control Plan Amendment: page 2a)* for controlling the roof required the operator to install screen wire on the immediate mine roof so as to "reduce exposure of falling material to personnel" (indicating all headings were to be screened), reduce the width of the entries from 20 to 18 feet, and increase the size of the roof bolt bearing plates. There is no MSHA approval attached to this modification.

The operator then submitted a second request to the August 22–26, 2005, modification *(Roof Control Plan Amendment: page 2a1)* that included minimum requirements beyond those originally submitted. In addition to those cited above, the modification required: the installation of 8-10 foot cable bolts in four-way intersections, 6-10 foot cable bolts in all three-way intersections, and two 10-foot cable bolts on 8-foot centers as mining advanced. Further, the plan modification noted, "The above stated stipulation will be in effect while the current roof conditions exist." MSHA approved the plan modifications on August 29, 2005.

The UMWA is convinced that these modifications and the dialogue between the two parties show a sense of concern on both their parts about the roof conditions. The changes to the plan approved on August 29, 2005, cannot be understated; they represent an understanding by the parties that the roof conditions were progressively getting worse, and that the conditions could not be corrected without extensively enhancing the roof control requirements.

On September 19, 2005, the operator submitted a modification to MSHA requesting that second mining be permitted in limited "test" areas of two sections of the mine including areas in the 2nd Left Mains Section. This amendment would permit the mining of the lower bench of the Kittanning seam of coal, which is located immediately beneath the originally mined seam at a depth of between 1-1/2 and 10 feet. Mining this coal seam would eliminate any further advancement of the 2nd Left Mains Section and require the eventual abandonment of the area. MSHA approved the plan on September 21, 2005.

On September 21, 2005 an MSHA official stated in a letter to Sago mine Superintendent, Jeffery Toler, "As you are aware, increasing the opening height of entries and crosscuts to the extent in your request decreases the stability of the coal and rock ribs and increases the hazards related to falls in areas where persons are required to work and/or travel."

The dangers associated with second mining have been discussed previously in this report. However, it is important to note that MSHA was well aware of the dangers that this practice would create at the Sago mine.

The operator requested modifications to permit second mining of additional areas of 2nd Left Mains Section be approved between October 3-7, 2005. MSHA approved the request on October 7, 2005. After completion of second mining, the area inby 62 block of the 2nd North Mains was abandoned, and the plans were approved by MSHA to seal the area.

A month after MSHA's approval of the second mining, on November 7, 2005, miner Charles Donegia was struck by rock and coal in an area that had been second mined. Donegia suffered permanently disabling injuries including two broken vertebrate, broken ribs, a collapsed lung and a ruptured spleen.

An investigation into the accident found that the operator exceeded the parameters of the mine's roof control plan, and that additional roof support that was required was not installed. Despite these findings the company did not correct the conditions when MSHA returned to the mine. The Agency also cited the company for not recording the conditions in the pre-shift report as required.

The modifications to the Roof Control Plan reveal ever-deteriorating roof conditions in the 2nd Left Mains Section. Management assessed the situation and determined that it was no longer feasible to continue mining in the area.

It is clear that by constantly modifying the roof control plan, conditions were changing in the affected area and that the operator and the regulatory agencies were aware of the deterioration. Still, the modifications required at the Sago mine do not give the complete story of the severity of the situation. During the investigation into the explosion, many of the miners testified about the adverse conditions in 2nd Left Mains Section. Their testimony is very important to understanding the magnitude of the problem.

Lonnie Short, Weekend Shift Foreman

When asked about abnormal conditions in 2nd Left Mains Section, he stated, "We just had a lot of bad top." *(Short page 30 at line 13)*

When asked what the roof conditions were in the area he stated, "I mean we had a lot of bad top up there. We set brow bolts—I mean, brow extenders, or whatever they call them." *(Short page 33 at line 10)*

Further, he noted, "Cable bolt intersections and at last, I think we screened every entry, but I'm not sure." *(Short page 33 at line 15)*

When asked why they pulled out of the area, he said, "It's all water and bad top. We was cable bolting every intersection, 12 and 14s, 10s. Tens, 12s, 14s cable bolts." *(Short page 33 at line 20)*

Jeff Snyder, Outby Foreman

When asked if he knew why mining was stopped in 2nd Left Mains Section, he said. "Yes sir, I do, it was adverse conditions. The mining process became intolerable." *(Snyder page 89 at line 25)*

When asked what those adverse conditions were, he stated, "We was running into bad roof and excess water." *(Snyder page 90 at line 5)*

Seth Osborne, Laborer

When asked what work he did in the 2nd Left Mains Section, he said, "...We screened (the roof) all the way up, pretty much all the way in there." *(Osborne page 49 at line 16)*

He further stated, "It was always pretty—you always had to keep your eyes on top, which you always do, but it was—it was more flaky in spots." *(Osborne page 49 at line 24)*

Darrel Lucas, Roof Bolter

In his description of 2nd Left Mains Section, he said, "Most of it was pretty bad top." *(Lucas page 23 at line 7)*

When asked to describe what he meant, he stated, "It was falling in everywhere. We set up rail plates, screen, we cable-bolted the section in a lot of places, because the 6-foot bolts didn't anchor in for the sand rock, we just did cable bolts." *(Lucas page 23 at line 17)*

When asked what the immediate roof strata was and what fell in, he said, "I guess sometimes it was sand rock. But most of it was slate." He further stated, "But some of it, I seen sand rock fall in, too." *(Lucas page 24 at line 5)*

Jeff Toler, Superintendent

"Well, we were advance mining, and toward the end of the panel, we were having some roof conditions." *(Toler page 145, line 21)*

When asked about roof falls in 2nd Left Mains Section, he stated, "Two falls, one in #1 entry, it was pretty good—it was a pretty long fall. I'm thinking it went a crosscut, maybe two crosscuts right down the entry, which would put it in excess of 100-foot long, probably six feet high, at least. And we had another one—we had one in the track entry that was about a crosscut long. It fell pretty high. ...eight, ten-foot, maybe higher." *(Toler page 149 at line 3)*

Al Schoonover, Safety Director

When asked if he was familiar with the 2nd Left Mains Section, he stated, "I would—yeah I would investigate roof falls up there." *(Schoonover page 81 at line 16)*

John Boni, Pumper

When asked if he knew why mining was stopped in 2nd Left Mains Section, he stated, "Adverse conditions." *(Boni page 131 at line 5)*

He further stated, "They were getting a lot of water. Some of the top wasn't real good..." *(Boni page 131 at line 8)*

John Collins, Inspector, West Virginia Office of Miners' Health, Safety and Training

> When asked if he ever noticed anything unusual in 2nd Left Mains Section, he stated, "Number two—old two Left had real adverse roof conditions. We had a permanent disabling injury up there with a piece of roof. That's why they were required to go full screen in the brow tenders." *(Collins page 47 at line 18)*

As noted previously, mine operators or the regulatory agencies can request modifications to the roof control plan. These changes are a common occurrence in the industry and do not necessarily represent anything out of the ordinary. A modification will, however, give clear indications of the conditions that are being encountered in specific areas of the mine. The series of requests, with increasingly stringent measures at the Sago mine, demonstrated that conditions were continuing to deteriorate and additional measures were necessary in an attempt to address the problems.

This is clearly the case in the 2nd Left Mains Section of the Sago mine preceding management's decision to abandon the area. The fact that the final decision was made to stop advance mining and seal the area shows that even the supplemental roof controls were not sufficient. There is every indication that the mine roof was too unstable to permit mining.

It is likely that the conditions in 2nd Left Mains Section continued to worsen during the retreat mining and while the seals were being constructed. This became obvious during the accident investigation when mapping of the area revealed adverse roof conditions and roof falls that were not present before the area was abandoned.

These roof conditions would have continued to present an even greater hazard once the area was sealed. Shifting of the roof strata and roof falls often create friction and sparking as the materials rub together or become dislodged and strike other materials as they fall. Roof falls create cavities where methane can accumulate. Previous reports have shown that frictional arcing can cause methane ignitions in sealed areas.

This problem is further compounded by the metal roof bolts, plates, straps and other materials—including oil and hydraulic cans, cables, equipment and other supplies left behind. Pressure exerted on point anchor and combination roof bolts can cause them to fail and become dislodged from the roof strata. This is also true for cable bolts: the weight of the rock compromises their ability to support the roof, and they are sheared off. This "popping" of the bolts releases energy and will in many instances cause arcing at the point of separation. The danger is compounded when the metal bolts strike other materials, including additional roof supports or rock in the area. These situations can create sparking which can ignite methane if an area has not been inerted.

Finally, the testimony of miners at Sago and the statement by mine inspector Collins indicated that, as mining progressed in 2nd Left Mains Section, wire screen was required in every entry. While the installation of wire screen to support the local roof was necessary to protect miners working in the Section, it proved to be a potential ignition source within what became the sealed area.

As the roof deteriorates and settles, it can exert pressure on the wire. Sudden shifting of the rock or wire can cause arcing. In addition, the pressure from the roof can cause sections of wire to shift and rub against one another. The action of metal rubbing against metal can create additional ignition sources.

Based on the underground investigation of the Sago mine and the information obtained during the interview process, the Union is convinced that the roof in the 2nd Left Mains Section continued to deteriorate after mining in the area ceased. These conditions, together with the additional roof support required, created an undeterminable number of possible ignition sources.

Based on the facts of the investigation, the United Mine Workers of America finds that the most likely cause of the explosion was frictional activity from the roof, roof support or support material igniting the methane-air mixture.

The suggested ignition source offered by ICG and WVOMHST represents a self-serving and predetermined theory that the ignition source was beyond their control. The facts of the investigation, as well as the long history of coal mining, indicate that frictional activity from the roof, roof support or supporting material was a more likely source of the ignition.

VENTILATION

Based on the information received from the federal and state regulatory agencies and observations made during the underground investigation, the Union has made the following assessment of the ventilation system at the Sago mine.

The mine was ventilated by a Joy 400 horsepower fan installed in a blowing type system. The fan produced approximately 125,000 cubic feet of air per minute (CFM) and was located at the mine mouth in the #5 entry.

Prior to the completion of the 2nd Left Mains seals and the installation of other ventilation controls, the #9 entry from the 2nd Right Section inby was used as a return. In this ventilation scheme, intake (fresh) air was coursed up #7 and #8 entries, inby the 2nd Right Section. It then crossed over the other entries from right to left through a series of overcasts and regulators to ventilate the 1st Left and 2nd Left Parallel Sections and the abandoned 2nd Left Mains Section.

The active working sections (1st Left and 2nd Left Parallel) were both ventilated in the same manner. Intake air would enter the section in #7 and #8 entries, sweep across the faces, and return in #1 and #2 entries to the mouth of the sections. The 1st Left Section ventilated the "butt" sections off of #1 entry as they advanced.

The abandoned area of 2nd Left Mains Section was ventilated by the same split of intake air used to ventilate 2nd Left Parallel Section. The ventilation entered the area in the #1 entry of 2nd Left Mains Section, swept the faces and returned in the #9 entry of 2 North Mains, inby the 2nd Right Section. The return air crossed over entries 5, 6, 7 and 8 and dumped into the main return at 2nd Right Section. Immediately after the completion of the seals, the mine ventilation remained the same. This meant the ventilation swept the inby side of the seals from left to right (from #1 entry to #9 entry). This ventilation scheme pushed the return air from the seals outby and away from the active 2nd Left Parallel Section.

According to testimony, on December 12, 2005, mine management completed a major ventilation change that affected the airflow from 2nd Right Section inby. From that point, the #9 entry was changed from a return to an intake entry. Intake ventilation was coursed into the working sections in #7, #8 and #9 entries by means of overcasts and other ventilation controls much as it was prior to the air change. However, a portion of the intake was split and pushed up the #9 entry to ventilate the seals. The seals were then ventilated from right to left, pushing this air towards the mouth of 2nd Left Parallel Section.

This air split would pass by the seals from entry #9 to entry #1 before being coursed into the #2 return. At this point the return entry was separated by only one brattice wall from the 2nd Left Parallel Section main intake.

This ventilation design was not sufficiently protective of the miners. The fact that a single brattice wall was all that separated the intake of the 2nd Left Parallel Section from air that had ventilated the seals is a cause of concern and should not be permitted. Mitchell even made special note of this in his report when he stated, "Further, sealed areas should not adjoin intake air courses." *(RI 7581 at page 8)*

It is clear that the explosion destroyed the seals and damaged ventilation controls in the 2nd Left Parallel Section and further outby. When this occurred, the single wall separating the return from the intake was also destroyed. Because of the mine's blowing system and ventilation design, the contaminants from the explosion were forced into the 2nd Left Parallel Section's primary and secondary escapeways.

The UMWA contends the ventilation system in place at the mine at the time of the explosion did not adequately protect the miners.

CONSIDERATION OF LIGHTNING AS A POTENTIAL CAUSE

The Union has completed an exhaustive review of data obtained from the Mine Safety and Health Administration, the West Virginia Office of Miners Health, Safety and Training, the United States Bureau of Mines reports and the National Institute for Occupational Safety and Health, in an effort to determine the potential for a lightning strike that occurred over two miles away to cause the explosion at the Sago mine.

The Union received information from MSHA's Warehousing Group in Denver, Colorado, identifying 1,151 incidences of ignitions and 35 reports of underground mine fires since 1995. The vast majority of these reports were of ignitions of methane gas accumulations, generally caused by frictional activity between mining equipment and the coal/rock faces being mined. There were also numerous reports of ignitions occurring when miners were cutting and welding.

The Union has also reviewed the information on coal mine ignitions and explosions compiled in 1998 by MSHA through the National Mine Safety and Health Academy. That historical reference, the *Historical Summary of Mine Disasters in the United States, Volume II - Coal Mines - 1959 - 1998*, documented the information on the following pages.

From January 29, 1959, to January 24, 1994:

- Total ignitions and explosions reported 2,289

CAUSES (RELEVANT TO THIS REPORT)

- Frictional roof fall 14
- Unknown origin 19
- Lightning (**without conduit**) **0**

FRICTIONAL ROOF FALLS:

	Date	Company	Mine	State
1)	12-14-62	Not listed	Lancashire #15	PA
2)	6-23-66	Not listed	Robena	PA
3)	4-3-67	Not listed	Moss #2	VA
4)	8-10-67	Not listed	Moss #2	VA
5)	8-17-67	Not listed	Forge Slope	PA
6)	6-5-71	Not listed	Humphrey #7	WV
7)	12-5-72	Not listed	Virginia Pocahontas #3	VA
8)	12-26-72	Not listed	Moss #3	VA
9)	3-15-75	Not listed	Virginia Pocahontas #3	VA
10)	12-19-75	Not listed	Olga	WV
11)	3-6-76	Not listed	Lancashire #20	PA
12)	10-7-86	Sidney Coal Co.	Roadfork Mine No. 1	KY
13)	7-27-87	Sidney Coal Co.	No. 1 Mine	KY
14)	12-19-92	Consolidation Coal Co.	Amanota No. 31 Mine	WV

UNDETERMINED ORIGIN:

	Date	Company	Mine	State
1)	5-24-62	Not listed	Shannopin	PA
2)	3-3-63	Not listed	Itman No. 3	WV
3)	1-20-68	Not listed	Jamison	WV
4)	1-9-74	Not listed	Maitland	WV
5)	3-9-76	Not listed	Scotia	KY
6)	3-9-76	Not listed	Scotia	KY
7)	4-10-77	Not listed	Vesta #5	PA
8)	12-19-81	Not listed	Mars #2	WV
9)	9-5-86	Jim Walter	Mine #3	AL
10)	12-12-86	Consolidation Coal Co.	Buchanan #1	VA
11)	4-27-87	Golden Oak Mining Co.	Black Oak No. 2	KY
12)	6-23-88	Green River Coal Co.	Green River Coal No. 9	KY
13)	7-19-88	Clinchfield Coal Co.	McClure No. 1 Mine	VA
14)	12-14-88	Pyro Mining Co.	No. 9 Slope William Station	KY
15)	12-18-89	Birchfield Mining Inc.	Mine No. 1	WV
16)	7-10-90	Clinchfield Coal Co.	Splashdam Mine	VA
17)	1-15-91	Island Creek Coal Co.	VA Pocahontas No. 3 Mine	VA
18)	5-4-93	Jim Walter	Mine #3	AL
19)	8-22-93	Drummond Coal Co.	Mary Lee No. 1 Mine	AL

Neither MSHA nor any other regulatory agency has ever specified the cause of the 19 ignitions and explosions listed above. They have been unable to determine the exact cause of the events because of the existence of several potential possibilities that were found at each event or the conditions caused as the result of the event precluded investigators from making any absolute determination. None of these events was ever attributed to a source outside the underground area of the mine.

In July 2006, Davitt McAteer, former Assistant Secretary of Labor for Mine Safety and Health, was appointed by West Virginia Governor Joseph Manchin, to determine the cause of the Sago disaster and offer regulatory measures to ensure such an event did not occur again.

The Sago Mine Disaster, a Preliminary Report to Governor Joseph Manchin III (Report), makes several statements the Union disputes. These statements are not supported by the facts uncovered during the joint investigation.

First, the statement that, "Based on the available evidence thus far, we do not believe that the Sago mine disaster can be attributed to any specific actions on the part of International Coal Group (ICG), the federal Mine Safety and Health Administration (MSHA) or the West Virginia Office of Miners' Health, Safety and Training (WVOMHST), *(Report at page 12)* is not accurate. The Union has determined, based on the available evidence, that some of the plans proposed by Sago mine management and approved by the regulatory agencies created the conditions that lead to the events of January 2, 2006.

The Report also states that, "Lightning probably caused the explosion." *(Report at page 38)* There is no evidence to support such a finding based on the investigation and additional data the Union has analyzed. Circumstantial evidence, such as timing of lightning strikes and the approximate onset of the explosion, offer no conclusive indication, let alone solid evidence, that the two events are related.

Finally, the Report cites eight specific incidences, excluding the Sago mine disaster, where sealed areas of underground mines were involved in explosions. The Report would suggest that these eight events were somehow relevant to the Sago mine disaster. **They are not.**

The examples in *The Sago Mine Disaster, a Preliminary Report to Governor Joseph Manchin III* noted above did not specify the additional information contained in the UMWA's report. The Report did not include the potential paths that would have enabled lightning to travel from the surface to the affected sealed areas of an underground coal mine, despite this information being noted in the investigative reports. Each of these examples contained a conduit path, should lightning have been the source, for energy to be transferred from the surface into these sealed areas. The Union is certain that these eight cases do not reflect the circumstances present at the Sago mine on January 2, 2006. It is disingenuous for the Report to even suggest that the other explosions have significant characteristics in common with the Sago mine disaster. **They do not.**

On December 11, 2006, WVOMHST issued its *Report of Investigation into the Sago Mine Explosion*, under the direction of Ronald Wooten, Agency Director. The report states on its initial page that, "This represents the final report regarding this matter." However, there are few conclusive findings within the report itself. The repeated omissions, general speculation and lack of solid facts contained in the state's report renders it unreliable. In fact, the report raises far more questions than it answers.

