

**Internal Review of MSHA's  
Actions at the Sago Mine  
Wolf Run Mining Company  
Sago, Upshur County, West Virginia**

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U.S. Department of Labor  
Mine Safety and Health Administration  
Program Evaluation and Information Resources

June 28, 2007



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June 28, 2007



## Table of Contents

<b>Executive Summary</b> .....	1
<b>Background</b> .....	3
<b>Purpose, Scope, and Methodology</b> .....	4
<b>Report Organization</b> .....	5
<b>Injury Incidence Rates for the Sago Mine</b> .....	6
<b>Enforcement Activities</b> .....	7
Section 103(a) Inspections .....	7
Other Inspections and Investigations .....	18
Use of Sections 104(a), 104(b), 104(d), and 314(b) .....	19
<i>Gravity Determinations (S&amp;S and Number of Persons Affected)</i> .....	20
<i>Negligence Determinations</i> .....	23
<i>Timely Abatement</i> .....	26
<i>Vacated Citations and Orders</i> .....	28
<i>Notice to Provide Safeguards</i> .....	29
Special Assessment Reviews .....	32
Possible Knowing/Willful Violation Reviews .....	34
Pattern of Violations .....	37
Alternative Case Resolution Initiative (ACRI) .....	40
Inspection Activities Prior to the Explosion .....	52
<b>Sealing of Worked-Out Areas</b> .....	54
Background on Alternative Seal Approval Criteria .....	54
<i>Criteria for Approval of Alternative Seals for Worked-Out Areas</i> .....	55
<i>Testing of Omega Block Alternative Seals at Lake Lynn</i> .....	57
<i>Previous Explosions Involving Seals</i> .....	58
<i>Seal Strength Criteria Used in Other Countries</i> .....	60
<i>Discussion of 20-psi Alternative Seal Strength Criterion in 30 CFR 75.335(a)(2)</i> .....	61
<i>Seal Use Pre-1971 versus Today</i> .....	63
<b>Alternative Seals at the Sago Mine</b> .....	63
Estimated Explosion Pressures in Sago Mine .....	63
Approval of Alternative Seals in Sago Mine Ventilation Plan .....	65
Inspection and Construction of the 2 North Mains Seals .....	69
<b>Enforcement of Specific Standards - Non-Contributory Violations</b> .....	73
Enforcement of 30 CFR 48 .....	73
Enforcement of 30 CFR 50.10 .....	75
Enforcement of 30 CFR 75.320(a) .....	76
Enforcement of 30 CFR 75.400, 75.402 and 75.403 .....	77
Enforcement of Electrical Standards .....	81
Enforcement of 30 CFR 75.503 .....	83
Enforcement of 30 CFR 75.512 .....	85
Enforcement of 30 CFR 75.517 .....	86
Enforcement of 30 CFR 75.518 .....	88
Enforcement of 30 CFR 75.521 .....	89

Enforcement of 30 CFR 75.601-1 .....	91
Enforcement of 30 CFR 75.1500.....	91
Enforcement of 30 CFR 75.1501.....	92
Enforcement of 30 CFR 75.1502(a).....	94
Enforcement of 30 CFR 75.1714-3 .....	97
<b>Plan Approvals .....</b>	<b>99</b>
Mine Emergency Evacuation and Firefighting Program of Instruction .....	99
Roof Control Plan - Review and Approval .....	102
Mine Ventilation Plan - Review and Approval .....	105
Training Plan - Review and Approval .....	108
<b>Mine Rescue and Recovery .....</b>	<b>109</b>
<b>Seismic Location System .....</b>	<b>122</b>
<b>Compliance Assistance .....</b>	<b>125</b>
<b>Management Issues .....</b>	<b>128</b>
Supervisory and Second-level Reviews.....	128
Accountability Program.....	132
District Communication.....	135
<b>Enforcement and Compliance Efforts at the Sago Mine .....</b>	<b>136</b>
<b>Agency Actions Taken Since January 2, 2006 .....</b>	<b>138</b>
<b>Root Cause Analysis.....</b>	<b>140</b>
<b>Signature Page .....</b>	<b>159</b>
<b>Appendix A - Persons Interviewed or Providing Information .....</b>	<b>A-1</b>
<b>Appendix B - Coal Mine Safety and Health Administrator’s Response .....</b>	<b>B-1</b>
<b>Appendix C - Recommendations from MSHA’s Accident Prevention Team .....</b>	<b>C-1</b>
<b>Appendix D - MSHA Inspection Events at the Sago Mine.....</b>	<b>D-1</b>
<b>Appendix E - Enforcement Actions Taken by MSHA at the Sago Mine .....</b>	<b>E-1</b>
<b>Appendix F - Explosions in or Affecting Sealed Areas.....</b>	<b>F-1</b>
<b>Appendix G - Omega Block Seal Construction Requirements .....</b>	<b>G-1</b>
<b>Appendix H - Sago Mine Map.....</b>	<b>H-1</b>

## Executive Summary

The purpose of this internal review is to evaluate the actions of the Mine Safety and Health Administration (MSHA) relative to the explosion at the Wolf Run Mining Company, Sago Mine, and to make recommendations to improve the Agency's enforcement processes to better protect our nation's miners. The internal review compares MSHA's actions with the requirements of the Federal Mine Safety and Health Act of 1977 (Mine Act), its standards and implementing regulations, and MSHA policies and procedures. The internal review team examined inspection records, traveled underground to the explosion area, and interviewed MSHA employees with personal knowledge of pertinent events.

Through enforcement of the Mine Act, MSHA inspection personnel recognized numerous hazardous conditions at the Sago Mine and required the operator to take corrective actions in an effort to achieve a safer and healthier work environment for the miners. During 2005, District personnel elevated the level of enforcement in response to continuing compliance problems. District 3 personnel held several meetings with Sago Mine managers to emphasize the need for increased compliance at the mine. Personnel from Technical Support also provided compliance assistance to reduce accidents and injuries.

Although the internal review team identified deficiencies in MSHA's actions at the Sago Mine, the team did not find any evidence that the actions of District 3 personnel caused or contributed to the fatal explosion.

It is evident from MSHA's accident investigation that the 20 pound per square inch (psi) pressure criterion used by the Agency for the approval of alternative seals was inadequate. The explosion in the Sago Mine generated forces well in excess of 20 psi and destroyed the seals.

MSHA appropriately approved the alternative seals in the Sago Mine based on a 1992 ventilation rule which established 20 psi as the threshold for determining whether a seal is explosion-proof. This threshold was based on the U.S. Bureau of Mines Report of Investigations No. 7581. According to that report, a seal or bulkhead may be considered explosion-proof when its construction is adequate to withstand a static load of 20 psi if there is sufficient incombustible material on both sides of the seal to abate the explosion hazard.

Prior to the Sago Mine explosion, MSHA had not identified the need for seals to withstand a pressure greater than 20 psi. From 1986 until the fatal accident at the Sago Mine, MSHA investigated 11 explosions involving seals. Seal failures occurred in eight of the incidents, but the failures were generally attributed to faulty seal construction. None of these incidents resulted in injuries. In the cases where explosion pressures could be estimated, there was no conclusive evidence that the pressures had exceeded 20 psi.

MSHA had not addressed the potential for lightning to provide a source of ignition for explosions in sealed areas. Incidents where lightning was identified as the likely source of ignition of a sealed-area explosion were thought to be isolated occurrences. The potential for electromagnetic energy created by a horizontal lightning discharge to radiate through earth and induce a voltage in a conductor was not recognized.

The internal review team identified a number of weaknesses in MSHA's performance that must be corrected. The team conducted a "Root Cause Analysis" of each deficiency to identify the root causes and to provide recommendations designed to prevent the recurrence of each deficiency and improve MSHA's performance overall. Principal findings of the root cause analysis are summarized below.

- The failure of personnel to follow established inspection procedures and inadequate management controls resulted in a number of enforcement deficiencies identified in this report.
- Ineffective use of the Performance Management System permitted poor performance to continue uncorrected.
- MSHA's Accountability Program effectively identified weaknesses in MSHA's enforcement activities but did not adequately identify root causes and eliminate recurrence of those weaknesses.
- Although District 3 inspectors appropriately elevated the level of enforcement at the Sago Mine in response to continuing compliance problems, their evaluations of gravity and negligence were adversely influenced by decisions made by Conference Litigation Representatives in prior safety and health conferences.
- MSHA's mine emergency response capabilities and procedures need to be improved. Existing procedures need to be evaluated and new procedures need to be established. Procedures should reflect that each mine rescue is unique and that the safety of rescue teams is paramount. The Agency also needs to address the deployment of rescue personnel and equipment, gas detection equipment that can rapidly detect high concentrations of methane and carbon monoxide, and the security of the command center.
- After the advent of self-contained self-rescuers, MSHA did not reevaluate the instructions on hard hat stickers that the Agency had distributed to miners. The stickers did not emphasize that miners should barricade only when all escapeways and alternate entries are blocked.
- MSHA's seismic location system is obsolete, takes too long to deploy, and has never located a missing miner.
- District 3 personnel did not recognize a deficiency in the approved Mine Emergency Evacuation and Firefighting Program of Instruction. The program



instructed miners to barricade when they were trapped by hazardous gases even though gases alone do not prevent miners from escaping the mine.

- In some cases, procedural instructions were unclear or outdated and need to be revised. In other cases, inspectors need to be retrained in specific inspection procedures.

The issues identified in each of these areas are specifically addressed and documented in this report. Some of the deficiencies are currently being addressed or have already been addressed by the Agency or through legislation. Where appropriate, this report includes recommendations to enhance MSHA's performance and to better protect all miners.

Deficiencies related to the Alternative Case Resolution and Accountability programs are not new. Similar deficiencies are documented in the Jim Walter Resources internal review report, released January 24, 2003, as well as in the Darby Mine No. 1 internal review report.

The internal review team fully anticipates that District 3 personnel will continue to exercise their authority and discharge their responsibility to vigorously enforce the safety and health standards at the Sago Mine, as well as at all other mines in the District. The effort, determination, and dedication of MSHA personnel is essential to the Agency's mission to administer the provisions of the Mine Act, enforce compliance with mandatory safety and health standards, and promote improved safety and health conditions in the Nation's mines.

## **Background**

The *Federal Mine Safety and Health Act of 1977* (Mine Act) states that mine operators, with the assistance of the miners, have the primary responsibility to prevent unsafe and unhealthful conditions and practices in the nation's mines. The Mine Safety and Health Administration has the responsibility to develop and promulgate mandatory safety and health standards, to inspect mines to determine whether there is compliance with these standards, and to investigate accidents to determine their causes and prevent recurrences.

At approximately 6:26 a.m. on January 2, 2006, an explosion occurred in by the 2 North Mains seals in the 2<sup>nd</sup> Left Mains of the Wolf Run Mining Company's Sago Mine near Sago, Upshur County, West Virginia. The explosion resulted in fatal injuries to 12 miners and serious injury to another miner. Sixteen additional miners who were working underground at the time of the explosion safely evacuated the mine.

At the time of the explosion, the Sago Mine was under the jurisdiction of MSHA's Coal Mine Safety and Health (CMS&H) District 3 office, located in Morgantown, West

Virginia. A regular safety and health inspection was started on October 3, 2005, and was ongoing at the time of the explosion. The last underground MSHA presence at the Sago Mine prior to the explosion was on December 27, 2005.

Immediately after the explosion, MSHA began an investigation into its cause. A team independent of District 3 conducted the accident investigation. The investigation included a physical examination of the mine, a review of pertinent documents, and interviews of persons having relevant information.

MSHA accident investigators determined that methane had accumulated in the 2 North Mains and 2<sup>nd</sup> Left Mains sealed areas. Lightning has been determined to be the most likely ignition source of the methane. The ensuing explosion generated forces well in excess of 20 psi and destroyed the seals, filling portions of the mine with toxic levels of carbon monoxide. One miner died of carbon monoxide poisoning shortly after the explosion. The 2<sup>nd</sup> Left Parallel miners' attempt to evacuate was unsuccessful and they barricaded themselves on the 2<sup>nd</sup> Left Parallel section. Tragically, the barricade was not able to prevent high levels of carbon monoxide from reaching the miners before they could be rescued. As a result, 11 additional miners perished. One miner survived and was rescued.

MSHA's official *Report of Investigation, Fatal Underground Coal Mine Explosion, January 2, 2006, Sago Mine, Wolf Run Mining Company, Sago, Upshur County, West Virginia, ID No. 46-08791* was made available to the public on May 9, 2007.

## **Purpose, Scope, and Methodology**

On, January 18, 2006, the Acting Assistant Secretary for Mine Safety and Health, instructed the Director of Program Evaluation and Information Resources to conduct an internal review of MSHA's actions at the Sago Mine. The purpose of the review is to evaluate MSHA's actions relative to the explosion at the Sago Mine and to make recommendations for improvements where appropriate.

This review compares MSHA's actions with the requirements of the Mine Act, its standards and implementing regulations, and MSHA policies and procedures. The review team examined inspection records, mine plans, the accident investigation report, and pertinent data from MSHA's Standardized Information System (MSIS). The team traveled to the mine site and observed conditions underground including 2<sup>nd</sup> Left Mains and the 2<sup>nd</sup> Left Parallel Section. The review team also interviewed MSHA employees with personal knowledge of pertinent events. Bargaining unit employees were afforded the opportunity to have a union representative present during their interviews. All persons interviewed cooperated fully with the review team during their interviews. A list of persons who were interviewed or who provided information to the review team is included as Appendix A.

In accordance with internal review procedures the review team evaluated MSHA's actions during the rescue and recovery operation. The internal review team also conducted an in-depth analysis of several other subjects, including pattern of violations, plan approvals, criteria for seal approval, special assessment of citations, and possible knowing/willful reviews, to determine their effect on MSHA's enforcement activities at the Sago Mine. The results of the review of these topics are discussed in this report.

Other subjects were also analyzed including the assessment of civil penalties, the section 104(d) tracking system, and conflict of interest. The review of these topics indicated they did not affect, influence, or otherwise have a bearing on the effectiveness of MSHA's activities at the Sago Mine. Therefore, these subjects are not discussed in this report.

Internal review policy and procedures require that every allegation of possible misconduct on the part of MSHA employees be examined. If the internal review team determines that there is credible evidence of possible employee misconduct, the procedures require the team to refer any such allegations for appropriate action to the Administrator of the program area being reviewed. No evidence of employee misconduct was found.

This report is in no way intended to denigrate the role of the dedicated District 3 personnel who have devoted thousands of hours to conducting inspections. Through enforcement of the Mine Act, these dedicated inspectors recognized numerous hazardous conditions and required the operator to take corrective action in an attempt to achieve a safer and healthier work environment for miners. Their continued dedication to these tasks will be critical to MSHA's mission of improving mine safety and health.

## **Report Organization**

This report is organized into several categories, each focusing on issues identified by the review team. The categories are as follows: Enforcement Activities; Sealing of Worked-Out Areas; Alternative Seals at the Sago Mine; Enforcement of Specific Standards – Non-contributory Violations; Plan Approvals; Mine Rescue and Recovery; Seismic Location System; Compliance Assistance; and Management Issues. These issues were derived from information gathered during the review team's evaluation of relevant documents and interviews of MSHA employees.

Each issue described in the report is divided into several sections. The "Requirement" section describes the relevant provisions of the Mine Act and its standards and implementing regulations. The "MSHA Policies and Procedures" section describes pertinent Agency policies and procedures. The "Statement of Facts" section presents the facts as found by the review team during its review. The "Conclusion" section contains the review team's analysis of the facts.

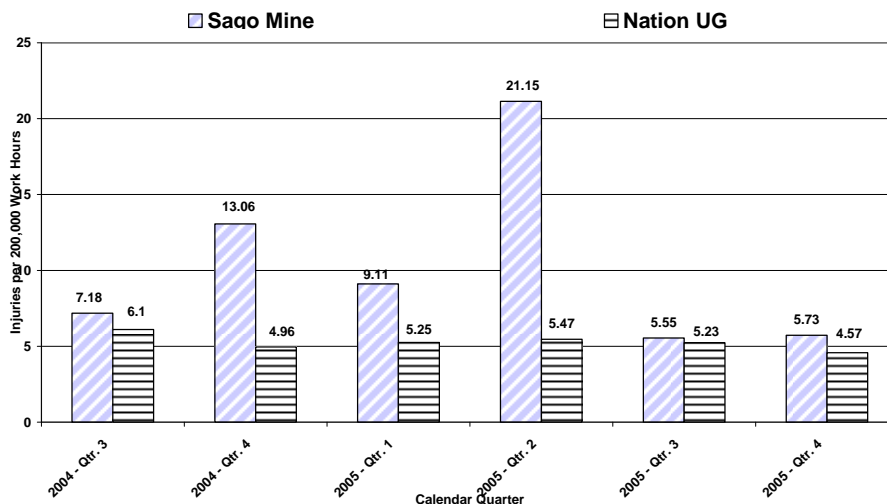
This report also contains sections on “Enforcement and Compliance Efforts at the Sago Mine,” “Agency Actions Since January 2, 2006,” and “Root Cause Analysis.” The Root Cause Analysis section identifies the root causes of each deficiency found by the internal review team and provides recommendations for addressing those causes.

After the Assistant Secretary approved the internal review report, he transmitted the report to the CMS&H Administrator and directed the Administrator to respond to the report’s recommendations. The Administrator’s response is included in Appendix B.

## Injury Incidence Rates for the Sago Mine

MSHA records indicate that while the operator Wolf Run Mining Company has owned the Sago Mine since January 2002, it actually started producing coal in 2004. Due to the Sago Mine’s production status, the internal review team examined the nonfatal, days-lost (NFDL) injury incidence rates from the 3<sup>rd</sup> quarter of 2004 through the 4<sup>th</sup> quarter of 2005. The NFDL injury incidence rate was significantly above the national average for underground mines between the 4<sup>th</sup> quarter of 2004 and the 2<sup>nd</sup> quarter of 2005. Because of the Sago Mine’s increasing incidence rate, mine management, District 3 personnel, and Technical Support’s Applied Engineering Division began an Incident Rate Reduction (IR) Effort. The program was directed at identifying accident trends, improving the mine’s safety culture, and lowering incidence rates. Miners were interviewed, accident data were analyzed, miners’ work habits and practices were observed, and the operator’s training materials were reviewed. As a result of this effort significant improvement was made in the incidence rate after the 2<sup>nd</sup> quarter of 2005 through the 1<sup>st</sup> quarter of 2006. (See Appendix E for a list of the recommendations from MSHA’s Accident Prevention team.)

**NFDL Incidence Rate Comparisons  
Sago Mine vs. Underground Coal National Average**



## Enforcement Activities

This section addresses inspections and investigations conducted under section 103(a) of the Mine Act, the use of enforcement tools provided by the Mine Act, knowing and willful violation reviews, and pattern of violations. Appendix F includes a list of all inspections and investigations conducted at the Sago Mine during the review period, calendar year 2005. Refer to Appendix G for a list of all enforcement actions at the Sago Mine during the review period.

### Section 103(a) Inspections

**Requirement:** Section 103(a) of the Mine Act states that authorized representatives of the Secretary shall make inspections of each underground mine in its entirety at least four times a year (regular inspections) for the purpose of determining whether an imminent danger exists and whether there is compliance with the mandatory health or safety standards or with any citation, order, or decision issued under the Mine Act.

**MSHA Policies and Procedures:** The *MSHA Program Policy Manual* is a compilation of Agency policies on the implementation and enforcement of the Mine Act and *Title 30 of the Code of Federal Regulations* (30 CFR) and supporting programs. MSHA's Handbook Series contains procedural instructions related to conducting inspections.

The *Coal General Inspection Procedures Handbook*<sup>1</sup> outlines procedures for conducting inspections of coal mines. Relevant provisions of this handbook instruct inspectors to complete the following activities when conducting a regular inspection of an underground mine.

- Inspect every working area in the mine, including all active haulageways; entrances to abandoned workings; accessible old workings, as safety permits; air courses; escapeways; and other places where miners work or travel.
- Inspect all face equipment (diesel and electric), electric installations, and all mobile equipment encountered, and document the equipment examined by company number, serial number, or some other means.
- Inspect haulage facilities including hoisting equipment; first aid equipment; ventilation facilities; communication installations; roof and rib conditions; blasting practices; fire hazards; and fire protection.
- Selectively travel at least once on each working shift with the mine examiner and observe at least one mantrip transporting miners into and out of the mine.

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<sup>1</sup> *Coal General Inspection Procedures Handbook (PH95-V-1), September 1995, including subsequent revisions up to the time of the explosion.*

- Inspect electrical installations on the surface.
- Examine all record books required by the Mine Act and regulations. Any record books examined must be listed in the inspection notes.
- Examine at least the preshift and on-shift record books before going underground paying particular attention to record book entries of conditions of an area of the mine that may identify a serious or potentially hazardous problem. The inspector should proceed to this area immediately. Any record books examined must be listed in the inspection notes.
- Selectively travel (at least once) with the persons who perform the preshift, on-shift, and weekly examinations to evaluate the thoroughness and completeness of such examinations and to determine if the time expended by the examiner is commensurate with the areas required to be traveled and examined.
- Determine whether the person(s) performing the weekly examinations of the bleeder systems are traveling the bleeder entries in their entirety or to key locations approved in the ventilation plan, to measure methane and oxygen concentrations and to determine whether the air is moving in the proper direction.
- Evaluate the operator's compliance with approved self-contained self-rescuer (SCSR) condition-of-use requirements by:
  - Inspecting a representative number, but not less than 10 percent, of each type of device in use at the mine. A higher percentage should be inspected when devices are worn, carried, or machine or equipment mounted. These inspections should be conducted in accordance with the manufacturer's approved daily inspection procedures; and
  - Reviewing the mine operator's records of self-rescuer tests. If possible, the inspector should also determine if the operator followed the manufacturer's approved test procedures.
- Evaluate the adequacy of SCSR training by discussing donning procedures with a representative number of individual miners to ascertain their understanding of how to use their SCSRs. If inspectors are made aware of any self-rescuer training deficiencies, they should report them to the district training liaison/specialist.
- Observe searches for smoking materials to ensure that the searches are done as prescribed in the mine's search program, determine whether an adequate search program exists by reviewing the records, and interview a number of miners concerning the search program.

- Collect air samples in main return(s) at or near the point the return is vented to the surface to determine methane liberation.
- Make uniform rock dust surveys in each advancing section. Also, areas not sampled during prior regular inspections because of wet conditions shall be identified. Locations where two or more consecutive samples were not collected shall be inspected and samples collected when conditions permit.
- Ensure that all required documentation is included in the final inspection report.

The *Carbon Monoxide Inspection Procedures Handbook* (PH92-V-5), January 1992, sets forth MSHA procedures under which carbon monoxide (CO) monitoring systems are inspected during regular inspections. Systems installed to provide protection equivalent to point-type heat sensors must satisfy the requirements of 30 CFR 75.1103-4 through 75.1103-7 at all times. Pertinent parts of the handbook direct the inspector to:

- Check the direction and velocity of the air currents with relation to the approved ventilation plan.
- Check to ensure the CO sensors are installed at the locations required by the approved plan.
- Observe calibration of a representative number of sensors, defined as 10% of the total sensors but no less than 5 sensors.

*CMS&H Memorandum No. HQ-03-021-A*, issued on March 5, 2003, revised MSHA's policy on the observation and discussion of fire drills. This directive instructs inspectors, during the course of regular inspections, to schedule their activities to observe simulated fire drills when possible and conduct discussions with the miners to ensure they are familiar with specific procedures in the event of an emergency. These observations and contacts should be documented in the inspection notes.

The *Uniform Mine File Procedures Handbook* addresses the maintenance and review of the Uniform Mine File (UMF). The Uniform Mine File is a compilation of mine plans and pertinent mine information to assist an inspector or specialist in the inspection of the mine. The handbook includes provisions requiring inspectors, specialists, and supervisors to review the UMF and document such review on Inspector's Certification Form, MSHA Form 2000-137, or Supervisor/Accountability Review Certification, MSHA Form 2000-138.

The *Coal General Inspection Procedures Handbook* states, in part, during every regular inspection at an underground coal mine, the inspector shall selectively travel (at least once) with the person(s) who performs the preshift, on-shift, and weekly examinations to evaluate the thoroughness and completeness of such examinations and to determine

if the time expended by the examiner is commensurate with the areas required to be traveled and examined.

The National Agreement between the U.S. Department of Labor and the National Council of Field Labor Locals AFGE, AFL-CIO, Article 25, defines the MSHA First 40-Hour Tour of Duty. The basic workweek for the first 40-hour tour of duty for MSHA employees shall be the first 40-hours worked within a period of five consecutive days in the Sunday through Saturday administrative workweek, beginning as early as Sunday but no later than Monday unless requested by the employee and approved by Management. An employee may vary the number of hours worked on a given workday within the week. This scheduling may be subject to the mission needs of the Agency and will be consistent with applicable laws and regulations.

*Procedure Instruction Letter No. I03-V-2<sup>2</sup>* states an important aspect of regular inspections is the physical presence of the inspector during active mining. The inspector's presence, visibility, and interaction with the miners promote improved attitudes towards health and safety which can result in reduced accident and injury rates. In mines where regular weekend production occurs, a representative number of regular inspection days should be allocated for weekend inspections. Accordingly, at mines which regularly (more than two weekends per month) produce coal on Saturday and/or Sunday, at least one Saturday or one Sunday should be included in each regular inspection.

**Statement of Facts:** MSHA's practice is to conduct one complete safety and health inspection (regular inspection) each quarter at each underground mine. The manner in which District 3 personnel conducted regular inspections at the Sago Mine consisted of the inspector beginning the inspection soon after the start of the calendar quarter. The regular inspection remained open approximately 3 months, with intermittent inspector presence throughout the entire period. The inspection was completed near the end of the calendar quarter, and the next inspection was subsequently started.

The District 3 Bridgeport, West Virginia, field office was responsible for inspecting the Sago Mine. Regular inspection responsibilities for the mine were assigned to a different lead inspector each quarter. Additional inspectors and specialists assisted the lead inspector in completing regular inspections.

District 3 personnel conducted three regular inspections of the Sago Mine from January 4, 2005, through September 30, 2005. The fourth regular inspection was started on October 3, 2005. This inspection was closed on December 22, 2005, and reopened on December 27, 2005.

In a follow-up interview, the field office supervisor stated that the inspector who started the last regular inspection transferred to another Coal Mine Safety and Health district. The inspector who was assigned to finish the inspection believed it was completed and

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<sup>2</sup> *Procedure Instruction Letter No. I03-V-2, Weekend AAA Inspections, Effective Date 6/15/1999.*



held a close-out conference on December 21, 2005. On December 22, 2005, this inspector worked on the inspection report in the field office and closed the event that day. The field office supervisor reviewed the report and determined that an air course needed to be walked, outstanding citations needed to be addressed, and SCSRs and some surface areas needed to be inspected. Accordingly, the inspection was extended.

Another inspector returned to the mine on December 27, 2005, to reopen and complete the regular inspection. This inspector did not complete all missed items and areas on that day. The inspection remained open after the fatal explosion so the remaining items and areas could be inspected.

The internal review team reviewed inspection data for these four regular inspections of the Sago Mine. The team's review included an evaluation of the inspection notes, citations and orders, subsequent actions, and associated paperwork. The team also interviewed inspectors who were responsible for conducting the inspections. The review team's findings regarding the four regular inspections follow.

Regular Inspection, January 2005 –March 2005

This inspection was conducted from January 4, 2005, through March 29, 2005, and encompassed 20 inspection days<sup>3</sup>. During this inspection, District 3 personnel issued 14 section 104(a) citations. One other inspector assisted the lead inspector by conducting a respirable dust survey during the inspection.

The internal review team determined that the following items were not inspected or documented in accordance with MSHA inspection procedures. The inspector did not:

- Inspect any SCSRs.
- Observe the 90-day fire drill or discuss the fire drill with miners.
- Travel with the preshift examiner.
- Inspect the carbon monoxide monitoring system or observe the calibration of the system.
- Observe a search for smoking articles.
- Examine several surface items including illumination of work areas, communication installations, firefighting equipment, first aid kit, and potable water.

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<sup>3</sup> *Inspection days may reflect multiple inspectors present at the mine on the same day (for example, two inspectors present at the mine on the same day are counted as two inspection days).*

The inspection notes did not indicate that the entire worked out panel off 2 North Mains was inspected. During the inspector's interview with the internal review team, he stated that he traveled the entire panel.

Regular Inspection, April 2005 – June 2005

This inspection was conducted from April 5, 2005, through June 30, 2005, and encompassed 43 inspection days. During this inspection, District 3 personnel issued 51 section 104(a) citations, 1 section 104(b) order, 1 section 104(d)(1) citation, 2 section 104(d)(1) orders, and 4 section 314(b) notices to provide safeguards. One additional inspector assisted the lead inspector during the inspection. Two field office supervisors and the Assistant District Manager – Inspection Division visited the mine because of growing compliance concerns.

During the inspection, SCSRs and the surface substation were examined. The internal review team determined that the following items were not inspected in accordance with MSHA inspection procedures. The inspector did not:

- Observe the 90-day fire drill or discuss the fire drill with miners.
- Travel with the preshift examiner.
- Inspect the carbon monoxide monitoring system, observe calibration of the system, or examine the calibration records.
- Observe a search for smoking articles.
- Examine the methane monitor calibration records.
- Examine several surface items including communication installations, firefighting equipment, surface first aid kit, potable water, and fuel storage.

Regular Inspection, July 2005 – September 2005

A review of the inspection notes and citations for this regular inspection indicated that inspectors examined the 2<sup>nd</sup> Left Mains, which were later sealed. The inspection was conducted from July 7, 2005, through September 30, 2005, and encompassed 52 inspection days. During this inspection, District 3 personnel issued 70 section 104(a) citations, 10 section 104(d)(2) orders, and 1 section 314(b) notice to provide safeguards. Another inspector assisted the lead inspector during the inspection.

The internal review team determined that the following items were not inspected in accordance with MSHA inspection procedures. The inspector did not:

- Inspect any SCSRs.
- Travel with the preshift examiner.

- Observe the 90-day fire drill or discuss the fire drill with miners.
- Inspect the carbon monoxide monitoring system, observe calibration of the system, or examine the calibration records.
- Examine the mine electrical map.
- Observe a search for smoking articles.
- Examine the mine check-in and check-out system.
- Examine surface work areas including the substation, fuel storage tank, firefighting equipment, and illumination.
- Examine several required mine records including the weekly inspection of fire suppression devices, inspection and tests of automatic fire sensors, tests of fire hydrants and fire hoses, roof bolt torque measurements, and roof bolt manufacturer's certification.

Regular Inspection, October 2005 – February 2006

The inspection was conducted from October 3, 2005, through February 13, 2006, and encompassed 39 inspection days. From October 3, 2005, through December 27, 2005, District 3 personnel issued 46 section 104(a) citations and 1 section 104(d)(2) order. One additional section 104(a) citation was subsequently issued under this inspection after the explosion. During the inspection, the lead inspector transferred to another district. Six other inspectors then completed the inspection. In response to continued compliance concerns, the mine was visited by the District Manager and the Field Office Supervisor prior to the explosion.

A review of the inspection notes and citations for this regular inspection indicated the 2<sup>nd</sup> Left Mains active mining area, including the bottom mining of the coal seam, and the construction of the 2 North Mains seals were inspected.

During the inspection, an inspector observed the construction of at least one of the seals, noted a deficiency with the placement of the block, required the miners to correct it, and reviewed the approved ventilation plan requirements for the construction of seals with the miners.

The internal review team determined that the following items were not inspected in accordance with MSHA inspection procedures. The inspector did not:

- Inspect any SCSRs.
- Observe the 90-day fire drill or discuss the fire drill with miners.

- Examine the mine electrical map.
- Examine the non-pillared, worked out 1<sup>st</sup> Right area prior to the explosion.
- Observe calibration of the carbon monoxide monitoring system.
- Examine mine records including training records for miners and first aid training records for supervisory employees.
- Examine surface items including illumination of work areas, first aid kit, potable water, and fuel storage.

Due to deficiencies observed by the field office supervisor, the inspection was reopened to examine an air course, additional surface areas, and terminate outstanding citations.

#### Overall Assessment of Regular Inspections

Generally, the inspection notes for the four regular inspections described the violations and conditions observed. A review of the citations and orders issued during the accident investigation, interviews with District 3 inspectors, and a review of inspection notes indicated that the inspectors did not cite several violations described in their inspection notes. The notes indicated that:

- Roof bolts being used to support the mine roof did not provide adequate support, a violation of 30 CFR 75.202(a).
- Dates, times, and initials were not present at the No. 3 battery charging station and at a dewatering pump to indicate the preshift examination had been conducted, violations of 30 CFR 75.360(e).
- During the regular inspection conducted from July 7, 2005, to September 30, 2005, eleven citations were issued for hazardous conditions that existed during required mine examinations. Additional citations were not issued for inadequate examinations under 30 CFR 75.360(a)(1) or 75.362(a)(1).
- During the regular inspection conducted from October 3, 2005, to February 13, 2006, five citations were issued for hazardous conditions that existed during required mine examinations. Additional citations were not issued for inadequate examinations under 30 CFR 75.360(a)(1) or 75.362(a)(1).
- A battery charging station was located in the intake escapeway, a violation of 30 CFR 75.380(f)(3)(iii).
- Combustible material was present along the No. 4 belt, a violation of 30 CFR 75.400.

- Bolts were left out of the lid of a 600 KVA power center, a violation of 30 CFR 75.512.
- A belt conveyor start switch was stuck in the start position, a violation of 30 CFR 75.1725(a).