The Union believes that the report by WVOMHST was drastically flawed from the beginning, based on the statement made by one of its primary authors before the underground investigation was even initiated.

The Union has reviewed a January 12, 2006, memorandum (attached as Appendix 16) from Monte Heib, Chief Engineer to then Agency Director Doug Conaway. Mr. Heib noted calibrations made to the mine's CO monitoring system clock and the approximate times of lightning strikes within several miles of the Sago mine. He then stated, "Unless evidence is uncovered in the future which casts doubts on the facts as stated above, there is convincing circumstantial evidence that the explosion at the Sago Mine on January 2, 2006, was directly related to one or both of the lightning strikes recorded at 06:26:35 am, both of which occurred at the opposite side of the Buchannon River from the Sago Mine."

The memorandum by Mr. Heib was written over two weeks before the official underground investigation into the cause of the disaster was initiated. Based on these facts, it is extremely difficult to believe, as a lead member of the investigation team, that he could conduct an impartial and thorough investigation into this matter. Further, being a major author of the report, it is apparent its writing parallels his initial thinking despite the lack of conclusive evidence to support the report's limited conclusion.

The Union's investigation does not find any plausible means for lightning to have entered the Sago mine on January 2, 2006. The facts remain that all the conditions necessary to cause the disaster were present within the confines of the mine.

Neither ICG nor the WVOMHST have cited one example where lightning entered a sealed area of the mine without a direct conduit from the surface to the sealed area. In addition, the Union is unaware of any investigative report by MSHA that offers any such evidence.

The Union has reviewed each of the explosions that were initiated in sealed areas along with MSHA's analysis:

1) 8-22-93 Drummond Coal Company Mary Lee Mine Alabama

An explosion occurred in a sealed area of the mine. Investigators determined that an electrical storm passed through the area around the time of the explosion. They also determined that a vent pipe located atop the 70 North Fan Shaft could have been electrified by a lightning strike and was the probable cause. **(Conduit present)**

2) 4-5-94 U.S. Steel Mining Oak Grove Mine Alabama

An explosion occurred in a sealed area of the mine. Investigators determined that an electrical storm passed through the area around the time of the explosion. A cased borehole was located in the immediate area of the lightning strike. The casing would have acted as a conduit from the surface to the sealed area of the mine. **(Conduit present)**

3) 6-9/16-95 U.S. Steel Mining Gary No. 50 Mine West Virginia

An explosion occurred in a sealed area of the mine between June 9 and 16, 1995. Investigators were unable to determine the source of the ignition. However, they have speculated that the source was either a lightning strike or a frictional roof fall.

There are several paths at the location from the surface that would have permitted energy generated by a lightning strike to enter the sealed area of the mine. A frictional roof fall is also a likely ignition source. **(Conduit present)**

4) 1-29-96 U.S. Steel Mining Oak Grove Mine Alabama

An explosion occurred in a sealed area of the mine. Investigators determined that an electrical storm passed through the area around the time of the explosion. There were several cased test wells located in the immediate area of the lightning strikes. The well casings would have acted as a conduit from the surface to the sealed area of the mine. A frictional roof fall is also a likely ignition source. **(Conduit present)**

5 & 6) 5-15 and 6-22-95 Oasis Contracting Mine #1 West Virginia

Two explosions occurred in a sealed area of the mine. Investigators were unable to determine an ignition source for either explosion. However, they have speculated that a lightning strike or frictional roof fall were probable causes. Cased borehole/wells were located in the immediate area of the lightning strikes. The casing would have acted as a conduit from the surface to the sealed area of the mine. A frictional roof fall is also a likely ignition source. **(Conduit present)**

7) 7-9-97 U.S. Steel Mining Oak Grove Mine Alabama

An explosion occurred in a sealed area of the mine. Investigators were unable to determine the origin of the ignition source, however, lighting was reported above the sealed area about the time of the explosion. Lightning had occurred in the same general location twice previously, May 4, 1994, and January 29, 1996 (noted above). The immediate area of the strikes had numerous cased wells. The casings would have acted as a conduit from the surface to the sealed area of the mine. **(Conduit present)**

8) 5-8-01 U.S. Steel Mining Gary No. 50 Mine West Virginia

An explosion occurred in a sealed area of the mine. Investigators have not determined an ignition source. However, they have speculated that the source was a lightning strike. The area is penetrated by several sealed shafts from the surface to the coal seam. There are also numerous cased wells in the area that would act as a conduit from the surface to the sealed area of the mine. **(Conduit present)**

CONCLUSION

There were numerous factors that came together on the morning of January 2, 2006, causing the violent explosion and the tragic and unnecessary loss of life. Based on the Union's investigation, and contrary to other assertions, it is not factual to say that events beyond the control of the mine operator or the regulatory agencies simply happened. Nor is it accurate to state the explosion was "an act of God," and thus unavoidable.

The UMWA believes that the decisions made months and years prior to the explosion put a series of events in motion that lead to the disaster. The failure to assess the overall impact of these decisions must be called into question.

Submission and approval of inadequate mining and training plans, improper installation of ventilation controls all have consequences after they are put in place. Each aspect of the mine's overall operating system impacts every other; no specific plan or method of operating is isolated from the others. If thoughtful analysis is not done of each plan or method—not only how they meet the immediate needs they are designed to address, but how they will impact other aspects of the mine's overall system—the possibility of bad things happening can dramatically increase.

The choices the International Coal Group (ICG) made, as approved by the agencies, to address the overall conditions at the mine and how each plan affects the other is even more tragic when we realize the initial explosion may have taken but one life. The fact that 11 other miners died because they were unable to escape compounds the consequences. These consequences could have and should have been prevented if reasonable care had been taken to assess the conditions being created.

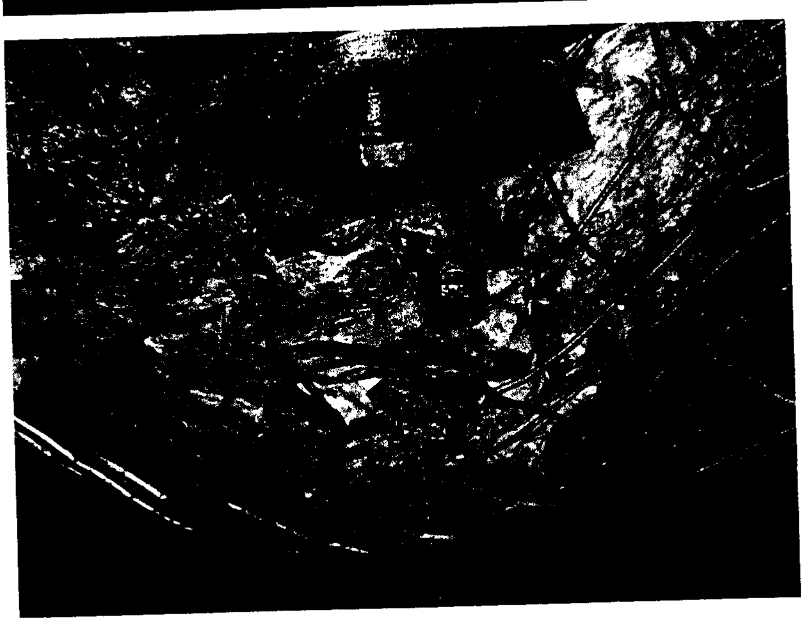
The actions by mine management, approved by the regulatory agencies, created the greater potential for an accident than would normally be found in a single area of a coal mine. However, to permit these conditions to be created in an area of the mine so susceptible to frictional activities that can cause arcing, the most probable ignition source for the explosion, was inexcusable.

It becomes apparent based on our findings that there is no conclusive evidence the lightning caused the explosion, as has been suggested in other reports or in others' comments. Based on the facts of the investigation, the United Mine Workers of America finds that the most likely cause of the explosion was frictional activity from the roof, roof support or support material igniting the methane-air mixture.

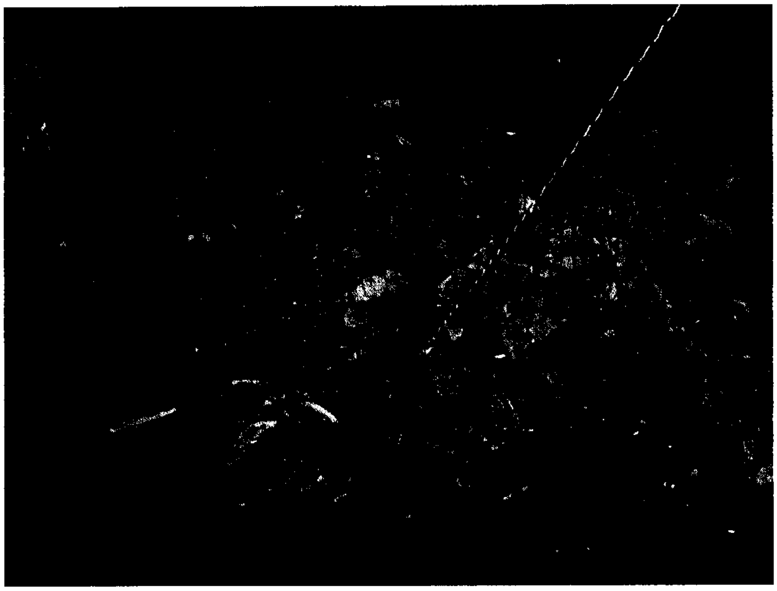
The events at the Sago mine on January 2, 2006, could and should have been prevented.

Wire screen, such as that in the picture to the left, was common in many areas of the Sago Mine. The West Virginia Office of Miners Health, Safety and Training required mine management to screen almost the entire roof area in the 2nd North Mains Section just prior to abandoning the Section.

In areas that did not require wire mesh, management was required to install large roof bolt plates (pie pans) to support the local roof. Supplemental supports, such as cable bolts, were also required in many areas of the mine to address adverse conditions, including the 2nd North Mains Sections.

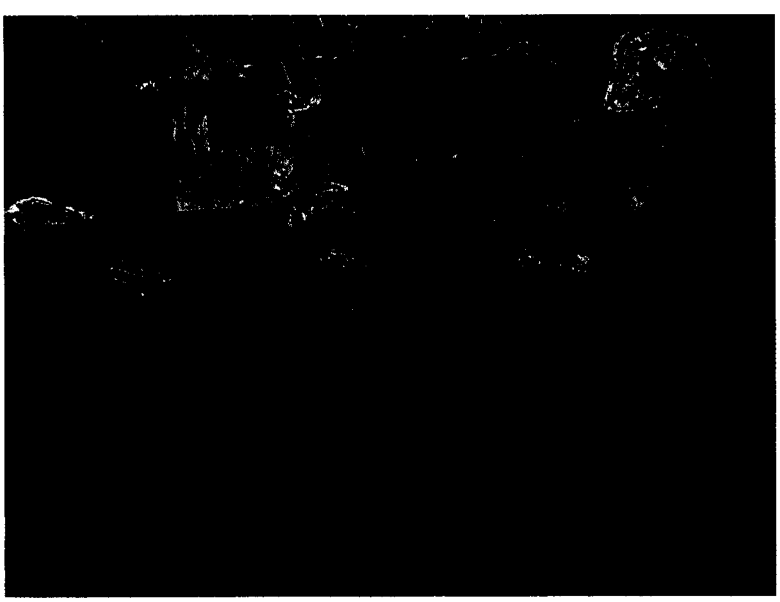


Continuously deteriorating roof conditions after an area has been supported by roof bolts and screening causes pressure on the supports as demonstrated in the picture. These stresses can cause the screening, bolts and roof to rub together or break under the pressure, potentially causing frictional arcing.

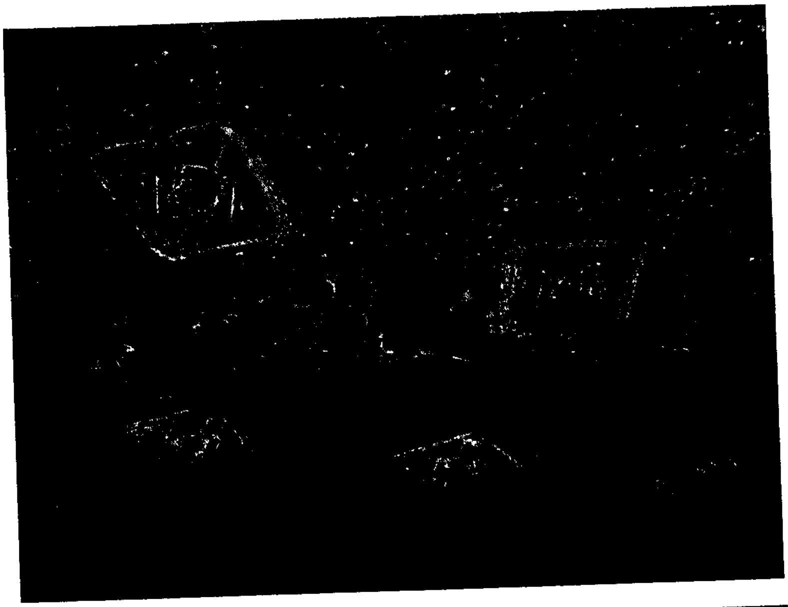


Roof falls are a hazard in the mining industry. The picture to the left was taken in the 2nd North Mains Section after the explosion. The investigation revealed numerous falls in the area that had occurred after it was sealed. Roof fall have been documented to cause frictional arcing.

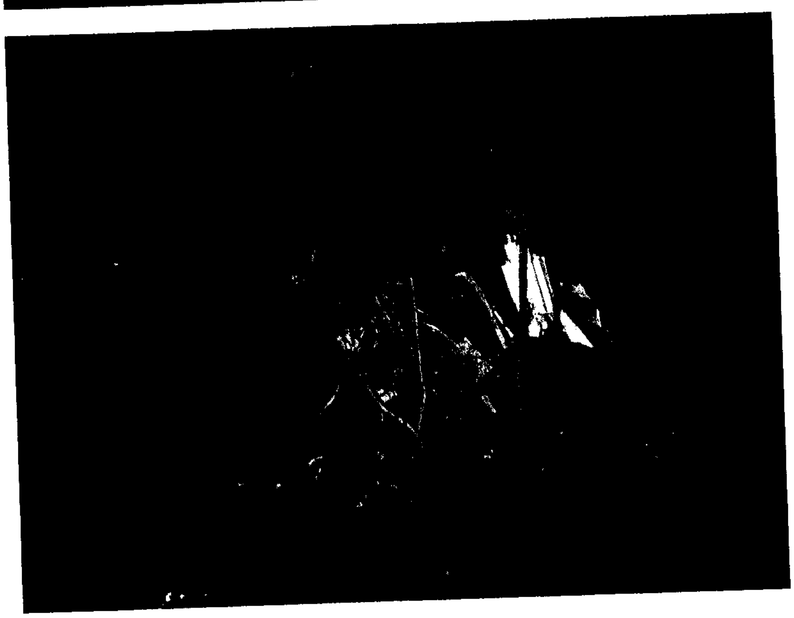
The remains of a concrete block wall after being struck by the forces of the explosion. It is still possible to see some of the blocks strewn around the area.



Damage to the roof supports (pie pans, roof bolts and plates) from the forces of the explosion. There is a roof fall in the foreground.

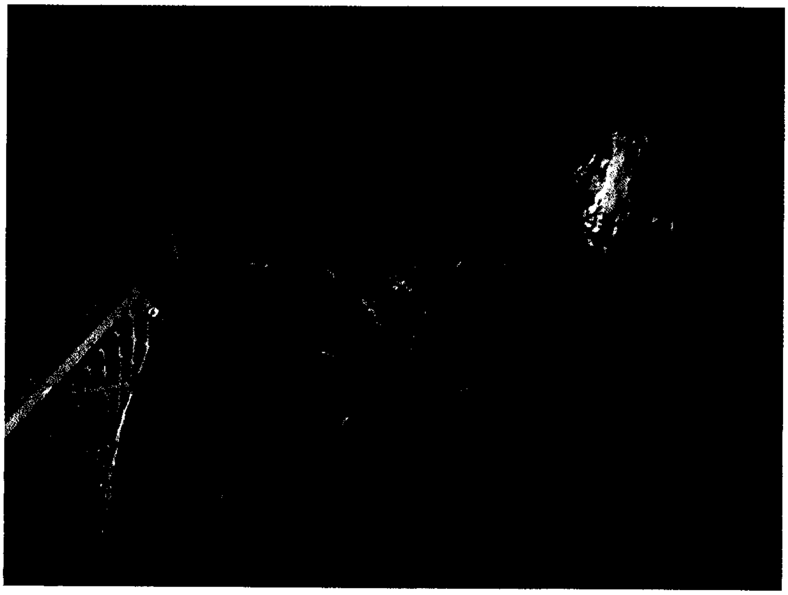


During the investigation the marks in the roof pictured at the left drew much attention. The "anomaly," as it became known, was later determined to be a fossil.

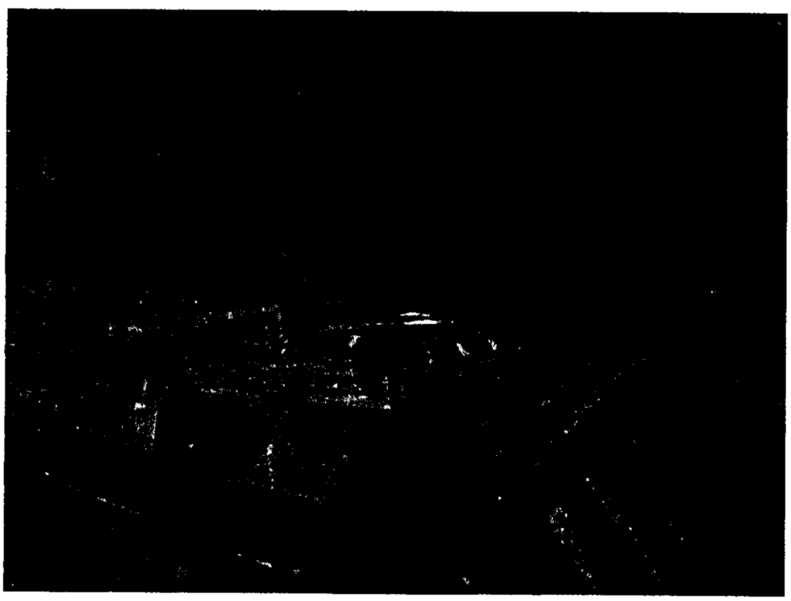


Damaged charging station located in the mains outby the sealed area.

Area inby the Omega Block seals after the explosion. Debris is scattered over the entire area and a thick layer of soot covers everything.



Damaged 2nd Left belt drive. The drive was located at 58 block, approximately the location where the miners were forced to abandon their first rescue attempt.