Some violations of electrical standards were not detected during the regular inspections. The accident investigation team cited 112 electrical violations, including some which may have existed during previous regular inspections.

During each regular inspection, inspectors collected air samples and measured air quantity in the return portal, but not at all locations where mine ventilating air currents exited the mine. As a result, the total methane liberation for the mine was not determined accurately during the inspections. Inspectors took the samples and air measurements required by the *Coal General Inspection Procedures Handbook*. However, the procedure described in the handbook did not address total methane liberation at mines with blowing ventilation systems.

The inspectors who started each regular inspection documented that they reviewed the uniform mine file as indicated by date and signature on MSHA Form 2000-137. During 2 of the 12 other inspections and investigations conducted at the Sago Mine during 2005, the uniform mine file was reviewed as evidenced by the inspector's signature and date of review. In their interviews with the review team, District 3 specialists stated that they sometimes called the field office and spoke to the supervisor or inspector. They did not follow up to determine if the Inspector Certification Form was signed on their behalf.

There was no documentation to indicate that the field office supervisor reviewed the uniform mine file for the Sago Mine during 2005. The last documentation in the uniform mine file for a supervisor's review was November 16, 2004.

In three of the four regular inspections conducted at the Sago Mine in 2005, District 3 inspectors did not travel with the preshift examiners. Preshift examinations are required within 3 hours preceding the beginning of any 8-hour interval during which any person is scheduled to work or travel underground. During interviews, Bridgeport field office inspectors stated that directives given in the form of three memoranda from the field office supervisors made observing preshift examinations difficult. The memoranda, dated November 17, 2004, and November 23, 2004, addressed a normal or reasonable work day as being 10 hours. The inspectors also stated that they were to catch the "first cage" or mantrip, although this is not mentioned in the memoranda. They interpreted this to mean that split-shifting, or working part of two different shifts on the same day, was not to be done.

The Bridgeport field office supervisors stated, when interviewed, that the intention of the memoranda was to direct inspectors to arrange their schedules so that at least 4 days a week could be dedicated to inspection time. The November 23, 2004, memorandum stated “A normal workday should be 10 hours or less” and “this will provide for inspection activity at the mine site of at least 4 days per week.” The supervisors also stated that the memoranda did not intend to prevent split-shifting and that preshift examinations were required to be observed.

The interviews with District 3 personnel revealed that inspection coverage on Friday and week-ends was infrequent. Bridgeport field office personnel did not observe coal production on weekends at the Sago Mine. The following table shows the breakdown of on-site inspection time for each day at the Sago Mine, for the Bridgeport field office, District 3, and the nation, and reinforces the information revealed in the interviews.

Percent On-Site Enforcement Time by Day of the Week - 2005								
	<i>Sunday</i>	<i>Monday</i>	<i>Tuesday</i>	<i>Wednesday</i>	<i>Thursday</i>	<i>Friday</i>	<i>Saturday</i>	<i>Total</i>
Sago Mine	2.2%	18.8%	31.6%	31.6%	11.5%	4.3%	0.0%	100%
Bridgeport Field Office	1.3%	23.8%	28.5%	28.0%	15.8%	2.4%	0.3%	100%
District 03	1.9%	22.9%	28.2%	27.6%	15.8%	2.7%	0.9%	100%
National	1.5%	19.9%	26.2%	25.9%	19.4%	5.9%	1.2%	100%

**Conclusion:** During the review period, District 3 inspectors completed three of the four regular inspections of the Sago Mine. The fourth inspection was extended into the next quarter. Inspection notes were generally descriptive of the conditions and violations observed.

The internal review team found the following recurring deficiencies in the inspections conducted at the mine.

- Inspectors did not recognize and cite several violations that were described in their inspection notes.
- Several electrical violations were not detected during regular inspections.
- Inspectors did not travel with the preshift examiner during three of the inspections.
- Several areas/items on the surface were not examined or documented as being examined, including communication installations, firefighting equipment, first aid kits, fuel storage installations, potable water, and illumination of work areas.

- Inspectors did not examine SCSRs during three of the inspections.
- Fire drills were not discussed or observed by inspectors during any of the inspections.
- Carbon monoxide monitoring systems were not inspected as required in the *Carbon Monoxide Inspection Procedures Handbook* during any of the inspections.
- Inspectors did not always check or document required records or record books, including training records, electrical map, records of carbon monoxide monitor calibration, and records of certified/qualified persons.
- On three of the inspections, inspectors did not observe any searches for smoking articles.

The deficiencies were caused by lapses in following established inspection procedures. District 3 supervisors and managers did not provide adequate oversight and guidance and their reviews of inspection reports did not identify and correct these deficiencies. An adequate checklist was not available to inspection personnel to aid in the completion of mandated inspection activities.

The procedures described in the *Coal General Inspection Procedures Handbook* for determining total methane liberation for a mine do not adequately address mines with blowing ventilation systems. This oversight is corrected in the revised *General Coal Mine Inspection Procedures Handbook*.

Bridgeport field office personnel were not complying with the requirements to travel with preshift mine examiners. The inspectors misinterpreted instructions from their supervisors, thinking that they would not be able to travel with preshift examiners if they complied with the instructions. The field office supervisors, during the inspection review process, should have identified that the inspectors were not traveling with the preshift examiners.

The uniform mine file was routinely reviewed by inspectors conducting regular inspections. District 3 specialists and supervisory personnel did not conduct necessary reviews or did not document their reviews by entering a signature and date on the Inspector Certification Form attached for that purpose. The field office supervisor did not document reviewing the uniform mine file for the Sago Mine during 2005.

Daily inspection time during weekends was considerably less than the daily inspection time during weekdays.

## Other Inspections and Investigations

**Requirement:** Section 103(a) of the Mine Act authorizes MSHA to make frequent inspections and investigations for the purpose of (1) obtaining, utilizing, and disseminating information relating to health and safety conditions, the causes of accidents, and the causes of diseases and physical impairments originating in mines, (2) gathering information with respect to mandatory health or safety standards, (3) determining whether an imminent danger exists, and (4) determining whether there is compliance with the mandatory health or safety standards or with any citation, order, or decision issued under this title or other requirements of this Act.

Mandatory safety standard 30 CFR 75.220(c) states that a proposed roof control plan or revision to a roof control plan shall not be implemented before it is approved.

**MSHA Policies and Procedures:** The *Coal General Inspection Procedures Handbook* states in pertinent part that technical investigations are similar to spot inspections because the investigations are directed to a specific purpose or subject. Detailed reports of tests, observations, and conditions must be maintained for these investigations.

**Statement of Facts:** The internal review team reviewed reports of 12 other inspections and investigations conducted at the Sago Mine during calendar year 2005. These inspections and investigations included one non-fatal accident investigation, seven non-injury accident investigations (roof falls), one roof control technical investigation, one ventilation technical inspection, one other technical investigation, and one knowing and willful violation investigation.

The ventilation technical inspection was conducted over a 7-day period from March 2 through March 17, 2005, with 1 day actually spent at the mine. While at the mine, the ventilation specialist traveled the 1<sup>st</sup> Right panel and examined ventilation and dust control parameters on the active section. The roof control technical investigation was conducted over a 5-day period from September 30 through October 6, 2005, with 3 days spent at the mine. The roof control specialist evaluated the operator's approved plan for mining a lower split of the coal seam.

During these inspections and investigations, inspectors issued three section 104(a) citations for violations of mandatory safety standards. Two section 103(k) orders were also issued, requiring revisions to the roof control plan. One section 103(k) order was terminated 1 day after issuance based on the operator submitting changes to the roof control plan. This revision was approved on the same day the order was terminated.

The other section 103(k) order was terminated on the day issued because the "company has submitted a change to the roof control plan." The mine operator continued to mine for 7 days before the revision was approved.



**Conclusion:** The other inspections and investigations at the Sago Mine were generally conducted in accordance with established procedures. In one instance, a revision to the roof control plan was implemented prior to final approval by the District 3 Manager.

### **Use of Sections 104(a), 104(b), 104(d), and 314(b)**

**Requirement:** Section 104 of the Mine Act provides MSHA inspectors with the authority to take progressively stronger enforcement actions to obtain compliance with mandatory safety and health standards.

Section 104(a) states that an inspector shall issue a citation if the inspector believes that an operator has violated the Mine Act, or any mandatory safety or health standard, rule, order, or regulation promulgated pursuant to the Mine Act. The inspector is also required to specify a reasonable time for the operator to abate the violation.

Section 104(b) provides that, if upon any follow-up inspection, an inspector finds that a cited violation has not been totally abated within the period of time as originally fixed therein or as subsequently extended, and that the period of time for the abatement should not be further extended, the inspector shall determine the extent of the area affected and shall issue a withdrawal order.

Section 104(d) creates a chain of increasingly severe enforcement actions that target unwarrantable failures of the mine operator. Under section 104(d)(1), if an inspector finds a violation of a mandatory health and safety standard that is significant and substantial (but is not an imminent danger) and is caused by the mine operator's unwarrantable failure, the inspector must issue a section 104(d)(1) citation. If, during the same inspection or any subsequent inspection within 90 days after issuance of a section 104(d)(1) citation, the inspector finds another violation caused by unwarrantable failure to comply with such mandatory standard, the inspector must issue a section 104(d)(1) order. If, upon any subsequent inspection pursuant to the issuance of a section 104(d)(1) order, an inspector finds a violation caused by unwarrantable failure, the inspector must issue a section 104(d)(2) order.

Section 104(b) and 104(d) orders require the operator to cause all persons in the area affected by the violation, except those necessary to correct the condition, to be withdrawn from and prohibited from entering such area until the inspector determines that the violation has been abated.

**MSHA Policies and Procedures:** Volume I of the MSHA *Program Policy Manual* states that *MSHA Form 7000-3a* must be completed when vacating a citation or order. The form must state the reason for vacating the citation or order. If possible, the authorized representative who issued the citation or order should be the person to issue the subsequent corrective action. Both the inspector and the supervisor must file, with the inspection report, notes that describe in detail the reasons and circumstances involved.

Copies of the citation or order, along with the subsequent corrective action and notes, must be sent to the district manager.

The *Citation and Order Writing Handbook* states that when terminating or vacating a citation or order, the inspector should clearly and fully describe the action taken to abate the violation or the reason for vacating a citation or order in the body of the subsequent action form. The handbook also addresses evaluations of gravity and negligence.

**Statement of Facts:** The internal review team evaluated 208 citations, orders, and safeguards issued at the Sago Mine from January 6, 2005, through December 21, 2005. Enforcement personnel issued two additional citations that were subsequently vacated. Two hundred of the citations and orders required evaluations for gravity and negligence<sup>4</sup>. The following sections address the manner in which District 3 enforcement personnel made these determinations, as well as the timely abatement of violations and vacated citations and orders.

#### *Gravity Determinations (S&S and Number of Persons Affected)*

Gravity is defined in 30 CFR 100.3(e) as an evaluation of the seriousness of the violation as measured by the likelihood of the occurrence of the event against which a standard is directed, the severity of the illness or injury if the event occurred or were to occur, and the number of persons potentially affected.

Volume I of the MSHA *Program Policy Manual* contains guidelines for evaluating whether a violation is significant and substantial (S&S). In determining whether a violation could “significantly and substantially contribute to the cause and effect of a mine safety or health hazard,” the inspector must first find that an injury or illness would be reasonably likely to occur if the violation were not corrected and, if the injury or illness were to occur, it would be reasonably serious. Additional guidance on S&S determinations is provided in Chapter 5 of the *Coal General Inspection Procedures Handbook*.

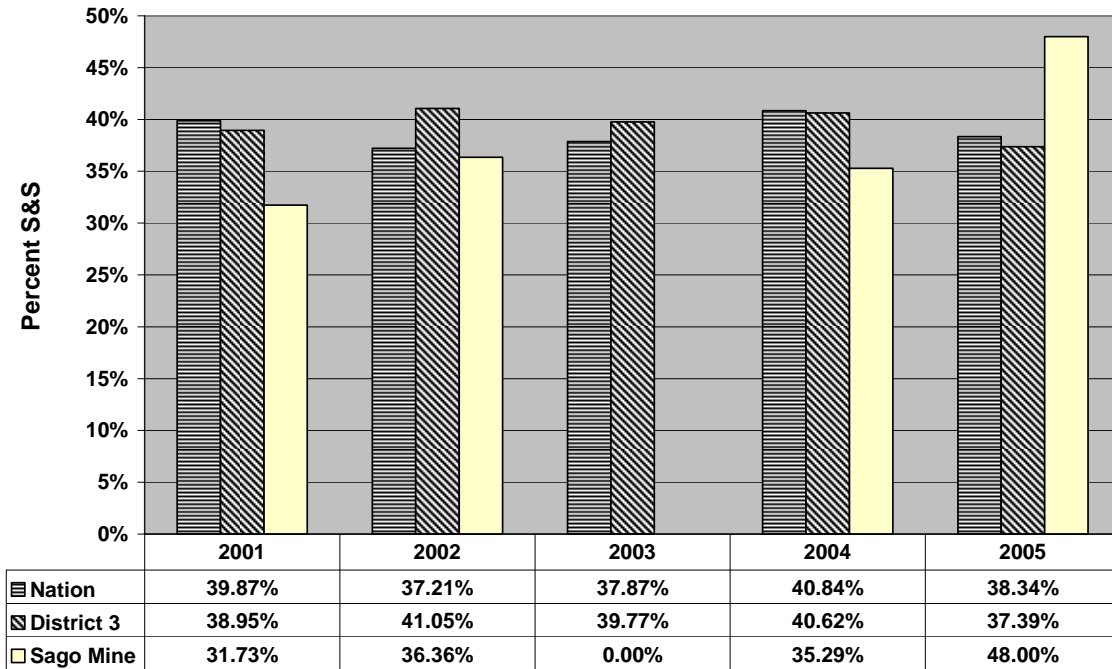
The *Citation and Order Writing Handbook* contains guidelines for determining the number of persons affected. The number of persons affected is the number of persons who would be expected to be injured if an accident or overexposure occurred as a result of the violation.

District 3 personnel designated 96 (48 %) citations and orders issued at Sago Mine during 2005 as S&S. The following chart compares the S&S rates for citations and orders issued at the Sago Mine with the S&S rates for all underground mines in District 3 and the nation from 2001 through 2005. (The mine was idle in 2003.)

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<sup>4</sup>Section 103(k) orders, section 104(b) orders, section 107(a) orders, and section 314(b) safeguards do not require an evaluation for gravity or negligence.

**Comparison of S&S Percentages**  
Nation, District 3, and Sago Mine



District 3 personnel stated in their interviews that they believed a condition had to be an imminent danger to evaluate a citation or order as highly likely (for an injury or illness to occur). A review of the citations and orders at the Sago Mine in 2005 revealed that none were evaluated as highly likely. Section 3(j) of the Mine Act defines an imminent danger as, “the existence of any condition or practice in a coal or other mine which could reasonably be expected to cause death or serious physical harm before such condition or practice can be abated.”

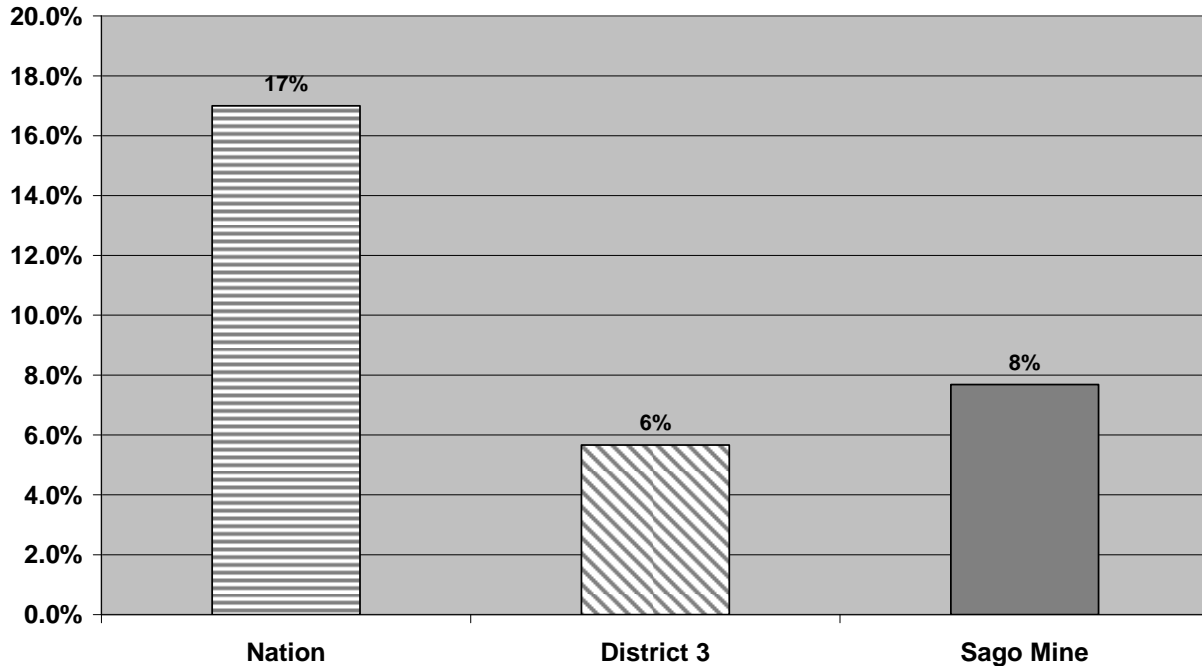
Sixteen (8 %) of the citations and orders requiring evaluation for gravity indicated more than one person would be affected by the cited condition or practice. The following table shows the number of persons affected by the type action taken.

Number Affected	Type of Action			Grand Total	Percent
	104(a)	104(d)(1)	104(d)(2)		
0	1			1	0.50%
1	167	3	13	183	91.50%
2	8			8	4.00%
5	1			1	0.50%
6	7			7	3.50%
<b>Grand Total</b>	<b>185</b>	<b>3</b>	<b>13</b>	<b>200</b>	<b>100.0%</b>

Further analysis revealed that about 6 percent of all citations and orders issued at District 3 underground mines during calendar year 2005 indicated more than one person affected, while 17 percent of all citations and orders issued at all coal mines

during calendar year 2005 indicated more than one person affected. See the following chart.

### 2005 - Percent of Citations and Orders Where the Number of Persons Affected Was Evaluated As Greater Than One



After reviewing all enforcement actions for the Sago Mine, the internal review team determined enforcement personnel frequently evaluated one person affected on citations and orders when the notes and conditions indicated more persons were affected. Three examples follow.

- On August 2, 2005, citation No. 7098126 was issued for a mantrip not being maintained in safe operating condition because 3 of the 4 sanders were not working. The mine has several grades and the track ranges from wet to damp. The mantrip typically transports an entire crew of miners. The number of persons affected was evaluated as one.
- On August 16, 2005, order No. 7098156 was issued because the primary escapeway was not maintained in a safe condition to assure safe passage of anyone, including disabled persons. The walkway was obstructed with concrete blocks, rock, mud and water. The roof had deteriorated away from roof bolts. Both the 003 and 006 working sections were located inby this escapeway. The number of persons affected was evaluated as one even though more miners were exposed to the condition.
- On December 14, 2005, order No. 7098644 was issued for accumulations of coal on the 006 mining section. The accumulations were extensive, up to 29 inches

deep in areas, and the linear measurement was approximated at 650 feet. Float coal dust was present throughout the last 2 mined breaks on the active section. The number of persons was evaluated as one, even though more miners were exposed to the condition.

Fifteen citations were issued for violations of maintenance of permissible equipment (30 CFR 75.503) and 21 citations and orders were issued for accumulations of combustible materials (30 CFR 75.400) during the review period. All permissibility violations were evaluated as one person affected. Twenty of the 21 accumulation violations were evaluated as one person affected; the remaining accumulation violation was evaluated as zero persons affected.

### Negligence Determinations

Subsection (d) of 30 CFR 100.3 defines negligence as committed or omitted conduct which falls below the standard of care established under the Mine Act to protect persons against the risks of harm. The standard of care established under the Mine Act is that the operator of a mine owes a high degree of care to the miners. A mine operator is required to be on the alert for conditions and hazards in the mine that affect the safety or health of the employees and to take the steps necessary to correct or prevent such conditions or practices. For purposes of assessing a penalty under Part 100, failure to do so is negligence on the part of the operator.

The negligence criterion gives appropriate consideration to the factors relating to an operator's failure to exercise a high degree of care to protect miners from safety or health hazards. When applying this criterion, MSHA considers actions taken by the operator to prevent or correct conditions or practices which caused or allowed the violation to exist. In determining the operator's diligence in protecting miners in any given hazardous situation, due recognition is given to mitigating circumstances which explain the operator's conduct in minimizing or eliminating the hazardous condition. Mitigating circumstances may include, but are not limited to, actions which an operator has taken to prevent, correct, or limit exposure to mine hazards.

*CMS&H Memo No. HQ-03-008-A (PRT-43)* states "Inspection personnel shall also review record books for reported hazards, the length of time the hazard has existed, and the action taken to correct the hazard. This review should also be compared to actual underground mine conditions to determine if enforcement is appropriate toward recordkeeping."

The *Citations and Order Writing Handbook* states that inspectors must evaluate the negligence of the mine operator using one of the following categories:

None - The operator exercised diligence and could not have known of the violative condition or practice.

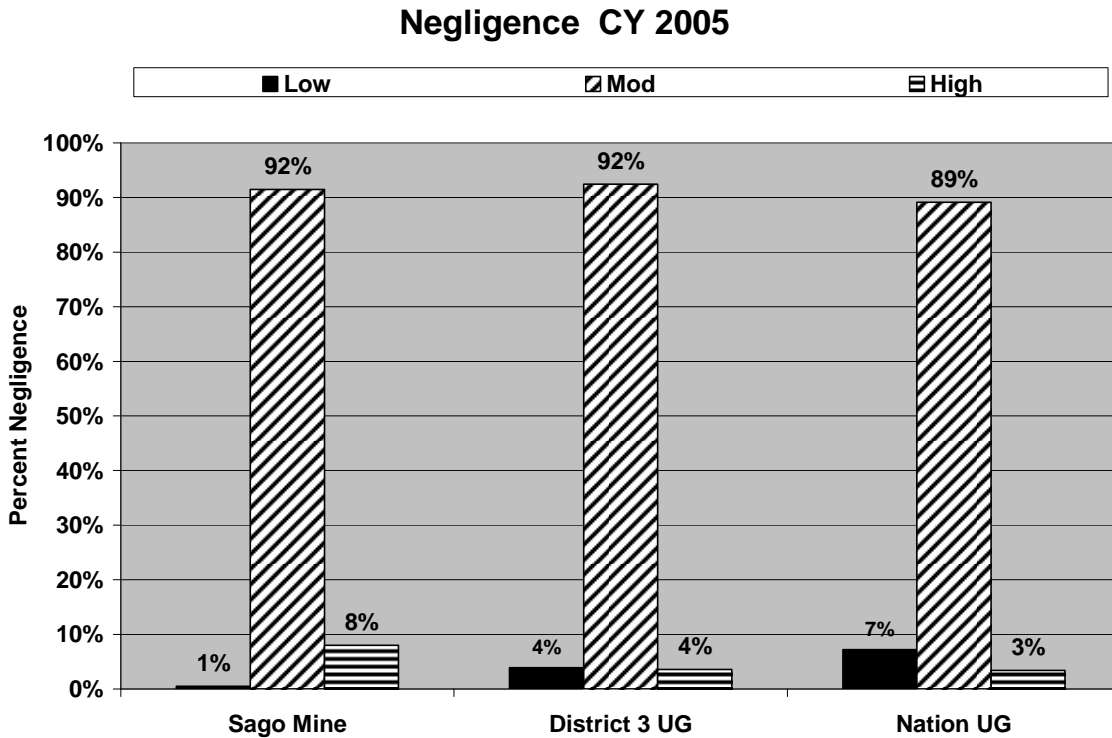
Low – The operator knew or should have known of the violative condition or practice, but there are considerable mitigating circumstances.

Moderate – The operator knew or should have known of the violative condition or practice, but there are mitigating circumstances.

High – The operator knew or should have known of the violative condition or practice, and there are no mitigating circumstances.

Reckless Disregard – The operator displayed conduct which exhibits the absence of the slightest degree of care.

The following chart shows a comparison of negligence determinations at the Sago Mine, District 3 underground mines, and underground mines nationwide during the review period.



During the review period, District 3 personnel issued sixteen section 104(d) citations and orders at the Sago Mine as follows:

- Five section 104(d) citations and orders were issued for violations of 30 CFR 75.400. Additionally, 16 section 104(a) citations were issued for violations of this standard.
- Two section 104(d) orders were issued for violations of 30 CFR 75.340(a)(1)(i).
- Two section 104(d) orders were issued for violations of 30 CFR 75.360(a)(1).

- The remaining seven section 104(d) orders were issued for violations of seven different mandatory safety standards.

District 3 personnel issued multiple citations for violations of the following mandatory safety standards as follows.

- 30 CFR 75.503 – Thirteen section 104(a) citations, all evaluated as moderate negligence, from April 11 through December 20.
- 30 CFR 75.517 – Fourteen section 104(a) citations, all evaluated as moderate negligence, from April 7 through November 1.
- 30 CFR 75.1107-16(b) – Nine section 104(a) citations, all evaluated as moderate negligence, from April 18 through October 5.
- 30 CFR 75.1403 – Twelve section 104(a) citations, all evaluated as moderate negligence, and one order marked high negligence, from July 20 through December 14.
- CFR 75.1725(a) – Seventeen section 104(a) citations, all marked moderate negligence, from April 11 through October 6.

The Federal Mine Safety and Health Review Commission<sup>5</sup> (Commission) has recognized that past discussions with MSHA about a recurring problem serve to put an operator on notice that it must increase its efforts to comply with the standard. The Commission<sup>6</sup> has also determined that past violations serve to put an operator on notice that it has a recurring safety problem in need of correction and the violation history may be relevant in determining the operator's degree of negligence. The Commission<sup>7</sup> has also stated that recent citations further serve to place an operator on notice of the need to increase its efforts to come into compliance.

In multiple instances, inspection notes and citations supported evaluations of higher negligence and more than one person affected. For example, citation No. 7098544 was issued on November 8, 2005, for a violation of 30 CFR 75.202(a). The citation indicated the mine roof in areas where persons work or travel on the 1 Left Mains section, 22 block mantrip station, was not supported or otherwise controlled to protect persons from hazards related to falls of multiple areas of the mine roof. The citation further indicated 1 person affected and a moderate degree of negligence. Finally, the citation stated men routinely traveled under the material going to and from the section and little

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<sup>5</sup> *Consolidation Coal Co.*, 23 FMSHRC 588 (2001).

<sup>6</sup> *Peabody Coal Co.*, 14 FMSHRC 1258 (1992).

<sup>7</sup> *Youghiogheny & Ohio Coal Co.*, 9 FMSHRC 2007 (1987).

or no effort was used to remove the loose material. The inspection notes indicated the preshift examiner for the track haulage knew of the condition, and it existed for an unknown amount of time.

In another example, citation No. 7149290, issued on October 5, 2005, for a violation of 30 CFR 75.380(d)(2) indicated that the primary escapeway was not marked to show route and direction for a distance of 500 feet and the secondary escapeway was not marked to show route and direction for a distance of approximately 2,000 feet. The citation further indicated 1 person was affected and a moderate degree of negligence was attributable to the mine operator. Inspection notes indicated the preshift examiner should have known of the condition, the section foreman and crew traveled by the area every shift, and the condition existed for a few weeks in the secondary escapeway.

The inspectors' notes often did not document that they examined the appropriate record books to determine if adequate examinations were conducted. This would have assisted them in determining the mine operator's negligence and whether an examination violation existed.

During interviews, many District 3 personnel stated that in previous safety and health conferences, citations were modified by reducing the negligence and the number of persons affected. Inspectors were aware of the modifications and therefore began to evaluate negligence and gravity in a manner to get citations through conference. Conference history modified the behavior of the inspection workforce. Some inspectors referred to this as "conference conditioning." This subject is covered in more detail in the section of this report entitled Alternative Case Resolution Initiative.

#### Timely Abatement

Section 104(a) of the Mine Act directs the inspector to specify a reasonable time for the operator to abate a violation.

The MSHA *Program Policy Manual* states that the time for abatement should be determined, whenever practical, after a discussion with the mine operator or the operator's agent. The degree of danger to the miners is the first consideration in determining a reasonable time for abatement. Upon expiration of the time fixed for abatement, the inspector should review the circumstances, and if circumstances so justify, extend the abatement period. If no extension of time is justified, and the violation is unabated, the inspector shall issue a withdrawal order under section 104(b). The section 104(b) withdrawal order remains in effect until an MSHA inspector terminates the order after determining that the violation has been abated.

The *Coal General Inspection Procedures Handbook* states that the inspector should make every effort to re-inspect the area as soon as the time has expired.



Eight citations were outstanding (not terminated) when the explosion occurred. A summary of these citations is in the following table.

Citation No.	Issue Date	Type Action	30 CFR	S&S	Due Date	Days Overdue
7098156	08/16/2005	104(a) Citation	75.380(d)(1)	Y	01/10/2006	*
7098157	08/16/2005	104(a) Citation	75.380(d)(1)	Y	01/06/2006	*
7093332	09/20/2005	104(a) Citation	77.404(a)	Y	01/02/2006	*
7093338	09/23/2005	104(a) Citation	75.1722(b)	N	12/28/2005	5
7098645	12/18/2005	104(a) Citation	75.220(a)(1)	Y	12/26/2005	7
7098646	12/18/2005	104(a) Citation	75.220(a)(1)	Y	12/26/2005	7
7098647	12/20/2005	104(a) Citation	75.220(a)(1)	Y	12/26/2005	7
7098650	12/20/2005	104(a) Citation	75.503	N	12/20/2005	13

\*Note – these citations could not be abated due to the January 2, 2006, mine explosion.

Citation No. 7098156 was issued on August 16, 2005, during a regular safety and health inspection. The citation addressed the primary escapeway not being maintained in a safe condition to assure passage of anyone, including disabled persons. The walkway of the escapeway was obstructed by concrete blocks and rock that had fallen from the mine roof, among other conditions affecting safe passage. The original date set for abatement of the violation was September 1, 2005; however, the date was extended three times. The due date at the time of the explosion was January 10, 2006.

Citation No. 7098157 was issued on August 16, 2005, during a regular safety and health inspection. The citation addressed the primary escapeway not being maintained in a safe condition to assure passage of anyone, including disabled persons. The primary escapeway had mud and water in the walkway, loose rock hanging from the roof in several locations, and the ramps provided at overcasts were wet, slick, and obstructed by rock. The original date set for abatement of the violation was September 1, 2005; however, the date was extended three times. The due date at the time of the explosion was January 6, 2006.

Citation No. 7093332 was issued on September 20, 2005, during a regular safety and health inspection. The citation addressed the John Deere 675B Skid Steer not being maintained in a safe operating condition due to the steering lever sticking and not self-centering. The original date set for abatement of the violation was September 20, 2005; however, the date was extended four times. The due date at the time of the explosion was January 2, 2006.

Citation No. 7093338 was issued on September 23, 2005, during a regular safety and health inspection. The citation addressed the conveyor belt system not being maintained in a safe condition because the wire screen being used for guarding on the Nos. 3, 4, 5, and 6 head drives, take-ups, and tailpieces was inadequate due to 4-inch by 4-inch holes in the screen. The original date set for abatement of the violation was September 30, 2005; however, the date was extended twice. The last termination due

date was December 28, 2005, and the citation was not terminated at the time of the explosion.

Citation No. 7098645 was issued on December 18, 2005, during a regular safety and health inspection. The citation addressed noncompliance with the mine's approved roof control plan. The tunnel liner being used as primary support in the No. 2 entry along 4 belt was not covered with a layer of cushioning material. The original date set for abatement of the violation was December 21, 2005; however, the date was extended once. The termination due date was December 26, 2005, and the citation was not terminated at the time of the explosion.

Citation No. 7098646 was issued on December 18, 2005, during a regular safety and health inspection. The citation addressed noncompliance with the mine's approved roof control plan. The tunnel liner being used as primary support in the No. 4 entry along 4 belt was not covered with a layer of cushioning material. The original date set for abatement of the violation was December 21, 2005; however, the date was extended once. The termination due date was December 26, 2005, and the citation was not terminated at the time of the explosion.

Citation No. 7098647 was issued on December 20, 2005, during a regular safety and health inspection. The citation addressed noncompliance with the approved roof control plan. The tunnel liner being used as primary support in the No. 8 entry for the 003-0 MMU was not covered with a layer of cushioning material. The original date set for abatement of the violation was December 22, 2005; however, it was extended once. The termination due date was December 26, 2005, and the citation was not terminated at the time of the explosion.

Citation No. 7098650 was issued on December 20, 2005, during a regular safety and health inspection. The citation addressed the Joy 14CM15 miner on the 003 MMU having a missing right headlight guard. The date set for abatement of the violation was December 20, 2005. The due date for this citation was not extended.

#### Vacated Citations and Orders

Two section 104(a) citations were vacated at the Sago Mine during calendar year 2005. Information on these two citations follows:

- On December 20, 2005, citation No. 7098648 was issued for a violation of 30 CFR 75.503 because the No. 6 shuttle car on MMU-03 section did not have a flame resistant spooling device for the level wind near the reel compartment. The inspector set the time for abatement the same day.
- On December 20, 2005, citation No. 7098649 was issued for a violation of 30 CFR 75.503 because the No. 5 shuttle car on MMU-03 section did not have a flame resistant spooling device for the level wind near the reel compartment. The inspector set the time for abatement the same day.