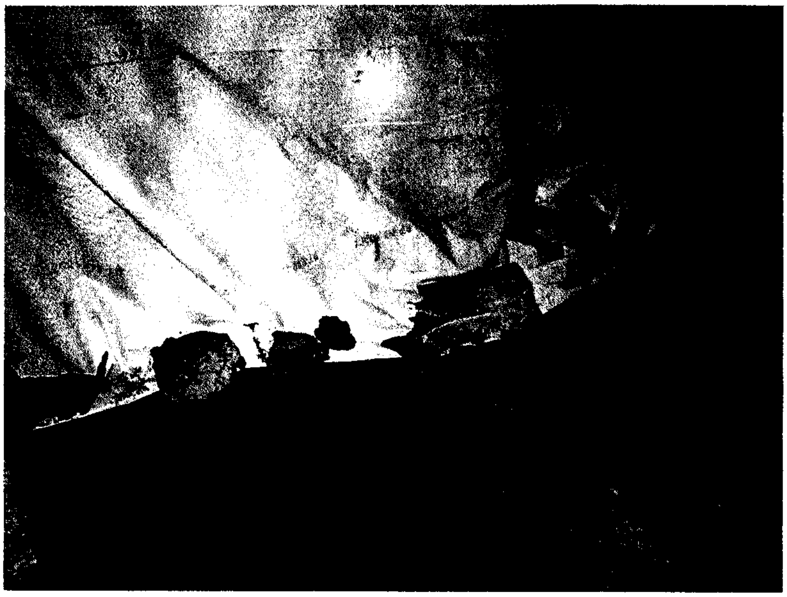
Ventilation overcast destroyed by the forces of the explosion.

Discarded pieces of the 2nd Left crews SCSR's were found in the #7 entry at about the eleven block. The picture indicates all the miners donned their rescuers at the same time at this location.

The forces of the explosion completely destroyed the Omega Block seal. Fine powder and dust was all that remained of most of the seal material.

Discarded SCSR found in the 2nd Left Section.

Outby view of the barricade constructed by the 2nd Left crew in an attempt to isolate themselves from the contaminated mine atmosphere.



View of the barricade from the inby side.

Sledge hammer used by the 2nd Left crew to signal their location to the surface.

Roof bolt the 2nd Left crew hit to signal the surface of their location.

General Information

International Coal Group

On January 2, 2006, the International Coal Group (ICG) headquarters was located at 2000 Ashland Drive, Ashland, Kentucky 41101. The company was formed in May of 2004 when Wilbur Ross led a group of investors who bought many of the assets of Horizon Natural Resources in a bankruptcy auction. Subsequently the company purchased the assets of Anker Energy and completed a merger agreement with Coal Quest.

The executive staff of ICG was:

Bennett K. Hatfield
: President, Chief Executive Officer and Director. Previously Executive Vice President and Chief Operating Officer at Massey Energy Company.

Charles Snavely
: Vice President, Planning and Acquisitions. Previously served in various management positions at Massey Energy Company.

William Campbell
: Vice President, Accounting and Treasury. Previously Vice President and Controller at Horizon Natural Resources.

Roger Nicholson
: Senior Vice-President and General Counsel. Previously Vice-President, Secretary and General Counsel at Massey Energy Company.

Samuel Kitts
: Senior Vice President, West Virginia and Maryland Operations. Previously served in various management positions at Massey Energy Company.

William Perkins
: Senior Vice President, Kentucky and Illinois Operations. Previously Vice President and General Manager of Horizon's Kentucky Division.

Michael Hardesty
: Senior Vice President, Sales and Marketing. Previously served in various positions at Arch Coal.

Oren Kitts
: Senior Vice President, Mining Services. Previously President of Massey Coal Services.

ICG held approximately 315 million tons of metallurgical coal reserves and approximately 572 million tons of steam coal reserves. It also reported owning or controlling 707 million additional tons of coal reserves that did not yet qualify as commercially viable coal reserves under SEC rules.

The company's overview highlighted 11 operations located in West Virginia, Kentucky and Maryland, nine of which were part of the Wolf Run Mining Company subsidiary. However, a run of the Mine Safety and Health Administration's data retrieval system indicated ICG owned and operated 31 additional operations under seven other subsidiaries.

GENERAL INFORMATION
WOLF RUN MINING COMPANY

As of January 2, 2006, the Wolf Run Mining Company was a wholly owned subsidiary of ICG. MSHA listed nine operations as subsidiaries of Wolf Run Mining Company. Some of the nine operations listed appear to have been independent operations at one point in time, but were part of Anker Energy at the time of purchase. Coaldat shows an additional operation, Spruce Fork Mine #1, located in Upshur County, West Virginia, as a subsidiary of Wolf Run Mining Company. MSHA's database listed the operation as an abandoned subsidiary of Anker Energy. The Spruce Fork Mine produced 249,855 tons of coal with 91 employees in 2005. It is unclear whether the mine was ever active after ICG purchased Anker.

MSHA's database includes the following information:

Mine Name	State	Fed ID	Type	Status	Empl	Tons
Steyer	MD	1800724	Und.	Temp. Idle	N/A	N/A
Sentinel	WV	4604168	Und.	Non-Prod.	70	147,035
Baybeck Prep.	WV	4608364	Prep	Active	9	N/A
Stoney River	WV	4608631	Und.	Non-Prod.	21	45,464
Sentinel Prep	WV	4608777	Prep.	Active	10	N/A
Sago	WV	4608791	Und	Active	141	507,775
Eccles Refuse	WV	4609023	Surf.	New	N/A	N/A
Sycamore #2	WV	4609060	Und.	Active	38	68,758
Imperial	WV	4609115	Und.	Active	N/A	N/A

General Information
Sago Mine

The mine was opened on August 1, 1999 by the BJM Coal Company as Spruce #2 Mine. It was purchased by Anker Energy on January 10, 2002. It is unclear from the Mine Safety and Health Administration (MSHA) data when the name was changed, however, the federal identification number, 4608791, has remained the same since the mine was first operational. The mine was operated by the Wolf Run Mining Company as of January 11, 2002. It was subsequently purchased by the International Coal Group.

The Sago mine is located approximately six miles outside of Buckhannon, Upshur County, West Virginia. The mine is ventilated using a 400 horsepower blowing fan manufactured by Joy. The mine accesses the Middle Kittanning Coal Seam in a box cut development through five entries driven level with the seam.

There were a total of 20 seals separating the old mine from the active operation. These seals were reportedly constructed of solid concrete blocks or packsetters.

ACKNOWLEDGMENTS

PARTICIPATING MINE RESCUE TEAMS

LOVERIDGE MINE

Robert Hovatter
Gary Hayhurst
James Clendenen
Richard Shockley
Wayne Conaway
Leslie Rich Cosner
Nick A Tippi
Donald A. Jack
Charles P. Layman

McELROY MINE

Danny E. Beyser
Dennis Crow
Kelvin Jolly
James Klug
Robert Rohde
Michael Clark
James A. Smith
Randy Clark
Jack Price
William Blackwell

EIGHTY-FOUR MINING COMPANY

Don Krek
Dale Tiberie
Richard Gindlesperger
Kenneth Clark
Robert Volpe
Michey Miskiewicz
Adrian Gordon
John Stowinsky
Dan Puckey
Brad DeBusk

ROBINSON RUN MINE

Sherman Goodwin
Jeff Bienkoski
Craig Carpenter
Alfred Bell
Mark Koon
Larry Tenney

SHOEMAKER MINE

Silas Stavischeck
Glenn McWhorter
Cliff Ward
Charles E. Fisher
Okey Rine
Ted Hunt
Robert Haines
Shan Michener
Jim Jack

BLACKSVILLE 2

Jim Ponceroff
David Rush
Richard Tolka
Robert Wade
Lonny Myers
Tony Casini

ENLOW FORK

Dennis Cole
Ron Henry
Bob Gross
Shawn Dewitt
Dave Leverknight
Terry Winland
Bill Whipkey

BAILEY

Larry Cuddy
Dennis Vicinell
George Joseph
Mike Spears
Kevin Williamson
Dave Cass
Bob Calhoun
Gene Menozzi

MSHA

STATE OF WEST VIRGINIA

BARBOUR COUNTY

Names not provided

TRI-STATE COAL

Names not provided

VIPER MINE

Names not provided

Mine Safety and Health Administration

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Kevin Stricklin
Allen McGilton
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Jim Satterfield
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Argel Vanover
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Bill Ponceroff
Ron Wyatt
Greg Fetty
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Willie Spens
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Frank Thomas
Ron Tulanowski
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Jan Lyall
Charles Pouge
Ronald Hixon
Cheryl McGill
Richard Gates
Denny Swentoski

West Virginia Office of Miners Health, Safety and Training

Doug Conaway
John Collins
Barry Fletcher
Jeff Bennett
John Scott
John Hall
Clarence Dishman
Eugene White
Bill Tucker
Mike Rutledge
Randy Smith
Jim Hodges

United Mine Workers of America

Cecil E. Roberts	International President
Daniel J. Kane	International Secretary-Treasurer
Dennis O'Dell	Administrator, Department of Occupational Health and Safety
Timothy Baker	Deputy Administrator, Department of Occupational Health and Safety
Judy Rivlin	Associate General Counsel
Ron Bowersox	International Representative
Gary Trout	International Representative
Max Kennedy	International Representative
Butch Oldham	International Representative
Mark Cochran	International Representative
Dennis "Turk" Bailey	International Representative
Silas "Sam" Stavischeck	International Representative
Marty Hudson	Executive Assistant to the President
Robert Scaramozzino	Administrator, President's Office
James Lamont	Executive Assistant to the Secretary-Treasurer
Philip Smith	Director, Communications Department
David Kameras	Communications Coordinator
Mike Caputo	International Representative
Jack Rinehart	International Representative
Jim Shifflett	International Representative

APPENDICES

1. Mine Map, showing:
   Portion of North Mains
   1st Left Section
   2nd Left Parallel Section
   2nd North Mains Section — sealed area
2. Pre-shift report Jan. 2, 2006 1st Left Section
3. Pre-shift report Jan. 2, 2006 Numbers 1-3 track and belt
4. Pre-shift Report Jan. 2, 2006 2nd Left Parallel Section
5. Dispatcher's Report Jan. 2, 2006
6. Mine Maps
   A. Ventilation of the active areas of the mine prior to Dec. 11, 2005 air change.
   B. Ventilation of seals prior to Dec. 11, 2005 air change.
7. Ventilation report Dec. 11, 2005 Completed seals (North Mains) and made air change.
8. Mine Maps
   A. Ventilation of the active areas of the mine after the Dec. 11, 2005 air change.
   B. Sketch on a mine map of seal locations, overcasts, brattice walls and direction of ventilation after the completion of the seals.
9. Oct. 12, 2005 Correspondence from Anker West Virginia Mining Co. to MSHA requesting approval for the use of non-hitched Omega Block seals.
10. Oct. 24, 2005 Correspondence from MSHA to Anker West Virginia Mining Co. approving the request to use Omega Block seals.
11. Oct. 12, 2005 Correspondence from Anker West Virginia Mining Co. to MSHA requesting approval to install Omega Block seals in the North Mains. The proposal also outlines the ventilation changes that will be made at the time the seals are completed.
12. Oct. 24, 2005 Correspondence from MSHA to Anker West Virginia Mining Co. approving the request to seal using Omega Blocks and notifying Sago mine management the changes will be added to the mine ventilation plan.
13. Guidelines for the installation of Omega Block seals (five pages)
14. Mine Map Location of the completed seals
15. Methane trending chart—based on methane liberation and the volume of the sealed area. Data collected during the course of the investigation.

16. Jan. 12, 2006 — Memorandum from Monte Hieb, Chief Engineer, West Virginia Office of Miners' Health, Safety and Training (WVOMHST) to Doug Conaway, WVOMHST Director, stating his determination regarding the cause of the explosion. (two pages)

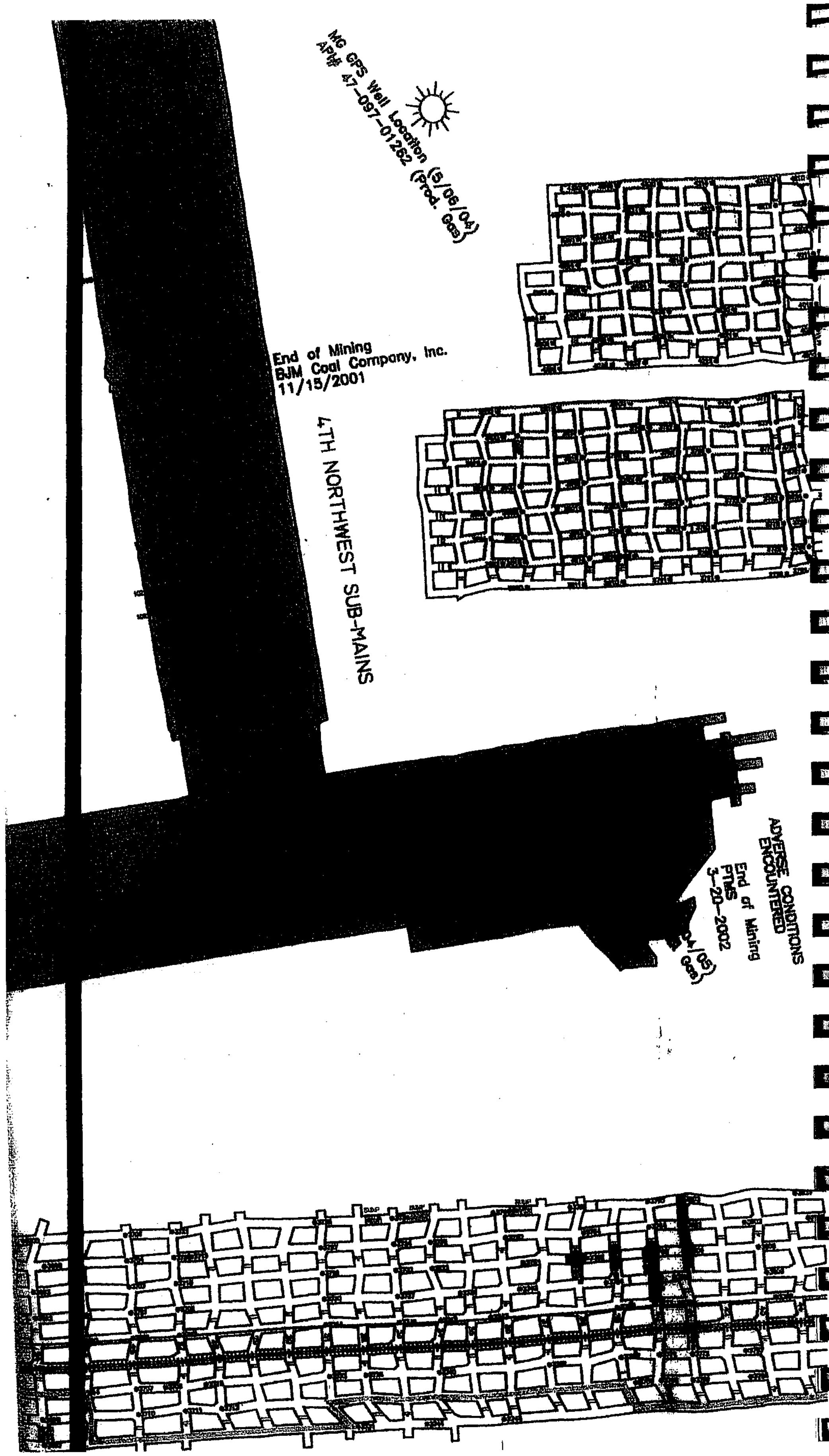
17. Topographical map showing lightning strikes and their proximity to the sealed area.

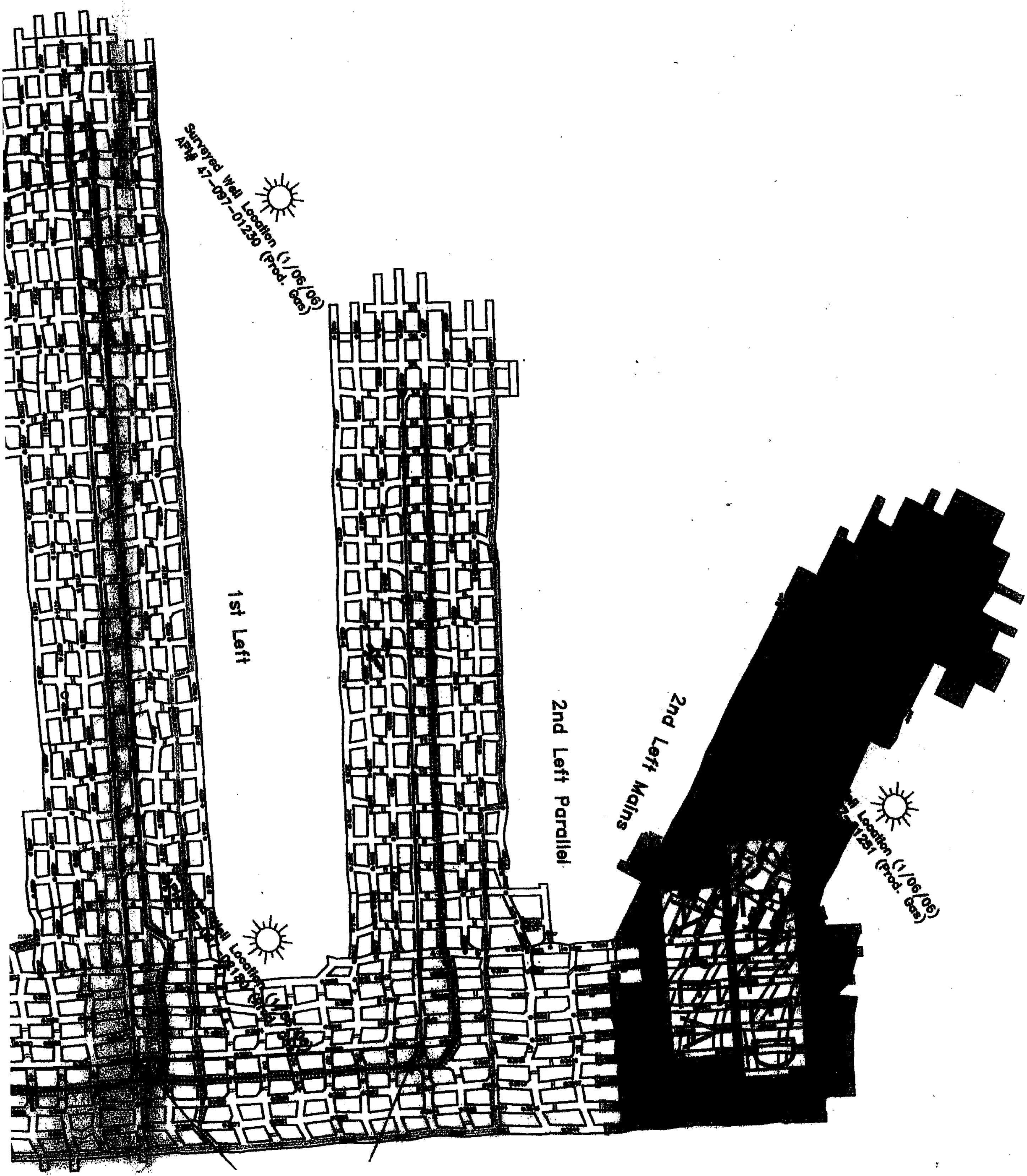
18. Accident overview 1999-2006
    Fatal overview 1999-2006

19. Violation overview 1999-2006

20. Violation history 2005-2006 (totaled by quarter and by year)
    - Citations/Orders Jan. 1, 2005 - Dec. 31, 2006
    - Citations/Orders by type Jan. 1, 2005 - Dec. 31, 2006
    - Citations/Orders by 30 CFR designation Jan. 1, 2005 - Dec. 31, 2006
    - Citations/Orders by proposed penalty Jan. 1, 2005 - Dec. 31, 2006

APPENDICES


MG GPS Well Location (5/06/04)
API# 47-097-01262 (Prod. Gas)
End of Mining
BJM Coal Company, Inc.
11/15/2001
4TH NORTHWEST SUB-MAINS
ADVERSE CONDITIONS
ENCOUNTERED
End of Mining
PTMS
3-20-2002


Surveyed Well Location (1/06/06)
API# 47-097-01230 (Prod. Gas)
1st Left
2nd Left Parallel
2nd Left Mains

Use Indelible Pencil or Ink

PRESHIFT-MINE EXAMINER'S REPORT

Report shall be signed when made

Date of Examination 1-2-06 20 ___ Section or Area Examined 1-Left

Time of Examination: from 4:20 a.m. or p.m. to 4:50 a.m. or p.m.