On December 21, 2005, both citations were vacated by the issuing inspector based upon additional information provided by the mine operator showing that the shuttle cars had proper spooling devices. The field office supervisor did not submit notes with the inspection reports describing the reasons or circumstances that caused the enforcement action to be vacated.

Notice to Provide Safeguards

Section 314(b) of the Mine Act and 30 CFR 75.1403 state that other safeguards adequate, in the judgment of an authorized representative of the Secretary (inspector), to minimize hazards with respect to transportation of men and materials shall be provided.

30 CFR 75.1403-1(a) states that sections 75.1403-2 through 75.1403-11 set out the criteria by which an inspector will be guided in requiring other safeguards on a mine-by-mine basis under 30 CFR 75.1403. Other safeguards may be required.

30 CFR 75.1403-1(b) states that an inspector shall in writing advise the operator of a specific safeguard which is required pursuant to 75.1403 and shall fix a time in which the operator shall provide and thereafter maintain such safeguard. If the safeguard is not provided within the time fixed and if it is not maintained thereafter, a citation shall be issued to the operator pursuant to section 104 of the Mine Act.

The *MSHA Program Policy Manual* states in pertinent part that safeguards, in addition to those included as criteria in the Federal Register may be considered of sufficient importance to be required in accordance with this Section. It must be remembered that these criteria are not mandatory. If an authorized representative of the Secretary determines that a transportation hazard exists and the hazard is not covered by a mandatory standard, the authorized representative must issue a safeguard notice, allowing time to comply before a section 104(a) citation can be issued. Nothing is intended to eliminate the issuance of a 107(a) order when an imminent danger exists.

The *Coal General Inspection Procedures Handbook* states that a safeguard is issued for a specific condition that presents a hazard to miners involved in the transportation of workers or materials. All notices to provide safeguards should document either in the notice itself or in the inspector's notes that the inspector has evaluated the specific conditions at the particular mine and determined that a safeguard is warranted in order to address the transportation hazard identified. When possible, the inspector should confer with the district manager or assistant district manager prior to writing a notice to provide safeguards for conditions not listed in the criteria at 30 CFR 75.1403-1 through 75.1403-11 or in one of the inspection handbooks.

The *Citation and Order Writing Handbook* states in pertinent part that when an inspector identifies a hazard specific to the mine and similar to those already identified in 30 CFR

75.1403-2 through 75.1403-11, he or she will issue a notice to provide safeguards to the mine operator if one has not been previously issued.

**Statement of Facts:** The internal review team reviewed three safeguards issued at the Sago Mine and several additional safeguards issued in District 3 in calendar year 2005. The team also reviewed two District 3 memoranda that governed the issuance of safeguards.

A district memorandum dated April 5, 2000, with subject "Instruction for New Safeguard Issuances" stated that "The last known district instruction on this subject appears to state that such requests are to be directed to the district manager for approval and/or guidance. Previous instructions issued by the former district manager stated that such requests were to be directed to the ADM for Enforcement Programs for approval and/or guidance. Our recent experience indicates that confusion now exists over how safeguard requests are to be handled and that some clarification is needed. No matter how these requests are directed in the future, I believe that it would be advisable and prudent to have the conference staff review each proposed safeguard for proper legal content and scope of application before issuance is approved."

A district memorandum dated April 6, 2001, with subject "Safeguard Notice Issuance" stated that "Some recently issued safeguard notices do not satisfy the Review Commission's guidelines for valid safeguards. Proposed safeguard notices shall be submitted for manager approval before they are issued in written form to the operator."

During interviews, several district personnel stated that prior approval must be granted through the District 3 office before safeguards are issued. Additionally, the wording in the condition or practice section of 7000-3 forms for safeguards was developed by the Conference/Litigation Representative (CLR) or Staff Assistant. After determining that hazards existed that warranted the issuance of safeguards, inspectors would use their "influence" to get the conditions abated while proposed safeguards were in the review process. This process created a delay that ranged from 3 to 4 weeks. When interviewed, several inspectors stated the District 3 policy for issuing safeguards conflicted with the Mine Act and MSHA's policies and procedures.

In one example, the safeguard was issued over 6 months after the hazard was discovered. This and other examples follow:

- On May 30, 2002, safeguard No. 7090845 was issued at another District 3 mine because "On November 5, 2001, the travelways along the No. 9 coal conveyor belt were obstructed with rock and coal caused by sloughage of the roof and ribs at various locations along the entire length of the conveyor belt. The exposed moving belt and rotating support rollers are immediately adjacent to the walkways creating the tripping and stumbling hazard to miners working or traveling along this belt conveyor. The fallen roof and rib material in the walkways also obstructed the clearance space in some areas to the extent that

persons had to crawl over material at a height above that of the moving belt conveyor. Floor irregularities and wet muddy conditions in the walkways also created slip, trip, and fall hazards to persons working or traveling along this belt conveyor....” Over 6 months elapsed before the safeguard was issued. Section 75.1403-5(g) covers this condition.

- On June 14, 2005, safeguard No. 7097927 was issued at the Sago Mine because “an inspection of track haulage between 4/07/05 and 6/02/05 revealed that the track haulage system was not properly maintained in good condition to insure the safe passage of the haulage equipment being operated at normal speeds.” The condition or practice section of the safeguard and the inspector’s notes indicate that the hazardous conditions were observed on different inspection days starting on April 7, 2005. Two months elapsed before the safeguard was issued. Section 75.1403-8(a) covers the conditions listed on this safeguard.
- On June 14, 2005, safeguard No. 7097926 was issued at the Sago Mine because “the inspection of track haulage conducted between 5/10/05 and 6/02/05 revealed that the track haulage system is not being provided with clearance space along both sides to insure the safe passage of the haulage equipment being operated at normal speeds.” The condition or practice section of the safeguard and the inspector’s notes indicate that the hazardous conditions were observed on different inspection days starting on May 10, 2005. One month elapsed before the safeguard was issued. Section 75.1403-8, paragraphs (b), (c), and (d) cover these conditions.

**Conclusion [Sections 104(a), 104(b), 104(d) and 314(b)]:** District 3 personnel recognized the need for an increased level of enforcement at the Sago Mine due to the number of roof falls that were occurring, the increase in the injury incidence rate, and the mine operator’s indifference to compliance. District 3 intentionally increased the level of enforcement which is reflected in the number of unwarrantable failure citations and orders issued in 2005.

The level of enforcement, however, was not always appropriate at the Sago Mine. District 3 managers, supervisors, and conference litigation representatives did not recognize that MSHA policies and procedures were not consistently followed and did not take corrective action. Inspector evaluations of gravity, negligence, and the type of enforcement action were not always consistent with the requirements of the Mine Act, 30 CFR, MSHA policy, controlling case law, and the conditions documented in citations, orders, and inspection notes.

- District 3 enforcement personnel did not always properly determine the number of persons affected by the condition cited. In all 21 citations issued for accumulations of combustible material, no more than one person was considered affected, regardless of how extensive the accumulations were or where they were located. Permissibility violations were never evaluated as affecting other miners

on a working section. Violations cited in areas where multiple persons would travel, such as personnel carriers and escapeways, were often evaluated as only one person affected. Since the conference officer(s) routinely modified the number of persons affected from multiple persons to one person, District 3 inspectors were conditioned to determine that only one person was affected.

- District 3 personnel did not always properly evaluate negligence. Repeated violations of certain mandatory safety standards were issued without being evaluated as more than moderate negligence. District 3 personnel did not follow controlling case law that provides that past violations serve to put an operator on notice that it has a recurring safety problem in need of correction and the violation history may be relevant in determining the operator's degree of negligence. Inspection notes documented that a higher level of negligence existed. Often, inspectors did not document that they examined the appropriate record books to determine if adequate examinations were conducted. This would have assisted them in determining the mine operator's negligence and whether an examination violation existed.
- Inspectors did not always terminate citations in a timely manner. While they generally set appropriate abatement times, inspectors extended some citations for an unjustifiable amount of time, instead of issuing section 104(b) orders. Some citations issued in September 2005 were extended several times.
- District 3 supervisors did not submit notes with the inspection report describing the reasons why enforcement actions were vacated.
- District 3 personnel were not following established policy in the issuance of notices to provide safeguards. District 3 memoranda and procedures sometimes created significant delays from the discovery of a hazard to the issuance of a notice to provide safeguard.

District 3 supervisors and managers should have recognized these deficiencies during their review of citations, orders, and inspection notes and taken corrective action.

## **Special Assessment Reviews**

**Requirement:** 30 CFR 100.5(a) states in pertinent part that MSHA may elect to waive the regular assessment formula (30 CFR 100.3) or the single assessment provision (30 CFR 100.4) if the Agency determines that conditions surrounding the violation warrant a special assessment. Although an effective penalty can generally be derived by using the regular assessment formula and the single assessment provision, some types of violations may be of such a nature or seriousness that it is not possible to determine an

appropriate penalty under these provisions. Accordingly, the following categories will be individually reviewed to determine whether a special assessment is appropriate:

- Violations involving fatalities and serious injuries.
- Unwarrantable failure to comply with mandatory health and safety standards.
- Violations for which individuals are personally liable under Section 110(c) of the Act.
- Violations involving an extraordinarily high degree of negligence or gravity or other unique aggravating circumstances.

**MSHA Policies and Procedures:** Volume III of the *MSHA Program Policy Manual* states in pertinent part that certain types of violations shall be individually reviewed to determine whether a special assessment is appropriate. Neither the standard nor this policy requires special assessment for these types of violations. Under 30 CFR 100.5(a)(8), MSHA may put special emphasis on a certain type of violation, which may include a requirement for a special assessment review. For example, an unacceptable level of repeat health standard violations at a mine is considered a unique aggravating circumstance, thereby supporting a review for possible special assessment.

After review of a violation by the issuing inspector and the issuing inspector's supervisor, the district manager has full discretion to recommend or not recommend a special assessment. The district manager level review should be conducted by either the assistant district manager or the district manager.

A recommendation for special assessment will be made by completing the Special Assessment Review (SAR) Form (MSHA Form 7000-32). The SAR will describe the facts and circumstances and give reason(s) that a special assessment is warranted. Copies of inspector notes, conference worksheets, sketches or photographs, relevant portions of plans, accident reports or memoranda, or any other information that may be helpful to the Office of Assessments in determining an appropriate civil penalty must be included with the citation or order.

The *MSHA Citation and Order Writing Handbook* also states categories of citations or orders that will be reviewed by inspection personnel for special assessment.

**Statement of Facts:** The internal review team reviewed 17 Special Assessment Review forms applicable to the Sago Mine in 2005. In 16 of the 17 reviews, the internal review team agreed with the reviewing official's conclusions. A description of the other order and special assessment review follows.

Section 104(d)(2) order No. 7149865 was not recommended to be specially assessed by the inspector, supervisor, or assistant district manager. This order was issued for an

inadequate preshift examination because the examiner did not identify several hazardous conditions. The inspection notes supported the inspector's evaluation of high negligence on the part of the operator. This condition was observed by another inspector and a supervisor who concurred with the inspector's evaluation. Other citations and orders with the same level of gravity and negligence were recommended for special assessment.

**Conclusion:** The decision not to specially assess section 104(d)(2) order No. 7149865 was inconsistent with reviews of other citations and orders issued that had the same gravity and negligence. District 3 personnel complied with established guidelines in conducting special assessment reviews in the majority (94%) of their recommendations.

## **Possible Knowing/Willful Violation Reviews**

**Requirement:** Section 110(c) of the Mine Act states that whenever a corporate operator violates a mandatory health or safety standard or knowingly violates or fails or refuses to comply with any order issued under this Act or any order incorporated in a final decision issued under this Act, except an order incorporated in a decision issued under subsection (a) or section 105(c), any director, officer, or agent of such corporation who knowingly authorized, ordered, or carried out such violation, failure, or refusal shall be subject to the same civil penalties, fines, and imprisonment that may be imposed upon a person under subsections (a) and (d).

Section 110(d) of the Mine Act states that any operator who willfully violates a mandatory health or safety standard, or knowingly violates or fails or refuses to comply with any order issued under section 104 and section 107, or any order incorporated in a final decision issued under this title, except an order incorporated in a decision under subsection (a) or section 105(c), shall, upon conviction, be punished by a fine of not more than \$25,000, or by imprisonment for not more than 1 year, or by both, except that if the conviction is for a violation committed after the first conviction of such operator under this Act, punishment shall be by a fine of not more than \$50,000, or by imprisonment for not more than 5 years, or both.

**MSHA Policies and Procedures:** The MSHA *Program Policy Manual* states that only a violation of a mandatory health or safety standard or order issued under the Mine Act shall be reviewed for possible further action. This includes violations of 30 CFR Parts 48, 56, 57, 70, 71, 72, 75, 77, and 90.

The *Special Investigations Procedures Handbook* sets forth guidelines and instructions for conducting special investigations pursuant to Title 1 of the Federal Mine Safety and Health Act of 1977.



The *Citation and Order Writing Handbook* states in part that inspectors will initiate a Possible Knowing/Willful Violation Review Form (MSHA Form 7000-20) for the following citations and orders.

- Section 107(a) orders with section 104(a) and section 104(d) citations
- Section 107(a) orders with section 104(d) orders
- Section 104(d) citations and orders which are "S&S" with an evaluation of at least "high" for negligence
- Citations issued for working in violation of an order

**Statement of Facts:** The internal review team reviewed 17 possible knowing/willful violation review forms applicable to the Sago Mine in 2005. In 16 reviews, the inspectors, supervisors, assistant district manager, supervisory special investigator, and the District 3 Manager indicated on the 7000-20 forms that a possible knowing/willful violation did not exist.

A review of five section 104(d)(2) orders issued at the Sago Mine on September 12, 2005, provides insight into the decision making process used in District 3 to make possible knowing/willful determinations. Brief descriptions of the orders and related inspection notes follow:

- Order No. 4890534 was issued for a violation of 30 CFR 75.400 and stated that combustible material in the form of loose, coal fines, and coal dust and float coal dust was allowed to accumulate around components of the No. 6 conveyor belt drive. A bottom conveyor belt roller was gobbled out and stuck. The inspection notes stated that the accumulations of combustible material were extensive; it took four miners 1 hour to correct the condition; the conditions existed for several shifts; if an injury occurred because of the conditions it would be serious in nature from a fire, burns, or smoke inhalation; and any prudent examiner would have found this condition.
- Order No. 4890535 was issued for a violation of 30 CFR 75.400 and stated that combustible material in the form of loose, coal fines, and coal dust and float coal dust was allowed to accumulate around components of the No. 5 conveyor belt drive. A thick layer of float coal dust was allowed to accumulate around the take-up and coal ribs. The inspection notes stated that the accumulations of combustible material were extensive; it took five miners 65 minutes to correct the condition; it took several shifts for accumulations to get to this extent; the injury would be serious in nature from fire, burns, or smoke inhalation; and any prudent examiner would have found this condition.

- Order No. 4890536 was issued for a violation of 30 CFR 75.400 and stated that combustible material in the form of loose, coal fines, and coal dust and float coal dust was allowed to accumulate around components of the No. 4 conveyor belt drive. The inspection notes stated it would take several shifts for combustible materials to accumulate to this extent; that injury would be of a serious nature from fire, burn, or smoke inhalation; and that any prudent examiner would have found this condition.
- Order No. 4890537 was issued for a violation of 30 CFR 75.1403 and stated that the Nos. 4, 5, and 6 belts were not maintained in a safe travelable condition. Mud and water were allowed to accumulate from 5 to 15 inches in depth in the travelway. The inspection notes stated it would take several shifts for the condition to accumulate to this extent; that injury would be of serious nature from slips, trips, and falls; that miners are exposed to these hazards when traveling the areas cited; and a prudent examiner would have found this condition.
- Order No. 4890539 was issued for a violation of 30 CFR 75.360 and stated that an inadequate preshift examination was conducted for the Nos. 4, 5, and 6 belts. The inspection notes stated that an accident resulting from this inadequate examination would be serious in nature from bruising, lacerations, broken bones, amputations, burns, and smoke inhalation; in normal mining conditions, accidents would occur; conditions existed for several shifts; and a prudent mine examiner would have found this condition.

Memoranda issued from the Senior Special Investigator to the District Manager on October 13, 2005, concerning these same orders also recommended no further action.

The issuing district specialist determined that the 17th violation did not meet the criteria for a possible knowing/willful violation review. This determination was inconsistent with conditions documented in the citation and inspector's notes.

During their interviews with the review team, several District 3 personnel stated that they had received minimal training regarding completing the possible knowing/willful review form. They stated that they were led to believe that the only time to conclude that a possible knowing/willful violation existed was if the inspector thought the violation warranted the operator going to jail.

**Conclusion:** During the review period, District 3 inspectors issued 17 S&S, section 104(d) citations and orders at the Sago Mine. Although special investigations are not routine and involve prosecutorial discretion and resource considerations, the internal review team found sixteen of the 17 citations and orders that met the criteria for possible knowing/willful violation reviews. In each case, the inspectors provided excellent documentation supporting their S&S and negligence determinations in both the body of the citations and orders and their inspection notes. The inspectors'

documentation fully justified proceeding with possible knowing/willful violation reviews. However, in all 16 instances, the inspector recommended that possible knowing/willful violation reviews not be initiated. Subsequent reviews by the supervisors, assistant district managers, and the Supervisory Special Investigator improperly supported the inspectors' determinations.

A District specialist's determination that a violation did not meet the criteria to be a possible knowing/willful violation was inconsistent and inaccurate.

District 3 inspectors were not given appropriate guidance concerning when to conclude that a possible knowing/willful violation existed. They incorrectly believed that the operator or his agent should go to jail if they concluded such a violation existed. Many District 3 inspectors did not understand a conclusion that a possible knowing/willful violation existed was not a recommendation for a person to go to jail, but merely a recommendation that a special investigation be initiated.

The *Special Investigations Procedures Handbook* does not provide adequate instruction concerning when an inspector or reviewer should conclude that a possible knowing/willful violation existed and a special investigation should be conducted.

## **Pattern of Violations**

**Requirement:** Section 104(e)(1) of the Mine Act states that if an operator has a pattern of violations of mandatory health or safety standards which are of such nature as could have significantly and substantially contributed to the cause and effect of coal or other mine health or safety hazards, he shall be given written notice that such pattern exists. If, upon any inspection within 90 days after the issuance of such notice, an authorized representative of the Secretary finds any violation of a mandatory health or safety standard which could significantly and substantially contribute to the cause and effect of a coal or other mine safety or health hazard, the authorized representative shall issue an order requiring the operator to cause all persons in the area affected by such violation, except those persons referred to in subsection (c), to be withdrawn from, and to be prohibited from entering, such area until an authorized representative of the Secretary determines that such violation has been abated.

Section 104(e)(4) of the Mine Act states that the Secretary shall make such rules as necessary to establish criteria for determining when a pattern of violations of mandatory health or safety standards exists.

30 CFR Part 104 establishes the criteria and procedures for determining whether a mine operator has established a pattern of significant and substantial (S&S) violations at a mine. It implements section 104(e) of the Mine Act by addressing mines with an inspection history of recurrent S&S violations of mandatory safety or health standards that demonstrate a mine operator's disregard for the health and safety of miners.

30 CFR 104.2 requires MSHA to conduct an “initial screening” (i.e., a review) of specified compliance records of each mine on at least an annual basis. The screening includes an examination of the mine’s history of the following:

- Significant and substantial violations
- Section 104(b) orders resulting from significant and substantial violations
- Section 107(a) imminent danger orders

In addition to the foregoing compliance records, the following factors must also be considered as part of the initial screening:

- Enforcement measures, other than section 104(e) of the Act, which have been applied at the mine
- Evidence of the mine operator's lack of good faith in correcting the problem that results in repeated S&S violations
- An accident, injury, or illness record that demonstrates a serious safety or health management problem at the mine
- Any mitigating circumstances

30 CFR 104.3 establishes criteria that must be used after an initial screening reveals that an operator habitually allows recurring violations of mandatory safety or health standards which significantly and substantially contribute to the cause and effect of mine safety hazards.

When a potential pattern of violations is identified, the district manager, pursuant to 30 CFR 104.4, must provide written notification to the mine operator, and a copy of such notification must also be provided to the miners’ representative. The notification must specify the basis for the determination that the mine has demonstrated a potential pattern of violations and must give the mine operator a reasonable opportunity of not more than 20 days to take steps required by 30 CFR 104.4(a)(1), (2), (3), and (4).

**MSHA Policies and Procedures:** The MSHA *Program Policy Manual* provides that, in most cases, a mine’s 2-year compliance history should provide sufficient information for evaluation of the health and safety criteria. In addition, the manual explains that Part 104 does not contemplate that a pattern notification will be based on a pre-determined number of violations of a particular standard. Therefore, the quantity of violations that might trigger pattern notification at one mine may be different than the number that may serve to trigger a notification at another mine.

*CMS&H Memo No. HQ-97-050-S (SUB-R75)* provides that copies of the initial screening records are to be provided to mine operators to advise them of MSHA's available programs to assist them in improving their compliance records. The memorandum does not specify a time frame for providing the initial screening results to the mine operator.

**Statement of Facts:** District 3 personnel conducted 106 Pattern of Violation (POV) screenings during the annual review cycle immediately preceding the Sago Mine explosion. District 3 personnel determined that none of the mines screened, including the Sago Mine, met the criteria for a potential pattern of violations. District 3 examined the compliance history for the Sago Mine on March 14, 2005. The period of review was from August 1, 2003 to December 31, 2004. The initial screening revealed the following compliance history at the Sago Mine:

- 25 S&S violations
- No section 104(b) orders
- No section 107(a) imminent danger orders
- One section 104(d)(1) citation
- One section 104(d)(1) order

District 3 personnel determined that the compliance history of the Sago Mine did not warrant further evaluation to determine if the mine had a potential pattern of violations. They examined the Sago Mine compliance data on March 14, 2005. The initial screening record notification letter to the mine operator, however, was dated December 22, 2005. At another mine, 13 months elapsed between the date that the POV screening was conducted and the date that the notification letter was sent to the mine operator.

Nationwide, several notices of potential pattern of violations have been sent to mine operators; however, a mine has never been placed on a pattern of violations.

**Conclusion:** District 3 personnel conducted an initial screening of the compliance record of the Sago Mine and properly determined that the mine did not warrant further evaluation to determine if the mine had a potential pattern of violations. District 3 did not provide initial screening records to several mine operators, including the operator of the Sago Mine, in a timely manner.

In view of the data available on MSHA's website, providing initial screening records to mine operators is no longer necessary unless a potential pattern of violations has been identified.

## **Alternative Case Resolution Initiative (ACRI)**

### Safety and Health Conferences

#### Alternative Case Resolution Initiative Background

In 1994, MSHA, in cooperation with the Department of Labor Office of the Solicitor (SOL), developed the Alternative Case Resolution Initiative (ACRI) to address the increasing number of cases in which mine operators sought formal and informal resolution of citations and orders issued by MSHA inspectors. The operator may:

- dispute the legality of the citation or order or the size of the civil penalty;
- ask for a conference with MSHA; or
- ask for a hearing before an administrative law judge of the Federal Mine Safety and Health Review Commission.

With the institution of the ACRI program, the position of Conference/Litigation Representative (CLR) was created. CLRs are primarily experienced mine inspectors who are trained in classroom and courtroom settings to represent the Secretary of Labor in contested cases. In accordance with a Memorandum of Understanding (MOU) between MSHA and SOL, CLRs are permitted to work on cases in which:

- MSHA's evaluation of negligence is "moderate" or less;
- MSHA's determination of gravity indicates that a less than fatal or permanently disabling injury or illness was likely to result from the violation;
- the amount of the proposed civil penalties for the docket is \$4,000 or less; and
- the alleged violation(s) does not involve novel or complex legal issues.

The CLRs are authorized to negotiate pre-hearing settlements with the mine operators and to represent MSHA in hearings. CLRs are subject to the continuing direction and guidance of SOL at all times.

#### Internal Review Team's Approach to Assessing the ACRI Program

Although the internal review team generally limited its review of the Agency's performance specifically to its actions at the Sago Mine in the calendar year preceding the explosion, the team conducted a more comprehensive review of MSHA's actions with respect to the conferencing component of the ACRI program. Because MSHA's District 3 office conducted only two safety and health conferences for violations issued at the Sago Mine during the review period (during which 10 violations were conferenced, but only six decisions were rendered), the team did not believe it could thoroughly examine the ACRI program based on the Sago conferences alone.

The internal review team was particularly sensitive to the need to thoroughly review the ACRI program because of the previous deficiencies and recommendations made following the September 23, 2001, explosions at the Jim Walter Resources, No. 5 Mine (JWR). The January 24, 2003, internal review report of MSHA's actions at JWR specifically referred to the ACRI program as one of several "fundamental factors that affected MSHA's performance," and explicitly detailed the "inadequacies" identified with the program at that time. Accordingly, the Sago internal review team assessed a significant number of conferences that occurred in District 3 between October 1, 2004, and September 30, 2005.

**Citation and Conference Information - Oct. 1, 2004 to Sept. 30, 2005**

	<b>Issuances</b>	<b>Conferenced</b>	<b>% Conferenced</b>	<b>Upheld</b>	<b>% Upheld</b>
<b>Sago Mine</b>	169	7	4%	4	57%
<b>District 3</b>	6,474	929	14%	592	64%
<b>National Average</b>	6,188	384	6%	258	67%

**Requirement:** 30 CFR 100.6 permits mine operators to request a safety and health conference following the issuance of a citation or order. If the district manager grants a mine operator's request for a conference, the CLR will serve on behalf of the district manager. All relevant information submitted in a timely manner by the parties with respect to the violation will be considered. District 3 had two CLRs during the year preceding the explosion at the Sago Mine.

30 CFR Section 100.6(b) states that upon notice by MSHA, all parties shall have 10 days to submit additional information or request a safety and health conference with the district manager or designee. A conference request may include a request to be notified of, and to participate in, a conference initiated by another party.

Section 3(j) of the Mine Act defines imminent danger as, "the existence of any condition or practice in a coal or other mine which could reasonably be expected to cause death or serious physical harm before such condition or practice can be abated."

Paragraph (d) of 30 CFR 100.3 defines negligence as committed or omitted conduct which falls below the standard of care established under the Mine Act to protect persons against the risks of harm. The standard of care established under the Mine Act is that the operator of a mine owes a high degree of care to the miners. A mine operator is required to be on the alert for conditions and hazards in the mine that affect the safety or health of the employees and to take the steps necessary to correct or prevent such conditions or practices. For purposes of assessing a penalty, failure to do so is negligence on the part of the operator.

**MSHA Policies and Procedures:** *General ACRI Handbook Instructions - The Alternative Case Resolution Handbook (ACRI Handbook)* states the purpose of safety and health conferences is to provide the mine operator and the miners' representative an

opportunity to be informed of MSHA's interpretation of regulations and to discuss and resolve all issues related to violations prior to assessment and litigation.

The MSHA *Program Policy Manual* also describes the purpose of such conferences. The manual provides that safety and health conferences are for the purpose of discussing the facts surrounding a citation or order, and are intended to provide an opportunity to submit additional information regarding the violation. The manual further explains that at the conference, questions regarding the issuance of a citation or order, including the inspector's evaluation of negligence, gravity, and good faith may be discussed.

Chapter 2 of the *ACRI Handbook* sets forth the procedures that CLR's and other officials are to follow when performing their conferencing work. In particular, the handbook discusses the procedures that are to be followed with regard to scheduling conferences, creating and maintaining records of conferences, preparing for conferences, conducting conferences, and performing certain post-conference actions.

With respect to scheduling conferences, the *ACRI Handbook* provides that following a request for a safety and health conference, the CLR, with assistance from a designated person, will set a date, time, and location for the conference. The CLR and the designee will also notify all interested parties, including the issuing inspector, the issuing inspector's supervisor, the mine managers, and the miners' representative, of the date, time and location of the conference. In preparation for the conference, the designee and CLR also begin collecting relevant documentation, such as copies of the citations and/or orders to be conferenced, and relevant notes from the issuing inspector.

With regard to creating and maintaining records of conferences, the *ACRI Handbook* explains that the CLR will maintain in the computer-based ACRI database system a log of all citations and orders that were conferenced. The log is intended to contain the details of conferences conducted by the CLR including, but not limited to, the: conference number, date of the alleged violation, section of Title 30 that was cited, issuing inspector's AR number, date of the conference, date of the conference decision, and conference disposition. The database information can be used to access reports.

The *ACRI Handbook* notes that, in preparation for a conference, the CLR must create a file that, at a minimum, contains a copy of the conference letter sent to the requester; a copy of the citations and orders to be conferenced; a copy of the issuing inspector's relevant notes; any appropriate approved plan; and any other relevant information regarding the violation, including previous history, maps, policy memoranda, letters, directives, and sample analyses. After the CLR collects and reviews documentation pertinent to the impending conference, he or she must contact the issuing inspector if any additional relevant information is required. The *ACRI Handbook* also states that the CLR should review applicable safety and health standards, mine inspection handbooks, the MSHA *Program Policy Manual*, and decisions of the courts, the Federal Mine Safety and Health Review Commission (Commission) and the Commission's Administrative Law Judges (ALJs).



The *ACRI Handbook* sets forth procedures that CLR's are to follow when conducting safety and health conferences. Although the CLR has discretion to determine whether the issuing inspector will participate in the conference, he or she must notify inspectors and their supervisors of any subsequent actions resulting from the conference. The handbook explains that the CLR may affirm the inspector's findings or, if facts or circumstances provided during the conference warrant, find that the citation or order should be modified or vacated. Unless the operator provides some additional information during the conference, or the CLR determines that the enforcement action is not in accordance with applicable case law, standards, or Agency policies or procedures, the CLR should not substitute his or her own judgment for that of the inspector.

In most cases, the CLR should not announce his or her decision at the conclusion of the conference. Inspectors and their supervisors must be notified prior to issuing any subsequent actions resulting from the conference. The CLR must issue any subsequent actions resulting from the conference. The CLR must communicate the reasons for actions taken to modify or vacate citations/orders, such as current Commission decisions or recurring evidence deficiencies, to enforcement personnel in order to achieve uniform application of regulations. This report or information should be presented by the CLR at monthly staff meetings or in a timely manner through the appropriate supervisor at a staff meeting.

The handbook also includes post-conference actions that each CLR is required to perform. Most importantly, the CLR is responsible for documenting his or her decision, including the reasons for modifying or vacating any citation or order, and entering certain specified information into the ACRI database. The CLR must also ensure that copies of subsequent actions are transmitted to interested parties. In particular, the CLR must provide a copy of the conference worksheet, or other appropriate documentation memorializing the information required by the conference worksheet, to the issuing inspector and his or her supervisor. The CLR is also responsible for ensuring that the CLR file contains all information relevant to the conference and sending the completed file to the appropriate office, where it is filed with the original citation or order.

*Negligence and Gravity* - The *Citation and Order Writing Handbook* states that in order to complete the citation/order form, MSHA's inspectors must evaluate the degree of negligence and gravity for each violation of the Mine Act or its standards. As part of the gravity determination, inspectors must evaluate the number of persons who could or would be affected if the event or injury were to occur. With respect to the "number of persons affected" criterion, the handbook instructs inspectors, when completing the citation/order form, to, "[e]nter the number of persons who were actually injured or became ill as a result of the hazard caused by the violation or the number of persons who could or would be affected if the anticipated event occurred."

The number of persons affected is the number of persons who would be expected to be injured if an accident or overexposure occurred as a result of the violation. The degree of hazard and exposure documented will determine the significant and substantial (S&S) rating in Section II of the Mine citation/order form.

The negligence criterion gives appropriate consideration to the factors relating to an operator's failure to exercise a high degree of care to protect miners from safety or health hazards. When applying this criterion, MSHA considers actions taken by the operator to prevent or correct conditions or practices which caused or allowed the violation to exist. In determining the operator's diligence in protecting miners in any given hazard situation, due recognition is given to mitigating circumstances which explain the operator's conduct in minimizing or eliminating a hazardous condition. Mitigating circumstances may include, but are not limited to, actions which an operator has taken to prevent, correct, or limit exposure to mine hazards.

*CMS&H Memo No. HQ-03-008-A (PRT-43)* states "Inspection personnel shall also review record books for reported hazards, the length of time the hazard has existed, and the action taken to correct the hazard. This review should also be compared to actual underground mine conditions to determine if enforcement is appropriate toward recordkeeping."

MSHA inspectors must evaluate the negligence of the mine operator using one of the following categories:

None - The operator exercised diligence and could not have known of the violative condition or practice.

Low- The operator knew or should have known of the violative condition or practice, but there are considerable mitigating circumstances.

Moderate- The operator knew or should have known of the violative condition or practice, but there are mitigating circumstances.

High- The operator knew or should have known of the violative condition or practice, and there are no mitigating circumstances.

Reckless Disregard - The operator displayed conduct which exhibits the absence of the slightest degree of care.

**Statement of Facts:** Improper Modifications to Citations and Orders (Sago Mine) - Between January 1, 2005, and January 2, 2006, the period of time for which the team reviewed MSHA's performance, the Sago Mine conferenced 10 violations; a CLR rendered substantive decisions with regard to six of the violations. The CLR made no substantive decisions as to the remaining four violations because those violations were already in the process of being litigated. The internal review team reviewed the six

violations for which a decision was rendered, and found one which raised concerns. In particular, the Sago Mine was issued order No. 7097836 for an alleged violation of 30 CFR 75.360(a)(1) (Preshift examination). In pertinent part, the issuing inspector stated in the body of the order that:

The preshift examination for the No. 3 scoop charging station and scoop supply haul road is inadequate in that the following conditions were observed by this inspector and should have been recognized by any prudent mine examiner given the responsibility of conducting a mine examination to detect hazards at their earliest possible stages. (1) The No. 3 scoop battery charging station was found by this inspector in the No. 7 intake entry at No. 58 crosscut between the No. 6 entry (secondary escapeway) and the No. 7 intake entry. (2) The No. 3 scoop charger is energized and charging a set of scoop batteries which is not ventilated directly to a return air course. (3) The No. 3 scoop charging station is ventilated with the main intake air that travels directly to the 001-0 & 002-0 MMU working super section and this intake air is used for face ventilation purposes. (4) The No. 3 scoop battery charging station is not provided with an operational fire suppression system. (5) No evidence could be found by this inspector to indicate that a preshift examination was conducted for the No. 3 scoop charging station. (6) This No. 3 scoop charging station is located along the No. 7 intake entry which is also the scoop supply haul road and this haul road is regularly traveled by the miners. A preshift examination report was called out . . . at 6:00 A.M. on 06/02/2005 as no hazards observed. . . . This violation is an unwarrantable failure to comply with a mandatory standard.

In support of the order, the issuing inspector's notes state that, "[t]he gasses that generates [sic] from charging scoop batteries will be carried by the mine ventilation directly to the mains . . . where miners are extracting coal from its natural bed." The inspector's notes continue by recognizing that the scoop charging batteries had no fire protection. In the inspector's judgment, if an accident were to occur as a result of the hazardous condition, it would be "of a serious nature from fire, burns, smoke inhalation." Finally, the inspector noted that "the preshift mine examiner should have know [sic] of this condition." He also noted that, "[b]ased on my mining experience this condition has existed for several shifts."

The CLR's documentation of the conference for the above order provides the following justification and conference conclusion:

The examiner is to check the workplaces for hazardous conditions. Yes, the condition cited in order No. 7097835, under the right conditions (such as battery problems, arching [sic], smoking, fire, and smoke) could become a hazardous condition, but at this time it is not. What is described in the inspector notes is a violation of section 75.360(e), in that there was no D[ates], T[imes], I[nitials]'s to show that the battery charger was ever examined. As a

result of this conference, the violation is changed from a 104(d) order to a 104(a) citation. The gravity in item 10(a) is changed to unlikely and item 10(c) is changed to No. The negligence is changed to moderate. With these changes, the violation does not meet the requirements for a Special Assessment Review and none is recommended.

The CLR's written justification did not reference Agency policy, statutory, regulatory, case law or other legal authority for the modification. Additionally, the CLR's conference worksheet does not refer to any additional information provided by the mine operator at the conference. The inspector's notes did not suggest the violation was one in which the examination was performed, but the preshift examiner did not certify the examination by placing the date, time, and his initials at the battery charging station. The issuing inspector's notes clearly explain that, based on his experience, the condition appeared to have existed for several shifts. Moreover, the inspector's notes state that he could not find any evidence that a preshift examination was conducted for the scoop charging station. When interviewed, the CLR did not recognize that his actions were not in accordance with established procedures and policies.

**Conclusion:** After reviewing the six violations cited at the Sago Mine for which a decision was rendered, the internal review team found that the CLR's performance in five cases was consistent with the requirements of the *ACRI Handbook*. In the remaining case, the CLR's conclusion was erroneous. Moreover, the CLR did not provide proper justification for the subsequent action on the conference worksheet. Conclusive statements provided on the Conference Worksheet (or other documentation of a health and safety conference) do not offer enforcement personnel the type of substantive feedback that is required to ensure that they understand precisely what evidentiary deficiencies were lacking, or in what respect issuance of the citation or order contravenes case law, statutory or regulatory authority, or MSHA's policy and procedures. In accordance with the *ACRI Handbook*, the CLR should have sustained this order as written.

**Statement of Facts:** *Improper Modifications to Citations and Orders (Other District 3 Mines)*

- The internal review team found numerous instances of modifications to citations and orders that did not conform to the instructions set forth in the *ACRI Handbook*. For example:

- On May 16, 2005, a District 3 mine operator was issued section 104(d)(2) order No. 7150073 for a violation of 30 CFR 75.360(b)(1) (failure to conduct a preshift examination of a track haulageway). The inspector evaluated the gravity as "unlikely" to occur, the expected injury or illness to result in "lost workdays or restricted duty," and one person affected. The order was evaluated as "non-significant and substantial" and the negligence was evaluated as "high."

The issuing inspector stated in his notes that the mine operator had been previously placed on notice about the violative condition, and that this order was

the third time in 12 days that the operator had been cited for the same practice. The inspector determined that the condition had been present for more than several days, it was obvious and extensive, no attempt had been made to correct the condition, and that the injuries likely to be received would be cuts, bruises, and broken bones. The mine operator requested and was granted a conference. Following the conference, the CLR vacated the order, stating, in pertinent part, that, "[a]s described by the issuing inspector, these conditions were not hazards that are likely to cause death or bodily injury to persons in the area. As a result of this conference, this order is vacated as issued in error; and there is nothing to special assess."

- On May 17, 2005, a District 3 mine operator was issued section 104(d)(2) order No. 7150207 for an alleged violation of 30 CFR 75.364 for failure to conduct a weekly examination of the primary escapeway. The inspector evaluated the gravity as "unlikely" to occur, the expected injury or illness to result in lost workdays or restricted duty, and 10 persons affected. The order was evaluated as "non-significant and substantial" and the negligence was evaluated as "high."

The issuing inspector stated in his notes that initials could not be found indicating that the examination had been conducted within the required 7-day timeframe. The initials that the inspector observed indicated that the examination was performed a day late. Agents of the mine operator could not locate any initials which would have indicated timely performance of the weekly examination. One agent "knew the examination was not signed for and marked the page" of the examination record book with a yellow Post-it® note. The inspector noted that, "[t]his mine has been cited before for failure to make exams & record the results in the record book." The inspector's notes also stated that the air in the escapeway was moving in the wrong direction.

The mine operator requested and was granted a conference. As a result of the conference, the section 104(d)(2) order was modified to a section 104(a) citation, and the CLR stated the following:

When the entry was examined by the inspector, no dates, times or initials were found to show that the area had been examined within the 7-day time period as required. Dates, times, and initials were found that showed that the entry was examined at 1:30 a.m. on 05/17/2005, approximately 1 ½ hours beyond the 7-day time period. Yes there was a violation of section 75.364(b)(5), but there is nothing in the notes to show that this is unwarrantable failure. Reasonable efforts were made by the company to correct the violation when they became aware of it. A violation is caused by an unwarrantable failure if it is determined that the mine operator engaged in aggravated conduct constituting more than ordinary negligence. A look at the inspector's notes and violation do not show factors that indicate aggravated conduct such as the

violation being obvious, extensive, existing for a period of time, similar violations, condition reported to the operator who then allowed it to exist, etc. As a result of this conference, the violation is modified in item 10(d) from 10 persons to 1 person affected, item 11 from high to moderate negligence, and the type of action is modified from a 104(d) order to a 104(a) citation. As a result of these changes, the violation does not meet the requirements for review under the Special Assessment, and none is recommended.

The CLR did not explain the mitigating circumstances that justified his reduction in negligence, nor did he provide any information rationalizing the reduction in the number of persons affected. Moreover, the CLR did not explain why he discounted the fact that the operator had been cited previously for failure to conduct an examination, or why the agent's marking of the record book was discounted.

**Conclusion:** In these cases involving other District 3 mines, the CLR improperly modified two orders. In both cases, the CLR did not provide sufficient documentation to justify the modifications. These were merely two examples in which the CLR's subsequent actions were inappropriate and/or not explained.

In addition, as demonstrated by these cases, improper modifications of citations and orders affect other enforcement activities. In both of these cases, the CLR's improper modification of the orders made them not meet the criteria for the recommended special assessment review. As discussed elsewhere in this report, special assessments serve a vital role in helping to deter certain negligent conduct.

**Statement of Facts:** Conference Timeliness - There are not any requirements currently in place that specify the timeframe between when a conference request is granted and when the conference takes place.

Interviews of District 3 personnel, as well as the volume of conferences that were requested or granted in the District in the year preceding the Sago Mine explosion, demonstrated that the District was becoming overwhelmed with safety and health conferences. For the past several years, the number of violations conferenced in District 3 had consistently been among the highest of the Coal Mine Safety and Health districts. In Fiscal Year 2005, 14.35% of the violations issued in District 3 were conferenced, ranking them No. 1 among the Coal Mine Safety and Health districts. Comparatively, the national average for percent conferenced during the same period was 7.06%. The high number of conferences in District 3 prolonged the time it took for conferences to actually take place once the District Manager granted a conference. Specifically, from the time that a conference request was granted to the time that it was conducted routinely took 3 to 4 months.

Interviewees believed that the onslaught of conference requests was related to a pervasive perception that the Office of the Solicitor had a shortage of resources to defend citations and orders that MSHA's inspectors issued. Interviews revealed that some operators have "standing orders" to conference all citations or orders of a certain degree, irrespective of the merit of the citation or order. Interviewees also stated that they believed operators used large volume conference requests knowing that a percentage would be modified.

**Conclusion:** For the past several years, the number of violations conferenced in District 3 has consistently been among the highest of the Coal Mine Safety and Health districts, causing a 3- to 4-month backlog of conferences. Because of these backlogs, it is reasonable to expect that inspectors, mine managers, and other interested parties could experience a more difficult time recalling relevant facts. In addition, large volume conference requests used simply for bargaining purposes, particularly when unmeritorious, tied up District resources.

**Statement of Facts:** *Pre- and Post-Conference Intra-District Communication* - Interviews revealed that inspectors and their supervisors were not always informed of scheduled conferences. Several interviewees indicated their belief that regardless of the nature of the conference, the inspector, his or her supervisor, or both should be informed of the impending conference and permitted to provide additional information to the CLR prior to the conference. Furthermore, one interviewee stated that in "very few" cases has he had "any say so at all or they've even asked me questions" on citations and orders prior to conferencing. The same interviewee stated that in most cases, once the CLR receives notes in preparation for the conference, he is left out of the conferencing process until the CLR renders a decision.

In several cases after the conference and before the decision was rendered, the inspector and the CLR argued their respective positions back-and-forth by email over the course of several days. Interviews revealed that inspectors were frustrated by this approach. At least one interviewee believed that CLRs continually emailed inspectors until the CLR received the answer he was seeking, or until the inspector became frustrated and no longer argued his or her position. These problems were recognized by headquarters auditors during the July 2005 audit of the District 3 ACRI program.

Interviewees also stated that they did not always receive feedback from CLRs to communicate why certain subsequent actions were taken. The *ACRI Handbook* states that CLRs must provide relevant feedback in a timely manner, and this should be done by the CLR or appropriate supervisor at a staff meeting. Although some previous District 3 CLRs, as well as one current CLR, had on occasion traveled to the District field offices and provided instruction and feedback to enforcement personnel, this was not a general practice. In many instances, it was months before the issuing inspector received feedback with regard to the results of a conference from the CLR.

**Conclusion:** Pre- and post-conference communication between inspectors and CLR's was not consistent, and was frequently strained. Inspectors were often excluded from providing additional information to support a citation or order. Monthly reports and feedback to enforcement personnel were not always given, or were not provided in a timely manner. By not sharing the rationale behind decisions, the ACRI program hindered the efficiency of the District 3 enforcement program.

**Statement of Facts:** National Oversight of the ACRI Program - As a follow-up to the January 2003, Jim Walter Resources, Inc. internal review, audits of the CLR work in each district are to be conducted by headquarters in conjunction with the Office of the Solicitor. The review is to include the CLR's conference work, including modification decisions and communication procedures, and controlling case law, including settlements and case decision results.

An ACRI-CLR Program Review ("audit") was held in District 3 during the week of July 19, 2005. This was the first audit that had been conducted of District 3 pursuant to the recommendations of the JWR Internal Review Report released January 24, 2003. The audit reviewed a representative number of conferences conducted in CY 2004 through August 2005. The conferences were randomly selected and included conferences in which citations or orders were vacated, modified, and upheld. The review sought to determine if ACRI procedures and policies were being followed. The headquarters audit team reviewed a different subset of conferences than did the internal review team. Although the headquarters audit team found some of the same issues the internal review team found, key conclusions of the auditors differed from those of the Sago internal review team. Among the differences were the conclusions of the auditors that "the reasons for any follow up action were clearly explained in the conference memorandum or worksheet," and that "a review of the citations/orders indicated that the correct action was taken with the information provided." The headquarters audit team conclusion continues by stating that "[a]ll citations/orders reviewed were appropriately Upheld, Modified, or Vacated in accordance with the *Alternative Case Resolution Handbook*."

The internal review team interviewed members of the headquarters audit team. When presented with some of the worksheets referenced in this section, the headquarters audit team agreed with the findings of the internal review team. They also agreed that the headquarters audit should evaluate the rationale for decisions and that there was a need for more structure in the HQ audits. The headquarters audit team does not always include a member that has enforcement experience.

**Conclusion:** The internal review team found pervasive problems with CLR's not properly documenting the reason for subsequent actions, a general lack of oversight by District management, and subsequent actions that were inappropriate given the available information.



Although the headquarters audit program is relatively new, it tends to focus on whether actions of the CLR are consistent with the procedures set forth in the *ACRI Handbook*, and not whether subsequent actions taken by CLR are consistent with MSHA's enforcement policies and procedures. Similarly, the audits do not focus on whether such actions are supported by the inspector's notes and other available information, CLR substitute their judgment for that of the inspector, or the rationale set forth by the CLR is supported by case law, statutory or regulatory authority, or Agency policy.

**Statement of Facts:** *Negligence and Gravity "Conditioning"* - A review of the 200 citations and orders issued at the Sago Mine during the review period revealed that in 92% of these issuances the inspector indicated the number of persons affected as one. For purposes of comparison, the internal review team reviewed all citations and orders issued at District 3 underground mines during the review period. Of those citations and orders, 94% indicated that one person was affected by the alleged violation.

During interviews, several enforcement personnel stated that their evaluation of the number of persons affected was influenced by previous modifications issued by CLR. These inspectors stated that they had been "conference conditioned," meaning that their evaluation of the number of persons affected was influenced or conditioned as a result of decisions made by CLR in prior safety and health conferences. While it appears that the problem of "conference conditioning" was most acute in terms of the evaluation of the "number of persons affected" criterion, it is also evident in inspectors' evaluations of the other gravity criteria, as well as in their negligence determinations.

Some District 3 personnel stated during interviews that they would often evaluate citations and orders as less than "high" negligence in order to prevent them from being reduced in conference. They also stated that they believed a condition had to be an imminent danger in order to evaluate a citation or order as highly likely (for an injury or illness to occur). A review of the citations and orders at the Sago Mine in 2005 revealed that none were evaluated as highly likely.

The team's review of the actions of one District 3 CLR suggests that the inspectors' belief that the number of persons affected would be modified to "one person affected" during a safety and health conference was accurate. For example, the CLR stated that only one person would be affected if there was an emergency on a working section requiring several miners to escape from the section by means of an escapeway that had extensive tripping and stumbling hazards. The CLR also suggested that determining the number of persons affected in accordance with the *Citation and Order Writing Handbook* assumes a "worst-case scenario" method of evaluation and provides for an "unrealistic" number of affected persons. The CLR also stated that the *Citation and Order Writing Handbook* serves merely as a "guideline" as he engages in conferencing responsibilities, notwithstanding the mandatory language of the handbook.

None of the interviewees could recount details of a specific instance in which the number of persons affected was increased during a safety and health conference, though several indicated that it has happened on occasion.

The internal review team's review of this issue revealed numerous instances where enforcement personnel's notes supported an evaluation of more than one person affected, but the citations or orders issued were evaluated as one person affected, reflecting the conditioning discussed above; or where the CLR modified the number of persons affected in conflict with the requirements of the *Citation and Order Writing Handbook*. For example:

- On the June 2, 2005, 104(d)(1) order No. 7097836 previously mentioned, the inspector evaluated the number of persons affected as one, despite the presence of the following in the inspection notes: "16 miners work on this 001-0 & 002-0 MMU main's super section and when a [sic] accident does occur from this condition the smoke will be carried directly to this section effecting [sic] all 16 miners."
- On May 17, 2005, 104(d)(2) order No. 7150206 was issued to a District 3 mine operator for failure to ventilate the primary escapeway with intake air. Air that was coursed through the specific airway in question was traveling outby, in the wrong direction. Although the inspector determined that 10 persons were affected by the violation, the CLR modified the number of persons affected from 10 to 1 during the conference.

**Conclusion:** The District 3 CLR program did not always follow the requirements set forth in MSHA's enforcement and procedural handbooks. In addition, District 3 management did not exercise appropriate oversight to ensure that actions of enforcement personnel and the CLRs conformed to the Mine Act, 30 CFR, MSHA policy, and controlling case law.

Because of past conferences, several District 3 enforcement personnel often indicated lower gravity (including number of persons affected) and negligence on citations and orders even though inspection notes and conditions cited clearly reflected higher degrees of gravity and negligence.

The deficiencies found in the above section on ACRI are many of the same deficiencies documented in the *Internal Review of MSHA's Actions at the No. 5 Mine Jim Walter Resources, Inc., January 24, 2003*.

## **Inspection Activities Prior to the Explosion**

A regular safety and health inspection was started on October 4, 2005, and continued throughout the quarter. The inspection was not complete when the explosion occurred.

In the 20 calendar days prior to the explosion, District 3 inspectors conducted inspection or investigation activities at the Sago Mine on December 14, 18, 19, 20, 21, and 27, 2005. A summary of these inspection activities follows.

December 14, 2005 (Day Shift)

The District 3 Manager and the Bridgeport Field Office Supervisor accompanied the assigned inspector. District management visited the mine in an appropriate response to recent enforcement concerns communicated by field office personnel. Five citations and one order were issued.

Two citations were issued for accumulations of combustible materials (30 CFR 75.400), one beneath the conveyor belt and another in the conveyor belt starter box of the MMU-006 section panel belt. Two citations were issued for violations of 30 CFR 75.1403 for the absence of 24 inches of clear travel way along coal conveyor belts. An additional citation was issued for low air velocity in the 1 left B panel section conveyor belt entry which utilized a carbon monoxide monitoring system. A section 104(d)(2) order was issued for a violation of 30 CFR 75.400 on MMU-006 for accumulations of coal which were extensive in nature and existed during previous mining shifts.

December 18, 2005 (Evening Shift)

An inspector examined outby pumps and electrical installations, inspected MMU-006 for imminent dangers and violations, and examined the tunnel liner installation along entries adjacent to the No. 4 conveyor belt. No citations were issued in the active working sections of the mine.

Two section 104(a) citations were issued for non-compliance with the mine's approved roof control plan. Tunnel liners, which had been installed in outby areas of the mine, were not provided with an overlying layer of cushioning material. The inspector held a partial close-out conference to discuss the citations with mine management.

December 19, 2005 (Midnight Shift)

An inspector observed a search for smoking articles, held a safety meeting, and inspected MMU-003, the section equipment, and the primary (intake) escapeway. Four section 104(a) citations were issued.

Three citations were issued for mobile equipment not being maintained in permissible condition (30 CFR 75.503). One citation was issued for noncompliance with the mine's approved roof control plan (30 CFR 75.220(a)(1)) because a layer of cushioning material was not provided on tunnel liners which were installed in the primary (intake) escapeway for MMU-003.

The inspector held a partial close-out conference to discuss the citations with mine management. The inspection day ended in the morning hours of December 20, 2005.

December 21, 2005 (Day Shift)

Two inspectors participated in the inspection. The first inspector traveled to underground areas of the mine and the second inspector remained on the surface to inspect surface work areas of the mine.

During the underground portion of the inspection, the 2 North Mains seals were visually inspected and methane readings were taken at each seal. The inspector took an air reading outby the No. 1 seal to determine the quantity of air provided to ventilate the seal locations. Inspection notes indicate the presence of rock dust, cribs for roof control, ventilation curtain, and dates, times, and initials of certified mine examiners. No violations were documented.

The inspector also examined personnel carriers, motors, mine track and the No. 5 conveyor belt drive. There were not any citations issued during the inspection of underground areas or equipment.

During the inspection of the surface work areas, examination records, surface structures and mobile equipment were examined. A section 104(a) citation was issued for eight fire extinguishers which were not examined or tagged within the previous 6 months. Another section 104(a) citation was issued for stumbling and slipping hazards on the elevated walkways of the inclined stacker belt.

The inspectors held a close-out conference to discuss citations and inspected areas with mine management.

December 27, 2005 (Day Shift)

An inspector, accompanied by an inspector-in-training, arrived at the mine and discussed outstanding citations with mine management. The inspector indicated in his inspection notes that the event was previously closed (completed), but should remain open.

## **Sealing of Worked-Out Areas**

“Seals” are walls or barriers constructed across underground mine entries to isolate worked-out areas from the active portion of a mine. This section of the report discusses the background and requirements for sealing worked-out areas of coal mines, criteria for approval of seals, testing of Omega Block alternative seals, previous explosions involving seals, seal strength criteria, and seal usage.

## **Background on Alternative Seal Approval Criteria**

**Requirement:** Section 303(z)(2) of the Federal Mine Safety and Health Act of 1977 requires that, “all areas from which pillars have been wholly or partially extracted, and

abandoned areas...shall be ventilated by bleeder entries or by bleeder systems...or be sealed..." The section further states that, "When sealing is required, such seals shall be made in an approved manner so as to isolate with explosion-proof bulkheads such areas from the active workings of the mine."

Mandatory safety standard 30 CFR 75.334 requires that worked-out areas of coal mines either be ventilated or sealed. Seal construction requirements are contained in 30 CFR section 75.335, which provides for two options:

- Section 75.335(a)(1) specifies requirements for constructing seals using solid concrete blocks; or
- Section 75.335(a)(2) specifies in part that, "Alternative methods or materials may be used to create a seal if they can withstand a static horizontal pressure of 20 pounds per square inch provided the method of installation and the material used are approved in the ventilation plan."

**Statement of Facts:** The accident investigation report for the explosion at the Sago Mine identified as a root cause of the accident that "The 2 North Main seals were not capable of withstanding the forces generated by the explosion." The accident report further indicates a corrective action in the root cause analysis as "Seals should be designed and installed to prevent an explosion from propagating to the opposite side."

*Criteria for Approval of Alternative Seals for Worked-Out Areas*

Mandatory safety standard 30 CFR 75.335 - Construction of Seals - was promulgated in 1992. Prior to the 1992 rule, the previous seal-related standard (30 CFR 75.320-2) had required that, "pending the development of specifications for explosion-proof seals or bulkheads, seals or bulkheads may be constructed of solid, substantial and incombustible materials sufficient to prevent an explosion that may occur on one side of the seal from propagating to the other side."

The preamble to the 1992 rule states the following:

"Seals must be designed to withstand elevated pressures. The final rule adopts 20 pounds per square inch gauge (psig) as the threshold for determining whether a seal is explosion proof. This threshold is based on the U.S. Bureau of Mines Report of Investigations No. 7581. According to that report, a seal or bulkhead may be considered explosion proof when its construction is adequate to withstand a static load of 20 psig if there is sufficient incombustible material on both sides of the seal to abate the explosion hazard. According to the Bureau's report, with adequate incombustible material and minimum coal dust accumulations, it is doubtful that pressures exceeding 20 psig could occur very far from the origin of the explosion."

Since the 1992 rule revision, MSHA’s approval of 30 CFR 75.335(a)(2) alternative seals has been based on the results of full-scale seal testing conducted at the National Institute for Occupational Safety and Health’s (NIOSH) Lake Lynn Experimental Mine (Lake Lynn) near Fairchance, PA. MSHA worked with a NIOSH group that was formerly part of the U.S. Bureau of Mines to develop the testing program.

While Lake Lynn is a limestone mine, the seal tests were conducted in mine entries configured similar in size to coal mine entries. The tests involved constructing seals and subjecting them to a pressure pulse generated from a methane explosion. The purpose was to determine whether the seals would withstand an explosion pressure of at least 20-psi; there was no attempt to determine the ultimate strength of the seals.

The test seals were constructed in cross-cuts off of the entry in which the methane explosion was initiated (see Seal “A” in Figure 1). As a result, the seals were subjected to a “side on” or “static” pressure. This test set up was based on a recommendation in RI 7581 that a seal be considered explosion proof if it could withstand a “static” pressure of 20-psi. The seal would be subjected to a head-on or “reflected” pressure if it was constructed across the entry in which the explosion was initiated (see Seal “B” in Figure 1). After being subjected to the “side on” pressure from an explosion, the seals were then examined, and if they had survived structurally, were tested for air leakage. The acceptable air leakage rates were established by MSHA. For pressure differentials up to 1-inch of water gauge, air leakage through the seal could not exceed 100 cubic feet per minute; for pressure differentials greater than 3 inches of water gauge, air leakage could not exceed 250 cubic feet per minute.

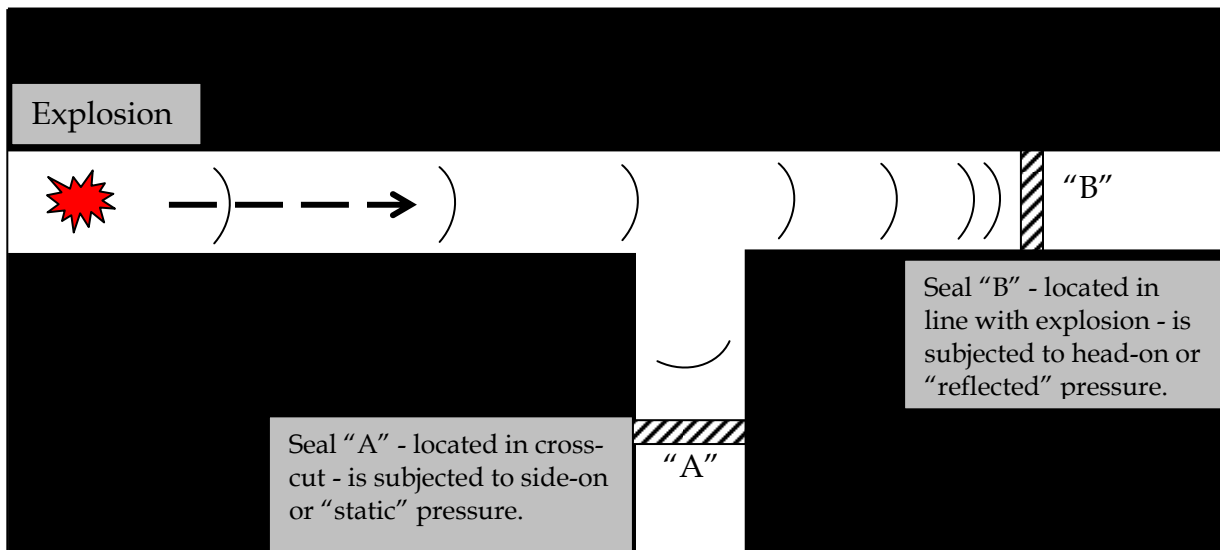


Figure 1 – Simplified illustration of “side-on” or “static” pressure versus “head-on” or reflected pressure.

Types of alternative seals that have been tested at Lake Lynn include light-weight cementitious blocks, poured-in-place cementitious seals, wooden seals and seals with a polyurethane-gravel core between concrete block walls. Details concerning the alternative seal testing program are provided in "*Evaluation of Solid-Block and Cementitious Foam Seals*," U.S. Bureau of Mines Report of Investigation (RI) 9382, Greninger, N.B. Weiss, E.S., Luzik, S.J., and Stephan S.R., United States Department of the Interior, 1991.

Since the 1992 rule revision, the basis for MSHA's approval of alternative seals has been that once a seal passed the test criteria at Lake Lynn (i.e., withstood at least a 20-psi explosion pressure and subsequently passed an air leakage test), then a seal that is proposed to be built in the same fashion as the test seal can be approved as an alternative seal in a mine ventilation plan.

#### *Testing of Omega Block Alternative Seals at Lake Lynn*

Omega block is a lightweight cementitious block product manufactured by Burrell Mining Products, International, Inc. Individual Omega blocks measure 8 x 16 x 24 inches and weigh approximately 45 lbs. Two types of Omega block seals had been tested at Lake Lynn and passed the test criteria. One type of Omega block seal required hitching, that is, constructing part of the seal into a channel or recess cut into the floor and ribs to help anchor the seal to the strata. The other type of Omega block seal did not require hitching.

The non-hitched seal, the type constructed at Sago Mine, was 40-inches thick with no pilaster. This configuration was originally investigated by NIOSH in the context of using Omega blocks for the rapid sealing of mine entries in emergency situations, such as mine fires. A benefit of this type of seal in such cases is that, by not having to cut hitches into the floor and ribs, the seals can be constructed more quickly.

The non-hitched Omega block seal tested at Lake Lynn was constructed in a 19-foot wide by 6-foot, 9-inch high crosscut. The seal was constructed using Quikrete<sup>®</sup> BlocBond<sup>®</sup>, a high-strength blend of Portland cement, fiberglass fibers and additives. A layer of wet-mixed BlocBond mortar was applied to the floor at a thickness of approximately ¼-inch before starting the first row of blocks. As the seal was constructed, the block pattern was alternated (left to right and front to back) to stagger the vertical joints. Wet-mixed BlocBond was used to fully mortar the joints at a nominal thickness of ¼ inch. The BlocBond was also used to coat both faces of the seal, to a thickness of ¼ inch. Three rows of wooden rough cut boards, 1-inch thick by 8-inches wide and aligned length-wise from rib to rib, were placed in the approximately 2.5 inch gap between the top course of blocks and mine roof. One row of these boards was placed in the middle of the top seal course with two rows of additional boards placed symmetrically on each side of the center row, with the board edges flush with the inby and outby sides of the seal. Each row of wood was wedged against the roof on about 1-foot centers and the gap between the wedges and wood rows was filled with BlocBond.

The non-hitched Omega seal was tested in August 2001. It was subjected to four explosions with peak pressures of approximately 18-psi, 27.5-psi, 26-psi, and 27-psi. Post-explosion observations of the Omega seal revealed little evidence of damage. Post-explosion air-leakage measurements showed that the Omega block design exhibited minimal air leakage (12 cubic feet per minute at approximately 1-inch water gauge). These seal test results were published in a technical paper co-authored by NIOSH and MSHA personnel ("*Designs for Rapid in Situ Sealing*," Sapko, M., Weiss, E. Trackemas, J. and Stephan, C.; Transactions of Society for Mining, Metallurgy and Explorations, Inc. Vol. 316, 2004).

#### Previous Explosions Involving Seals

From 1986 until the explosion at the Sago Mine, MSHA investigated 11 explosions involving seals. Seal failures occurred in eight of the incidents and the seals held in two cases. In the other incident, the mine was sealed following the explosion and seal conditions were not investigated. None of these incidents resulted in injuries. Information on the 11 incidents is provided in Appendix H.

Quality of Seal Construction: The eight incidents where seal failure was reported involved seals constructed using concrete blocks, pumpable cement, polyurethane-gravel mixture, or lightweight cementitious blocks. Six of these cases involved alternative seals. In three of the eight cases, specific information is not available on the quality of seal construction. In the other five incidents, seal failure was attributed to deficiencies in seal construction – either quality control issues with construction materials or the use of improper construction techniques. Seal construction deficiencies included: insufficient seal thickness for the width of the entry; seal material with compressive strength less than specified; improperly cured polyurethane seal material; extraneous material embedded within a seal; and lack of mortar on vertical joints of a block seal.

Estimated Explosion Pressures: In 5 of the 11 cases, the maximum explosion overpressures the seals were subjected to, that is, the pressures in excess of normal atmospheric pressure, were estimated to be less than 20-psi. Pressure estimates were apparently not made for five other cases. In one case, which involved cementitious foam seals, the accident report indicates that the pressure exceeded 20-psi. This conclusion was based on samples of material from one of the failed seals - the seal believed to have been subjected to the highest explosion pressure - having tested at the required minimum compressive strength. However, samples tested from two of the other failed seals were found to have low compressive strengths, and one of these seals was found to have an empty 5-gallon can embedded inside the seal. These conditions bring the adequacy of the general seal construction practices for these seals into question and raise an issue about whether the seals were subjected to an overpressure of at least 20-psi. In summary, in the cases where explosion pressures were estimated, there was no conclusive evidence that the pressures had exceeded 20-psi.



Ignition Sources: The ignition source was concluded to have been lightning in 5 of the 11 explosion incidents. This was based on lightning strikes being recorded in the areas at the same time that the explosions occurred, and the apparent absence of other ignition sources. In three other cases, the ignition source was concluded to have been either lightning or a frictional ignition from a roof fall. In one case, based on examination of the ignition location, the source was concluded to be friction from either a roof fall or from a metal strap being torn from its anchorage. The likely ignition source was not identified in the other two cases.

The distribution over time and the location of the accidents listed in Appendix H are shown below. Incidents where seals failed are shaded.