Was this report phoned to outside: Yes ______ no ______

By whom Terry Helmes Time ________ A.M. ________ P.M.

Report received by Owen Jones

(Signed)

Violations and other Hazardous Conditions Observed and Reported

Location	Violation or Hazardous Condition	Action Taken
1. entry	none obs	
2. entry	none	
3. entry	none	
4. entry	none	
5. entry	none	
6. entry	none	
7. entry	none	
8. entry	none	
9.		
10.		

Air Measurements

Location	CFM	Location	CFM
L,O,B	14,510		
Ret CH4	.0%		
Ret O2	20.9%		

old

1-2-06.

Remarks:

2-N/B 4-N/B

5, 6, 7, needs cleaned

Section and charger safe at exam time

This is to certify that: (a) This section of the mine was properly examined by me, (b) all violations of the W. Va. Mining Laws and the Federal Coal Mine Health and Safety Act of 1969 and other unsatisfactory conditions and practices observed by me are listed in this report.

Signed By ____________ Preshift-Mine Examiner ______ Certificate No. ____________ Assistant Foreman ______ Certificate No.

Countersigned ____________ Mine Manager Mine Foreman

Owen Jones (Assistant Foreman) 36860

____________ Superintendent or Assistant

. or ink

PRESHIFT-MINE EXAMINER'S REPORT

Report shall be signed when made

Date of Examination 1-2- 2006 Section or Area Examined Belts Tracks

Time of Examination: from 3:00 a.m. or p.m. to 5:00 a.m. or p.m.

Was this report phoned to outside: Yes ___ no ✓

By whom F. Jamison - L. Helms Time 5:25 A.M. ___ P.M.

Report received by [illegible] (Signed)

Violations and other Hazardous Conditions Observed and Reported

	Location	*Violation or Hazardous Condition*	*Action Taken*
1.	1-3 Belts	clear	
2.	1-3 tracks	clear	
3.			
4.	Belt - Head to 15 Block needs dusted.		Reported
5.	Belt - 5 to 20 Block - Off side needs dusted.		Reported
6.	Belt -	Off side needs dusted.	Reported
7.	"	30 Block - Water - need bridge.	Reported
8.			
9.	4, 5 & 6 track.	clear.	
10.			

Air Measurements

Location	*CFM*	*Location*	*CFM*
CH4	0.0		
O2	20.9		

Remarks: Belt & track. safe to travel

Good air movement

This is to certify that: (a) This section of the mine was properly examined by me, (b) all violations of the W. Va. Mining Laws and the Federal Coal Mine Health and Safety Act of 1969 and other unsatisfactory conditions and practices observed by me are listed in this report.

Signed By Fred Jamison 33073

Preshift-Mine Examiner — Certificate No. — Assistant Foreman — Certificate No.

Countersigned ___

Mine Manager Mine Foreman

Assistant Foreman

Superintendent or Assistant

Use Indelible
Pencil or Ink

PRESHIFT-MINE EXAMINER'S REPORT

Report shall be
signed when made

Date of Examination 1 - 2 20 06 Section or Area Examined 2 Left
Time of Examination: from 4:00 a.m. or p.m. to 4:25 a.m. or p.m.
Was this report phoned to outside: Yes ___ no ✓
By whom Brought out Time 5:30 A.M. ___ P.M.
Report received by M Toler (Signed)

Violations and other Hazardous Conditions Observed and Reported

	Location	*Violation or Hazardous Condition*	*Action Taken*
1.	Entry	Clear	
2.	Entry		
3.	Entry		
4.	Entry		
5.	Entry		
6.	Entry		
7.	Entry		
8.	Entry		
9.			
10.			

Air Measurements

Location	*CFM*	*Location*	*CFM*
Last open Brk	11,241		
Return O_2	20.9		
Return CH_4	0.0%		

Remarks: 1-2-06 J.b. 1-2-06 John Collins

This is to certify that: (a) This section of the mine was properly examined by me, (b) all violations of the W. Va. Mining Laws and the Federal Coal Mine Health and Safety Act of 1969 and other unsatisfactory conditions and practices observed by me are listed in this report.

Signed By F. Jamison (Preshift-Mine Examiner) 33073 (Certificate No.) Martin Toler (Assistant Foreman) 28298 (Certificate No.)

Countersigned ___ (Mine Manager Mine Foreman)

___ (Assistant Foreman)

0000146

___ (Superintendent or Assistant)

Sago Mine
Dispatcher Report

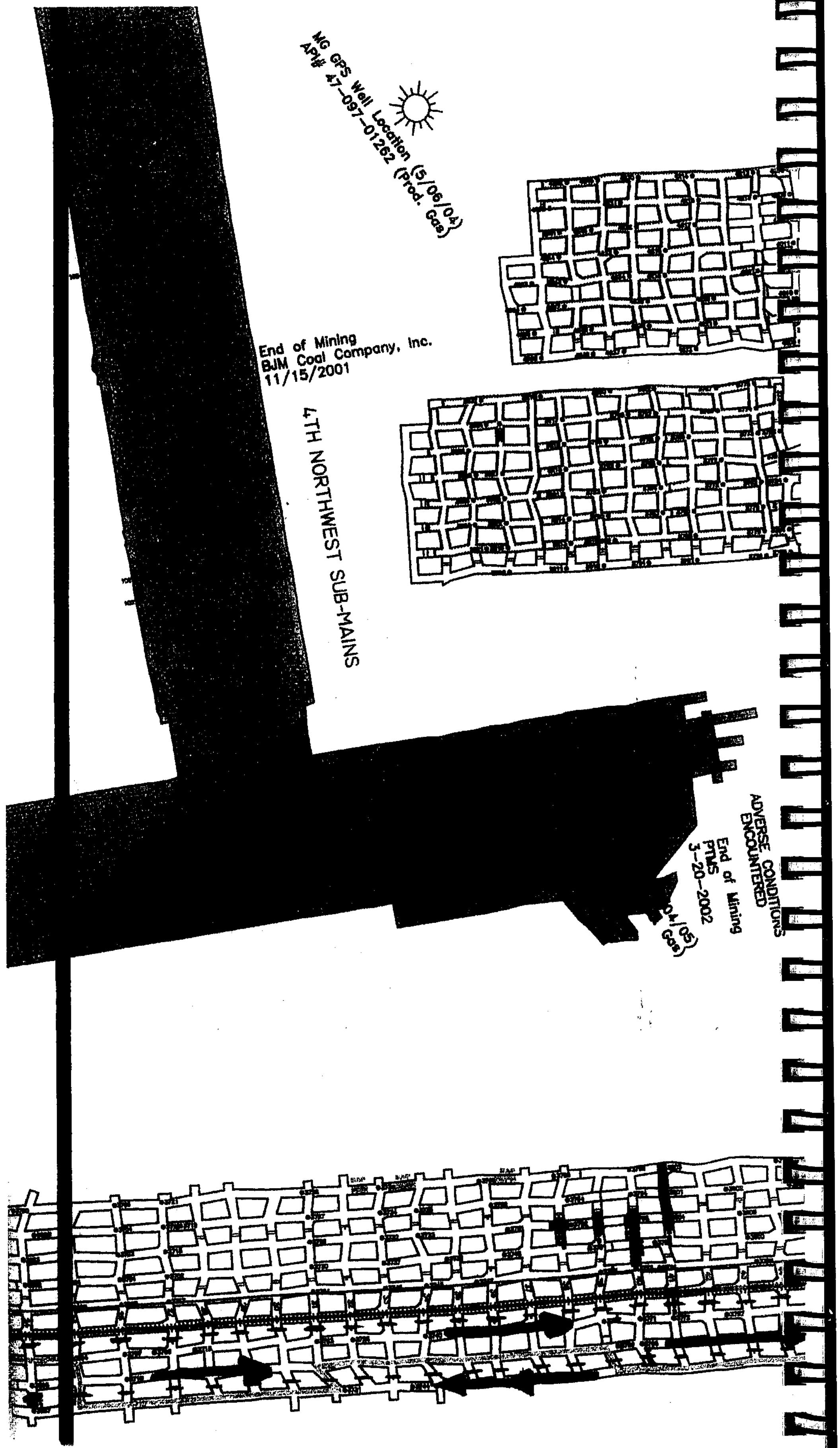
DATE: ______________________ [redacted]

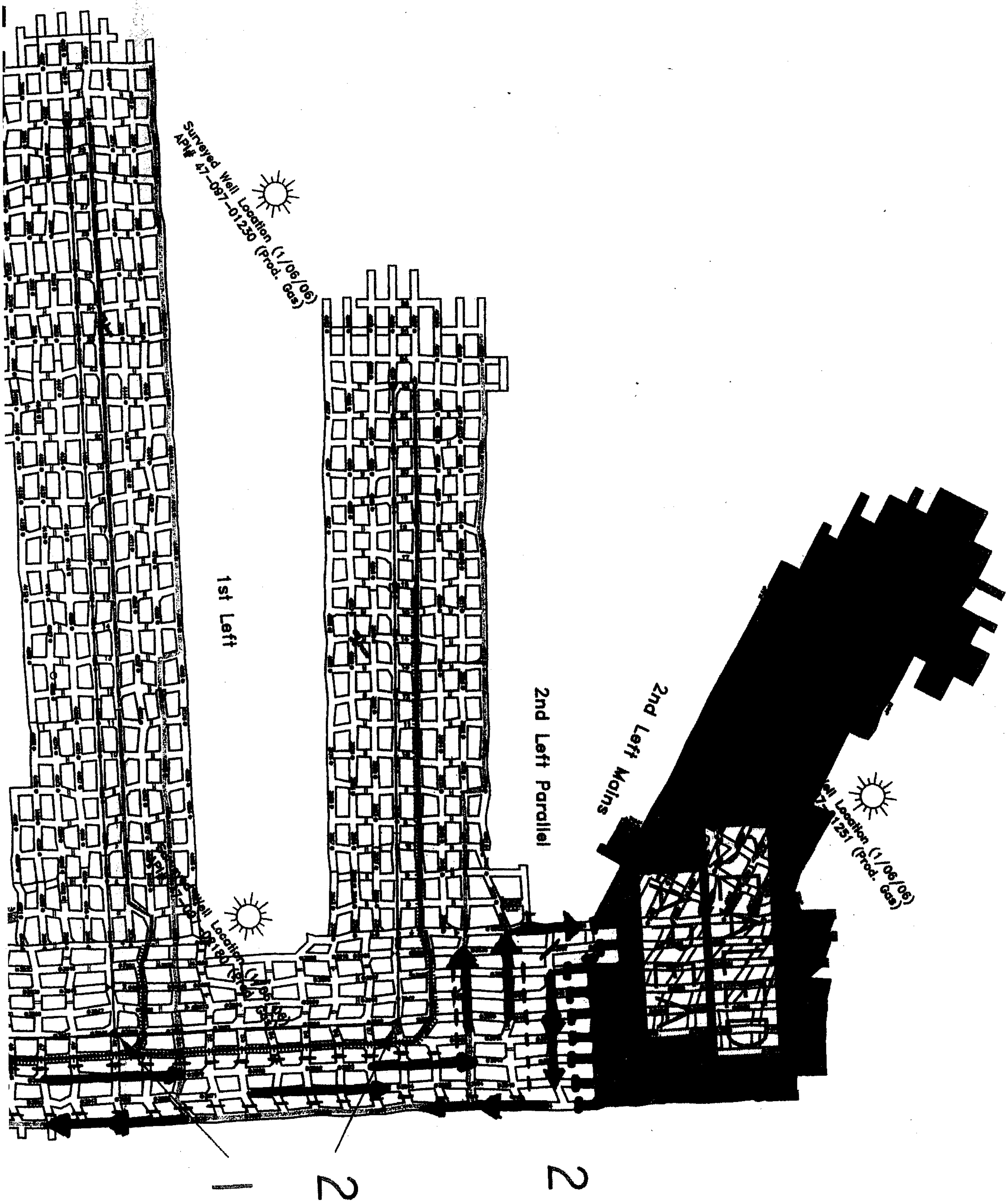
... OUND TRIPS TO CLOSE THE DERAIL AFTER THEY GO THROUGH

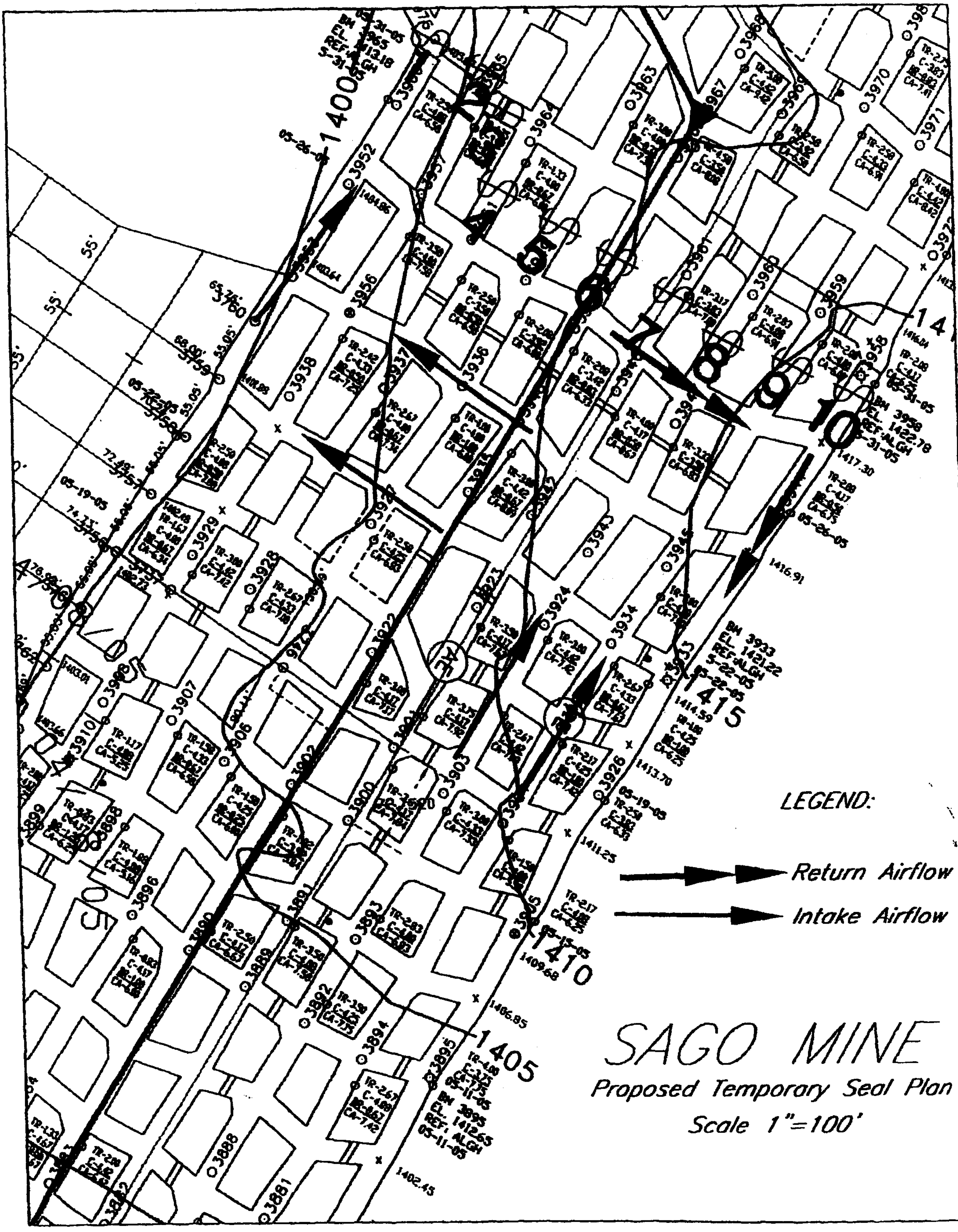
	Dispatch From	Dispatch To	Time Of Arrival	Operator Name	NOTES
[illegible] 832	outside	1 left			
[illegible] 840	outside	28 block 3 left			
719	~~[illegible]~~ shop	5 Head 11 left [illegible]			
956	outside	2 left			
[illegible] 130	2 left	outside			
[illegible] 4:35	2 left	Outside			
[illegible] 6:00	outside	2nd left			
	outside	1st left			

Copy of dispatcher record for 1-2-06
[illegible]

0000192


MG GPS Well Location (5/06/04)
API# 47-097-01262 (Prod. Gas)
End of Mining
BJM Coal Company, Inc.
11/15/2001
4TH NORTHWEST SUB-MAINS
ADVERSE CONDITIONS
ENCOUNTERED
End of Mining
PTMS
3-20-2002


Surveyed Well Location (1/06/06)
API# 47-097-01230 (Prod. Gas)
1st Left
2nd Left Parallel
2nd Left Mains
1
2
2


LEGEND:
Return Airflow
Intake Airflow
SAGO MINE
Proposed Temporary Seal Plan
Scale 1"=100'

Use Indelible
Pencil or Ink

Weekly Examinations—Week Ending ________________ 19____

Air Measurements

Volume Cubic Feet Per Minute

Location	Working Face	Main Intake	Main Return	Intake Split	Return Split(s)	Bleeder Split	Last Open Crosscut	Date	Person Taking Air Measurements

Significant

Examination for Hazardous Conditions Including Tests for Methane

Location	Intake and Return Air Courses Traveled	Hazards Noted	Date	Signature of Examiner