Year	No. of Incidents	State	MSHA District
1986	1	KY	6
1987	0		
1988	0		
1989	0		
1990	0		
1991	0		
1992	0		
1993	1	AL	7 <sup>8</sup>
1994	1	AL	7 <sup>8</sup>
1995	1	WV	4
1996	3	AL, WV	7 <sup>8</sup> , 4
1997	1	AL <sup>8</sup>	11
1998	0		
1999	0		
2000	0		
2001	1	WV	4
2002	1	IL	8
2003	0		
2004	0		
2005	1	CO	9

The internal review team found that information on seal failures was not widely known within MSHA. The *Accident/Illness Investigations Procedures Handbook* does not provide specific guidance on the distribution of formal accident reports within MSHA. According to the Coal Accident Investigation Program Manager, the procedure for the distribution of formal reports is that the district sends a copy of the final report to individuals and industry/labor organizations on a distribution list which includes the Accident Investigation Program Manager, each of the other district managers and the Technical Support Center Chiefs. Each manager then distributes copies of the report to the appropriate individuals within their organization. This procedure applies to both fatal and non-fatal formal accident reports. Fatal accident reports, and certain non-fatal

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<sup>8</sup>Alabama mines were no longer under District 7 after District 11 was established on October 1, 1995.

reports (e.g., Quecreek), are also posted on MSHA's web page, at [www.msha.gov](http://www.msha.gov), where they are available for all interested parties. Accident information provided on a database form is not distributed but is available on the accident investigation database.

The internal review team found that the distribution of non-fatal accident reports varies from district to district. Some districts send copies of the reports to the same distribution lists used for fatal accident reports, while others do not.

#### Seal Strength Criteria Used in Other Countries

For perspective on the alternative seal strength criterion contained in 30 CFR 75.335(a)(2), it is helpful to consider seal strength requirements used in some other countries where coal is mined.

European Practice: In the United Kingdom, according to "*Design Criteria for Explosion Proof Stoppings*," issued January 19, 1998, explosion proof stoppings (seals) should be able to withstand pressures up to 76-psi (5.24 bar). This figure is based on the publication "*Sealing Off Fires Underground*" by the Institution of Mining Engineers, 1985.

Plug-type seals are used in the United Kingdom. They are constructed by filling the space between two concrete block walls with a gypsum mix called "hardstop." The block walls are 4 inches thick, wet mortared, and hitched into the ribs and floor. The thickness of the seal is dependent on the width and height of the mine opening and is determined from an empirically derived relationship developed in the 1950s by the National Coal Board. By this relationship, the required thickness of the seal in meters is equal to the average of the width and height of the entry, in meters, plus 0.6 meters. For an entry approximately 20 feet (6.7 m) wide and 8 feet (2.7 m) high, this relationship results in a seal thickness of almost 16 feet (5.3 m).

Use of the National Coal Board formula for seal thickness was evaluated experimentally and found to be conservative in a series of tests reported in a paper entitled, "*The Performance of Explosion Proof Stoppings*" by Leeming and Brookes in 1999. This report indicates that a 1.5 meter thick seal withstood a dust explosion generating a pressure of approximately 80-psig and a 1.0 meter thick seal withstood a pressure of approximately 68-psig. These tests were conducted in an explosion chamber using coal dust ignited by black powder and the seals were subjected to a head-on pressure.

In Germany and Poland, seals are required to be capable of withstanding a pressure of 5 bar, which is equivalent to 72.5-psi.

Australian Practice: Seals tested or designed to withstand a 20-psig explosion are permitted to be installed, however, if the atmosphere behind the seal is in the explosive range, then this atmosphere is required to be inerted and miners withdrawn from the mine until this occurs. Otherwise, seals tested or designed to withstand a 50-psig explosion pressure are required. The results of seal testing conducted for Australia by

NIOSH at Lake Lynn have been used for seal approval, as well as engineering analyses of a seal's capability to withstand overpressure.

South African Guideline: The "*Guideline for the Compilation of a Mandatory Code of Practice for the Prevention of Coal Dust Explosions in Underground Coal Mines*" defines an "explosion proof seal" as a seal which is designed to withstand a static pressure of typically 58-psi. Such seals require "an approved design endorsed by a Professional Civil Engineer." The guideline further indicates that "use of explosion proof seals is dictated by the hazard potential of the area in question and the situation." A situation where explosion proof seals "may be needed, is when the atmosphere of a sealed off area stabilizes within the explosive range or will take so long to pass through the explosive range that it will cause an unacceptable hazard."

The guideline also recognizes that "containment walls" can be installed where the atmosphere in the sealed area stabilizes in the non-explosive range, provided regular monitoring occurs to verify the safe condition. Containment walls "must be designed to withstand a static pressure of approximately 140 kPa (20-psi) on the assumption that the area being sealed has been adequately stone dusted and cleared of all possible conductors of lightning and other electrical charges."

Summary: As indicated above, the pressure criterion used in the United Kingdom, Germany and Poland is about 5 bar, or in the range of 72.5- to 76-psi. The criteria used in Australia and South Africa are similar in that seals are constructed to withstand pressures of either 20-psi or 50- to 58-psi, depending on the explosion potential of the atmosphere behind the seal. Obviously the criterion used in the European countries, and the requirements in Australian and South African mines for abandoned areas with explosive atmospheres, are significantly more stringent than the criterion that has formed the basis for alternative seal approvals in the U.S.

*Discussion of 20-psi Alternative Seal Strength Criterion in 30 CFR 75.335(a)(2)*

As indicated in the preamble to the current rule, a pressure of 20 pounds per square inch gauge (psig) was established as the threshold for determining whether a seal is explosion proof based on U.S. Bureau of Mines Report of Investigations (RI) No. 7581. RI 7581, published in 1971, states that "...a bulkhead may be considered 'explosion proof' when its construction is adequate to withstand a static load of 20 psig, provided that the area to be sealed contains sufficient incombustible to abate the explosion hazard in that area and that adequate incombustible is maintained in the adjoining open passageways."

This conclusion, that a seal be considered "explosion proof" if it can "withstand a static load of 20 psig," appears to be inconsistent with other information provided in RI 7581. That is, the report indicates that explosion pressures had been measured to 127-psi, that the U.S. had previously required 50-psi for the strength of seals between mines on Federal property, and that other countries considered that seals needed to be constructed to withstand 50- to 72-psi. Consider, however, that at the time that RI 7581

was published, the main concern was for explosions occurring near the face area of a mine, where the primary sources of ignition are located and where methane is liberated during mining. It is unlikely that explosions originating in gobs were a major concern in 1971, when RI 7581 was written. Indeed, RI 7581 states that "...present studies are directed toward preventing flames from propagating into sealed areas..." Additionally, prior to 1971, seals were mainly used in areas remote from the face area.

As a result of the wording used in RI 7581- especially use of the term "static load" in relation to an explosion loading - the meaning of, or basis for, the 20-psi recommendation can be interpreted in different ways.

- The 20-psi conclusion may have been based on the expectation that the main source of an explosion was from the face area of a mine and seals would be located a sufficient distance from the face that the pressure would have dissipated to no more than 20-psi.
- The 20-psi conclusion may have been based on the expectation that more than 200 feet from an explosion, the pressure seldom exceeds 20-psi unless coal dust accumulations are excessive.
- The 20-psi criterion may have been designated as a "static load" because it was expected that seals, being remotely located from the face area, would not be located in the direct line of an explosion and thus would be subject only to a "side on" pressure (that is, interpreting the term "static loading" in the ventilation engineering sense of the term).
- The 20-psi may have been designated as a "static load" because of the author's perception that a seal designed to withstand a "static" load of 20-psi - with the term "static load" interpreted in the structural engineering sense of a time-independent load - would actually be able to withstand a higher explosion pressure. The report states that "a bulkhead designed to withstand a given static load will have a considerable margin of safety should it be subjected to a greater dynamic load." It also indicates that in trials in the Bruceton Experimental Mine, "a bulkhead designed to withstand a static load of 14 psig withstood 27 explosions developing from 5 to 50 psig."

Although the exact intent of RI 7581 is debatable, it is clear that the test criteria adopted for the approval of alternative seals in the U.S. as tested at Lake Lynn does not take into account the potential for a seal to be subjected to a head-on or "reflected" overpressure. As indicated in *"Design of Blast Resistant Buildings in Petrochemical Facilities,"* prepared by the Task Committee on Blast Resistant Design, American Society of Civil Engineers, "when the free blast wave from an explosion strikes a surface, it is reflected. The effect of this blast wave reflection is that the surface will experience a pressure much more than the incident side-on value." By interpreting the "static" load as a side-on pressure, the seal test criteria does not take into account the higher head-on or "reflected"

pressure. The alternative seal test criteria also results in a significantly lower strength criteria than is generally required in other countries (unless the sealed area is inert).

#### Seal Use Pre-1971 versus Today

The seal strength requirement incorporated into the 1992 rule revisions, being based on RI 7581, was based on research on seals performed prior to 1971.

- At the time that the 1971 recommendations were made, the main concern was for explosions occurring in the active area of the mine.
- The statement is made in RI 7581 that "Seldom...do pressures 200 feet and more from the origin of an explosion exceed 20 psig unless coal dust accumulations are excessive..." The report provides no basis for this conclusion. It may have been based on an explosion occurring in the open active portion of the mine, where pressures would have more of an opportunity to dissipate, versus explosions occurring in a sealed gob area, where pressures would be confined and would not dissipate as readily.
- The use of seals in U.S. coal mines has changed significantly since 1971. Sealing is much more frequent now. Many seals are used to seal pillared areas and longwall panels, and longwall mining has increased substantially since 1971. Overall, the use of seals has now become much more common in U.S. coal mines, where many more seals are built than in European mines. There are approximately 14,000 seals in coal mines in the U.S. and most have been constructed since the 1992 rule.

### **Alternative Seals at the Sago Mine**

This section of the report discusses the estimated explosion pressures in the Sago Mine, the seal approval in the mine ventilation plan, and the inspection and construction of the 2 North Mains seals.

#### **Estimated Explosion Pressures in Sago Mine**

According to the Sago accident investigation report, the pressure generated by the explosion was estimated to have exceeded 93-psi. This pressure significantly exceeds the 27-psi explosion pressure that the 40-inch thick, unhitched, Omega seal had been subjected to in Lake Lynn testing. This test formed the basis for MSHA's approval of the Omega seals at Sago Mine.

The Sago accident report concludes that the explosive overpressure generated at the seals was increased by the effect of "pressure piling." "Pressure piling" refers to the development of abnormal pressure as a result of an accelerated rate of burning of a gas-

air mixture. It occurs when the fuel-air mixture ahead of a flame front is compressed and then burns with an increased explosion pressure. The Sago accident report concluded that pressure piling occurred as a result of the difference in entry height at the seals versus farther in by in the sealed area where the entries had been bottom mined. The concept of pressure piling is not addressed in the preamble to the 1992 seal rule.

**Conclusion:** The seal strength criteria set forth in 30 CFR 75.335(a)(2) that alternative methods or materials may be approved for seals if the seal “can withstand a horizontal pressure of 20 pounds per square inch,” is inadequate.

- RI 7581 is based on seal practices used prior to 1971. Significant changes have occurred in the use of seals in U.S. coal mine since that time.
- The 20-psi criteria was based on a recommendation in RI 7581 which is subject to different interpretations as a result of the different circumstances in which seals were used prior to 1971 versus now. The use of the term “static” pressure has a different meaning depending on whether it is considered in the context of ventilation or structural engineering.
- In the full-scale testing of seals, the 20-psi recommendation in RI 7581 was interpreted as a “side-on” explosion pressure. Seals can be subjected to “reflected” pressures which can be significantly larger than the side-on pressures.
- Pressure piling and the focusing of reflected pressure waves can occur whenever entry sizes decrease or the number of entries is reduced. The potential for pressures to be increased by these mechanisms was not addressed by the 1992 rule revision.
- Use of a 20-psi “side on” explosion pressure is a significantly lower seal-strength criterion than is used in other countries, which typically require seal strengths in the range of 50- to 76-psi (unless the atmosphere in the sealed area is inert).
- The 20-psi criterion is significantly lower than the conclusion of MSHA investigators that the pressure generated by the explosion at the Sago Mine exceeded 93-psi.

A non-hitched, 40-inch thick Omega block seal, the type of alternative seal approved in the Sago Mine ventilation plan, passed Lake Lynn testing by withstanding four explosion tests with pressures up to approximately 27-psi. Multiple parties, including seal manufacturers, NIOSH, and MSHA, participated in alternative seal testing at Lake Lynn in which the 20-psi testing criteria was applied.

From the 1992 rule revision until the explosion at the Sago Mine, the inadequacy of the 20-psi criteria was not recognized. In the investigations of 11 explosions involving seals, going back to 1986, there had been no conclusive evidence that the explosion pressure had exceeded 20-psi.

Even though previous accident investigations revealed that several seals had failed as a result of faulty construction, MSHA did not recognize the potential for significant problems with seal construction. Prior to the Sago Mine explosion, seal failures were viewed as incidents occurring in gob or abandoned areas as a result of isolated cases of poor seal construction. The Sago Mine explosion was the first seal failure resulting in injuries or loss of life. MSHA should have investigated the extent of poor seal construction practices throughout the coal industry and taken corrective action.

There was no specific protocol in MSHA for the evaluation, compilation, and distribution of information on seal failures and incidents.

## **Approval of Alternative Seals in Sago Mine Ventilation Plan**

**Requirement:** Section 303(z)(2) of the Federal Mine Safety and Health Act of 1977 states that “all areas from which pillars have been wholly or partially extracted, and abandoned areas...shall be ventilated by bleeder entries or by bleeder systems... or be sealed...” The section further states, “When sealing is required, such seals shall be made in an approved manner so as to isolate with explosion-proof bulkheads such areas from the active workings of the mine.”

Mandatory safety standard 30 CFR 75.334 requires that worked-out areas of coal mines be ventilated or sealed.

Mandatory safety standard 30 CFR 75.370(a)(1) requires that each operator develop and follow a ventilation plan designed to control methane and respirable dust and that the plan be suitable to the conditions and mining system at the mine. The plan is required to be approved by the District Manager. Paragraph (a)(2) requires that the proposed ventilation plan and any revision to the plan shall be submitted in writing to the district manager.

Mandatory safety standard 30 CFR 75.371 specifies the information to be contained in the ventilation plan. Paragraph (ff) requires a description of the methods and materials to be used to seal worked-out areas if those methods or materials will be different from those specified by 30 CFR 75.335(a)(1).

Construction requirements for seals are contained in 30 CFR 75.335 which provides for two options:

- 30 CFR 75.335(a)(1) specifies requirements for constructing seals using solid concrete blocks; or
- 30 CFR 75.335(a)(2) specifies in pertinent part that “Alternative methods or materials may be used to create a seal if they can withstand a static horizontal pressure of 20 pounds per square inch provided the method of installation and the material used are approved in the ventilation plan.”

**Statement of Facts:** According to the Sago accident report, between October 24 and December 11, 2005, a set of ten seals was constructed to seal the 2<sup>nd</sup> Left Mains and a portion of the 2 North Mains in the Sago Mine. The seals were constructed using Omega blocks in the 40-inch thick, non-hitched configuration. The mine operator had requested approval to use Omega block seals as alternative seals, in openings up to 8-foot high and 20-feet wide, in a letter dated October 12, 2005. Use of the Omega block seals was approved by the District 3 Manager in a letter dated October 24, 2005.

The mine operator later proposed, in a letter dated October 28, 2005, construction requirements to allow the use of Omega block seals in openings up to 12-feet high and 20-feet wide. On November 2, 2005, District 3 sent this submittal to Technical Support for comments. Technical Support responded on November 28, 2005, indicating that the submittal was acceptable. The District 3 Manager approved the plan on December 8, 2005. According to the Sago accident investigation report, the proposal for Omega block seals for entries higher than 8 feet was intended for sealing the A1 and A2 Panels in 1<sup>st</sup> Left, not the 2<sup>nd</sup> Left Main entries.

The requirements for construction of alternative Omega block seals for mine openings up to 8-feet high, as approved on October 24, 2005, were stated in the ventilation plan as follows:

1. Each seal shall be substantially constructed of 8-inch by 16-inch by 24-inch Omega blocks with joints plastered with BlocBond and all joints shall be adequately mortared.
2. Inby and outby faces of the completed seal shall be fully coated with BlocBond.
3. Seals shall be at least forty (40) inches thick.
4. No hitching of the seal is required.
5. Joints must be staggered.
6. All joints will be a minimum of ¼ -inch thick and be mortared using BlocBond.
7. Three rows of wood planks running the entire length of the seal shall be installed across the top of the seal.
8. Wedges will be placed on one foot centers or less with BlocBond used to fill the gaps.
9. Seals shall be at least ten (10) feet from the corners of a pillar.



10. Seals shall be constructed in solid floor that remains unbroken. Where this is not possible, the preferred site is floor that is settled. All loose, broken material shall be removed from the ribs, roof, and floor for at least 3 feet on both sides of the point where the seal is to be built. All cracks shall be grouted in the site preparation area.
11. Water shall be drained from the inby face of the seal (where standing water could weaken the seal or floor) into the open portion of the mine by using a sized for drainage non-corrosive pipe with a minimum 12-inch deep water trap.
12. Seals must be protected from adverse roof and floor conditions by no less than two rows of timbers on four foot centers or three cribs on both sides of the seal.
13. Test pipe: Sample pipes will be installed as per 30 CFR 75.335.

The ventilation plan also included sketches showing the Omega block seal construction requirements which are shown in Appendix I.

The internal review team compared the seal construction specifications used for the Lake Lynn tests of non-hitched Omega block seals with the provisions of the approved ventilation plan for the Sago Mine. The seal construction requirements which were submitted in the mine operator's plan, and approved by MSHA, were consistent with the practices used in the construction of the test seals at Lake Lynn.

The information in the operator's plan did not specifically address how the first Omega block course was to be set, but did indicate that "all joints shall be adequately mortared." The information that had been provided to MSHA by NIOSH following the test of the 40-inch thick Omega block seal at Lake Lynn indicates the following: "Bloc-Bond applied approximately 1/4-inch thick to floor before starting first row." And: "Bloc-Bond applied approximately 1/4-inch thick on top and all four sides of block."

In his interview with the internal review team, the District 3 Ventilation Supervisor stated that information on whether a proposed alternative seal should be approved – that is, was consistent with a seal that had passed the 20-psi test criteria in Lake Lynn testing – was based on information provided in handouts from Technical Support's Ventilation Division. Lake Lynn alternative seal test results were also published in NIOSH or MSHA technical papers. If district personnel had a question about a proposed alternative seal, they would typically contact the Principal Mining Engineer in Technical Support's Ventilation Division, for advice on whether, or under what conditions, the alternative seal should be approved. This was illustrated in the case of the Sago Mine ventilation plan, where District 3 personnel were aware of the requirements for non-hitched Omega seals for entries under 8 feet in height, but contacted Technical Support for assistance on the proposed Omega seals for entries over 8 feet in height.

In 1999, the Principal Mining Engineer, Ventilation Division, prepared and distributed summaries of information to the coal districts on the various alternative seal designs that had passed the 20-psi testing at Lake Lynn. He also distributed seal information to

MSHA personnel at training presentations on alternative seals, as indicated in the following table.

Training on Alternative Seals Provided by the Ventilation Division's Principal Mining Engineer	
Date	MSHA Group Receiving Training:
August 1994	Ventilation Supervisors
February 1997	District 11
February 1997	District 9
March 1997	District Managers
May 1997	District 5
June 1997	District 3
July 1997	Ventilation Supervisors
September 1997	District 2
September 1997	District 10
January 1999	District 11
May 2000	Ventilation Supervisors
July 2000	Ventilation Specialists
December 2003	Ventilation Supervisors

Following the testing of the non-hitched, 40-inch thick Omega block seal at Lake Lynn, Technical Support distributed information on the basic construction requirements for this alternative seal to the districts. While the placement of the first course of blocks was not specifically addressed in this information, it did indicate that "...all joints shall be adequately mortared."

In February 2005, the Principal Mining Engineer, Ventilation Division, expressed in an e-mail message his intention to prepare a report compiling and detailing the construction requirements for alternative seals. This message was sent to the Safety Division of CMS&H and to district ventilation supervisors. In referring to the alternative seal testing that had taken place over the previous 15 years, the e-mail stated: "Unfortunately, over a period of years some of the required characteristics may have been forgotten or accidentally overlooked during the construction phase." The e-mail continued: "It is the intention of Technical Support's Ventilation Division to provide an in-depth, updated technical report detailing each of the explosion-resistant seal constructions that have been determined to be suitable." Previous proposals to prepare such a document were reportedly not carried out due to the workload in the Ventilation Division. At the time of the Sago Mine explosion, this document had not yet been prepared.

On December 15, 2005, the District 8 ventilation supervisor sent an e-mail to the Safety Division of CMS&H, ventilation supervisors in other districts, and personnel in Technical Support's Ventilation Division. This e-mail indicated a problem with making

sure the specifications in submitted alternative seal plans were “exactly as they were tested,” meaning the specifications were exactly the same as the seals tested at Lake Lynn. The e-mail referred to “extraneous information” in Technical Support’s alternative seal handouts and expressed the need for revised handouts: “Only the information that needs to be in the ventilation plan needs to be included in the handout.” Information in response to these concerns had not been prepared at the time of the Sago Mine explosion.

MSHA’s approval of plans for sealing worked-out areas did not address the potential for conductors located within sealed areas to allow lightning to create a source of ignition for an explosion. The potential for electromagnetic energy created by a horizontal lightning discharge to radiate through the earth and induce voltage in a conductor in a sealed area was not recognized.

**Conclusion:** The construction requirements submitted by the mine operator and approved by the District 3 Manager were consistent with how the non-hitched Omega block seals were constructed in Lake Lynn testing. The information did not specifically address how the first course of block was to be set, but did indicate that “...all joints shall be adequately mortared.”

The non-hitched Omega block seal had passed Lake Lynn testing by withstanding explosion pressure up to approximately 27-psi.

MSHA did not recognize the potential for electromagnetic energy created by a horizontal lightning discharge to radiate through earth and induce a voltage in a conductor. Incidents where lightning was identified as the likely source of ignition of a sealed-area explosion were thought to be isolated occurrences.

There was no formal protocol in MSHA for the distribution of information on the results of testing of alternative seals and alternative seal construction requirements. Technical Support passed on information to the districts on the methods used for constructing alternative seals tested at Lake Lynn. This information, however, was not compiled in a single, formal document that was kept up-to-date.

Expertise on alternative seals within Technical Support was limited to one individual, the Principal Mining Engineer in the Ventilation Division. Technical Support’s Ventilation Division was planning to prepare a report on alternative seal construction requirements when the explosion occurred at the Sago Mine.

## **Inspection and Construction of the 2 North Mains Seals**

**Requirement:** Mandatory safety standard 30 CFR 75.371 establishes the information to be contained in a mine ventilation plan. Subsection (ff) requires a description of the

methods and materials to be used to seal worked-out areas if those methods or materials will be different from those specified by 30 CFR 75.335(a)(1).

Seal construction requirements are contained in 30 CFR 75.335 which provides for two options:

- Subsection (a)(1) specifies requirements for constructing seals using solid concrete blocks; or
- Subsection (a)(2) states that “Alternative methods or materials may be used to create a seal if they can withstand a static horizontal pressure of 20 pounds per square inch provided the method of installation and the material used are approved in the ventilation plan.”

**MSHA Policies and Procedures:** The *Coal General Inspection Procedures Handbook* instructs inspectors to determine that all approved plans are being followed, are up-to-date, and are appropriate during every regular inspection at an underground coal mine. The handbook also instructs inspectors and specialists to review the Uniform Mine File (UMF) and sign the inspector's certification sheet prior to an inspection or investigation of a coal mine.

**Statement of Facts:** The MSHA accident investigation team determined that deficiencies existed in the construction of the seals at the Sago Mine. The accident investigators issued section 104(d)(1) order No. 7100904, which states: “The Mine Ventilation Plan addendum approved on October 24, 2005, required the installation of 40-inch thick, Omega Block Seals, not to exceed 8-feet in height and 20-feet in width, was not being followed. Ten Omega Block Seals were constructed to seal off the 2 North Mains area of the Sago Mine I.D. No. 46-08791. The following deficiencies were discovered during an on-site investigation of the seal locations following an explosion that occurred on January 2, 2006 and from testimony of various witnesses that assisted in the construction of the seals:

- BlocBond powder, 1 to 3 inches thick, was spread on the mine floor directly from the bag. The BlocBond was dumped on the mine floor and leveled as a base. The first courses of Omega blocks were laid in the dry BlocBond.
- The BlocBond was not mixed with water as required.
- Vertical joints were not completely filled with the bonding agent as required.
- Wooden planks did not extend completely across the top of the Omega block seal as required. In some cases, a center plank was not used.
- The wood wedges required to be installed between the plank and mine roof were installed between the plank and the Omega block.

- The wood wedges installed over the center plank were one and a half feet to 2 feet apart. The plan requires that the wood wedges be installed one foot apart.
- The No. 1 seal was installed on an angle. The height and width of the No. 1 seal exceeded the 8 feet high and 20 feet wide requirement of the plan. The seal was 21.7 feet wide and a portion of the seal was 8.9 feet high.
- The No. 1 seal was not at least 10 feet in by the corner of the coal block as required. The right side of the No. 1 seal was 6.6 feet in by the corner. The left side of the seal was installed against the rounded corner.
- The No. 2 seal was 8.7 feet in height and 20.4 feet wide.”

MSHA accident investigators issued a S&S, section 104(d)(1) order for this non-contributory violation of 30 CFR 75.370(a)(1).

During an interview with the internal review team, the District 3 Ventilation Supervisor indicated that during the course of an inspection, inspectors may observe a seal during construction, but that District 3 had no specific policy in effect, prior to the Sago Mine explosion, for inspection of seals during their construction. Also, there were no specific requirements, other than visual inspections during regular inspections, to check whether constructed seals had been built in accordance with the approved plan.

On November 1, 2005, a District 3 inspector and inspector-trainee were at the Sago Mine conducting an on-going regular inspection when they observed one of the 2 North Mains Omega block seals being constructed. The MSHA personnel were in the area, along with a company representative, examining part of an intake entry in order to extend a citation. They stopped to observe the work being done by the seal construction crew. Four seals had been completed and the fifth was in the process of being built. The MSHA inspector did not observe the practice of placing the first course of blocks on a bed of dry mortar because the seals he examined were either completed or the first course of blocks had been set.

The mine inspector noticed that one of the Omega blocks was being laid with its edge in line with another block, in other words, the vertical joint at that block was not staggered. The mine inspector recognized this was not in compliance with the alternative seal requirements approved in the ventilation plan. According to the inspection notes, the inspectors discussed the seal plan with the construction crew and talked to them about off-setting the block joints and using the proper amount of mortar between joints to ensure the strength of the seals. According to the testimony given by the inspector in an interview with the accident investigation team, “After we left that, I went back and reviewed - or looked at - the other four seals that were completed. They were working on the fifth one. I didn’t go behind the seals and look at them, but I did look at it from a distance of approximately five to seven feet from the face of the seals.

And at that - they had mortared the face of the seals that you couldn't see the joints. But the integrity there, the solid rib, the roof, the floor, everything looked really good. And other than that one joint, I didn't observe them doing anything that wasn't approved in the plan that day."

One of the conditions identified in the accident investigation was that dry mortar had been used to provide a level base for the seals and that the first course of Omega blocks was set on this dry mortar. The mine operator has indicated that dry mortar had been placed to form a level foundation for the seal. The mine operator's contention is that this mortar would absorb moisture and become permanently joined with the seal. The District 3 Ventilation Supervisor indicated that his expectation was that the first course of blocks would be set in a layer of wet BlocBond mortar. The Omega seal tested at Lake Lynn had been constructed by setting the first course of blocks in a layer of wet, mixed BlocBond mortar approximately 1/4-inch thick. Testing performed as part of the accident investigation revealed that the mortar beneath the seals was typically significantly weaker than samples of BlocBond that were properly mixed and cured.

The internal review team determined that the Uniform Mine File contained a copy of the approved ventilation plan for the Sago Mine. In interviews with the review team, regular inspectors stated that they reviewed the mine file at the beginning of each regular inspection and that they understood the provisions of the approved ventilation plan related to the construction of Omega block seals.

Interviews with members of the National Mine Health and Safety Academy staff revealed that the subject of seals was covered in a ventilation module during inspector training. The training focused primarily on the requirements in 30 CFR 75.335. Construction requirements for the alternative seals that had passed the 20-psi Lake Lynn testing were not covered in detail. Inspectors were instructed to check the approved ventilation plan for the alternative seal construction requirements. For additional information on acceptable seal designs, inspectors were referred to "*Strength Characteristics and Air-Leakage Determinations for Alternative Mine Seal Designs*," U.S. Bureau of Mines' Report of Investigation 9477.

**Conclusion:** The 2 North Mains seals were not constructed as approved in the ventilation plan. The accident investigation team determined, however, that the pressure from the explosion exceeded the pressure that the Omega block non-hitched seals would have withstood had they been constructed correctly. Furthermore, testing at Lake Lynn indicated that a non-hitched Omega block seal constructed similar to the Sago Mine seals withstood an explosion pressure of over 20 psi.

The differences between the 2 North Mains Omega block seals, the approved seal design, and the test seal built at Lake Lynn illustrate the need for more thorough and mine-specific construction specifications for seals. Better dissemination and understanding of information on alternative seal construction is also required. For example, the use of a layer of dry mortar under the first course of Omega blocks brings

into question the level of bonding that would have been achieved at the joint between the blocks and the mine floor. When the unhitched 40-inch thick Omega block seal was tested at Lake Lynn, the first course of blocks was set in a layer of wet mortar.

The construction deficiencies in the 2 North Mains seals highlight the need for MSHA to be aware of when seals are to be constructed and to perform more effective inspections of seals.

MSHA did not provide formal training to ensure that enforcement personnel had adequate knowledge of alternative seal construction and inspection procedures.

### **Enforcement of Specific Standards - Noncontributory Violations**

The MSHA accident investigation team determined there were not any violations of mandatory safety standards or regulations which either contributed to or caused the January 2, 2006, explosion or the deaths of the miners.

This section of the report addresses other enforcement issues examined by the internal review team. These issues are relevant to the activities of MSHA at the Sago Mine prior to the explosion, but were not considered by the accident investigation team to have either contributed to or caused the fatal explosion at the Sago Mine. A detailed discussion of the District 3 enforcement pertaining to Omega block seals at the Sago Mine can be found in the subsection of this report entitled Inspection and Construction of the 2 North Mains Seals.

### **Enforcement of 30 CFR 48**

*Experienced Miner Training and Annual refresher training of miners; minimum courses of instruction; hours of instruction*

**Requirement:** Section 104(g)(1) of the Mine Act requires that if, upon any inspection or investigation, an inspector finds a miner who has not received the requisite health and safety training, an order shall be issued which declares the miner to be a hazard to himself and to others, and requires the miner to be immediately withdrawn from the mine, and be prohibited from entering the mine until an inspector determines the miner has received the required training.

Mandatory safety standard 30 CFR 48.8(a) requires each miner to receive a minimum of 8 hours of annual refresher training. Mandatory safety standard 30 CFR 48.8(b) states that the annual refresher training program for all miners shall include minimum courses of instruction which are listed in this section. Specifically, 30 CFR 48.8(b)(8) requires the annual refresher training course of instruction to include instruction and demonstration in the use, care, and maintenance of self-rescue and respiratory devices used at the mine. Training in the use of self-contained self-rescue devices shall include

complete donning procedures in which each person assumes a donning position, opens the device, activates the device, inserts the mouthpiece or simulates this task while explaining proper insertion of the mouthpiece, and puts on the nose clip.

Mandatory safety standard 30 CFR 48.9(a) requires that upon a miner's completion of each MSHA approved training program, the operator shall record and certify on MSHA form 5000-23 that the miner has received the specified training. A copy of the training certificate shall be given to the miner at the completion of the training. The training certificates for each miner shall be available at the mine site for inspection by MSHA and for examination by the miners, the miners' representative, and State inspection agencies. Mandatory safety standard 30 CFR 48.9(b) states that false certification that training was given shall be punishable under section 110(a) and (f) of the Act.

**MSHA Policies and Procedures:** The *MSHA Program Policy Manual* addresses the application of 30 CFR 48.8 which includes refresher training following an absence, extension of time to complete the training, and guidelines for training plans. The manual also addresses the application of 30 CFR 48.9 which includes approved forms, record-keeping requirements, cooperative training plans, and documentation for surface mines and surface work areas of underground mines.

The *Coal General Inspection Procedures Handbook* instructs the inspector to evaluate, during every regular inspection at an underground coal mine, the operator's examination records to determine that all approved plans are being followed (including training plans), are up-to-date, and are appropriate. In addition, inspectors are to evaluate the adequacy of SCSR training by discussing donning procedures with a representative number of individual miners to ascertain their understanding of how to use the SCSR. If inspectors are made aware of any self-rescuer training deficiencies, they should report them to the District training liaison/specialist.

**Statement of Facts:** The Mine Emergency Evacuation and Firefighting Program of Instruction for the Sago Mine states, "Where emergency evacuation is required, personnel should immediately don their Person Wearable Self Contained Self Rescuer (PWSCSR)." The mine operator provided the miners with CSE SR-100 SCSRs.

MSHA accident investigators issued section 104(d)(1) order No. 7100912 for a noncontributory violation of 48.8(b)(8) indicating that annual refresher training was not adequate. During annual refresher training, one miner did not don a SCSR. MSHA inspection procedures require an inspector to interview a representative number of individual miners, to ascertain their understanding of how to use the SCSRs. Inspection reports do not indicate miners were interviewed to determine their understanding of how to use SCSRs.