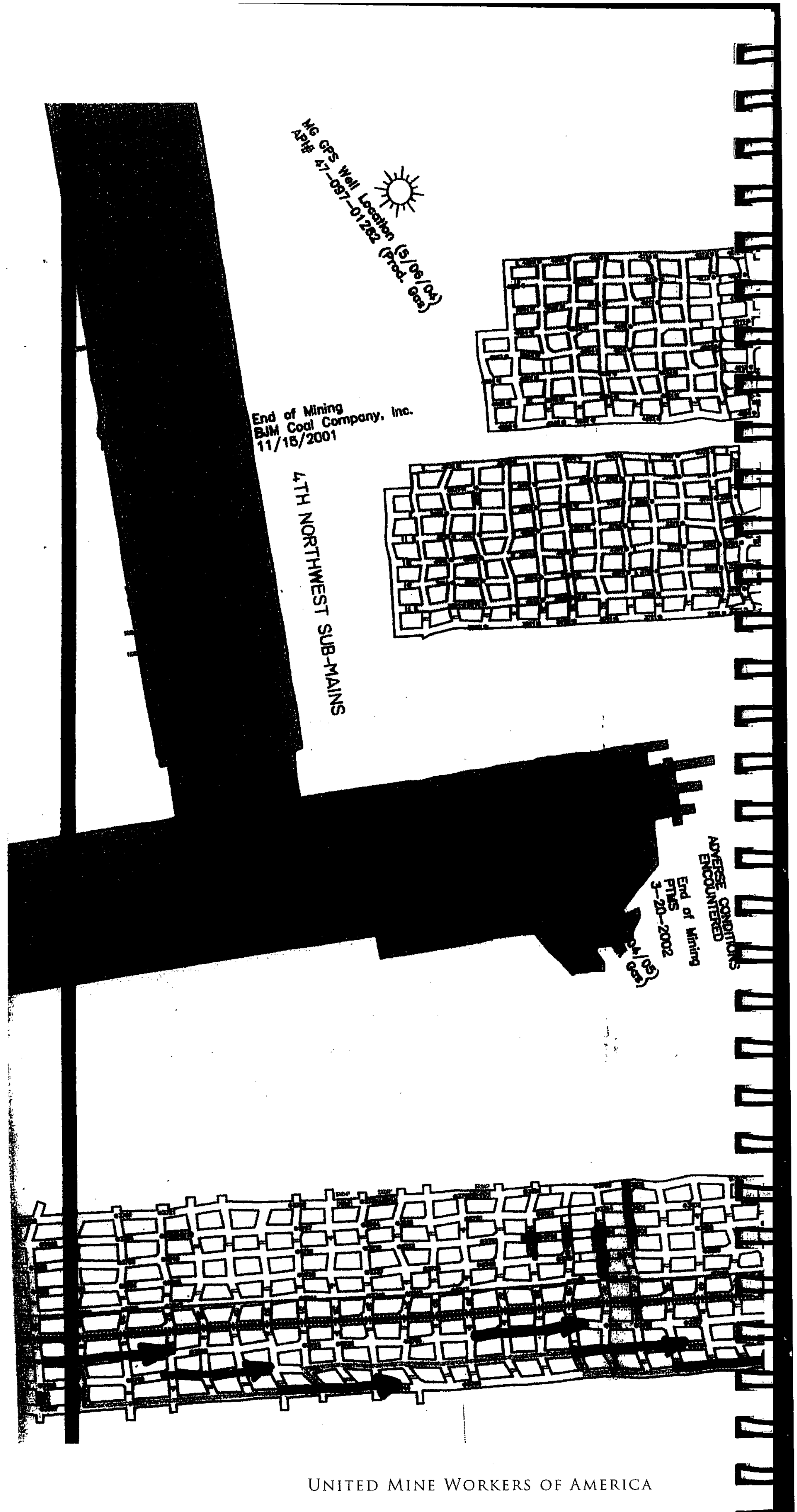
12-11-05 Finished seals in 2 left mains, made air change at 2nd right to make common James Sept 2810

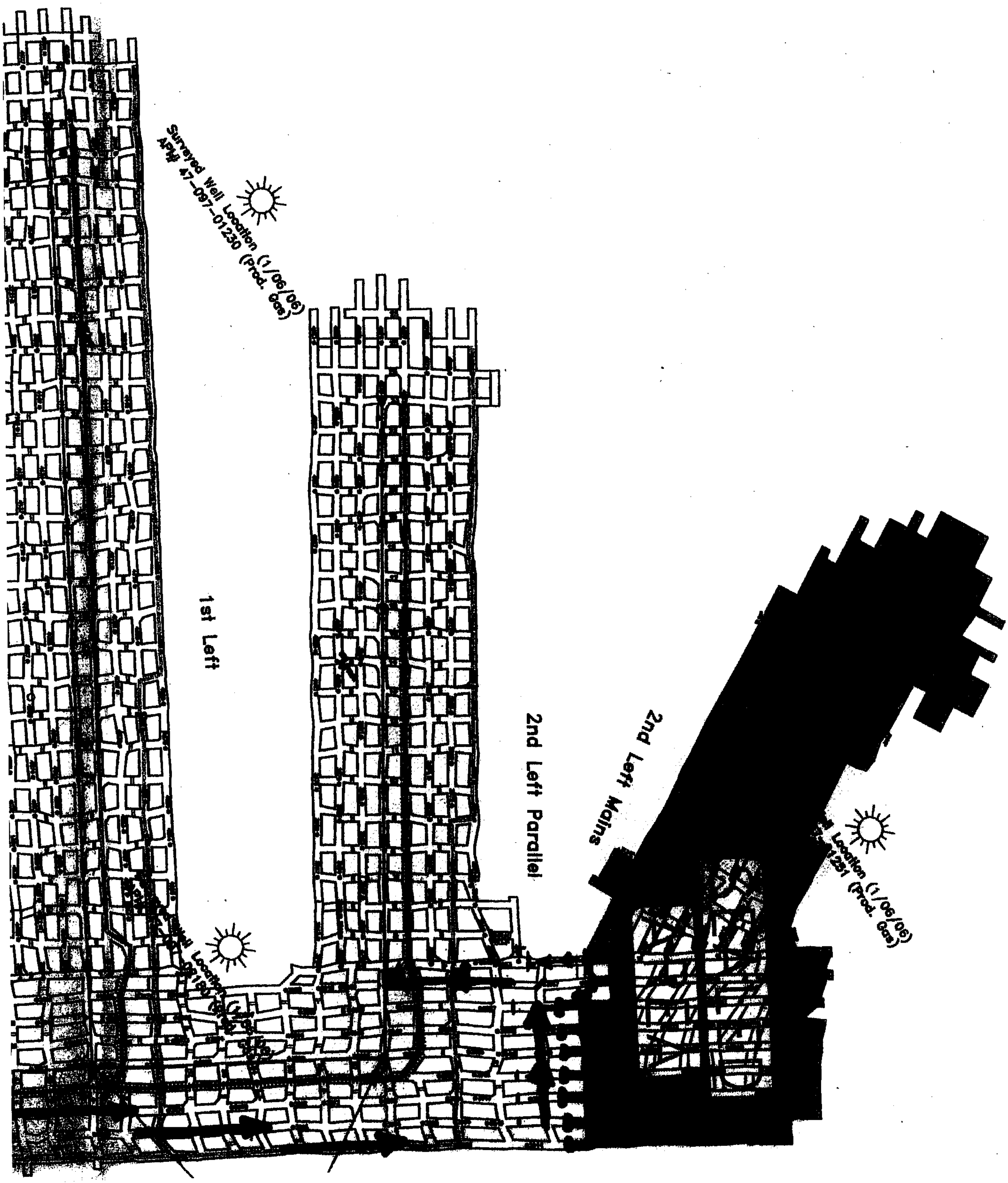
Examination of pillar falls, seals, idle workings, abandoned areas

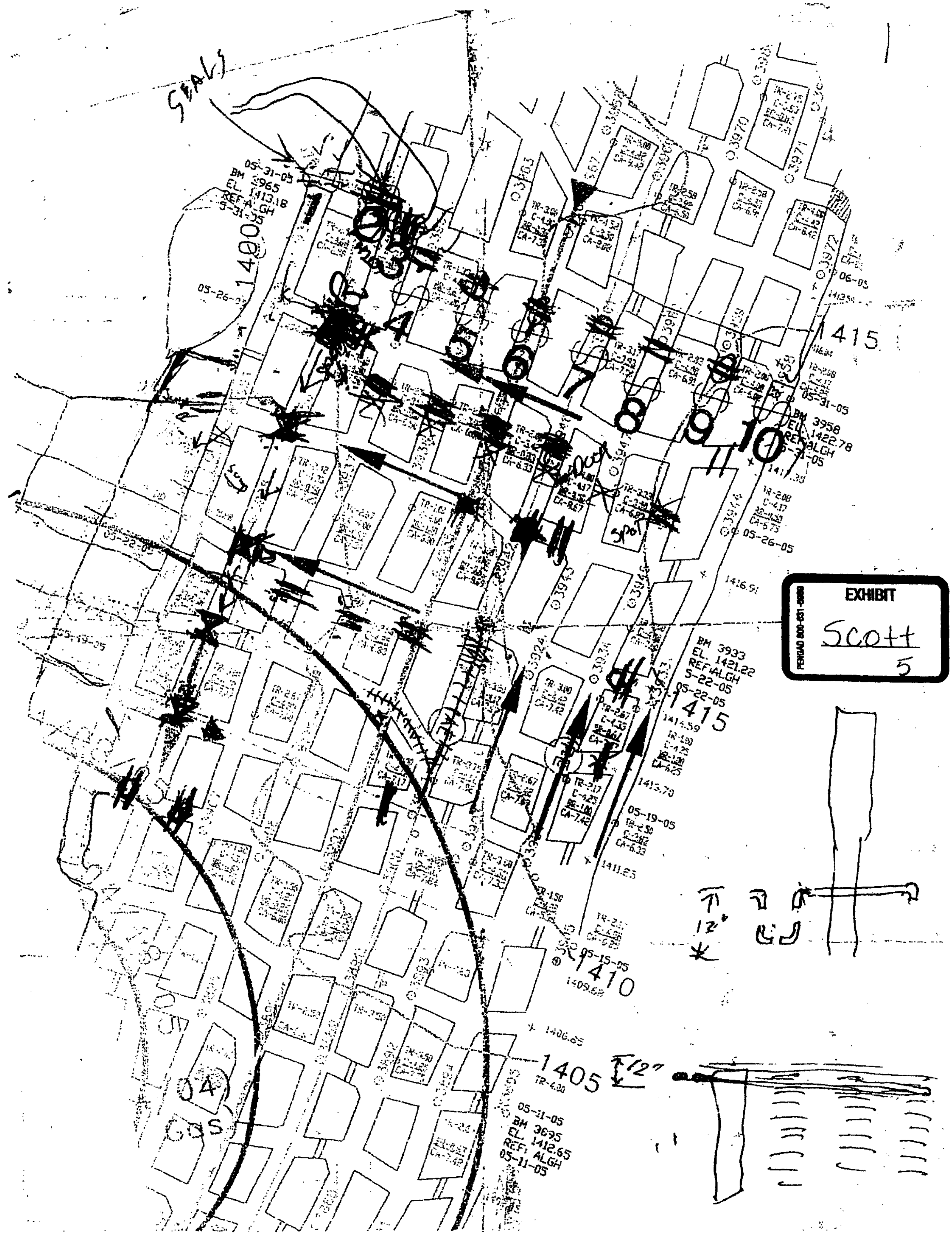
Actions taken

0000111

Signature [signature] Mine Foreman 25812 Certificate No. Signature


MG GPS Well Location (5/06/04)
API# 47-097-01282 (Prod. Gas)
End of Mining
BJM Coal Company, Inc.
11/15/2001
4TH NORTHWEST SUB-MAINS
ADVERSE CONDITIONS
ENCOUNTERED
End of Mining
PTMS
3-20-2002


Surveyed Well Location (1/06/06)
API# 47-097-01230 (Prod. Gas)
1st Left
2nd Left Parallel
2nd Left Mains
Location (1/06/06)
231 (Prod. Gas)


SEALS
05-31-05
BM 3965
EL. 1413.18
REF. AGH
1400
4
5
6
7
8
9
10
1415
BM 3958
EL. 1422.78
REF. ALGH
05-31-05
05-26-05
05-22-05
05-19-05
BM 3933
EL. 1421.22
REF. ALGH
5-22-05
1415
05-19-05
05-15-05
1410
1405
05-11-05
BM 3695
EL. 1412.65
REF. ALGH
05-11-05
GAS
12"
EXHIBIT
Scott
5

Anker West Virginia Mining Company
Rt. 9 Box 507
Bucktannon, WV 26201

... SAFETY AND
... ADMINISTRATION
... TOWN, WV

2005 OCT 12 PM 3:18

RECEIVED
cm

10-13-05

October 12, 2005

Kevin Stricklin, District Manager
Mine Health and Safety Administrtation
604 Cheat Road
Morgantown, WV 26508
Attn: Tom Hlavsa

RE: Sago Mine's Ventilation Plan Changes

Mr. Stricklin:

Anker West Virginia Mining Company wishes to add an Omega Concrete Block Seal Method and Plan to our current Ventilation Plan for our Sago Mine, MSHA ID # 46-08791. It should be noted, that at this time, we only wish to add the non-hitched style to our plan. (See attached diagrams).

If you have any questions on this matter, please feel free to contact me at 304-471-3300.

Sincerely,

Joe Myers

For Al Schoonover
Safety Director

ldition of Omega Seal to 4
lon 8' high by 20' wide
ily

U.S. Department of Labor

Mine Safety and Health Administration
604 Cheat Road
Morgantown, West Virginia 26508

SENT TO AND/OR DISCUSSED WITH FIELD OFFICE:

SURNAME	DATE
Grant/Terry	10/13/2005

REVIEWED BY:

Parrish	10/19/2005
Brooks for TH	10/20/05
Sonna	10-20-05
Mosley	10-20-05

UNDERGROUND MINE FILE
RECEIVED 10-24-5
INITIALS aew

OCT 24 2005

Mr. Jeffrey K. Toler
Superintendent
Anker WV Mining Company, Inc.
Route 9, Box 507
Buckhannon, West Virginia 26201

Dear Mr. Toler:

The request filed October 12, 2005, and revision filed October 19, 2005, to add an alternative method of seal construction to the ventilation plan for the Sago Mine, I.D. No. 46-08791, has been reviewed. The alternative method seal made with nonhitched-style Omega blocks is approved and will be included in your currently approved mine ventilation plan.

You are reminded that all changes or revisions to the mine ventilation plan, as specified in 30 CFR 75.370(d), must be submitted to and approved in writing by this office before they are implemented.

If you have any questions, please feel free to contact this office.

Sincerely,

Kevin G. Stricklin

Kevin G. Stricklin
District Manager

EParrish:aew

bcc:
Bridgeport F/O (2)
W. Ponceroff
E. Parrish
Health Section
Map File
Main File

EXHIBIT
PENGAD 800-631-6989
Scott
1

10

Anker West Virginia Mining Company

Rt. 9 Box 507
Buckkannon, WV 26201

HEALTH ADMINISTRATION
MORGANTOWN, WV

2005 OCT 12 PM 3:18

RECEIVED

October 12, 2005

Kevin Stricklin, District Manager
Mine Health and Safety Administrtation
604 Cheat Road
Morgantown, WV 26508
Attn: Tom Hlavsa

RE: Sago Mine's Ventilation Plan Changes

Mr. Stricklin:

Anker West Virginia Mining Company wishes to seek approval relative to installing nine mine seals across our North-East Mains in our Sago Mine, MSHA ID # 46-08791.

The mine seals being proposed will be constructed across our North East Mains, just inby the area that will be the future location of the 2nd Mains Unit. The proposed seals will be constructed across the North East Mains area in such a manner that the No. 2-9 seals will be constructed first, with seal numbers 1 and 10 be constructed simultaneously. It should be noted that for a temporary time frame, (not to exceed a four week period after the construction of said seals), that we will course air from a left-to-right direction, (from the number 1 entry towards the number 9 entry), in order to ventilate these seals; however, once we have constructed the necessary overcasts on the future 2nd Left Mains the air flow direction will be switched to a right-to-left direction, (From the number 9 entry towards the number 1 entry). See attached mapping to see air flow direction and ventilation control devices.

If you have any questions on this matter, please feel free to contact me at 304-471-3300.

Sincerely,

Joe Myers

For Al Schoonover
Safety Director

Approval of 2 Left Seals 9

U.S. Department of Labor

Mine Safety and Health Administration
604 Cheat Road
Morgantown, West Virginia 26508

UNDERGROUND MINE FILE	
DATE FILED	10-24-5
INITIALS	aew

SENT TO AND/OR DISCUSSED WITH FIELD OFFICE:

SURNAME	DATE
Parrish/Terry	10/18/2005

REVIEWED BY:

Parrish	10/18/2005
[illegible]	10/19/05
[illegible]	10-20-05
Mosley	10-20-05

OCT 2 4 2005

Mr. Jeffrey K. Toler
Superintendent
Anker WV Mining Company, Inc.
Route 9, Box 507
Buckhannon, West Virginia 26201

Dear Mr. Toler:

The proposed location and sequence of seal construction across North East Mains and the intentional ventilation change filed October 12, 2005, at the Sago Mine, I.D. No. 46-08791, has been reviewed. The request is approved and will be included as a supplement to the mine ventilation map filed pursuant to 30 CFR 75.372.

You are reminded that this ventilation change must be conducted in accordance with 30 CFR 75.324.

If you have any questions, please feel free to contact this office.

Sincerely,

Kevin G. Stricklin

Kevin G. Stricklin
District Manager

EParrish:aew

bcc:
Bridgeport F/O (2)
E. Parrish
Map File
Main File

6

Guidelines for installation of Omega Block Concrete Seals

1. All loose material will be removed from the roof, ribs, and floor to accommodate seal construction and supplemental supports. The seals will be constructed at such a location so that a permanent block seal can be installed in front of the omega seal, if required in the future.

2. The seal will be constructed with Omega blocks using one of the following Methods:

   A) Total thickness of 40"
   B) No hitching required.
   C) Joints must be staggered.
   D) A bonding agent (Blockbond #122551), will be used to seal between each layer and joining edges of blocks at least ¼" thick and will be applied to the front and back of the seal.
   E) The Omega blocks will be either be sawed or constructed so as to bring the top blocks to within 2" of the mine roof.
   F) Three rows of wood planks running the entire length of the seal shall be installed across the top of the seal.
   G) Wedges will be placed on 1 Foot centers or less, with an approved sealant used to fill the gaps.
   H) An approved sealant shall be used as full face coating on both sides of the seal.
   I) Seals shall be installed at least 10 feet from the corner of the pillar.
   J) Sample pipes shall be installed as per 75.335.
   K) Water traps will be installed within 12" of the bottom or floor.

RECEIVED
2005 OCT 19 PM 12: 4

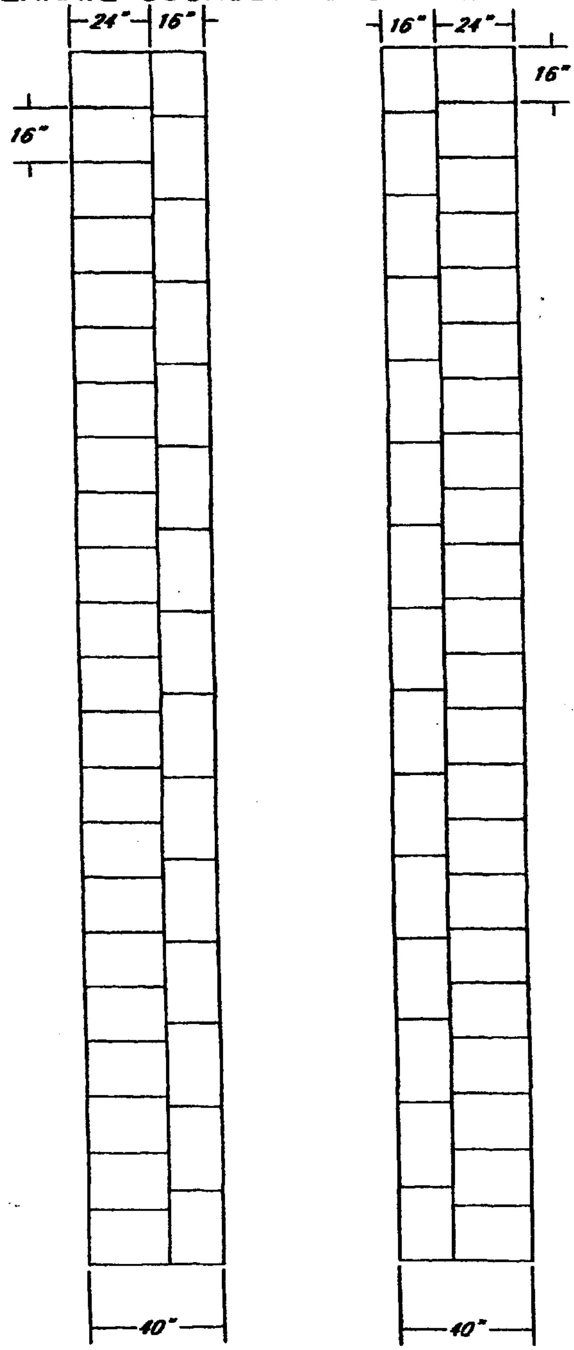
SAGO MINE

40" THICK OMEGA BLOCK SEAL

CONTRUCTION PLAN

FOR USE WITH SEALS UP TO 8 FT HIGH BY 20 FT WIDE

ALTERNATE COURSES TO STAGGER JOINTS

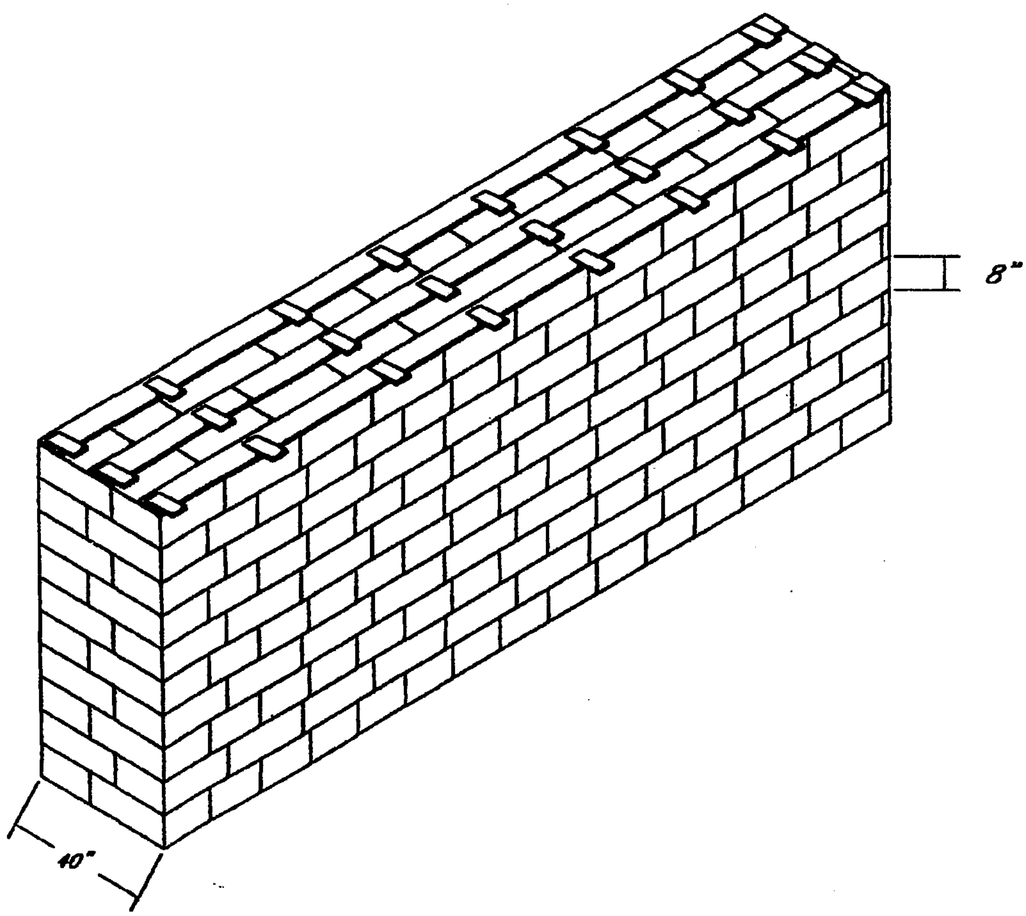


SAGO MINE

40" THICK OMEGA BLOCK SEAL

FOR USE WITH SEALS UP TO 8 FT HIGH BY 20 FT WIDE

1. Total thickness 40 inches
2. No hitching required
3. Joints must be staggered
4. All joints shall be a minimum 1/4 inch thich and be motared using an approved motar/sealant
5. Three rows of wood planks running the entire length of the seal shall be installed across the top of the seal
6. Wedges will be placed on 1' centers or less with an approved sealant used to fill the gaps
7. An approved sealant shall be used as full face coating on both sides of the seal.



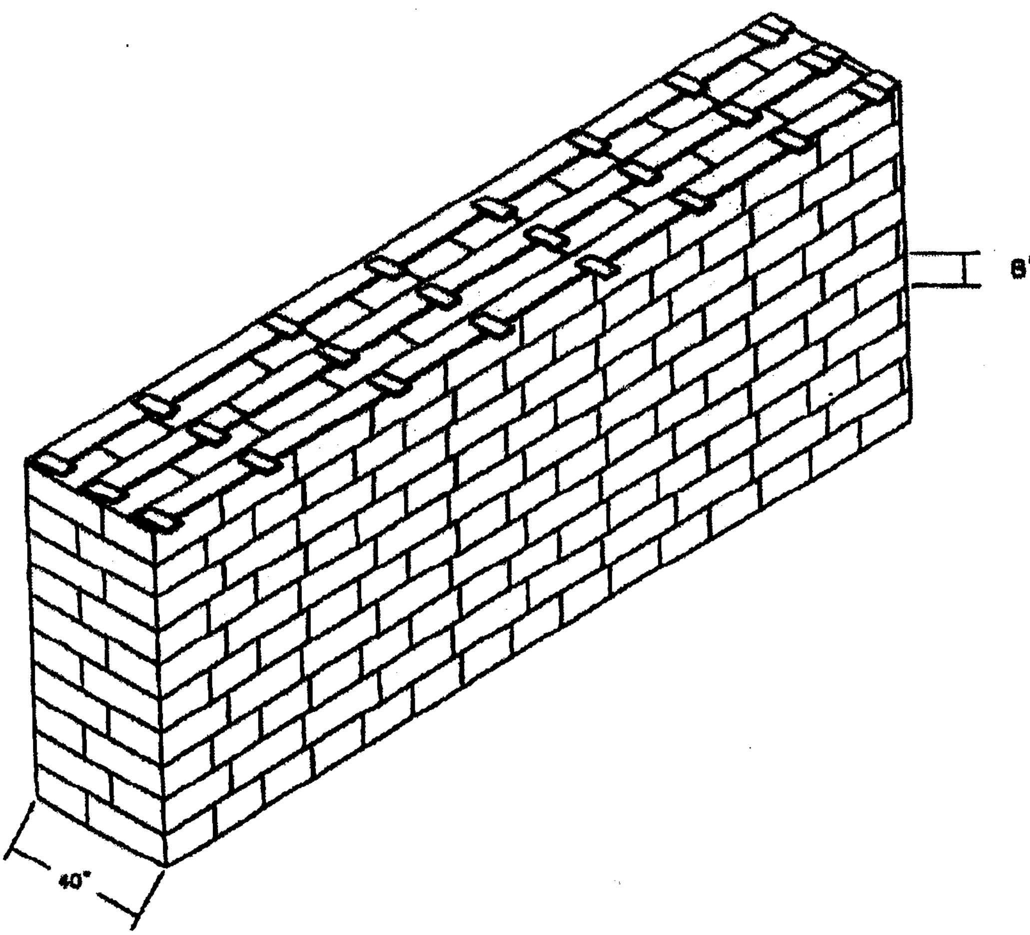
- Seals shall be at least 10 feet from the corner of the pillar
- Sampling pipes shall be installed as per 75.335

40" THICK OMEGA BLOCK SEAL

FOR USF WITH SEALS UP TO 8 FT HIGH BY 20 FT WIDE

NO HITCHING REQUIRED

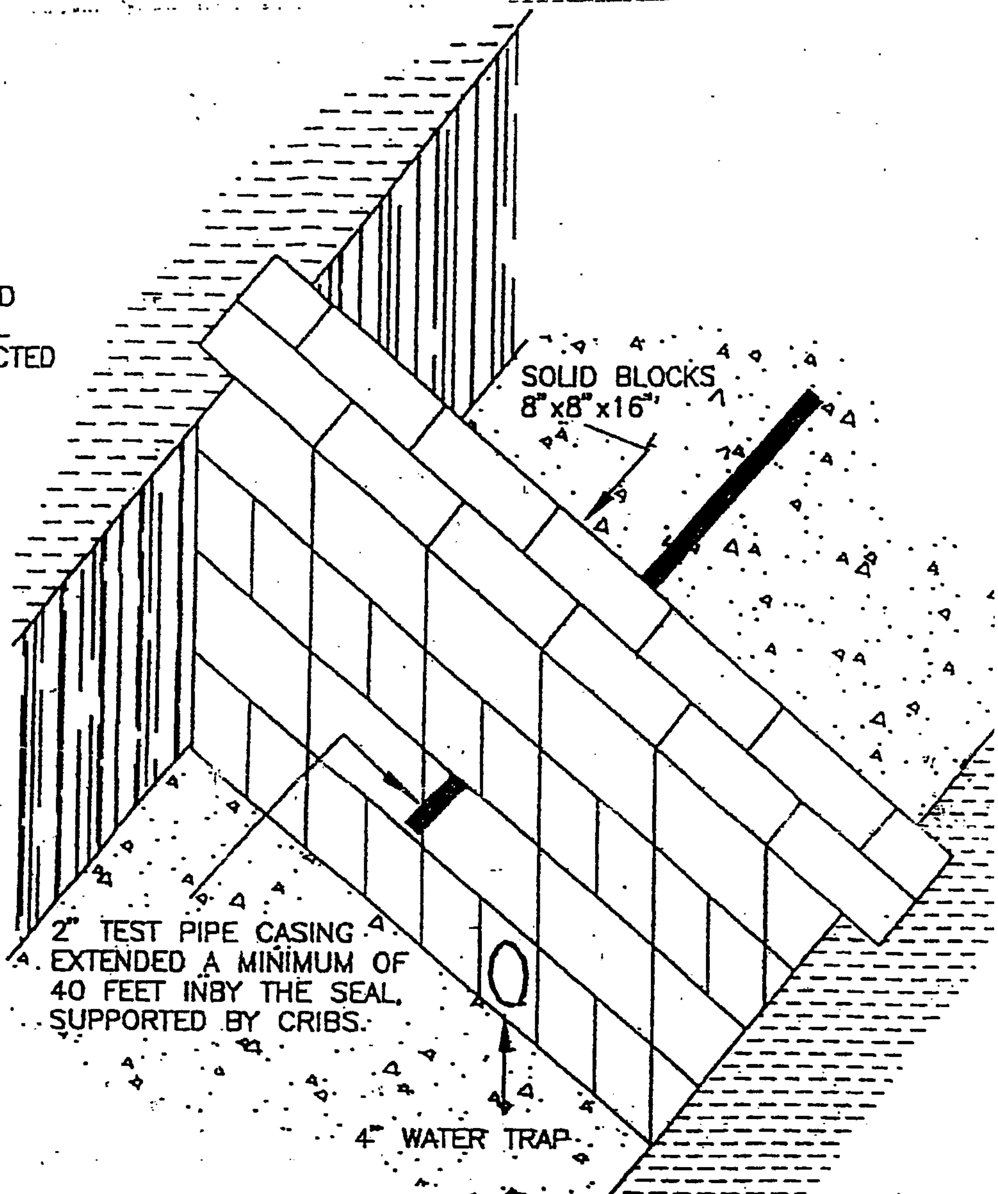
1. Total thickness of completed seal shall be 40 inches
2. No hitching required
3. Joints must be staggered
4. All joints shall be a minimum ¼ inch thich and be motored using "BlockBond"
5. Three rows of wood planks running the entire length of the seal shall be installed across the top of the seal
6. Wedges will be placed on 1' centers or less with "BlocBond" used to fill the gaps
7. "BlocBond" shall be used as full face coating on both sides of the seal.



- seals shall be at least 10 feet from the corner of the pillar
- Sampling pipes shall be installed as per 75.335

5

METHOD FOR SEALING ABANDONED OR WORKED OUT AREAS



. A minimum of 30" crib blocks shall be used in crib construction.

. Blocks are to be interlocked by laying every other row crosswise.

. A minimum of two cribs are to be built inby and outby each seal.

. Seals must be built a minimum of 10 feet inby the corner of the coal block.

All stoppings to be removed in the line of crosscuts inby each set of seals. 1/4" copper tubing is to be installed through the entire length of the 2" test pipe casing.

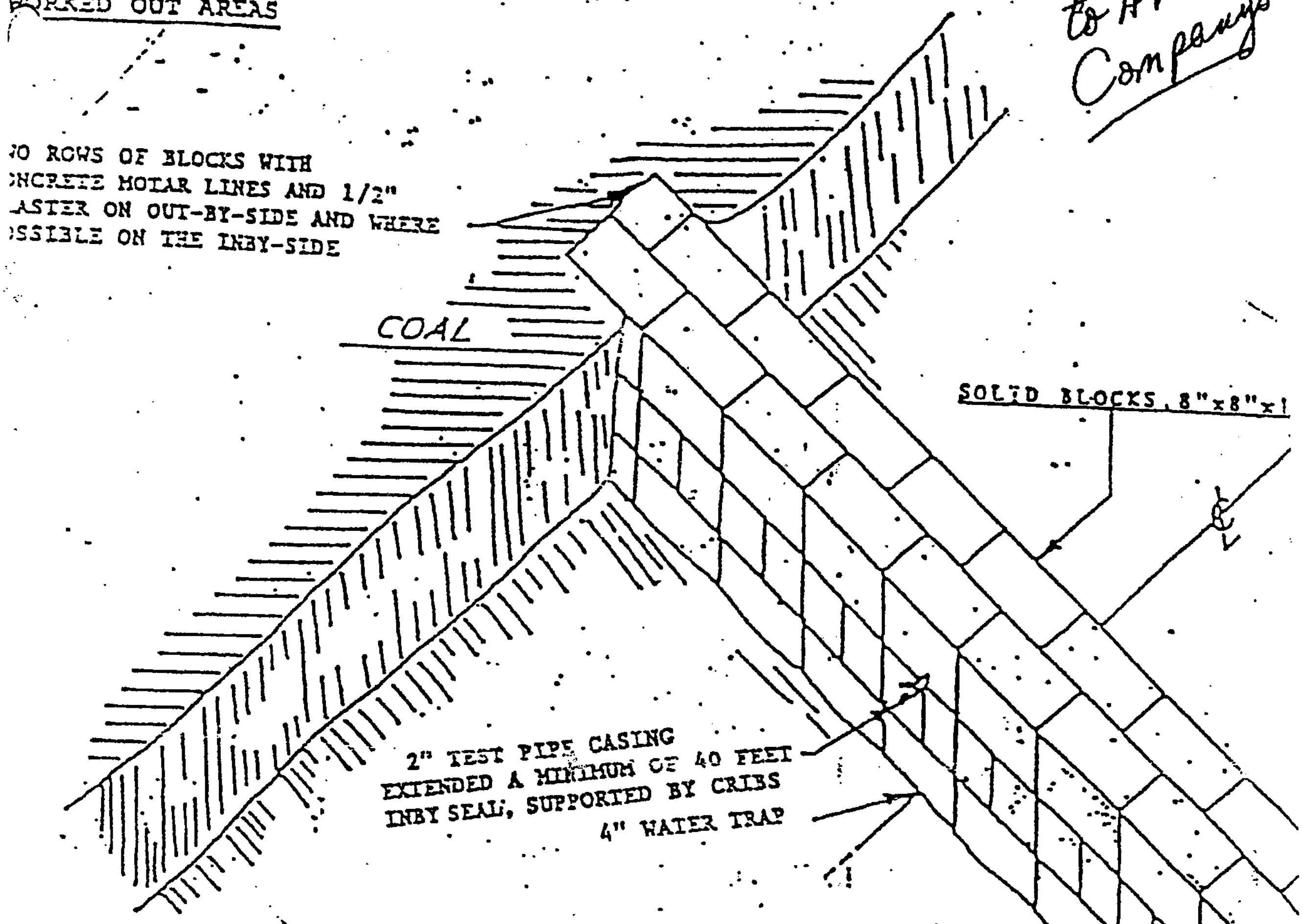
Each of the above pipes must be installed in each set of seals. The 2" text pipe casing must be in the seal of the highest elevation. The division office shall be notified before the seals are finished so that the district inspector can check to see if the seals have been constructed to specifications.