The accident investigation team issued section 104(d)(1) citation No. 7100911 for a noncontributory violation of 30 CFR 48.9(b) because a 5000-23 training form was signed indicating annual refresher training was given to a miner, when in fact, the training did



not occur. This violation could only have been detected by interviewing the miner. MSHA inspection policies and procedures do not require inspectors to interview miners concerning their annual refresher training.

Section 104(g)(1) order No. 7100909 was issued for a noncontributory violation of 48.8(a) stating one miner had not received annual refresher retraining within the last 12 months. Refresher training was last given to this miner on November 16, 2004. Another miner had not received any annual refresher training since he began his employment in July 2004. Four other miners had also not received annual refresher training within the past 12 months.

The internal review team reviewed inspection reports for the four regular inspections conducted prior to the explosion. This review disclosed that District 3 inspectors examined MSHA 5000-23 training forms on the first three inspections of calendar year 2005. During the third inspection, the inspector examined training records in August 2005. The annual refresher training for one miner was required to be completed during July 2005. Training records were not examined during the last inspection prior to the explosion.

In calendar year 2005, no violation of 30 CFR 48.8(a), 48.8(b)(8), or 48.9(b), was cited at the Sago Mine.

**Conclusion:** District 3 inspectors did not detect two of the violations concerning annual refresher training which were cited by the accident investigation team. During the third inspection, a District 3 inspector did not recognize that one miner had not received the required annual refresher training. During the fourth inspection, training records were not examined, and therefore several training violations were not identified and cited.

Inspectors did not interview a representative number of individual miners to ascertain their understanding of how to use SCSRs. As a result, inspectors did not identify the violation of 30 CFR 48.9(b).

## **Enforcement of 30 CFR 50.10**

### *Immediate Notification*

**Requirement:** At the time of the explosion, 30 CFR 50.10 required that "If an accident occurs, an operator shall immediately contact the MSHA District Office having jurisdiction over its mine. If an operator cannot contact the appropriate MSHA District Office, it shall immediately contact the MSHA Headquarters Office in Arlington, Virginia by telephone, at (800) 746-1553."

**MSHA Policies and Procedures:** The *MSHA Program Policy Manual* requires an evaluation of operator compliance with reporting requirements under Part 50 to be made at every regular inspection. To ensure that the issuance and assessment of

citations for failure to report as required by Part 50 is handled uniformly, inspectors will issue a citation for each separate instance of a failure to report an accident, injury or illness, or quarterly employment and production. Each such citation will be subject to a separate penalty.

**Statement of Facts:** The MSHA accident investigation team determined that the mine operator did not contact MSHA immediately following the explosion. The explosion occurred at 6:26 a.m., and the first attempt to notify MSHA of the explosion was made at 7:50 a.m. The accident investigation team issued section 104(a) citation No. 7100919 for a noncontributory violation of 30 CFR 50.10.

Prior to the explosion, District 3 personnel cited 14 violations of this standard during calendar year 2005, all at other mines. For example, at another mine, the following citation was issued for an unplanned inundation of methane gas on September 6, 2005.

“The mine operator did not immediately notify MSHA of the accident that occurred of an unplanned inundation of methane gas. On 09-05-2005 at approximate 5:00 p.m. the return air course was found to be inundated with methane gas at 27 Crosscut, on the 22-M Section, 065-0 MMU, where de-gas drilling machine was idle in an active de-gas hole. The on-shift examination record indicated 3.2% methane was detected and power removed from the area. A pressure disk ruptured at the degas drill allowing the methane to escape from the pressurized de-gas drilling machine degasification tank to the return air. The pressure disk was repaired at approximately 6:30 p.m. which stopped the flow of the methane gas. The mine operator is placed on notice to assure that all accidents are immediately notified to MSHA.”

During interviews, District 3 personnel indicated the requirements of 30 CFR 50.10 were enforced whenever they became aware of a violation.

**Conclusion:** District 3 properly enforced the requirements of 30 CFR 50.10.

### **Enforcement of 30 CFR 75.320(a)**

*Air quality detectors and measurement devices*

**Requirement:** Mandatory safety standard 30 CFR 75.320(a) states that tests for methane shall be made by a qualified person with MSHA approved detectors that are maintained in permissible and proper operating condition and calibrated with a known methane-air mixture at least once every 31 days. This standard does not require the mine operator to maintain a record of methane detector calibration.

**Statement of Facts:** MSHA accident investigators issued section 104(a) citation No. 7458185 for a noncontributory violation of 30 CFR 75.320(a) because two methane detectors, recovered after the explosion, were not calibrated within the required 31

days. The two detectors were last calibrated on November 16, 2005, and March 1, 2004. This was determined by data retrieved from the methane detectors by MSHA Technical Support personnel.

The internal review team reviewed inspection reports for the four regular inspections of the Sago Mine conducted prior to the explosion. Inspection notes for the review period did not document the inspection of methane detectors to verify that the calibration dates were current. The inspectors did not document observing the procedures used at the mine to calibrate methane detectors. The review also disclosed that the inspectors did not cite a violation of 30 CFR 75.320(a) during any of the inspections. The review team did not identify any instance in which an inspector documented a violation of this standard.

The *Coal General Inspection Procedures Handbook* does not require the inspection of methane detectors to verify that the calibration dates were current.

**Conclusion:** Based on interviews, District 3 inspectors understood the requirements of 30 CFR 75.320(a) and would have taken appropriate enforcement action if they observed a violation of this standard. Mandatory safety standard 30 CFR 75.320(a) does not require mine operators to maintain records of methane detector calibrations. Current MSHA inspection procedures do not require inspectors to examine records of methane detector calibration during the course of their regular inspections and do not address the existence of digital records retained by electronic equipment.

The internal review team could not determine whether the detector which was last calibrated on November 16, 2005, was examined by District 3 inspectors prior to the explosion. District 3 inspectors did not identify that one of the methane detectors in use at the Sago Mine was last calibrated on March 1, 2004.

### **Enforcement of 30 CFR 75.400, 75.402, and 75.403**

#### *Maintenance of incombustible content of rock dust*

**Requirement:** Mandatory safety standard 30 CFR 75.400 requires, in part, that coal dust, including float coal dust deposited on rock dusted surfaces, loose coal, and other combustible materials, shall be cleaned up and not be permitted to accumulate.

Mandatory safety standard 30 CFR 75.402 states “All underground areas of a coal mine, except those areas in which the dust is too wet or too high in incombustible content to propagate an explosion, shall be rock dusted to within 40 feet of all working faces, unless such areas are inaccessible or unsafe to enter or unless the Secretary or his authorized representative permits an exception upon his finding that such exception will not pose a hazard to the miners. All crosscuts that are less than 40 feet from a working face shall also be rock dusted.”

Mandatory safety standard 30 CFR 75.402-1 defines the term “too wet” as meaning that sufficient natural moisture is retained by the dust that when a ball of finely divided material is squeezed in the hands water is exuded.

Mandatory safety standard 30 CFR 75.403 states that where rock dust is required to be applied, it shall be distributed upon the top, floor, and sides of all underground areas of a coal mine and maintained in such quantities that the incombustible content of the combined coal dust, rock dust, and other dust shall be not less than 65 per centum. The incombustible content in the return air courses shall be no less than 80 per centum. Where methane is present in any ventilating current, the per centum of incombustible content of such combined dusts shall be increased 1.0 and 0.4 per centum for each 0.1 per centum of methane where 65 and 80 per centum, respectively, of incombustibles are required.

Mandatory safety standard 30 CFR 75.403-1 states that moisture contained in the combined coal dust, rock dust and other dusts shall be considered as a part of the incombustible content of such mixture.

**MSHA Policies and Procedures:** Under 30 CFR 75.402 the MSHA *Program Policy Manual* states, in pertinent part, where high-pressure rock-dusting machines are available, inspectors shall require that these machines be used at the outby edges of abandoned areas to rock dust as much of the area as can be done safely.

Inspection procedures for the collection of rock dust samples are outlined in the *Coal General Inspection Procedures Handbook*. Inspectors are required to collect samples to substantiate a violation when citing inadequate rock dust. Samples are to be taken by band or perimeter method from an entry or a room to a depth of 1 inch. In addition, uniform rock dust surveys are required to be obtained to determine the adequacy of rock dusting in a mine during each regular inspection. Sampling procedures require all mine entries to be sampled at a zero point, at 500-foot intervals thereafter, and at a representative number of crosscuts. In addition to rock dust surveys, inspectors can take spot samples of individual locations to determine if adequate incombustible content of dust is present. Rock dust samples are required to be mailed to the National Air and Dust Laboratory located in Mount Hope, West Virginia, for analysis. Also, areas not sampled during prior regular inspections because of wet conditions shall be identified. Locations where two or more consecutive samples were not collected shall be inspected and samples collected when conditions permit.

Sampling procedures allow the inspector to document areas which could not be sampled due to poor roof conditions, roof falls, areas that are too wet to sample, etc.

**Statement of Facts:** The MSHA accident investigation team issued section 104(a) citation No. 7100906 for a noncontributory violation of 30 CFR 75.403 stating that based on the results of a rock dust survey conducted in the 2<sup>nd</sup> Left Parallel section between January 30, and February 3, 2006, it was found that the incombustible content of

samples collected did not meet the requirements of this section. Fourteen of forty-two samples, or 33%, were substandard.

Rock dust surveys were examined for 1 year prior to the explosion. From March 1, 2005, to December 20, 2005, nine rock dust surveys were conducted. The following table summarizes the results of the rock dust surveys.

Survey Date	No. of Areas Attempted to Sample	No. of Areas Designated "Too Wet"	No. of Areas Sampled	Samples In Compliance	Noncompliant Samples	Citation Number
March 1, 2005	9	3	6	6	0	-
April 26, 2005	9	5	4	0	4	7097804
May 2, 2005	70	70	0	-	-	-
*September 20, 2005	51	51	0	-	-	-
September 28, 2005	31	31	0	-	-	-
* October 19, 2005	1	1	0	-	-	-
October 25, 2005	16	16	0	-	-	-
December 19, 2005	12	12	0	-	-	-
December 20, 2005	16	16	0	-	-	-
<b>Total</b>	215	205	10	6	4	
<b>Percentage</b>	100.0%	95.3%	4.7%	2.8%	1.9%	

\* A portion of these samples were contained within the 2-Left Mains area, which was later sealed.

During the 12 months prior to the explosion, inspectors attempted to take 215 samples to determine the incombustible content of rock dust present in an area from 2<sup>nd</sup> Right to the 2<sup>nd</sup> Left Mains area. Portions of the 1<sup>st</sup> Left panel and the 2<sup>nd</sup> Left panel were also surveyed. Survey results indicate that 10 band samples (4.7%) were taken. The remaining 205 samples (95.3%), which were designated too wet to sample, were not later resampled to determine compliance with applicable standards. Four samples were found to have an incombustible content below the required 65 percent incombustible content, and section 104(a) citation No. 7097804 was issued May 10, 2005. The mine operator applied rock dust to the affected area(s) and the citation was terminated on the same day.

During the accident investigation, rock dust surveys were conducted along the Mains from crosscut 1 at No. 4 belt to the active working areas of 1<sup>st</sup> Left, 2<sup>nd</sup> Left and the 2<sup>nd</sup> Left Mains (sealed) areas.

The following table illustrates the post-explosion rock dust surveys which were taken in the same areas that were sampled in the 12 months prior to the explosion. In these areas, along the mains from No. 4 belt crosscut 11 to the location of the seals, and 1<sup>st</sup> Left and 2<sup>nd</sup> Left panels, 300 areas were attempted to be sampled. Samples were collected in 134 areas (44.7%), and 166 areas (55.3%) were found to be too wet to sample. One hundred ten samples (36.7%) were found to have an incombustible content above the required 65 percent in intake air courses and 80 percent in return air courses; and 23 samples (13.9%) were found to have an incombustible content below 65 percent in intake air courses and 80 percent in return air courses. A portion of these were not cited

by the accident investigation team, due to the potential influence of the explosion. The accident investigation team was able to sample 44.7% of the areas that were attempted compared to only 4.7% prior to the explosion. During an interview with one inspector, he stated that areas too wet to sample were rarely re-sampled.

Area	No. of Areas Attempted to Sample	No. of Areas Designated "Too Wet"	No. of Areas Sampled	Samples in Compliance	Noncompliant Samples
#4 Belt - Crosscut 11	9	4	5	3	2
#4 Belt - Crosscut 15	9	5	4	1	3
#4 Belt - Crosscut 20	9	2	7	3	4
#4 Belt - Crosscut 25	9	4	5	5	0
#4 Belt - Crosscut 30	9	6	3	2	1
#4 Belt - Crosscut 36	9	5	4	3	1
#4 Belt - Crosscut 42	9	6	3	2	1
#4 Belt - Crosscut 45	9	4	5	3	2
#4 Belt - Crosscut 48	9	7	2	0	2
#4 Belt - Crosscut 50	9	9	0	0	0
#4 Belt - Crosscut 51	9	7	2	2	0
#4 Belt - Crosscut 52	9	7	2	2	0
#4 Belt - Crosscut 53	8	4	4	4	0
#4 Belt - Crosscut 54	9	6	3	2	1
#4 Belt - Crosscut 55	9	6	3	3	0
#4 Belt - Crosscut 56	9	5	4	4	0
#4 Belt - Crosscut 57	10	5	5	5	0
#4 Belt - Crosscut 58	11	2	9	9	0
#4 Belt - Crosscut 59	12	2	10	10	0
#4 Belt - Crosscut 60	9	1	8	8	0
#4 Belt - Crosscut 61	9	2	7	6	0
#4 Belt - Crosscut 62	17	1	16	15	1
1-Left - Crosscut 6	9	7	2	2	0
1-Left - Crosscut 12	8	7	1	1	0
1-Left - Crosscut 16	8	8	0	0	0
2-Left - Crosscut 6	9	5	4	4	0
2-Left - Crosscut 7	8	6	2	1	1
2-Left - Crosscut 8	9	6	3	3	0
2-Left - Crosscut 9	8	6	2	2	0
2-Left - Crosscut 10	10	6	4	3	1
2-Left - Crosscut 11	8	6	2	1	1
2-Left - Crosscut 12	12	9	3	1	2
<b>Total</b>	<b>300</b>	<b>166</b>	<b>134</b>	<b>110</b>	<b>23</b>
<b>Percentage</b>	<b>100.0%</b>	<b>55.3%</b>	<b>44.7%</b>	<b>36.7%</b>	<b>7.7%</b>

After initial development of the 2<sup>nd</sup> Left Mains area, the lower bench of the Middle Kittanning seam was mined on retreat. The mine operator submitted a ventilation plan revision requesting establishment of a test area for mining the lower bench of the coal seam. The ventilation plan revision was approved on September 28, 2005. The safety

precautions contained within the approved revision included the following statement, “No person will be allowed inby the second mining area so as to eliminate exposure of persons to heightened coal ribs.” A subsequent ventilation plan revision was submitted and approved on October 4, 2005, requesting to extend the test area and allow additional mining of the lower bench of the Middle Kittanning seam of the 2<sup>nd</sup> Left Mains. This ventilation revision also stated, “No person will be allowed inby the second mining area so as to eliminate exposure of persons to heightened coal ribs.”

Due to the safety provision limiting exposure to heightened coal ribs, rock dust was not applied to the lower bench mining in the 2<sup>nd</sup> Left Mains area. The mining area remained wet during and after mining. During interviews, the area outby the 2 North Mains seals was described as being well rock dusted and white in color.

**Conclusion:** The Bridgeport field office did not have an effective system in place to ensure that areas “too wet” to take rock dust samples were revisited and sampled on subsequent inspections. As a result, the Bridgeport field office personnel did not determine the incombustible content of coal dust, rock dust, and other dusts present in some areas of the Sago Mine. Supervisory oversight did not identify and correct the absence of re-sampling in areas deemed too wet to sample.

After mining was conducted of the lower bench of the Middle Kittanning seam and prior to seal construction, rock dust was not applied to the 2<sup>nd</sup> Left Mains and the 2 North Mains inby the 2 North Mains seals location. Although the mining area was known to be wet, high-pressure rock-dusting machines could have been used to apply rock dust at the outby edges of the second-mined area.

## **Enforcement of Electrical Standards**

**Requirement:** Section 103(a) of the Mine Act states that authorized representatives of the Secretary shall make inspections of each underground mine in its entirety at least four times a year (regular inspections) for the purpose of determining whether an imminent danger exists and whether there is compliance with the mandatory health or safety standards or with any citation, order, or decision issued under the Mine Act.

**MSHA Policies and Procedures:** The *Coal General Inspection Procedures Handbook* requires the inspection of all face equipment (diesel and electric), electric installations, and all mobile equipment as encountered, and haulage facilities, including hoisting equipment.

The *Coal Electrical Inspection Procedures Handbook* provides technical guidance for inspecting electric equipment that requires the technical expertise of electrical inspectors. The handbook states, in pertinent part, that many of the requirements of 30 CFR 75.500 through 75.1003 and 30 CFR 77.500 through 77.906 are very technical in nature and a thorough knowledge of electrical theory, mine power systems, and electric

equipment is essential if inspection personnel are to properly implement these requirements without creating hazards to themselves or to miners. When coal mine inspectors encounter electrical problems involving high-voltage protection, grounding conductors or other problems that require special electrical expertise, the assistance of an electrical engineer or coal mine inspector (electrical) should be requested. The request should be forwarded through the inspector's immediate supervisor and should outline the nature of the problem with as much background information as possible.

The Handbook provides that, during each electrical inspection, the electrical inspector or engineer (electrical specialist) shall inspect an adequate portion of the electric circuits, electric equipment, and mechanical equipment at each mine to ascertain that the equipment and circuits are being maintained in accordance with the Mine Act. If the electrical specialist determines that the maintenance program at the mine is not adequate to maintain compliance with the Mine Act, the inspector shall make a complete electrical inspection of the mine.

**Statement of Facts:** In 2005, District 3 regular inspectors cited 208 violations at the Sago Mine. Forty-three (21%) were issued for violations of electrical standards. After the explosion, a team of five electrical engineers and four electrical specialists from outside District 3 cited 112 non-contributory violations of electrical standards. These citations represented 75% of the total non-contributory violations cited after the explosion by the accident investigation team. Of these electrical violations, 34 (30%) were evaluated as significant and substantial.

The internal review team evaluated these electrical violations. This evaluation disclosed approximately half of the violations involved electrical conditions that regular inspectors have been trained to recognize. The review team determined that some of these violations may have been present during previous inspections. A more complete review of selected electrical standards is included in subsequent sections of this report.

A review of training records for District 3 personnel revealed that regular inspectors received training to conduct general inspections of electric equipment at the National Mine Health and Safety Academy (Academy). Electrical specialists received this same general training, specialized electrical training, and annual electrical retraining at the Academy.

The internal review team found that prior to the explosion, District 3 inspectors conducted general inspections of electric equipment that did not require special electrical expertise. Interviews revealed that during the review period, inspectors did not request the assistance of an electrical specialist at the Sago Mine. During interviews, electrical specialists stated that complete electrical inspections had not been performed in District 3 for several years.

The last electrical inspection at the Sago Mine was performed on October 14, 2003. The inspection involved the surface substation, including lightning arresters and ground



fields. Additional information concerning the lightning protection at the Sago Mine can be found in the Enforcement of 30 CFR 75.521 section of this report.

Staffing of the District 3 electrical department has been uneven. In January 2005, the electrical department was staffed with four specialists, including one who was on military leave. Due to retirements and military leave, the department was reduced to one electrical specialist by June 2005. The District responded and through a reassignment and a transfer, the department staffing was increased to three electrical specialists and one trainee by July 2005. In November 2005, one specialist returned to active military duty. At the time of the explosion, there were two available electrical specialists in District 3. A review of the District electrical department staffing records revealed an average of less than 4 electrical specialists over the previous 10 years.

The electrical supervisor had collateral duties as the impoundment supervisor and provided oversight for the gas well permits program. He stated that less than 50% of his time was spent on electrical supervision duties. In addition, electrical inspectors had spent most of their time performing other inspection duties including conducting regular inspections and inspecting elevators, hoists, shaft and slope sinking operations, and fan installations. During interviews, District management indicated that District 3 did not have adequate resources in the electrical department. They stated that inspection assignments and the hiring of personnel focused on completing mandatory inspections.

**Conclusion:** Electrical standards were not enforced adequately at the Sago Mine. Inspectors were trained to identify and cite many types of electrical violations. However, a portion of the violations cited by the accident investigation team were not found during regular inspections conducted during the review period. Some of the violations developed after the last regular inspection, some required specialized electrical training to identify, and others should have been recognized during the inspections.

Additional electrical specialists conducting inspections of electric equipment would increase the level of safety by identifying and citing hazardous conditions that inspectors are not trained to recognize.

### **Enforcement of 30 CFR 75.503**

*Permissible electric face equipment; maintenance*

**Requirement:** Mandatory safety standard 30 CFR 75.503 requires the operator of each coal mine to maintain in permissible condition all electric face equipment required by 30 CFR 75.500, 75.501, and 75.504 to be permissible which is taken into or used in by the last open crosscut.

**MSHA Policies and Procedures:** The *Coal General Inspection Procedures Handbook* states that the inspector is required to inspect all face equipment (diesel and electric), electric installations, and all mobile equipment as encountered.

The *Coal Electrical Inspection Procedures Handbook* provides technical guidance for inspecting electric equipment that requires the technical expertise of electrical inspectors. The handbook states, in pertinent part, that many of the requirements of 30 CFR 75.500 through 75.1003 and 30 CFR 77.500 through 77.906 are very technical in nature and a thorough knowledge of electrical theory, mine power systems, and electric equipment is essential if inspection personnel are to properly implement these requirements without creating hazards to themselves or to miners.

**Statement of Facts:** Inspection reports were reviewed for the four regular inspections conducted prior to the explosion. This review disclosed that District 3 inspectors conducted permissibility inspections of electric face equipment during each regular inspection. Thirteen permissibility violations were cited during the four inspections. A review of enforcement data revealed that no electrical inspections were conducted at the Sago Mine during the review period.

After the explosion, accident investigators cited 23 non-contributory violations of this standard. Of the 23 violations, some may have existed during the last regular inspection. For example:

Section 104(a) citation No. 7335332 states “The No. 3 Roof Bolter, Fletcher S/N 82105/2004320, used in the 2 Left Section was not in a permissible condition for the following reasons. 1) SMC Electrical Products, Inc., Light Switch Enclosure X/P-1683-2, located in the operator’s cab, gland nut was not secured from loosening (seal wire was broken)(Part 18.37(c) [sic]). 2) The tri-plane style headlight enclosure (manufactured by Ocenco, X/P-3190-0), located on top of the machine in the front and middle location was damaged and a lens retainer was missing. 3) And the start switch, X/P-1685-2, located at the off-cab side operator’s station, the button was very difficult to push. A dust cover was missing.”

Some of the violations would require special electrical expertise to identify, and regular inspectors are not trained to recognize this type of condition. Two examples of these conditions follow.

Section 104(a) citation No. 7335235 states “The Phillips Machine Service No. 6 Shuttle Car, (S/N 2007, Approval No. 2G-3936-0) used in the 2 Left Section of this mine, has not been maintained in a permissible condition as approved. This car was originally approved as a 250 Volt dc powered shuttle car. Several components, such as the overload relays, pump motor, and conveyor motor, affecting the permissibility of the machine were changed to permit the machine

to operate at 575 VAC. No documentation to modify the approval of this unit has been found that would allow it to operate at 575 VAC.”

Section 104(a) citation No. 7335236 states “The Joy Manufacturing Company No. 16 Shuttle Car, (S/N ET 10946, Approval No. 2G-2585A-5) used in the 1 Left Section of this mine, has not been maintained in permissible condition as approved. This car was originally approved with the older style speed control system using contactors and resistors. The machine was modified to use an SCR style tram package. No documentation to modify the approval of this unit has been found that would allow it to operate with a SCR style tram package.”

The review team’s interviews with District 3 inspectors and evaluation of inspection notes and citations did not disclose any instances in which a permissibility violation was identified and not cited.

**Conclusion:** There was not any evidence that District 3 inspectors failed to cite permissibility violations that they observed. Regular inspectors should have identified some of the permissibility violations cited by the accident investigation team. However, some permissibility violations were technical in nature and required electrical specialists to identify. Other violations may have developed after the last time inspectors examined the equipment involved.

## **Enforcement of 30 CFR 75.512**

*Electric equipment; examination, testing and maintenance*

**Requirement:** Mandatory safety standard 30 CFR 75.512 states that all electric equipment shall be frequently examined, tested, and properly maintained by a qualified person to assure safe operating conditions. When a potentially dangerous condition is found on electric equipment, such equipment shall be removed from service until such condition is corrected. A record of such examinations shall be kept and made available to an authorized representative of the Secretary and to the miners in such mine.

Mandatory safety standard 30 CFR 75.512-2 states that examinations and tests required by 30 CFR 75.512 shall be made at least weekly. Permissible equipment shall be examined to see that it is in permissible condition.

**MSHA Policies and Procedures:** The *Coal General Inspections Procedures Handbook* requires the inspector to inspect all face equipment (diesel and electric), electric installations, and all mobile equipment as encountered; and haulage facilities, including hoisting equipment.

**Statement of Facts:** MSHA accident investigators cited 12 non-contributory violations of 30 CFR 75.512 through 75.512-2. These violations involved the mine operator’s failure to examine, test, and properly maintain electrical equipment in a safe operating

condition. Ten of the violations involved the unsafe operating condition of electrical equipment. One violation involved the operator's failure to examine four units of electrical equipment on a weekly basis. The other violation was cited because several potentially dangerous conditions existed for a long period and should have been observed by the qualified person conducting the examinations.

Some of the violations cited by the accident investigation team required special electrical expertise to identify, and regular inspectors were not trained to recognize the violations. Some of the violations may have developed after the last inspection of the equipment by District 3 inspectors.

The review team examined inspection reports for the four regular inspections of the Sago Mine conducted prior to the explosion. District 3 inspectors cited two violations of 30 CFR 75.512 during these inspections. In the inspection notes for one regular inspection, an inspector documented a violation of this standard where lid bolts were missing on an underground power center and did not issue a citation. During his interview with the review team, the inspector acknowledged the existence of the violation identified in his inspection notes. He stated that he forgot to issue a citation because he had several other citations to issue that day.

The internal review team determined that, during the regular inspections, District 3 personnel inspected the electrical examination records. No citations were issued by District 3 or the accident investigation team for a failure to list electrical equipment in the records. Similarly, no citations were issued by District 3 or the accident investigation team for a failure to correct a hazardous electrical condition recorded in these records.

**Conclusion:** In one instance, a District 3 inspector forgot to cite an observed violation of 30 CFR 75.512. There was not any evidence that District 3 inspectors failed to cite other violations of this standard that they observed. Regular inspectors should have identified some of the violations of 30 CFR 75.512 that were cited by the accident investigation team. However, some of the violations were technical in nature and required electrical specialists to identify. Other violations may have developed after the last time inspectors examined the equipment involved.

### **Enforcement of 30 CFR 75.517**

*Power wires and cables; insulation and protection*

**Requirement:** Mandatory safety standard 30 CFR 75.517 states that power wires and cables, except trolley wires, trolley feeder wires, and bare signal wires, shall be insulated adequately and fully protected.

**MSHA Policies and Procedures:** The MSHA *Program Policy Manual* states that this section requires that damaged insulation on insulated power wires and cables (including trailing cables) and damaged jackets on power cables (including trailing cables) be repaired. The Manual also states that the outer jacket of a cable is intended to protect the internal conductors from cuts, abrasion, moisture, etc., and must be intact for the cable to be fully protected as required by this section.

**Statement of Facts:** After the explosion, MSHA accident investigators identified and cited 10 violations of this standard. These violations involved damaged outer jackets or damaged insulation on power wires and cables on both mobile and stationary equipment. Brief descriptions of the violations follow:

- A 120-volt cord to the overhead light at the 1 Left power center was open, exposing inner insulated conductors.
- The jumper cable on the No. 17 Scoop charger had exposed conductors.
- The power cable leading to the No. 6 jeep charger contained a damaged area in the outer jacket.
- Three citations were issued for damaged inter-machine cables or conduits on the No. 5 Mantrip and Nos. 6 and 8 rail runners.
- The trailing cable for the No. 17 shuttle car was damaged exposing at least one 600 VAC phase conductor.
- The cable supplying power to the No. 3 belt starter box had a very badly damaged outer jacket.
- Instead of a cable, three separate unprotected wires, supplied power to the No. 1 belt starter box.
- The power cable supplying power to the No. 1 distribution box had damaged insulation on a splice and a place where shielding was not continuous.

Some of these violations required electrical expertise to identify. In interviews with the review team, District 3 inspectors demonstrated that they understood the requirements of this standard and stated that they would have taken appropriate enforcement action if a damaged cable or power wire was observed. The internal review team could not determine if some of the violations issued by the accident investigation team developed after the equipment or power cables were last inspected by a District 3 inspector.

The internal review team reviewed inspection reports for the four regular inspections conducted prior to the explosion. The team determined that there were no instances

where a violation of 30 CFR 75.517 was identified and not cited. District 3 inspectors cited 14 violations of this standard at the Sago Mine during these inspections.

A review of MSHA accident and injury data revealed that there were no injuries associated with damaged power wires and cables during the review period.

**Conclusion:** District 3 inspectors understood the requirements of 30 CFR 75.517 and issued appropriate citations when they observed violations. Some of the violations were technical in nature and required electrical specialists to identify.

## **Enforcement of 30 CFR 75.518**

*Electric equipment and circuits; overload and short circuit protection*

**Requirement:** Mandatory safety standard 30 CFR 75.518 states that automatic circuit-breaking devices or fuses of the correct type and capacity shall be installed so as to protect all electric equipment and circuits against short circuit and overloads. Three-phase motors on all electric equipment shall be provided with overload protection that will deenergize all three phases in the event that any phase is overloaded.

Mandatory safety standard 30 CFR 75.518-1 states that a device to provide either short circuit protection or protection against overload which does not conform to the provisions of the *National Electric Code, 1968*, does not meet the requirement of 30 CFR 75.518.

**MSHA Policies and Procedures:** The *Coal Electrical Inspection Procedures Handbook* states, in pertinent part, that many of the requirements of 30 CFR 75.500 through 75.1003 and 30 CFR 77.500 through 77.906 are very technical in nature and a thorough knowledge of electrical theory, mine power systems and electric equipment is essential if inspection personnel are to properly implement these requirements without creating hazards to themselves or to miners.

The tables in Appendix D to the handbook show the minimum wire size, the maximum instantaneous branch circuit protection and the maximum overload (running) protection for the more common motor sizes encountered in coal mining installations.

**Statement of Facts:** After the explosion, MSHA accident investigators cited 21 violations of 30 CFR 75.518 at the Sago Mine. Six of the violations were observed inside electrical enclosures. Eighteen of the 21 violations involved improper or nonexistent short circuit protection, and 16 of the 21 violations required application of the 1968 *National Electrical Code*.

Information provided by National Mine Health and Safety Academy (Academy) electrical instructors indicated that regular inspectors are not trained to calculate short circuit or overload current. Inspectors are introduced to the requirements of

Appendix D to the *Coal Electrical Inspection Procedures Handbook* and the 1968 *National Electrical Code* as part of their Academy training. Electrical specialists receive this training, advanced electrical training, and annual electrical retraining in the technical aspects of short circuit and overload protections. Appendix D to the handbook contains tables to help inspectors and specialists determine short circuit and overload protection for most motors and motor circuits.

The internal review team reviewed inspection reports for the four regular inspections conducted prior to the explosion. District 3 inspectors did not cite this standard at the Sago Mine during calendar year 2005. A review of inspection records revealed that the last time an electrical inspector was at the Sago Mine was in October 2003. In interviews with the review team, inspectors indicated that they did not request the assistance of an electrical specialist during the review period.

**Conclusion:** With additional training, regular inspectors could have recognized some of the violations of 30 CFR 75.518 that were cited by the accident investigation team. However, regular inspectors receive minimal training in the enforcement of this standard. Many of the violations were technical in nature and required electrical specialists to identify.

### **Enforcement of 30 CFR 75.521**

*Lightning arresters; ungrounded and exposed power conductors and telephone wires*

**Requirement:** Mandatory safety standard 30 CFR 75.521 requires each ungrounded, exposed power conductor and each ungrounded, exposed telephone wire that leads underground to be equipped with suitable lightning arresters of approved type within 100 feet of the point where the circuit enters the mine. Lightning arresters shall be connected to a low resistance grounding medium on the surface which shall be separated from neutral grounds by a distance of not less than 25 feet.

**MSHA Policies and Procedures:** The *MSHA Electrical Inspection Procedures Handbook* states that the separation of lightning arrester ground fields from neutral ground fields prevents lightning surges from being transmitted to the neutral ground field where they could momentarily energize the frames of [underground] equipment grounded to the neutral ground field.

**Statement of Facts:** The accident investigation team issued five citations for noncontributory violations of 30 CFR 75.521. Four of the citations were issued because lightning arresters were not provided on ungrounded, exposed power conductors or telephone wires leading underground. The other citation was issued because the surface lightning arrester grounding medium was not separated from the neutral ground field by a distance of at least 25 feet. The lightning arrester ground was electrically connected to the frames of the surface belt structure which entered the mine and was connected to all underground electrical equipment.

To determine if lightning energy may have entered the mine, MSHA contracted with Sandia Corporation, Sandia National Laboratories (Sandia). Sandia concluded that it was highly unlikely that a 100,000-ampere lightning strike attached at the mine portal to the belt conveyor structure, trolley communication antenna, high-voltage cable grounding medium, and the track rail could generate sufficient voltage on the pump cable within the sealed area to initiate electrical arcing and therefore, ignite methane in the sealed area.