Page 1

PLAN FOR SEALING
ABANDONED OR
WORKED OUT AREAS

DEPARTMENT OF ENERGY
Division of Mines and Minerals
Effective as of 12/13/85

Distribute to All 6 Companys



TES:

A MINIMUM OF 30 IN. CRIB BLOCKS THAT HAVE BEEN TREATED OR THE EQUIVALENT SHALL BE USED IN CRIB CONSTRUCTION.
BLOCKS ARE TO BE INTERLOCKED BY LAYING EVERY OTHER ROW CROSSWISE.
A MINIMUM OF TWO CRIBS ARE TO BE BUILT INBY AND OUTBY EACH SEAL.
SEALS MUST BE BUILT A MINIMUM OF 10 FT. INBY THE CORNER OF THE COAL BLOCK
ALL STOPPINGS TO BE REMOVED IN THE FIRST LINE OF CROSSCUTS INBY EACH SET OF SEALS. 1/4 INCH COPPER TUBING IS TO BE INSTALLED THROUGH THE ENTIRE LENGTH OF THE 2" TEST PIPE CASING.
EACH OF THE ABOVE PIPES MUST BE INSTALLED IN EACH SET OF SEALS. THE 2" TEST PIPE CASING MUST BE IN THE SEAL OF THE HIGHEST ELEVATION AND THE WATER TRAP IN THE SEAL OF LOWEST ELEVATION.
HE DIVISION OFFICE SHALL BE NOTIFIED BEFORE THE SEALS ARE FINISHED SO THAT THE DISTRICT INSPECTOR CAN CHECK TO SEE IF THE SEALS HAVE BEEN CONSTRUCTED TO SPECIFICATIONS.

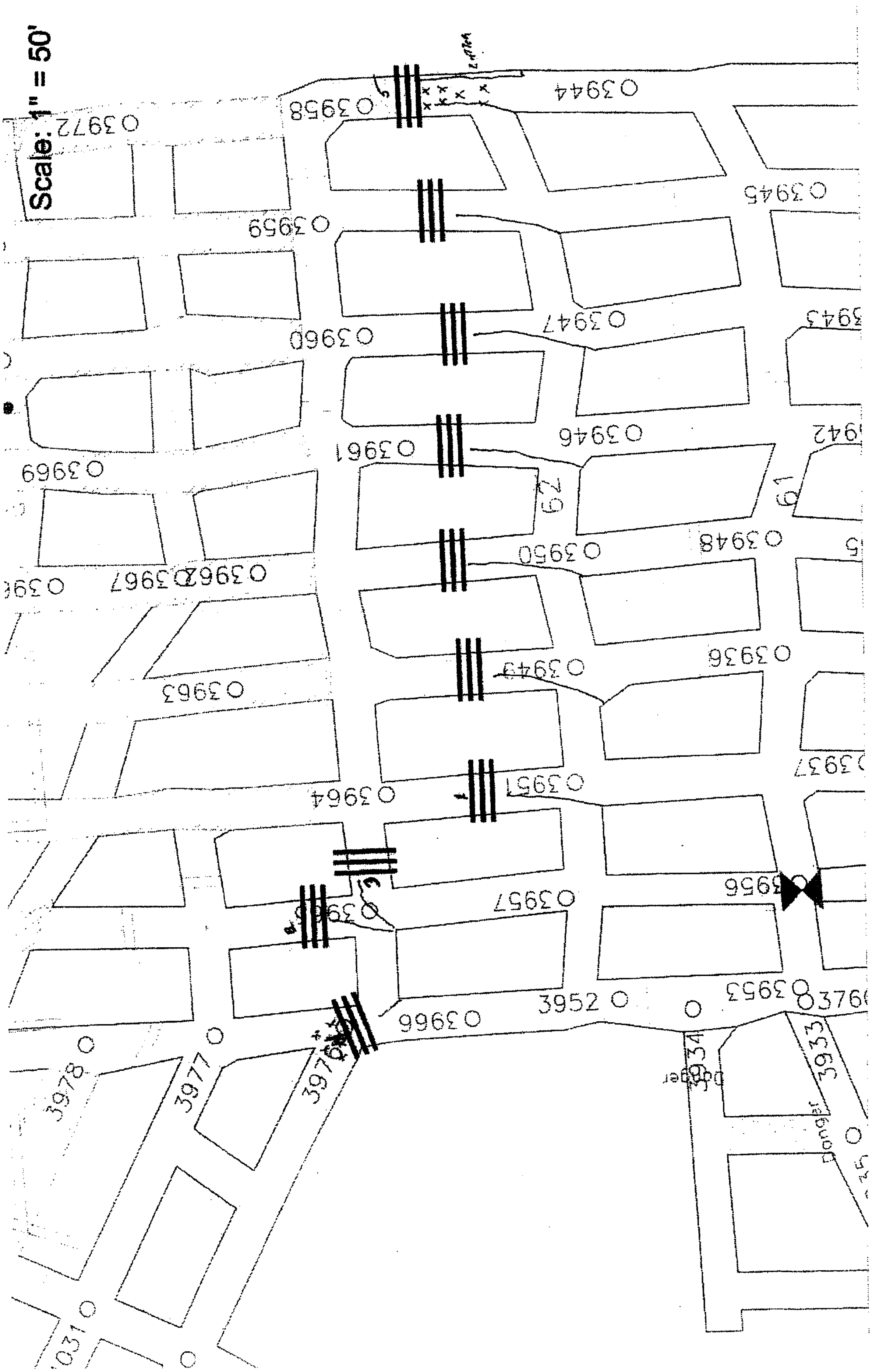
BLOCKS TO BE ANCHORED ONE FOOT SOLID COAL AND THE SHALL BE CONSTRUCTE SOLID BOTTOM.

COMPANY: ____________________

MINE: ____________________

____
SIGNATURE OF COMPANY OFFICIAL & T

PAGE 2


Scale: 1" = 50'
3972
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3967
3936
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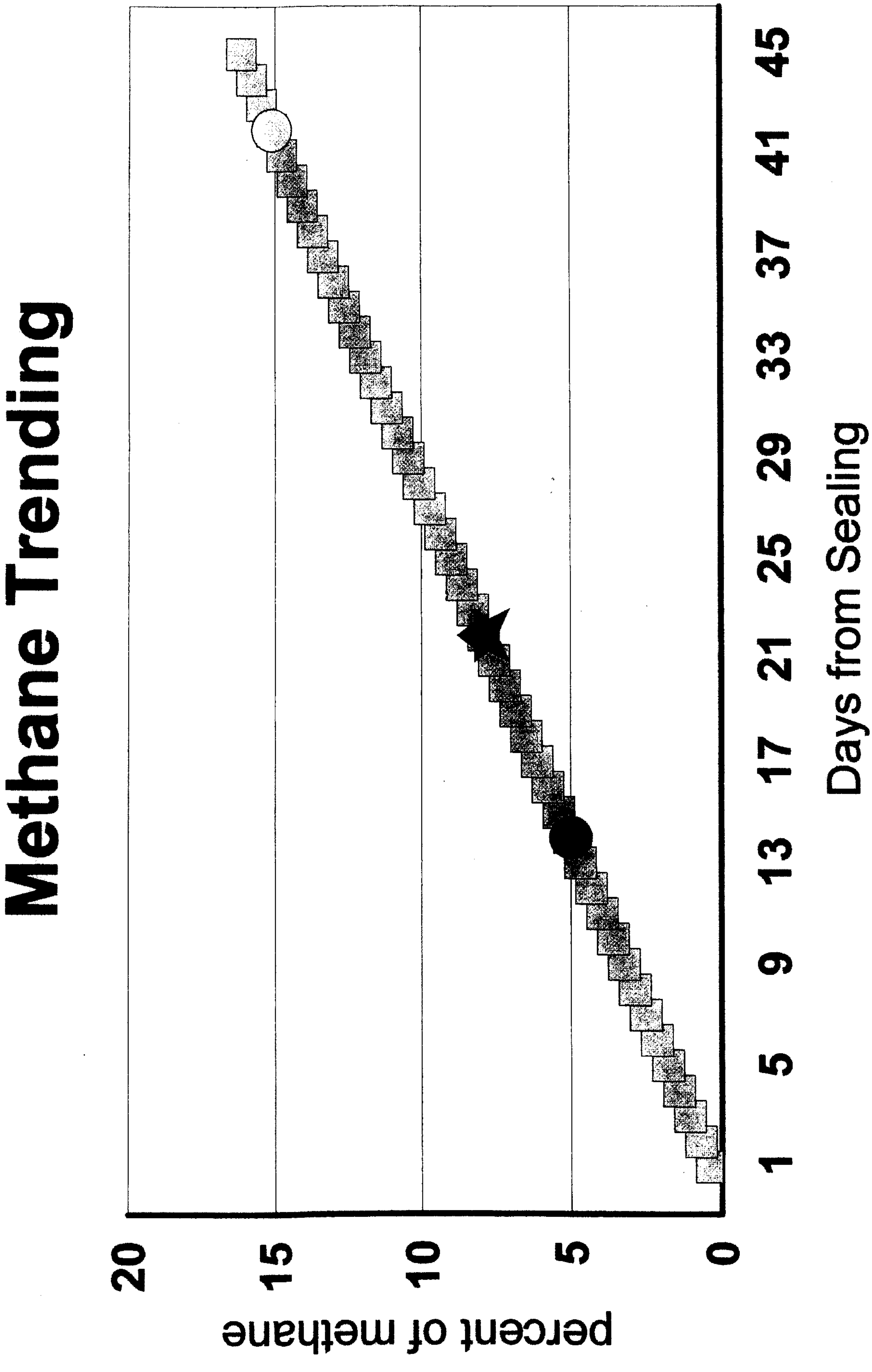
3977
3934
3933
Danger


Methane Trending
percent of methane
0
5
10
15
20
1
5
9
13
17
21
25
29
33
37
41
45
Days from Sealing

West Virginia Office of Miner's Health, Safety, and Training

142 Industrial Drive
Oak Hill, WV 25901

PH 304-469-8100
FX 304-469-4059

MEMO

TO: Doug Conaway
FROM: Monte Hieb
DATE: January 12, 2006
SUBJECT: Timing of explosion corresponds to lightning strike

Yesterday with the help of John Scott, Marshall Robinson (Allegheny Land Surveying), and Kevin Hedrick (MSHA) it was determined that the time of the explosion January 2, 2006 at Sago Mine occurred at **6:26:35 am**.

This determination was made by comparing the time on the CO monitoring computer at Sago to a GPS clock (precise actual time). The Sago CO computer clock was determined to be running 4 minutes 56 seconds (00:04:56) ahead of the GPS clock.

John Scott advised that the first spike on the **CO computer log** for January 2, 2006 was 51 ppm which occurred at 6:31:31 am. Subtracting the time correction places the actual time of this event at **06:26:35 am**.

This corresponds precisely with the timing of two nearly simultaneous **lightning strikes** approx. 2 miles apart, located on the attached map. The strongest of these, recorded by Vaisala (StrikeNet), was reported to be a +101.0 kA hit at LAT 38.926, LONG -80.233 at **06:26:35.680 am** on January 2, 2006. This is the location where Sago engineer Kermit ~~Melvin and myself found the lightning-struck tree last Friday (see Photo 1).~~

A second, smaller strike of +38.8 kA occurred nearly simultaneously nearby at LAT 38.897, LONG -80.231 at 06:26:35.522 am. This one left no obvious physical damage on the ground or treetops, but prevalent minor tree damage from prior early snows last fall may have obscured evidence of a minor strike.

The 06:26:35 am timeframe for the explosion also seems to be corroborated by a subtle **seismic event** recorded by a USGS seismic station located at WVGES at Mont Chateau and detected by Martin Chapman, a geophysicist at the University of Virginia. He places the time at approximately **06:26:38 am +/- 3 sec**. The proof for this has not yet been independently verified.

Unless evidence is uncovered in the future which casts doubt on the facts as stated above, there is convincing circumstantial evidence that the explosion at Sago Mine on January 2, 2006 was directly related to one or both of the lightning strikes recorded at 06:26:35 am, both of which occurred on the opposite side of the Buckhannon River from Sago Mine.

Notably, a 12 kvA powerline passes within about 500 feet of the +110 kA lightning strike location (see map, attached). This line begins at the Allegheny Power substation on French Creek and supplies the power to the Sago preparation plant and Sago Mine.

Because of these findings, it is suggested that we begin taking a look at the conductive and grounding systems of the 12 kvA transmission line to explore the possibility that a power surge may have entered Sago Mine by such means. Pipelines, phone communication lines, and other similar structures at this location should also be examined.

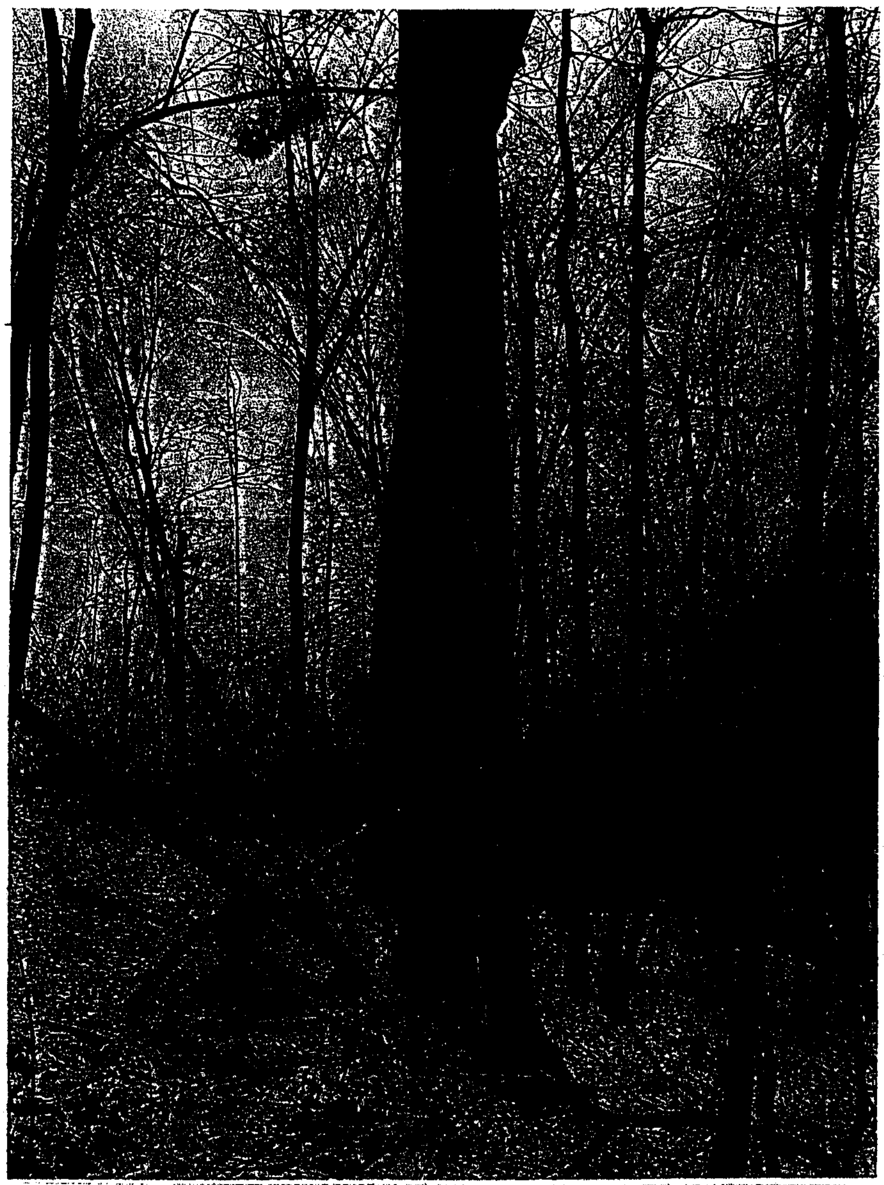
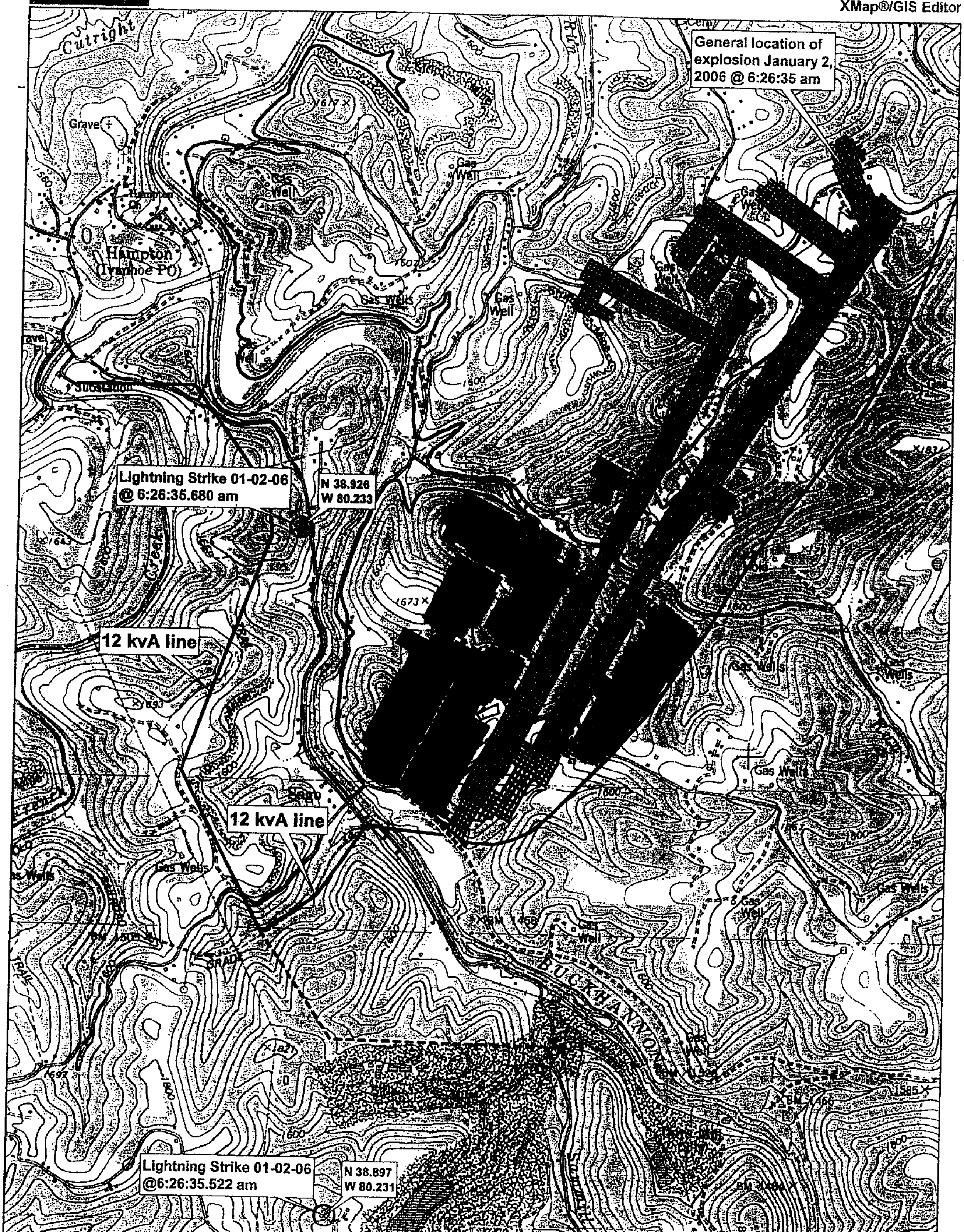


Photo 1. Poplar tree very recently hit by lightning and in close proximity to +110 kA hit recorded by Vaisala (StrikeNet) at LAT 38.926, LONG -80.233 at 06:26:35.680 am on January 2, 2006, Photo by Kermit Melvin, January 6, 2006.