Sandia concluded that electromagnetic energy produced by a horizontal component of lightning, could induce sufficient voltage to cause an arc capable of igniting methane. MSHA accident investigators determined that lightning most likely induced voltage on an approximately 1,300 feet long pump cable, found in four sections, located in the sealed 2<sup>nd</sup> Left Mains area. An arc from this pump cable most likely ignited an explosive mixture of methane. Lightning arresters would not have prevented electromagnetic energy from energizing the pump cable. Accordingly, violations of 30 CFR 75.521 cited by the accident investigation team were determined to be non-contributory to the cause of the explosion.

The last electrical inspection at the Sago Mine was performed on October 14, 2003. The inspection covered the surface substation, including associated lightning arresters and ground fields. At that time, the substation was not in service and lightning arresters were not provided on the primary circuit supplying power to the substation. Lightning arresters were later installed. These lightning arresters were not the ones cited by the accident investigation team as being not provided.

The internal review team reviewed inspection reports for the four regular inspections conducted prior to the explosion. District 3 inspectors did not cite any violations of 30 CFR 75.521 at the Sago Mine during the review period. Information provided by Academy electrical instructors indicated that inspectors are trained to visually identify lightning arresters on power and telephone circuits. Inspectors are not trained to evaluate the physical and electrical separation of lightning arrester grounds from neutral grounds. Electrical specialists are trained in all aspects of lightning arrester selection and installation.

**Conclusion:** District 3 regular inspectors should have recognized the violations for missing lightning arresters. However, special electrical expertise is generally required to recognize that lightning arresters are properly grounded and separated from neutral grounds.

MSHA did not recognize the potential for induced voltage from horizontal lightning to ignite explosive atmospheres in sealed areas.

The violations of 30 CFR 75.521 cited by the accident team had no bearing on the explosion.



## **Enforcement of 30 CFR 75.601-1**

*Short circuit protection; ratings and settings of circuit breakers*

**Requirement:** Mandatory safety standard 30 CFR 75.601-1 states that circuit breakers providing short circuit protection for trailing cables shall be set so as not to exceed the maximum allowable instantaneous settings specified in this section; however, higher settings may be permitted by an authorized representative of the Secretary when he or she has determined that special applications are justified.

**Statement of Facts:** After the explosion, MSHA accident investigators cited six violations of 30 CFR 75.601-1. These citations were issued because circuit breaker instantaneous settings were too high for the conductor size of trailing cables. The internal review team could not determine if these conditions existed during the inspections prior to the explosion. Instantaneous settings can be changed easily by any miner.

Interviews with District 3 personnel and reviews of inspection reports for the four regular inspections conducted at the Sago Mine prior to the explosion did not disclose any instances where a violation of 30 CFR 75.601-1 was identified and not cited. District 3 inspectors cited this standard six times during these inspections. During interviews, inspectors indicated that they understood the requirements of this standard and the hazards associated with incorrect circuit breaker settings.

**Conclusion:** District 3 inspectors understood the requirements of 30 CFR 75.601-1 and issued appropriate citations when they observed violations.

## **Enforcement of 30 CFR 75.1500**

*Emergency shelters*

**Requirement:** 30 CFR 75.1500, which restates the statutory provision found in Section 315 of the Mine Act, states that the Secretary or an authorized representative of 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. Such chambers shall be properly equipped with first aid materials, an adequate supply of air and self-contained breathing equipment, an independent communication system to the surface, proper accommodations for the persons while awaiting rescue, and such other equipment as the Secretary may require. 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.

**Statement of Facts:** MSHA did not promulgate standards to implement section 315 of the Mine Act. MSHA did not consider refuge chambers to be technically feasible in coal

mines. MSHA has never established any policy or criteria to define what would be acceptable to satisfy this standard before the explosion at the Sago Mine. MSHA has enforced 30 CFR 75.1500 in coal mines on four occasions. Two violations were vacated and two were terminated within one day. The Sago Mine did not have any emergency shelters.

**Conclusion:** MSHA has never implemented section 315 of the Mine Act.

## **Enforcement of 30 CFR 75.1501**

### *Emergency evacuations*

**Requirement:** Mandatory safety standard 30 CFR 75.1501(a) states that for each shift that miners work underground, there shall be in attendance a responsible person designated by the mine operator to take charge during mine emergencies involving a fire, explosion or gas or water inundations. The responsible person shall have current knowledge of the assigned location and expected movements of miners underground, the operation of the mine ventilation system, the location of the mine escapeways, the mine communications system, any mine monitoring system if used, and the Mine Emergency Evacuation and Firefighting Program of Instruction.

**MSHA Polices and Procedures:** *CMS&H Memorandum No. HQ-03-021-A*, issued on March 5, 2003, revised MSHA's policy on the observation and discussion of fire drills. This directive instructs inspectors, during the course of regular inspections, to schedule their activities to observe simulated fire drills when possible and to have discussions with miners to ensure they are familiar with specific procedures in an emergency. These observations and contacts should be documented in the inspection notes.

The *Carbon Monoxide Inspection Procedures Handbook* dated January 1992 establishes procedures for inspection of carbon monoxide (CO) monitoring systems. The procedures instruct inspectors to determine the duties of the responsible person assigned to monitor the CO system at a surface location by:

- Ascertaining if the monitoring system activates underground alarms automatically or if action of the responsible person on the surface is necessary to notify the sections. The responsible person must always be located where he or she can manually activate the section alarm and notify those affected if an emergency situation arises.
- Determining if the responsible person is aware of the actions that must be taken when an alert or alarm level has been indicated.
- Determining if problems with the monitoring system are reported and corrected immediately.

- Determining if the responsible person is notified when activities such as cutting, welding, or calibrating, which may cause alarms, are to be performed.

**Statement of Facts:** The MSHA accident investigation team determined that mine dispatchers, designated as responsible persons by the operator, were not knowledgeable in the mine ventilation system, the location of the mine escapeways, the mine monitoring system, and the Mine Emergency Evacuation and Firefighting Program of Instruction. The accident investigation team issued an S&S, section 104(d)(1) order No. 7100917 for this noncontributory violation of 30 CFR 75.1501(a).

Mandatory safety standard 30 CFR 75.1501 was first published as an Emergency Temporary Standard (ETS) on December 12, 2002. The final rule became effective on September 9, 2003. Coal Mine Safety and Health has not issued specific guidance defining the responsibilities of inspectors for determining compliance with 30 CFR 75.1501. The *Carbon Monoxide Inspection Procedures Handbook* establishes procedures for inspectors to determine if the responsible person assigned to monitor the CO system is knowledgeable in his or her duties. In some cases, the person responsible for monitoring the CO monitoring system is not the same person designated by the operator as the responsible person under 30 CFR 75.1501. At the Sago Mine, the responsible person in each case was the same person.

The internal review team reviewed inspection reports for the four regular inspections conducted at the Sago Mine prior to the explosion. This review disclosed that District 3 inspectors did not observe any fire or evacuation drills at the Sago Mine during the review period. Discussions with the miners to ensure they were familiar with specific procedures in the event of an emergency or that they were adequately trained in the donning of SCSRs were also not documented as being held.

In an interview, one District 3 inspector assigned to inspect the Sago Mine stated he did not know who the mine's responsible person was, but thought it was the mine foreman. The Mine Emergency Evacuation and Firefighting Program of Instruction for the Sago Mine designated the dispatcher as the responsible person.

During the review period, District 3 inspectors did not issue any citations for violations of 30 CFR 75.1501(a) at the Sago Mine.

**Conclusion:** District 3 inspectors did not effectively enforce the requirements of 30 CFR 75.1501(a) at the Sago Mine. Inspectors did not document that they held discussions with miners (including the responsible person) to ensure they were familiar with specific procedures in the event of an emergency at the Sago Mine. Coal Mine Safety and Health has not provided specific guidance to inspectors for determining compliance with this mandatory safety standard.

## **Enforcement of 30 CFR 75.1502(a)**

*Mine emergency evacuation and firefighting program of instruction*

**Requirement:** Mandatory safety standard 30 CFR 75.1502(a) states, in pertinent part, that each operator of an underground coal mine shall adopt and follow a mine emergency evacuation and firefighting program that instructs all miners in the proper evacuation procedures they must follow if a mine emergency occurs, location and use of firefighting equipment, and location of escapeways, exits, and routes of travel to the surface. Such program of instruction shall be approved by the District Manager of the Coal Mine Safety and Health district in which the mine is located. Before implementing any approved revision to the program of instruction, the operator shall instruct persons affected by the revision in any new provisions.

**MSHA Policies and Procedures:** *CMS&H Memorandum No. HQ-03-021-A*, issued on March 5, 2003, revised MSHA's policy on the observation and discussion of fire drills. This directive instructs inspectors, during the course of regular inspections, to schedule their activities to observe simulated fire drills when possible and to conduct discussions with miners to ensure they are familiar with specific procedures in an emergency. These observations and contacts should be documented in the inspection notes. Each district manager is also required to ensure that inspection personnel continue to evaluate the operator's compliance with 30 CFR 1502(c) during regular inspections.

The *Carbon Monoxide Inspection Procedures Handbook* dated January 1992 sets forth MSHA procedures under which carbon monoxide (CO) monitoring systems are inspected during regular inspections. Systems installed to provide protection equivalent to point-type heat sensors must satisfy the requirements of 30 CFR 75.1103-4 through 75.1103-7 at all times. Pertinent parts of the handbook instruct the inspector to:

- Check the direction and velocity of the air currents with relation to the approved ventilation plan;
- Check to ensure the CO sensors are installed at the locations required by the approved plan; and
- Observe calibration of a representative number of sensors, defined as 10% of the total sensors but no less than 5 sensors.

The *Coal General Inspection Procedures Handbook*, in part, instructs the inspector to evaluate the adequacy of SCSR training by discussing donning procedures with a representative number of individual miners to ascertain their understanding of how to use the SCSR. If inspectors are made aware of any self-rescuer training deficiencies, they should report them to the District training liaison/specialist.

**Statement of Facts:** After the explosion, the accident investigation team issued seven citations and orders for non-contributory violations of 30 CFR 75.1502(a). All seven

were issued because the operator did not follow the approved Mine Emergency Evacuation and Firefighting Program of Instruction for the Sago Mine. A summary of the citations and orders follows:

- An S&S, section 104(d)(1) order No. 7100914 was issued because on 18 occasions between December 19, 2004, and January 2, 2006, an alert or alarm was given from the CO monitoring sensor on the 1 Left Section and appropriate action was not taken. The system operator reset the sensor and did not take appropriate action. A record of each alert and alarm and the action taken was also not maintained for one year as required. There was no record kept of action taken.
- An S&S, section 104(d)(1) order No. 7100915 was issued because on January 2, 2006, the 1 Left section alarm sensor gave an alarm of 26 ppm. The alarm was reset without anyone investigating the source of the alarm and the 1 Left section miners working the shift were permitted to enter the mine. The Program of Instruction states that when an alarm above 15 ppm above the established ambient level is given at shift change, no one shall be permitted to enter the mine except qualified persons designated to investigate the source of the alarm.
- An S&S, section 104(d)(1) order No. 7100916 was issued because the atmospheric monitoring system (AMS) installed throughout the mine was not being used as approved. The system was being activated manually to signal working sections to answer the mine phone rather than to evacuate the mine.
- An S&S, section 104(d)(1) order No. 7100918 was issued because 6 miners did not don their SCSRs as required during the mine emergency that occurred on January 2, 2006, and four other miners did not don their SCSRs when evacuating the mine after the explosion.
- An S&S, section 104(d)(1) order No. 7100920 was issued because the Barbour County mine rescue team was not immediately notified of the explosion that occurred on January 2, 2006. The 1<sup>st</sup> Left section foreman phoned the surface approximately 5 to 10 minutes after the explosion and informed them “we’ve had a mine explosion in here” and “get mine rescue team here now.” The first attempt to contact the mine rescue team was made at 8:04 a.m.
- An S&S, section 104(a) citation No. 7292256 was issued because the AMS sensor at the 1 Left section loading point would not activate the fire alarm signal when tested. The dispatcher also could not manually activate the fire alarm signal.
- An S&S, section 104(d)(1) order No. 7292257 was issued because the AMS sensor at the Motor Barn Spur was not calibrated within the required 31 days. The sensor had not been calibrated for at least 100 calendar days. The sensor was also tested and found not to be in calibration.

Five of the seven 30 CFR 75.1502(a) citations were issued for either the AMS (carbon monoxide monitoring) system not being properly maintained, used, or calibrated.

Mandatory safety standard 30 CFR 75.1502 was first published as an emergency temporary standard (ETS) on December 12, 2002. The final rule became effective on September 9, 2003.

The directives relating to emergency evacuations, donning and use of SCSRs, fire and escapeway drills, and atmospheric monitoring systems overlap. Coal Mine Safety and Health *Memorandum No. HQ-03-021-A* defines the responsibilities of inspectors for determining compliance with 30 CFR 75.1502. The *Carbon Monoxide Inspection Procedures Handbook* establishes procedures for inspectors to determine if the responsible person assigned to monitor the CO system is knowledgeable in his or her duties. The *Coal General Inspection Procedures Handbook*, in part, instructs the inspector to evaluate the adequacy of SCSR training by discussing donning procedures with a representative number of individual miners to ascertain their understanding of how to use the SCSR. In addition, the *Carbon Monoxide Inspection Procedures Handbook* is outdated, and does not reflect recent developments in computer-based atmospheric monitoring systems and applicable standards.

The Mine Emergency Evacuation and Firefighting Program of Instruction for the Sago Mine was approved by the District Manager on May 3, 2005. The program states that: "Where emergency evacuation is required, personnel should immediately don their person wearable self contained self rescuer (PWSCSR). Once the PWSCSR is donned, personnel should begin evacuation."

The internal review team reviewed the inspection reports for the four regular inspections conducted prior to the fatal explosion. This review revealed that during two of the four regular inspections prior to the explosion, District 3 inspectors did not document examining records of AMS activation or records of the carbon monoxide monitoring system calibration. In their interviews with the review team, these inspectors stated that they examined the records but did not document the examinations in their inspection notes. The accident investigation team determined that there was no record kept of action taken for each alert and alarm for a period of 1 year as required.

A review of the inspection reports also disclosed that District 3 inspectors did not document that they observed or discussed fire drills at the Sago Mine during the review period. Specifically, inspectors did not document that they conducted discussions with the miners to ensure they were familiar with specific procedures in the event of an emergency. Interviews with inspectors disclosed that they did not conduct these discussions.

The review team determined, through interviews and review of inspection reports, District 3 inspectors did not inspect the carbon monoxide monitoring system as

instructed in the *Carbon Monoxide Inspection Procedures Handbook* during any of the four regular inspections prior to the explosion. They also did not document the calibration of the carbon monoxide monitoring system or the velocity and the direction of air currents in relation to the approved plan.

**Conclusion:** District 3 inspectors did not effectively enforce the requirements of 30 CFR 75.1502(a). District 3 inspectors did not have discussions with miners to ensure they were familiar with specific procedures in the event of an emergency. Inspectors also did not inspect the carbon monoxide monitoring system as required during the review period.

Effective oversight by supervision and management would have identified and prevented many of these lapses.

MSHA has too many overlapping directives regarding: ensuring that miners (including responsible persons) are familiar with specific procedures in the event of emergency mine evacuation drills; inspection of CO monitoring systems; and ensuring miners are trained in the use and donning of SCSRs.

### **Enforcement of 30 CFR 75.1714-3**

*Self-rescue devices; inspection, testing, maintenance, repair, and recordkeeping*

**Requirement:** Mandatory safety standard 30 CFR 75.1714-3(a) states that each operator shall provide for proper inspection, testing, maintenance, and repair of self-rescue devices by a person trained to perform such functions.

Paragraph (d) of 30 CFR 75.1714-3 states that all SCSRs approved by MSHA and NIOSH under 42 CFR Part 84 shall be tested in accordance with instructions approved by MSHA and NIOSH. Any device which does not meet the specified test requirements shall be removed from service.

Paragraph (e) of 30 CFR 75.1714-3 provides, in pertinent part, that at the completion of each test required by paragraph (d) of this section the person making the tests shall certify by signature and date that the tests were done. This person shall make a record of all corrective action taken. Certifications and records shall be kept at the mine and made available on request to an authorized representative of the Secretary.

**MSHA Policies and Procedures:** Chapter 3 of the *Coal General Inspection Procedures Handbook* instructs the inspector to evaluate the operator's compliance with approved self-rescuer condition-of-use requirements by:

- Inspecting a representative number of each type of device in use at the mine, but not less than 10 percent. A higher percentage should be inspected when devices are stored on equipment, worn, or carried. These inspections should be

conducted in accordance with the manufacturer's approved daily inspection procedures; and

- Reviewing the mine operator's records of self-rescuer tests. If possible, the inspector should also determine if the operator followed the manufacturer's approved test procedures.

Chapter 8 of the handbook states, in pertinent part, that inspection notes should include the following for each self-rescue device inspected:

- The name of the manufacturer, model and serial number, and date of manufacture of the device.
- The method of deployment, i.e., "C" worn/ carried, "M" machine mounted (including Personnel carriers), "S" stored or cached underground, "W" stored/warehoused on the surface.
- The location of the device at the time of inspection; if a device is normally worn or carried by the miner, the location the miner normally works should be documented.
- The date the mine operator last tested the device.

**Statement of Facts:** After the explosion, accident investigators issued a section 104(d)(1) order for a non-contributory violation of 30 CFR 75.1714-3(a) and a section 104(d)(1) order for a non-contributory violation 30 CFR 75.1714-3(e). Descriptions of these two orders follow:

- A S&S, section 104(d)(1) order No. 7100907 was issued because a CSE SR-100 self rescuer device (serial No. 46433) was found underground that exceeded the manufacturer's recommended life of ten years. The manufactured date stamped on the unit was 8/95, and the unit was found underground in January of 2006. The self rescuer device had not been inspected adequately.
- An S&S, section 104(d)(1) order No. 7458186 was issued because the mine operator did not produce records which certified that the 90-day inspection test was done for fourteen SCSRs that were recovered after the January 2, 2006 explosion.

The internal review team reviewed inspection reports for the four regular inspections conducted prior to the fatal explosion. The review disclosed that during all four regular inspections, District 3 inspectors documented checking the mine operator's records of self rescuer tests. One section 104(a) citation was issued during the second regular inspection because a record of required testing, inspecting, and maintenance of SCSRs was not provided.



A review of inspection notes revealed that inspectors did not document examining SCSRs during three of the four regular inspections. In their interviews with the internal review team, the inspectors stated that they did not examine SCSRs during the three inspections. During the second regular inspection, an inspector documented that he checked 86 SCSRs on May 5, 2005. The inspector included the operator's list of 122 SCSRs in this inspection report. At the time of this inspection, the SCSR cited by the accident investigation team as being out of date was still within the allowable service life.

The fourth regular inspection of the Sago Mine for calendar year 2005 was closed on December 22, 2005. The field office supervisor reviewed the inspection report and determined that SCSRs, among other items, still needed to be inspected. The supervisor directed that the inspection be reopened until these items could be inspected.

**Conclusion:** Enforcement of 30 CFR 75.1714-3 at the Sago Mine was not effective. Although inspectors checked the mine operator's records of self rescuer tests during all four regular inspections conducted during the review period, they did not inspect SCSRs during three of the four inspections. Thorough inspections of SCSRs and records may have identified the two violations found by the accident investigation team.

Effective oversight by supervisors and management would have identified and possibly prevented these lapses.

With the exception of the fourth regular inspection for calendar year 2005, supervisory review of inspection reports did not identify deficiencies in enforcing 30 CFR 75.1714-3.

## **Plan Approvals**

This section of the report addresses the plan approvals for the Sago Mine, including the Mine Emergency Evacuation and Firefighting Program of Instruction, roof control plan, ventilation plan, and training plan.

### **Mine Emergency Evacuation and Firefighting Program of Instruction**

**Requirement:** Mandatory safety standard 30 CFR 48.8, which includes the minimum courses of instruction for annual refresher training for underground miners, states in pertinent part that: "*Barricading*. The course shall include a review of the methods of barricading and locations of barricading materials, where applicable."

At the time of the fatal explosion, mandatory safety standard 30 CFR 75.1502(a) provided that each operator of an underground coal mine shall adopt and follow a mine emergency evacuation and firefighting program that instructs all miners in the proper evacuation procedures they must follow if a mine emergency occurs, location

and use of firefighting equipment, and location of escapeways, exits, and routes of travel to the surface. Such program of instruction shall be approved by the District Manager of the Coal Mine Safety and Health district in which the mine is located. Before implementing any approved revision to the program of instruction, the operator shall instruct persons affected by the revision in any new provisions. The approved program of instruction shall include a specific plan designed to acquaint miners on all shifts with procedures for:

- Mine emergency evacuation for mine emergencies that present an imminent danger to miners due to fire, explosion, or gas or water inundation;
- Evacuation of all miners not required for a mine emergency response;
- Rapid assembly and transportation of necessary miners, fire suppression equipment, and rescue apparatus to the scene of the mine emergency; and,
- Operation of the fire suppression equipment available in the mine.

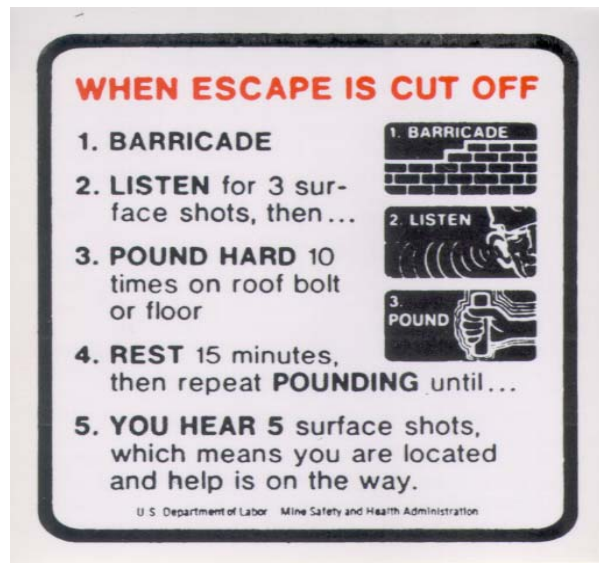
**MSHA Policies and Procedures:** At the time of the explosion, the MSHA *Program Policy Manual* stated, in pertinent part, that the mine operator's program of instruction, required by 30 CFR 75.1502, must include all miners on all shifts. The training program should emphasize the location of the proper routes of travel and the importance of prompt evacuation when such an order is given. The program should incorporate provisions to advise miners of changes to the escapeways, such as rerouting, designation of other entries, and any changes in escape facilities. It should also emphasize proper SCSR donning procedures. Specific situations such as encountering smoke dictate donning the SCSR immediately, while others may permit partial or complete evacuation without donning the unit. As evacuation through some smoke may be necessary, the program should include precautions to take when smoke is encountered, as well as instruction and drills in communication techniques emphasizing not to remove the SCSR mouthpiece to talk in contaminated air.

**Statement of Facts:** The internal review team reviewed the Mine Emergency Evacuation and Firefighting Program of Instruction for the Sago Mine that was approved by the District 3 Manager on May 3, 2005. The team's review disclosed that the introduction to the Program of Instruction for the Sago Mine lists explosions, fires, and gas and water inundations as mine emergencies. The specific evacuation instructions, however, only address fires and not the other three emergencies.

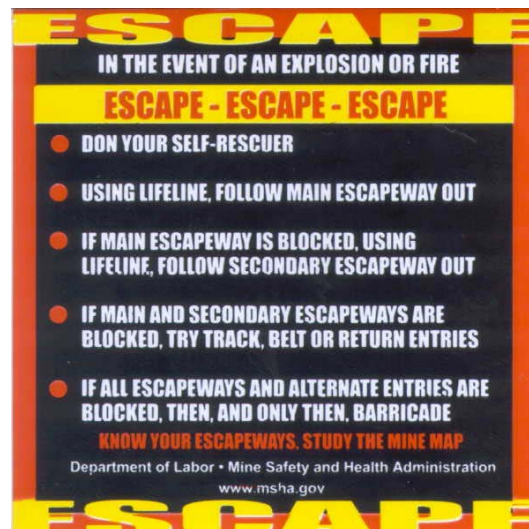
The Program of Instruction also instructed miners to barricade when trapped by "toxic gases" and described where and how to construct a barricade. The instructions did not specify that miners should barricade only when the mine atmosphere is irrespirable and evacuation is impossible due to physical barriers.

The operator's Program of Instruction also stated, "persons behind the barricade should: (a) listen for 3 shots, then (b) signal by pounding hard on the roof 10 times, (c) rest for 15 minutes, and (d) repeat until 5 shots are heard which would indicate that they have been located." The accident investigation team determined that the miners repeatedly pounded on a roof bolt located within the barricade. Surface shots were not initiated because, as discussed in the Mine Rescue and Recovery section of this report, the seismic equipment was not deployed.

For years, MSHA distributed the following informational sticker to the mining industry to be placed inside the miners' hard hats that described procedures to be followed when escape is cut off.



Following the explosion at the Sago Mine, MSHA created and distributed the following new informational sticker that reinforces the idea for miners to escape from the mine instead of barricading.



The mine operator's Program of Instruction addressed the donning procedure for the CSE SR-100 self-rescuers used at the Sago Mine. The Program did not include instructions on how to activate oxygen if pulling the oxygen actuator tag failed to activate oxygen. In the event of an activation failure, miners should follow the manufacturer's instructions. The manual start procedures listed in the manual provided by the manufacturer instructs the user to exhale into the mouthpiece 3 to 6 times to inflate the breathing bag.

**Conclusion:** The Mine Emergency Evacuation and Firefighting Program of Instruction approved by the District 3 Manager on May 3, 2005, had the following deficiencies:

- Although the introduction to the Mine Emergency Evacuation and Firefighting Program of Instruction for the Sago Mine listed explosions, fires, gas and water inundations as mine emergencies, the specific evacuation instructions only addressed fires and not the other three emergencies.
- The Program of Instruction instructed miners to barricade when they were trapped by hazardous gases; however, the instructions did not specify that barricading should only be performed when the mine atmosphere is irrespirable and evacuation is impossible due to physical barriers.
- The donning procedure for the CSE SR-100 self-rescuer contained in the Program of Instruction did not include instructions on how to activate oxygen when the oxygen actuator tag failed.

After the advent of SCSRs, MSHA did not reevaluate the instructions on hard hat stickers that the Agency distributed to miners. The stickers did not emphasize that miners should barricade only when all escapeways and alternate entries are blocked.

The language in the mine operator's approved Program of Instruction, hard hat stickers provided by MSHA, and unfounded confidence in MSHA's seismic location equipment may have adversely affected the Sago miners' decision to barricade rather than to attempt escape.

## **Roof Control Plan - Review and Approval**

**Requirement:** Mandatory safety standard 30 CFR 75.220(a)(1) requires each operator to develop and follow a roof control plan, approved by the District Manager, that is suitable to the prevailing geological conditions and the mining system to be used at the mine. Additional measures shall be taken to protect persons if unusual hazards are encountered.

30 CFR 75.220(b)(1) states the mine operator will be notified in writing of the approval or denial of approval of a proposed roof control plan or proposed revision.

Mandatory standard 30 CFR 75.221(a)(5) requires a description and drawing of the sequence of installation and spacing of supports for each method of mining to be included in the roof control plan. Mandatory safety standard 30 CFR 75.221(b) requires that each drawing submitted with a roof control plan contain a legend explaining all symbols used and shall specify the scale of the drawing which shall not be less than 5 feet to the inch or more than 20 feet to the inch.

Mandatory safety standard 30 CFR 75.222 sets forth the criteria that shall be considered on a mine-by-mine basis in the formulation and approval of roof control plans and revisions to such plans. This section states that the district manager may approve plans that do not conform to the applicable criteria provided that effective control of the roof, face and ribs can be maintained. The district manager may also require additional measures in roof control plans not addressed in sections 30 CFR 75.221 or 30 CFR 75.222.

Mandatory safety standard 30 CFR 75.223(d) requires the roof control plan for each mine to be reviewed every 6 months by an authorized representative of the Secretary.

**MSHA Policies and Procedures:** Chapter 3 of the *Coal General Inspection Procedures Handbook* states that during every regular inspection at an underground coal mine, the inspector shall determine that all approved plans are being followed, are up-to-date, and are appropriate.

**Statement of Facts:** The internal review team determined that District 3 had a formal standard operating procedure (SOP) for the review and approval of roof control plans which complied with current regulations, policies, and procedures. Specialists reviewed new plans and supplements and conducted 6-month reviews of existing plans. Inspectors completed plan review forms (MSHA Form No. 2000-204) during regular inspections. The SOP required a tracking sheet to be used for plan and supplement reviews to ensure all pertinent information was considered. Memoranda for communicating the specialists' conclusions regarding the adequacy of the plan were completed during the 6-month review process.

During 6-month reviews, specialists were to consider the accident and injury experience, history of unintentional roof falls, violation history (as it relates to roof control), whether plan criteria were properly addressed, input from field office supervisors and inspectors, and information reported on plan review forms (MSHA Form 2000-204). Specialists also reviewed any information received from other technical service groups or miners' representatives. The roof control supervisor and the Assistant District Manager - Technical Division (Technical ADM) reviewed the specialist's recommendation before forwarding it to the District 3 Manager. The District 3 Manager then sent correspondence to the mine operator as to the results of the review.

The District 3 Manager approved the roof control plan for the Sago Mine on October 4, 2004. Five supplements, four revisions, and six tentative approvals for test areas related to this plan were submitted and approved prior to the explosion. District 3 specialists completed 6-month reviews of the plan on October 24, 2004, June 29, 2005, and November 8, 2005. Following these reviews, the District 3 Manager sent letters of continuing approval to the operator. Inspectors conducted plan reviews during their inspections and completed a plan review form for each review.

The internal review team identified that the following deficiencies were noted in the approved plan.

- The maximum allowable distance from the last row of permanent roof supports to the face of developing entries was not specified.
- Page 7b contained a drawing identified as being on a scale of 10 feet to the inch. The actual scale of the drawing was 16 feet to the inch.
- Several submitted roof control plan revisions and supplements from the mine operator referred to attachments or diagrams that were not included with the submittals as approved. A December 19, 2005, tentative approval for mining the lower seam referred to an "Attached Equipment Schematic" that was not included. An October 21, 2005, approval of a test area for mining the lower seam referred to "Line A" on the attached map. The attached map did not include "Line A." An October 7, 2005, tentative approval for mining the lower seam referred to an attached diagram for the operator of the continuous mining machine which was not included. A June 24, 2005, supplement referred to an attached map of supplemental roof supports that was not included.

Tentative approvals or approvals for test areas were granted on April 7, September 28, October 4, October 7, October 21, and December 19, 2005. Only the April 7 submittal was followed by permanent approval or disapproval documentation. The District 3 SOP states that plan submittals to be approved or disapproved.

**Conclusion:** District 3 personnel followed the procedures outlined in the District SOP when approving the roof control plan, supplements, and revisions for the Sago Mine. Specialists reviewed the roof control plan at least every 6 months and considered the mine history and input from field office supervisors and inspectors and representatives of miners. Documentation of the reviews was excellent. However, there were some minor deficiencies in the approved roof control plan for the Sago Mine. District 3 did not follow their SOP when they granted tentative approvals for roof control plan revisions.

## Mine Ventilation Plan – Review and Approval.

This section deals with general procedures for review and approval of mine ventilation plans in District 3. See the section of this report entitled Approval of Alternative Seals in Sago Mine Ventilation Plan for a detailed discussion of the approval of alternative seals for the Sago Mine

**Requirement:** Mandatory safety standard 30 CFR 75.370(a) requires that each operator develop and follow a ventilation plan designed to control methane and respirable dust and that the plan be suitable to the conditions and mining system at the mine. The ventilation plan is required to consist of two parts: the plan content prescribed in 30 CFR 75.371 and the ventilation map with information prescribed in 30 CFR 75.372. Only that portion of the map that contains information required by 30 CFR 75.371 is subject to approval by the district manager.

Mandatory safety standard 30 CFR 75.370(g) requires the plan to be reviewed by an authorized representative of the Secretary at least every 6 months to assure that the plan is suitable to current conditions in the mine.

Mandatory safety standard 30 CFR 75.372(a) requires the mine operator, at intervals not to exceed twelve months, to submit to the district manager three copies of an up-to-date mine map certified by a registered engineer or surveyor. Mandatory safety standard 30 CFR 75.372(b) specifies information that must be included on the mine ventilation map.

**MSHA Policies and Procedures:** The MSHA *Program Policy Manual* outlines basic principles to be applied in administering each district's mine plan approval responsibilities.

The *Mine Ventilation Plan Approval Procedures Handbook, PH92-V6*, issued on May 27, 1992, establishes guidelines and instructions for evaluating and processing mine ventilation plans. The handbook states that the purpose of a mine ventilation plan is to define minimum ventilation and respirable dust control requirements for normal mining conditions.

The *Coal General Inspection Procedures Handbook* states that the inspector shall determine that all approved plans are being followed, are up-to-date, and are appropriate.

**Statement of Facts:** District 3 had a standard operating procedure (SOP) for the review and approval of ventilation plans, supplements, and revisions that complied with current regulations, policies, and procedures. Specialists reviewed new plans, supplements, and revisions and conducted 6-month reviews of existing plans. Inspectors completed plan review forms (MSHA Form No. 2000-204) during regular inspections. The SOP required a tracking sheet to be used for plan and supplement reviews to ensure all pertinent information was considered. Memoranda for

communicating the specialists' conclusions regarding the adequacy of the plan were completed during the 6-month review process.