DELORME

XMap®/GIS Editor



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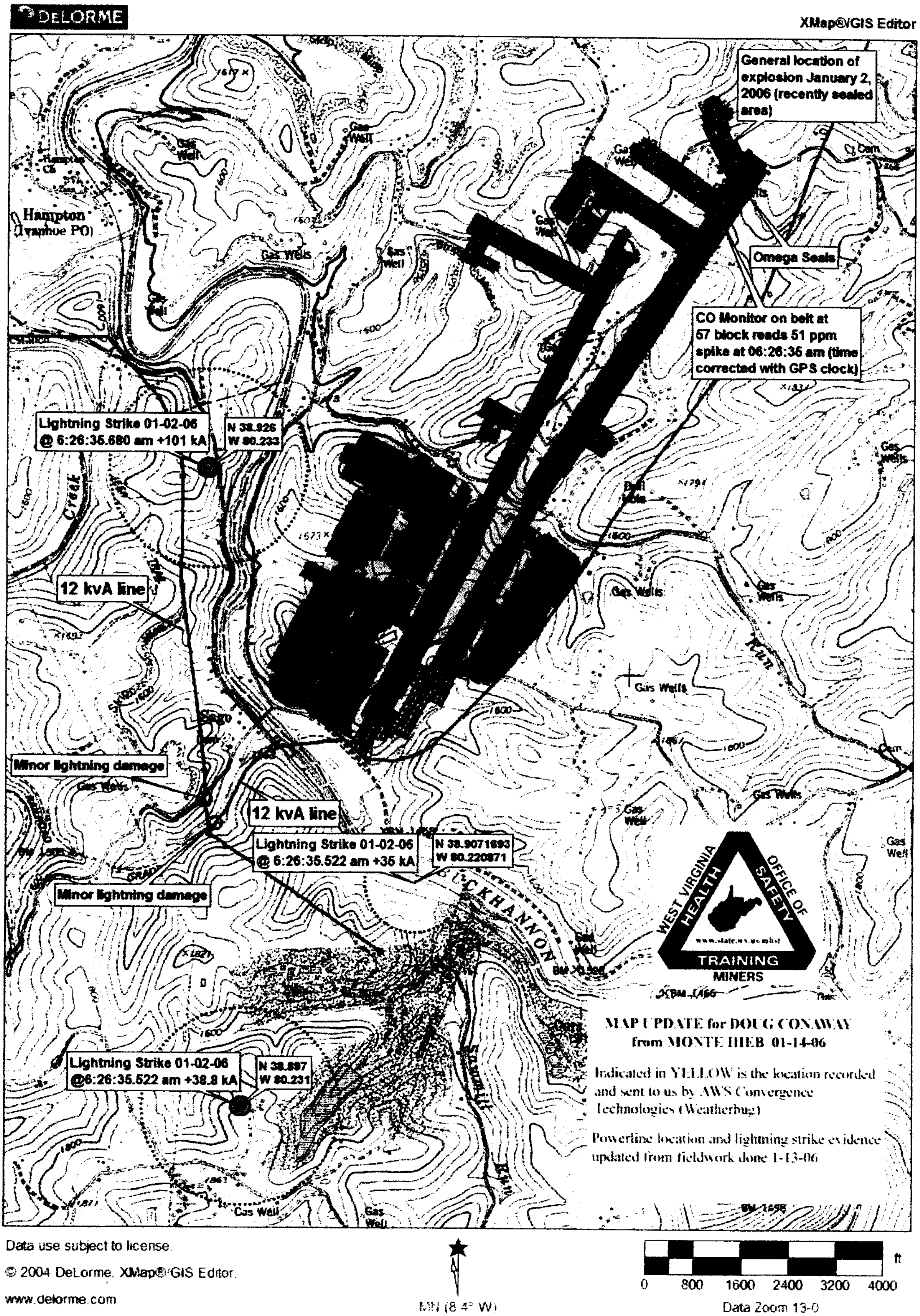
www.delorme.com

TN
MN (8.4°W)

Scale 1 : 24,000

1" = 2,000.0 ft

Data Zoom 13-0


DELORME
XMap®/GIS Editor
General location of explosion January 2, 2006 (recently sealed area)
Omega Seals
CO Monitor on belt at 57 block reads 51 ppm spike at 06:26:35 am (time corrected with GPS clock)
Lightning Strike 01-02-06 @ 6:26:35.680 am +101 kA
N 38.926 W 80.233
12 kvA line
Minor lightning damage
12 kvA line
Lightning Strike 01-02-06 @ 6:26:35.522 am +35 kA
N 38.9071693 W 80.220871
Minor lightning damage
Lightning Strike 01-02-06 @6:26:35.522 am +38.8 kA
N 38.897 W 80.231
Hampton (Ivanhoe PO)
Gas Wells
Gas Well
WEST VIRGINIA OFFICE OF MINERS HEALTH SAFETY TRAINING
MAP UPDATE for DOUG CONAWAY from MONTE HIEB 01-14-06
Indicated in YELLOW is the location recorded and sent to us by AWS Convergence Technologies (Weatherbug)
Powerline location and lightning strike evidence updated from fieldwork done 1-13-06
Data use subject to license.
© 2004 DeLorme. XMap®/GIS Editor.
www.delorme.com
MN (8.4° W)
0 800 1600 2400 3200 4000 ft
Data Zoom 13-0

SAGO MINE

Lost Time Accidents Compaired to National Data

Year	Operator Injuries	Contractor Injuries	Mine Incident Rate	National Incident Rate
1999	0	0	0	8.25
2000	9	0	17.22	8.29
2001	5	0	11.83	7.13
2002	0	4	0	7.13
2003	Mine	was	not	operating
2004	8	0	15.9	5.68
2005	14	2	10.22	5.15
2006	6	2	5.91	4.99

Fatal Accident Compared to National Data

Year	Operator Fatal Accidents	Contractor Fatal Accidents	Mine Incident Rate	National Incident Rate
1999	0	0	0	0.0362
2000	0	0	0	0.0472
2001	0	0	0	0.076
2002	0	0	0	0.0329
2003	Mine	was	not	operating
2004	0	0	0	0.0356
2005	0	0	0	0.0325
2006	12	0	13.94	0.1619

SAGO MINE

Citation / Orders Type Issued by Year Penalty

Year	103(k)	104(a)	104(b)	104(d)(1)	104(d)(2)	107(a)	314(b)	Proposed Penalty	Assessed Penalty	Amount Paid
1999	0	18	0	0	0	0	0	1,155.00	1,155.00	1,155.00
2000	0	22	0	0	0	0	0	1,980.00	1,980.00	1,980.00
2001	1	95	0	2	0	1	0	18,868.00	18,868.00	18,868.00
2002	0	33	0	0	0	0	0	2,215.00	2,215.00	2,215.00
2003	Mine	was	not	operating		Mine	was	not	operating	
2004	0	68	0	0	0	0	0	9,575.00	9,575.00	9,575.00
2005	2	181	1	3	13	0	5	130,545.00	130,376.00	30,576.00
2006	6	211	0	2	2	1	1	76,499.00	76,499.00	26,585.00

Sago Mine: Citations / Orders, January 1, 2005 to December 31, 2006

2005

First Quarter (January 1, 2005 to March 31, 2005)

Citations	16
Orders	0
Safe Guards	0
Total	**16**

Second Quarter (April 1, 2005 to June 30, 2005)

Citations	52
Orders	3
Safe Guards	4
Total	**59**

Third Quarter (July 1, 2005 to September 30, 2005)

Citations	70
Orders	12
Safe Guards	1
Total	**83**

Fourth Quarter October 1, 2005 to December 31, 2005)

Citations	47
Orders	3
Safe Guards	0
Total	**50**

Calendar Year 2005

Citations	185
Orders	18
Safe Guards	5
Total	**208**

2006

First Quarter (January 1, 2006 to March 31, 2006)

Citations	122
Orders	2
Safe Guards	0
Total	**124**

Second Quarter (April 1, 2006 to June 30, 2006)

Citations	18
Orders	3
Safe Guards	0
Total	**21**

Third Quarter (July 1, 2006 to September 30, 2006)

Citations	44
Orders	3
Safe Guards	0
Total	**47**

Fourth Quarter (October 1, 2006 to December 31, 2006)

Citations	28
Orders	2
Safe Guards	1
Total	**31**

Calendar Year 2006

Citations	212
Orders	10
Safe Guards	1
Total	**223**

Sago Mine: Citations / Orders by Type, January 1, 2005 to December 31, 2006

2005

First Quarter (January 1, 2005 to March 31, 2005)

104(a) Citation	16
Total	**16**

Second Quarter (April 1, 2005 to June 30, 2005)

104(a) Citation	51
104(b) Citation	1
104(d)(1) Order	3
314(b) [Safe Guard]	4
Total	**59**

Third Quarter (July 1, 2005 to September 30, 2005)

103(k) Order	2
104(a) Citation	70
104(d)(2) Order	10
314(b) [Safe Guard]	1
Total	**83**

Fourth Quarter October 1, 2005 to December 31, 2005)

104(a) Citation	47
104(d)(2) Order	3
Total	**50**

Calendar Year 2005

103(k) Order	2
104(a) Citation	184
104(b) Citation	1
104(d)(1) Order	3
104(d)(2) Order	13
314(b) [Safe Guard]	5
Total	**208**

2006

First Quarter (January 1, 2006 to March 31, 2006)

104(a) Citation	122
104(d)(2) Order	1
107(a) Citation	1
Total	**124**

Second Quarter (April 1, 2006 to June 30, 2006)

103(k) Order	2
104(a) Citation	17
104(d)(1) Order	2
Total	**21**

Third Quarter (July 1, 2006 to September 30, 2006)

103(k) Order	2
104(a) Citation	44
104(d)(2) Order	1
Total	**47**

Fourth Quarter (October 1, 2006 to December 31, 2006)

103(k) Order	2
104(a) Citation	28
314 (b)	1
Total	**31**

Calendar Year 2006

103(k) Order	6
104(a) Citation	211
104(d)(1) Order	2
104(d)(2) Order	2
107(a) Citation	1
314(b)	1
Total	**223**

Sago Mine: Citations / Orders by CFR, January 1, 2005 to December 31, 2006

2005

First Quarter (January 1, 2005 to March 31, 2005)

70.200Series [sampling procedures]	1
75.300 Series [ventilation]	8
75.400 Series [combustible material]	2
75.500 Series [electrical]	1
75.800 Series [under. High-volt]	1
75.1100 Series [fire protection	2
75.1700 Series [Misc.]	1
Total	**16**

Second Quarter (April 1, 2005 to June 30, 2005)

104(b) Citation [unknown]	1
50.200 Series [accident reporting]	1
62.100 Series [noise exposure]	1
70.200 Series [sampling procedures]	2
75.200 Series [roof control]	1
75.300 Series [ventilation]	8
75.400 Series [combustible material]	8
75.500 Series [electrical]	8
75.600 Series [trailing cables]	3
75.800 Series [under. High-volt]	1
75.1100 Series [fire protection	5
74.1400 Series [mantrips / hoisting]	4
75.1700 Series [Misc.]	14
77.200 Series [surface installations]	2
Total	**59**

Third Quarter (July 1, 2005 to September 30, 2005)

103(k) Order	2
70.200 Series [sampling procedures]	1
75.200 Series [roof control]	7
75.300 Series [ventilation]	17
75.400 Series [combustible material]	6
75.500 Series [electrical]	21
75.600 Series [trailing cables]	3
75.900 Series [under low-med-volt]	1
75.1100 Series [fire protection	3
75.1400 Series [mantrips / hoisting	12
75.1700 Series [Misc.]	8
77.400 Series [mech equip]	2
Total	**83**

Fourth Quarter October 1, 2005 to December 31, 2005)

70.200 Series [sampling procedures	1
75.200 Series [roof control]	13
75.300 Series [ventilation]	10
75.400 Series [combustible material]	6
75.500 Series [electrical]	4
75.1100 Series [fire protection	7
75.1400 Series [mantrips / hoisting]	2
75.1700 Series [Misc.]	3
77.100 Series [certified persons]	1
77.200 Series [surface installations]	2
77.400 Series [mech. equip]	1
Total	**50**

Calendar Year 2005

103(k) Order	2
104(b) Citation [unknown]	1
50.20 Series [accident reporting]	1
62.100 Series [noise exposure]	1
70.200 Series [sampling procedures]	5
75.200 Series [roof control]	21
75.300 Series [ventilation]	43
75.400 Series [combustible material]	22
75.500 Series [electrical]	34
75.600 Series [trailing cables]	6
75.800 Series [under. High-volt]	2
75.900 Series [under low-med-volt]	1
75.1100 Series [fire protection]	17
75.1400 Series [mantrips / hoisting]	18
75.1700 Series [Misc.]	26
77.100 Series [certified persons]	1
77.200 Series [surface installations]	4
77.400 Series [mech equip]	3
Total	**208**

2006

First Quarter (January 1, 2006 to March 31, 2006)

103(k) Order	0
107(a) Order	1
104(a) Citation [unknown]	1
75.41.12 [ownership notice]	1
75.300 Series [ventilation]	3
75.400 Series [combustible material]	2
75.500 Series [electrical]	76
75.600 Series [trailing cables]	7
75.700 Series [grounding]	3
75.800 Series [under. High-volt]	2
75.900 Series [under low-med-volt]	10
75.1100 Series [fire protection	3
75.1700 Series [Misc.]	2
77.200 Series [surface installations]	3
77.400 Series [mech equip]	1
77.500 Series [elec. equip.]	6
77.700 Series [grounding]	3
Total	**124**

Second Quarter (April 1, 2006 to June 30, 2006)

103(k) Order	2
50.30 [employment/production reports]	1
70.200 Series [dust sampling procedures]	1
72 600 Series [miscellanious]	1
75.200 Series [roof support]	1
75.300 Series [ventilation]	7
75.400 Series [combustible material]	3
75.500 Series [electrical]	2
75.1100 Series [fire protection	3
Total	**21**

Third Quarter (July 1, 2006 to September 30, 2006)

103(k) Order	2
50.100 Series [notification]	1
75.200 Series [roof support]	9
75.300 Series [ventilation]	22
75.400 Series [combustible material]	2
75.500 Series [electrical]	1
75.1200 Series [maps]	1
75.1400 Series [hoisting/mantrips]	6
75.1700 Series [Misc.]	3
Total	**47**

103(k) Order	2
70.200 Series [dust sampling procedures]	1
72.600 Series [miscellaneous]	1
75.200 [roof support]	5
75.300 Series [ventilation]	7
75.400 Series [combustible material]	4
75.500 Series [electrical]	4
75.1100 Series [fire protection	3
75.1400 Series [hoisting/mantrips	1
75.1700 Series [Misc.]	2
77.200 Series [surface installations]	1
Total	**31**

Calendar Year 2006

103(k) Order	6
107(a) Order	1
104(a) Citation [unknown]	1
50.100 Series [notification]	1
50.30 [employment/production reports]	1
75.41.12 [ownership notice]	1
70.200 Series [dust sampling procedures]	2
72.600 Series [miscellaneous]	1
75.200 Series [roof support]	15
75.300 Series [ventilation]	39
75.400 Series [combustible material]	11
75.500 Series [electrical]	83
75.600 Series [trailing cables]	8
75.700 Series [grounding]	3
75.800 Series [under. High-volt]	2
75.900 Series [under low-med-volt]	10
75.1100 Series [fire protection	9
75.1200 Series [maps]	1
75.1400 Series [hoisting/mantrips]	7
75.1700 Series [Misc.]	7
77.200 Series [surface installations]	4
77.400 Series [mech equip]	1
77.500 Series [elec. equip.]	6
77.700 Series [grounding]	3
Total	**223**

Sago Mine: Citations / Orders, penalties, January 1, 2005 to December 31, 2006

2005

First Quarter (January 1, 2005 to March 31, 2005)

	12	$60.00
	2	$247.00
	1	$324.00
	1	$350.00
Total	**16**	**$1,888.00**
Average Per Citation		**$118.00**

Second Quarter (April 1, 2005 to June 30, 2005)

	5	$0.00
	22	$60.00
	16	$247.00
	3	$268.00
	2	$324.00
	7	$440.00
	1	$878.00
	1	$4,200.00
	1	$5,400.00
	1	$8,200.00
Total	**59**	**$28,382.00**
Average Per Citation		**$481.05**

Third Quarter (July 1, 2005 to September 30, 2005)

	3	$0.00
	38	$60.00
	1	$99.00
	26	$247.00
	5	$268.00
	2	$5,400.00
	4	$6,600.00
	2	$8,200.00
	1	$9,200.00
	1	$9,600.00
Total	**83**	**$80,621.00**
Average Per Citation		**$988.69**

Fourth Quarter October 1, 2005 to December 31, 2005)

	29	$60.00
	4	$247.00
	9	$286.00
	3	$324.00
	1	$440.00
	1	$629.00
	1	$838.00
	1	$4,000.00
	1	$5,600.00
Total	**50**	**$16,781.00**
Average Per Citation		**$335.62**

Calendar Year 2005

	8	$0.00
	101	$60.00
	1	$99.00
	48	$247.00
	17	$268.00
	6	$324.00
	1	$350.00
	8	$440.00
	1	$629.00
	1	$838.00
	1	$878.00
	1	$4,000.00
	1	$4,200.00
	3	$5,400.00
	1	$5,600.00
	4	$6,600.00
	3	$8,200.00
	1	$9,200.00
	1	$9,600.00
Total	**208**	**$127,672.00**
Average Per Citation		**$613.81**

2006

First Quarter (January 1, 2006 to March 31, 2006)

	3	$0.00 or N/A
	80	$60.00
	2	$350.00
	11	$440.00
	3	$614.00
	5	$838.00
	7	$963.00
	8	$1,238.00
	2	$1,576.00
	1	$2,393.00
	1	$5,000.00
	1	$7,500.00
Total	**124**	**$51,062.00**
Average Per Citation		**$411.79**

Second Quarter (April 1, 2006 to June 30, 2006)

	4	$0.00 or N/A
	12	$60.00
	2	$440.00
	1	$963.00
	1	$1,238.00
	1	$1,760.00
Total	**21**	**$5,461.00**
Average Per Citation		**$260.05**

Third Quarter (July 1, 2006 to September 30, 2006)

	3	$0.00 or N/A
	21	$60.00
	1	$247.00
	4	$350.00
	8	$440.00
	3	$614.00
	2	$723.00
	2	$963.00
	2	$1,238.00
	1	$1,576.00
Total	**47**	**$15,693.00**
Average Per Citation		**$333.89**

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