During reviews, specialists were to consider the accident and injury experience, history of methane ignitions, violation history (as it relates to ventilation), plan criteria, input from field office supervisors and inspectors, and information reported on plan review forms (MSHA Form 2000-204). Specialists also reviewed any information received from other technical service groups or representatives of miners. The ventilation supervisor and the Technical ADM reviewed the specialist's recommendation before forwarding it to the District 3 Manager. The District 3 Manager then provided correspondence to the mine operator as to the results of the review.

The District 3 Manager approved the ventilation plan for the Sago Mine on May 5, 2005. Three supplements, three revisions, and four test areas were submitted and approved prior to the explosion. District 3 specialists completed a 6-month review of the ventilation plan on October 25, 2005. Following the review, the District 3 Manager sent a letter of continuing approval to the operator.

Receipt of required ventilation maps was acknowledged through a letter from the District 3 Manager dated April 25, 2005.

The internal review team determined that the approved ventilation plan for the Sago Mine had the following deficiencies:

- Page 2 of the approved plan contained dust control parameters for a Joy 14CM15 continuous mining machine. The MMU (Mechanized Mining Unit) number for the continuous mining machine was not identified.
- Pages 6 and 7 of the plan identified three belt conveyor flights and one loading point with designated sampling area No. 802 located in the section intake and designated sampling area No. 502 located 20 feet outby the section feeder. At the time of the explosion, the Sago Mine had six belt conveyor flights and two loading points. The approved plan did not address dust sampling of the additional loading point and belt conveyor flights or the air used to ventilate the belt conveyor entries before this air exited the mine. The Sago Mine utilized a blowing fan.
- The description of the bleeder system on Page 8 of the plan indicated that future bleeder systems would be included on the mine ventilation map submitted in accordance with 30 CFR 75.372. The "Inactive Bleeder Systems and Non-Pillared Worked Out Areas" section on Page 8 stated that weekly examinations would be made at approved evaluation points and/or measurement point locations. The plan did not specifically identify any evaluation points or measurement point locations for the 1<sup>st</sup> Right Panel. The mine map acknowledged by the District 3



Manager on April 25, 2005, did not include any designated bleeder evaluation points or measurement point locations.

- Several submitted ventilation plan pages, revisions and supplements referred to attachments, diagrams, or maps that were not included with the submittals.
  - Drawing Nos. 3 and 5 of the approved ventilation plan refer to page 6a referencing safety precautions. The plan did not contain a page 6a.
  - Item 3 of the “Safety Provisions” in the October 4, 2005, submittal referred to an Attached Equipment Schematic that was not included with the submittal.
  - An October 21, 2005, letter from the District 3 Manager approved a supplement for a test area for mining the lower seam in Panel A. The operator’s submittal letter did not include the name or signature of an agent of the operator.
  - A December 19, 2005, supplement approving mining of the lower seam in the A2 Panel referred to a detailed cut sequence map and a list of safety precautions that were not included with the submittal.
- The District accepted a partially certified mine ventilation map. Maps submitted by Alpha Engineering Services, Inc. for the Sago Mine were returned to the operator with a letter from the District 3 Manager, dated January 21, 2004, stating that the maps could not be accepted as certified. The “Notes” section of the map prepared by the certifying professional engineer contained a statement indicating that information shown on the maps dated prior to September 1, 2003 was not certified. These items included surface structures, surface facilities, gas wells, oil wells, property lines, surface waters, water wells, surface mined areas, adjacent underground mining, and overlying/underlying underground workings. The mine ventilation maps submitted on April 7, 2005, contained a similar statement that also included a note indicating work was currently underway to confirm the location of all the items. The maps were acknowledged by the District 3 Manager in a letter dated April 25, 2005. During interviews, the ventilation supervisor indicated that this was an allowable practice that was confirmed during a telephone call to headquarters personnel.
- The mine ventilation map acknowledged on April 25, 2005, did not contain some of the information required by 30 CFR 75.372. Personnel door spacing exceeded 600 feet in some areas of the mine. Adjacent mine portals were shown within 1,000 feet of the Sago Mine workings but details of the adjacent mining were not mapped. The quantity of air at each mine portal was not provided.

**Conclusion:** District 3 personnel followed procedures outlined in the District’s SOP in approving the ventilation plan, revisions, and supplements. Specialists reviewed the plan at 6-month intervals and considered mine history and input from field office supervisors and inspectors and representative numbers of miners. Documentation of 6-

month reviews was excellent. There were several minor deficiencies, however, in the approved ventilation plan and ventilation map.

## **Training Plan – Review and Approval**

**Requirement:** Mandatory Safety Standard 30 CFR 48.3(a) states, in pertinent part, that each operator of an underground mine shall have an MSHA-approved plan containing programs for training new miners, training experienced miners, training miners for new tasks, and providing annual refresher training and hazard training for miners.

Mandatory requirements for a training plan to include training and retraining of miners working in underground mines and surface areas of underground mines are set forth in 30 CFR 48, Subparts A and B.

Mandatory safety standards 30 CFR 75.160 and 77.107 require each operator to provide a program of training and retraining for both qualified and certified persons needed to carry out functions prescribed in the Act for underground and surface areas of underground mines.

**MSHA Policies and Procedures:** Chapter 3 of the *Coal General Inspection Procedures Handbook* states that during every regular inspection at an underground coal mine, the inspector shall determine that all approved plans are being followed, are up-to-date, and are appropriate.

Chapter 1 of the *Education and Training Procedures Handbook*, November 2003, gives general guidelines for the approval of training plans.

**Statements of Fact:** The mine operator submitted the training plan for the Sago Mine on November 24, 2003. The training plan for the Sago Mine was approved by the District 3 Manager on January 20, 2004. The plan addressed Parts 48, 75, and 77. An amendment to the plan was submitted by the mine operator to add additional instructors. The amendment was approved by the District 3 Manager on September 16, 2004.

In an interview with the District 3 supervisor responsible for Education and Training, the internal review team discovered that Educational Field Services (EFS) employees would review submitted training plans. The plans would then be given to the District 3 supervisor. The supervisor, in the case of the Sago Mine, assumed that EFS had properly reviewed the training plan and determined it was in compliance with Part 48. The supervisor did not recheck the plan against the *Education and Training Procedures Handbook*. The plan was then recommended for approval.

The internal review team identified the following minor deficiencies in the approved training plan.

- Hazard Communication (HazCom) training was not included for Experienced Miner training.

The internal review team reviewed the inspection notes and reports for the four regular inspections conducted prior to the explosion. There was not any documentation in the notes or reports that the training plans were reviewed or the deficiencies were identified by District 3 inspectors.

**Conclusion:** The procedures used in District 3 for reviewing and approving training plans were not effective. District 3 relied on plan reviews by Educational Field Services and did not provide oversight to ensure that the plans met all requirements of Part 48 before approval.

## Mine Rescue and Recovery

**Requirement:** Section 103(k) of the Mine Act states that in the event of any accident occurring in a coal or other mine, an authorized representative of the Secretary, when present, may issue such orders as he deems appropriate to ensure the safety of any person in the coal or other mine, and the operator of such mine shall obtain the approval of such representative, in consultation with appropriate State representatives, when feasible, of any plan to recover any person in such mine or to recover the coal or other mine or return affected areas of such mine to normal.

Title 30 CFR Part 49 provides that every operator of an underground mine must assure the availability of mine rescue capability for purposes of mine rescue and recovery. In addition to the availability of mine rescue teams, Part 49 establishes requirements for alternative mine rescue capability, mine rescue stations, equipment and maintenance, physicals for mine rescue teams, training for mine rescue teams, and mine emergency notification plans.

At the time of the explosion, 30 CFR 50.10 stated, "[i]f an accident occurs, an operator shall immediately contact the MSHA District Office having jurisdiction over its mine. If an operator cannot contact the appropriate MSHA District Office, it shall immediately contact the MSHA Headquarters Office in Arlington, Virginia by telephone, at (800) 746-1553." As defined in 30 CFR 50.2, the term "accident" includes an unplanned ignition or explosion of dust or gas.

**MSHA Policies and Procedures:** The *MSHA Program Policy Manual* provides interpretations of the standards with regard to how teams that have been designated by the operator can satisfy the requirements of 30 CFR Part 49.

The *Headquarters Mine Emergency Response Procedures Handbook* (AH99-III-8) outlines procedures to be followed by MSHA headquarters organizations and selected field organizations in responding to a full scale mine emergency.

The District 3 *Mine Emergency Response Plan*, dated November 2004, sets forth the procedures to be followed by District 3 managers, supervisors, and employees in responding to a full-scale mine emergency.

*Instructor's Manual for Mine Rescue Training – Coal* (IG 7), and *Principles of Mine Rescue* (IG 16) set forth established basic principles of mine rescue and recovery. Even though these materials are not formal policies, they do provide MSHA enforcement personnel with important guidelines to follow during a mine rescue and recovery operation. The materials have been designed in accordance with the Federal requirements for team training under 30 CFR Part 49 to satisfy the requirement for 20 hours initial training on the use, care, and maintenance of the team's breathing apparatus, advanced or refresher training to satisfy the requirement for at least 40 hours of refresher training annually, and 12 hours of mandatory training for all entry level coal inspectors. The following are excerpts from these documents that highlight specific issues addressed by the internal review team.

*Instructor's Manual for Mine Rescue Training – Coal* (IG 7) outlines the following:

- As a mine rescue team explores, they must keep in mind that their first priority is team safety. The rescue of survivors comes second. The third priority is the recovery of the mine.
- The initial role of the rescue team after an explosion is normally to explore and assess conditions. Once this is completed, the teams will begin the process of reestablishing ventilation and recovering the mine.
- Mine Rescue teams should be briefed and debriefed to be informed as much as possible about what has happened in the mine and what conditions currently exist.
- Following some explosions or inundations, conditions may make it possible to conduct an initial exploration without self-contained breathing apparatus. This is known as "barefaced" exploration. Barefaced exploration should stop at any point where disruptions in ventilation are found or when gas tests indicate the presence of any carbon monoxide or other noxious gases, elevated methane, or oxygen deficiency. A barefaced crew should also stop exploration when they encounter smoke or damage.
- Another standard exploration procedure is to "tie in" as the mine rescue team advances. "Tying in" is the process by which you systematically explore all crosscuts and adjacent entries as you advance so that you are never in by an

unexplored area. By tying in and ensuring that there is never any unexplored area between you and the fresh air base, you are protecting your own safety. Even though you know (or think you know) where survivors are located, or where a fire or explosion has originated, it's absolutely essential for the mine rescue team to tie in as they advance.

- The team must also have a portable or sound-powered communication system. The system's wire or cable must be at least 1,000 feet long, and it must be strong enough to be used as a manual communication system (or "lifeline"). The distance the mine rescue team can advance depends on underground conditions. However, it is often recommended that the mine rescue team limits its advance to 1,000 feet.
- Testing for carbon monoxide and explosive gases in the return airways is essential so that the teams can be withdrawn from the mine if a dangerous situation develops.
- No sudden changes should ever be made to the ventilation. The rule-of-thumb when altering ventilation is not to change the ventilation into an unexplored area.

*Principles of Mine Rescue* (IG 16) outlines the following:

- NEVER change airflow into and through unexplored areas.
- In ventilating any portion of a mine after an explosion, the afterdamp (asphyxiating mixture of gases after a fire or explosion) must be routed to the outside.

**Statement of Facts:** At 6:26 a.m. on January 2, 2006, an explosion occurred in the Sago Mine. At the time of the explosion, 29 miners were underground. The explosion occurred in by the 2 North Mains seals, and destroyed all 10 of the seals used to separate the area from the active portion of the mine.

Mine management officials entered the mine in an attempt to assess the situation. The 1<sup>st</sup> Left Foreman remained underground and eventually joined this group. They found that the explosion had damaged ventilation controls. In an effort to reach the missing miners, they attempted to restore ventilation, using temporary ventilation controls. The group was unable to clear the smoke and gasses, and eventually ended their rescue attempt and evacuated the mine. They met with and briefed MSHA, West Virginia Office of Miners' Health, Safety, and Training (WVOMHS&T), and company personnel.

The 2<sup>nd</sup> Left Parallel miners' attempt to evacuate was unsuccessful and they barricaded themselves in the 2<sup>nd</sup> Left Parallel section. One miner died of carbon monoxide poisoning shortly after the explosion. All other miners eventually evacuated the mine.

There was an 84-minute delay from the time the explosion occurred until the operator notified MSHA. At 7:50 a.m. (1 hour and 24 minutes after the explosion), Johnny Stemple, Assistant Director of Safety and Employee Development for the Sago Mine, first attempted to contact Ken Tenney, MSHA Field Office Supervisor in the Bridgeport office. Stemple left a message for Carlos Mosely, MSHA Assistant District Manager, at 8:10 a.m. MSHA first became aware of the explosion when Stemple spoke to Jim Satterfield, another Bridgeport field office supervisor, at 8:28 a.m. Satterfield issued a verbal section 103(k) order<sup>9</sup> at 8:32 a.m.

Within 10 minutes, Satterfield placed calls to several District 3 MSHA officials and left messages. Satterfield also called several inspectors from the Bridgeport field office by 8:50 a.m. They traveled to the Bridgeport field office to gather their inspection equipment and vehicles. At 9:30 a.m., several inspectors and Satterfield left the Bridgeport field office to travel the 41 miles to the Sago Mine. They were the first MSHA personnel to arrive on site at 10:25 am; 2 hours after being notified, and approximately 4 hours after the explosion occurred. Satterfield was the primary decision maker for MSHA at this time.

Kevin Stricklin, the District 3 Manager, was notified of the explosion at 10:59 a.m. by Jeff Kravitz, Chief of Mine Emergency Operations and Special Projects. Since January 2<sup>nd</sup> was a federal holiday, Stricklin was not at work. Stricklin ran an errand that morning, returned home around 8 a.m., and left his work cell phone in his vehicle after checking it for messages. His home telephone did not ring until 10:59 a.m. when he received a call from Kravitz. Attempts to contact him earlier proved unsuccessful due to telephone service problems.

The following table shows the travel distances and notification times of key District 3 personnel and their response times to the emergency.

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<sup>9</sup> Section 103(k) provides that, "In the event of any accident occurring in a coal or other mine, an authorized representative of the Secretary, when present, may issue such orders as he deems appropriate to insure the safety of any person in the coal or other mine, and the operator of such mine shall obtain the approval of such representative, in consultation with appropriate State representatives, when feasible, of any plan to recover any person in such mine or to recover the coal or other mine or return affected areas of such mine to normal."

### Notification, Travel and Arrival Times of Key District 3 Personnel

Person Notified	James Satterfield	Inspector 1	Ron Wyatt	William Ponceroff	Inspector 2	Willie Spens	Kevin Stricklin
Time notified of explosion	8:30 AM	8:50 AM	8:38 AM	8:40 AM	8:45 AM	9:30 AM	10:59 AM
Notified By	Johnny Stemple	James Satterfield	James Satterfield	Ron Wyatt	James Satterfield	William Ponceroff	Jeff Kravitz
Time left house to go to MSHA office	9:00 AM	9:00 AM	9:05 AM	8:50 AM	9:00 AM	9:50 AM	11:10 AM
Miles from house to MSHA office	7	5	11	18	35	4	42
Arrival time at MSHA office	9:15 AM	9:10 AM	9:19 AM	9:15 AM	9:30 AM	10:00 AM	12:05 PM
Time left MSHA office to go to the mine	9:30 AM	9:30 AM	9:45 AM	9:45 AM	9:30 AM	10:30 AM	12:10 PM
Miles between MSHA office and mine	41	41	76	76	41	76	76
Arrival time at the mine	10:25 AM	10:25 AM	11:40 AM	11:40 AM	10:25 AM	12:00 NOON	1:45 PM

About 10:00 a.m., Ron Wyatt, District 3 Staff Assistant, notified William Crocco, Coal Accident Investigation Program Manager, who works in MSHA headquarters. Crocco notified Kravitz at 10:15 a.m. Kravitz mobilized the MSHA Mine Emergency Unit (MEU). The MEU unit is comprised of MSHA mine rescue team members from several districts, equipment, and vehicles that include a mobile command center vehicle, a gas analysis van, ventilation van, a television truck, MEU mine rescue team truck, the explorer robot, and electrical truck.

The gas analysis van and the ventilation van were being used at the West Elk Mine in Colorado, making them unavailable for use at the Sago Mine. Since these trucks were unavailable, gas analysis equipment, including a gas chromatograph and an infrared (IR) gas analyzer were transported from the MSHA Safety and Health Technology Center (SHTC) located in Bruceton, PA, to the mine and set-up for use in the command center vehicle.

The television truck contains two self-contained systems consisting of two complete television probes. This truck was readied for deployment to the Sago Mine from the Bruceton office; however, the mining company had already contracted for this service and the TV probe system was not deployed.

The explorer robot is used for exploration in areas that may be unsafe for mine rescue teams to enter. This permissible robot is self-propelled, can transmit live video footage as it advances, can perform gas analysis and take air samples. The robot is usually stationed at the Mine Academy in Beckley, WV, but at the time of the Sago Mine explosion it was at a repair facility in Knoxville, TN.

The following table shows what MEU vehicles and equipment were used at the Sago Mine and the time they arrived on site.

MEU Vehicles/Equipment Used at Sago Mine	Location of Vehicles/Equipment	Time of Departure on January 2	Time of Arrival
MEU Mine Rescue Team Truck	Beckley, WV	12 noon	3:30 pm
Mobile Command Center Vehicle	Beckley, WV	2:30 pm	5:30 pm
Gas Analysis Equipment	Bruceton, PA	2:00 pm	5:15 pm
Ventilation Equipment	Bruceton, PA	2:00 pm	5:15 pm
Office Trailer	Beckley, WV	12:05 pm January 3	3:00 pm January 3
Explorer Robot	Knoxville, TN	6:30 pm	2:30 am, January 3

The seismic location truck stationed at the Bruceton, PA, office, was prepared for mobilization at 1:30 p.m., but was never deployed to the Sago Mine.

When the first two District 3 inspectors arrived at the mine at 10:25 a.m., they were assigned by Satterfield to go to the return portals to begin monitoring for fire gases. Initial carbon monoxide (CO) concentrations, measured with Solaris hand-held detectors, were 500 parts-per-million (ppm), the maximum which could be measured with these detectors. The actual CO level was likely to have been much higher. At 11:30 a.m., 5 hours after the explosion, mine rescue teams began arriving at the mine. Carbon monoxide concentrations, measured at 12 noon, were in excess of 1,999 ppm. The concentrations were measured with advanced instrumentation provided by the mine rescue teams. The measured elevation of CO became a factor in the decision to delay mine rescue teams from going underground because elevated CO levels may have indicated a fire was burning. Because of the increase in the readings, MSHA, WVOMSH&T and company officials thought that some event, either a second explosion or a fire that increased in magnitude, had occurred. They agreed that a downward trend in the CO levels was needed before rescue teams could be sent underground.

At 12:00 p.m., Ponceroff and Wyatt arrived at the mine and were briefed. They went to the mine pit area and learned that carbon monoxide levels were being monitored at the



return portal every fifteen minutes. These readings were taken by MSHA and mine rescue personnel. At 12:20 p.m., the CO levels in the mine pit were determined to be too high for anyone to stay in the atmosphere without a breathing apparatus. After this time, mine rescue personnel wearing self-contained breathing apparatus monitored the mine gases. CO levels in the pit area, and in and around the mine office where the command center was being established, elevated to 130 ppm inside the office, 300 ppm outside the office, and over 2,000 ppm in the pit. This led MSHA to issue a section 107(a) imminent danger order requiring all non-essential workers to be removed from the area until the CO levels returned to a safe level. These elevated CO levels continued intermittently around the mine office for 70 minutes, causing confusion in the command center. Officials considered whether to move the command center from the mine office to the company's nearby preparation plant. However, at 1:30 p.m., the CO levels in the mine office and pit area decreased to acceptable levels, so the section 107(a) order was terminated.<sup>10</sup>

Between 12 noon and 1:00 p.m., officials from the mine operator, WVOMHST, and MSHA established the command center in the mine office. Later, miners' representatives joined the command center. This group made all decisions concerning the rescue operation.

The first mine rescue teams were briefed at 1:00 p.m. by the command center, but were not permitted to enter the mine because of concerns over elevated CO. Other mine rescue teams continued to arrive throughout the afternoon and evening hours.

Stricklin arrived at the mine between 1:45 and 2:00 p.m. He was briefed by MSHA personnel and assumed command, making decisions for MSHA throughout the mine rescue and recovery operation.

Normally after an explosion, initial CO levels are very high. In order to determine if a fire is present, a period of time is necessary to evaluate whether CO levels are increasing or decreasing. If the CO levels from the explosion decrease and there is not a later increase in CO levels, a fire does not exist. During interviews, MSHA Technical Support personnel indicated that 72 hours after an explosion is generally recognized as the waiting time to determine if the mine atmosphere has stabilized to minimize the possibility of a second explosion. Since there were miners unaccounted for, however, the trending had to be determined much faster. Hand held detectors could not be relied upon for accurate trending measurements because they had a maximum CO detection

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<sup>10</sup> Section 107(a) provides that, "If, upon any inspection or investigation of a coal or other mine which is subject to this Act, an authorized representative of the Secretary finds that an imminent danger exists, such representative shall determine the extent of the area of such mine throughout which the danger exists, and issue an order requiring the operator of such mine to cause all persons, except those referred to in section 104(c), to be withdrawn from, and to be prohibited from entering, such area until an authorized representative of the Secretary determines that such imminent danger and the conditions or practices which caused such imminent danger no longer exist. The issuance of an order under this subsection shall not preclude the issuance of a citation under section 104 or the proposing of a penalty under section 110."

capability of 500 parts per million. Other means for determining trending was necessary.

Gas chromatographs are used to help determine trends in mine gases. MSHA's gas chromatograph was deployed from the Bruceton office at 3:00 p.m. The MSHA gas chromatograph and infrared (IR) gas analyzers arrived at the mine at 6:00 p.m. By 7:20 p.m., the infrared detectors were ready and being used. A gas chromatograph from Consolidation Coal Company (CONSOL) was set up and ready to analyze samples at 3:00 p.m. MSHA's chromatograph was set up, but was not ready to analyze gas samples until 12:05 a.m. on January 3. MSHA's chromatograph was taken to the mine from a laboratory in Bruceton and was not intended to be portable. This chromatograph is technologically more advanced and thereby more sensitive than the one provided by the local coal company. Accordingly, set-up and calibration of the unit required more time.

By using CONSOL's chromatograph, the CO levels were determined to be trending downward with no evidence of a fire at 4:15 p.m. At 4:55 p.m., the mine operator submitted a plan for the start of exploration which was approved by MSHA and WVMHS&T. The plan called for Tri-State Team A to enter the No. 5 intake entry and to explore the first 1,000 feet. Tri-State Team B would serve as their backup in the event Team A personnel experienced any type of difficulty. At 5:12 p.m., the mine operator submitted a new plan switching the Tri-State teams to the CONSOL teams, since CONSOL's teams had more experience in mine rescue than any other team present. The first mine rescue team went underground at 5:25 p.m., nearly 11 hours after the explosion.

Starting in the intake entry, the mine rescue team began a systematic exploration of the mine (advancing and tying in). At 6:57 p.m., the team encountered water at Crosscut 21 of the Number 1 belt. The water was in the track and return entries. This water was accumulating from the 1<sup>st</sup> Northeast Mains seals, which are located 5 crosscuts inby Crosscut 21. The mine normally operates a 58-horsepower pump located in the return entries to keep the water from accumulating and restricting ventilation. The pump operates continuously. Electrical power had been removed from underground at 7:30 a.m., which de-energized the pump.

Ray McKinney, Administrator for Coal Mine Safety and Health, arrived at the mine at 7:00 p.m. to provide support. McKinney did not take charge of rescue operations for MSHA.

A plan was approved to allow the pump to be energized to pump the standing water at 7:30 p.m. Power was restored to the pump at 7:55 p.m., and exploration then resumed.

The mine rescue teams continued the systematic exploration of the mine until 2:40 a.m. on January 3. By this time they had reached Crosscut 34 of the Number 4 conveyor belt. The teams observed a "red light" about four crosscuts inby their position. It was

determined that the light was from a carbon monoxide sensor that was used to monitor the conveyor belts for fire. For the light to be operational, the carbon monoxide monitoring system had to still be energized. Since this monitoring system is on a different power source than the rest of the underground electrical equipment, it was overlooked when the underground power was removed. For the teams' safety, command center personnel withdrew them from the mine. The teams arrived on the surface at 3:40 a.m. Power was removed from the monitoring system at 3:57 a.m.

While the teams were exploring underground, preparations for a borehole were started on the surface. This borehole was to penetrate the 2 Left Parallel at Crosscut 23, directly over the section loading point. Determining the exact location on the surface proved to be difficult. Due to the inclement weather, it took several hours for surveyors to get accurate readings with global positioning system (GPS) equipment. Surveyors arrived at the site at 2:00 p.m. on January 2, but it took until 11:30 p.m. for the borehole to be located. Site preparation (leveling the drill pad, setting up the drill rig) took until 2:45 a.m. on January 3. At this time drilling of Borehole No. 1 began.

At 4:03 a.m. on January 3, command center personnel were informed that Borehole No. 1 should penetrate the mine in approximately 1 hour. Because the drill would cut into an area of unknown atmosphere, no persons could be underground when the drill penetrated the mine. The command center decided there was not enough time to send the teams back underground to continue exploration before they would have to be withdrawn again. As a result, the teams remained outside until after the borehole intersected the mine and it was safe for teams to re-enter.

At 5:35 a.m., Borehole No. 1 intersected the mine at the 2 Left panel section feeder. The mine atmosphere was sampled at 5:39 a.m. with the following results: CO levels were 1280 ppm, methane levels were 0.4 %, and oxygen levels were 20.3 %. At 5:42 a.m., a ten minute quiet period began, which would allow the missing miners to signal the surface by striking the drill steel. After no signal was heard, the drill steel was removed from the borehole.

Robert Friend, Acting Deputy Assistant Secretary, arrived at the mine approximately 5:30 a.m. to provide support. Friend did not take charge of rescue operations for MSHA.

At 6:33 a.m., a contractor-operated television camera was lowered into the mine through the borehole. The camera lens was covered with mud the first attempt, and was removed for cleaning. At 7:02 a.m., the camera was again lowered into the borehole. The video showed no evidence of the missing miners or explosive forces on the section.

Mine rescue teams were able to re-enter the mine at 6:57 a.m. MSHA's exploration robot also entered the mine at this time with the rescue teams. (The exploration robot had been retrieved from the repair facility in Knoxville, TN, at 6:30 p.m. on January 2,

and arrived at the Sago Mine at 2:30 a.m. on January 3.) Officials decided that the robot could speed up exploration by sending it ahead of the mine rescue teams to determine the carbon monoxide levels. If the CO levels were safe, the rescue teams could move farther and faster before having to establish a new fresh air base. The mine rescue teams and robot traveled into the mine to Crosscut 27 of the Number 4 belt.

At 7:34 a.m., the exploration robot began advancing from Crosscut 27. The robot advanced up the track entry because it could navigate on the graveled track bed easier than the uneven terrain of other entries. The mine rescue teams continued exploration independent of the robot. The robot traveled to Crosscut 32 at 8:00 a.m. and transmitted back video images and gas measurements. One of the robot's video cameras was used to view into the adjacent crosscut to determine if ventilation controls were intact. While the camera was pointed toward the crosscut, the robot was trammed forward. The robot ran off the track and tilted over. One of the robot's tires was damaged and this disabled one of the caterpillar tracks. At 8:48 a.m. it was determined that the robot could not advance any further.

Mine rescue teams continued to explore along 4-belt, and discovered the 1<sup>st</sup> Left crew's abandoned mantrip near Crosscut 50. Rescue team personnel disconnected the power on the mantrip, and continued their exploration. At 5:20 p.m., the rescue teams located the first victim, Terry Helms. Exploration continued and the destroyed seals were discovered. The mine rescue teams proceeded to explore the 2<sup>nd</sup> Left Parallel section.

Because the command center had information that the mine atmosphere in the 2<sup>nd</sup> Left Parallel was not life-threatening, they directed the teams to "shotgun," or proceed immediately to the faces of the 2<sup>nd</sup> Left Parallel instead of systematically exploring the entries. It is established mine rescue protocol, as described in IG 7, that teams will not advance more than 1,000 feet before establishing a new fresh air base. Communication cables, which also serve as lifelines, are usually 1,000 feet in length. Going beyond this 1,000-foot distance increases the risk to the team.

In order for the teams to maintain communication with the fresh air base, the following occurred.

- The fresh air base communication officer, who stayed in touch with the command center on the surface and the communication member of the mine rescue team, was located at Crosscut 58 of the Number 4 belt.
- A 'hard' phone line was advanced to Crosscut 59 where a rescue team member was stationed with a headset and a hand held radio.
- As the team advanced the 26 crosscuts to the face of the 2<sup>nd</sup> Left Parallel, another team member was stationed between Crosscuts 8 and 10 of the 2<sup>nd</sup> Left Parallel with a hand held radio. These two communication members had to be in direct line of sight in order for the radios to function.

- The next communication point was the hand held radio that the rest of the team took with them to the face of the 2<sup>nd</sup> Left Parallel at Crosscut 26. This radio also had to be in line of sight to be able to communicate with the team member between Crosscuts 8 and 10.

As a result, there were five communication links between the rescue team and the command center on the surface.

The mine rescue team left the fresh air base at Crosscut 58 at 11:17 p.m. Using the shotgun method, the mine rescue team reached the face of the track entry at Crosscut 26 at 11:40 p.m. As the team explored across the faces, they advanced to the Number 3 entry. The team found curtains hung across the entries that were intended to be barricades. At 11:41 p.m., the rescue team found one survivor, Randal McCloy, and 11 deceased miners in the Number 3 heading. Using the method of communication described above, word was relayed to the fresh air base, then on to the command center on the surface. The message received by the command center at 11:46 p.m. was that all 12 miners were found alive behind the barricade.

The team that found the survivor prepared him for transport from the section. It was decided that none of the deceased miners would be brought out at that time. Meanwhile, the “back-up” rescue team at the fresh air base was given permission to go to the face to help with what they and command center personnel thought were 12 survivors. On the way to the face, they met the rescue team coming out of the mine with the sole survivor. The back-up team then first learned that there was only one survivor. When these teams reached the fresh air base at 12:30 a.m. on January 4, they contacted the command center and informed them that only one miner had survived. The rescue team arrived on the surface with the survivor at 1:00 a.m., and he was transported by ambulance to a local hospital.

When command center personnel received word at 11:46 p.m. that all 12 missing miners were alive, celebration ensued on the surface. Preparations were made to send medical personnel and supplies and more mine rescue teams underground to assist in bringing the miners to the surface. Due to lack of secure communications between the command center and the fresh air base, many people overheard the erroneous message. The message that all missing miners were alive reached persons at the church where the families were gathered. A celebration commenced by all who were in and around the church. The belief that all 12 miners were alive continued until around 3:00 a.m. on January 4.

Command center officials received the message from the fresh air base at 12:30 a.m. that there was only one survivor. They repeatedly asked for confirmation from the fresh air base for the actual number of survivors. When it became apparent that only one survivor had been found by the mine rescue team, command center officials decided to

send a mine rescue team containing emergency medical technicians (EMTs) to the 2<sup>nd</sup> Left Parallel to confirm with stethoscopes that the remaining 11 miners were deceased. Confirmation was made by the EMTs that all remaining miners were dead. The families were then given the news that only one miner, Randal McCloy, had survived.

Recovery of victims is usually done after the mine has been ventilated, but to keep from prolonging the families' grief, command center personnel asked if the mine rescue teams would bring the deceased miners out of the mine. Since the atmosphere was still contaminated, the recovery had to be conducted using mine rescue apparatus. All 12 deceased miners were recovered and arrived on the surface at 9:55 a.m. on January 4.

The internal review team interviewed all MSHA personnel who participated in the command center. All stated that a well secured command center, with limited accessibility, was not maintained at the mine site. Because doors were open, the area was readily accessible to anyone walking through the mine office building. Also, many persons entered the command center for updates. Conversations were not private because other mine phones on the surface were still connected to the underground mine phone system which was in use by the mine rescue teams.

MSHA Mine Emergency Unit (MEU) team members provide technical and expert assistance and specialized equipment during emergency operations. During mine rescue operations, they can be assigned to the exploration and backup teams to monitor mine rescue team activities and observe general mine rescue and recovery procedures.

The internal review team interviewed three of the MEU team members who participated in the Sago Mine rescue and recovery operations. They indicated that they did not participate in mine rescue team briefings and debriefings on a regular basis, making it difficult for them to keep current with the rescue activities. The MEU team members also stated that they did not receive mine rescue training on a regular basis due to other work duties.

**Conclusion:** Although MSHA personnel were not timely notified of the explosion, their response time was reasonable. Mine management's failure to immediately notify MSHA increased the time between the explosion and MSHA's arrival at the mine. Additionally, because the day of the explosion was a federal holiday, MSHA personnel were not in the office when they were notified. As a result, they had to travel from their homes to the MSHA offices to obtain equipment and vehicles. The extra travel time increased the time it took the first MSHA responders to arrive at the mine.

The mine operator did not have gas detecting equipment capable of measuring elevated concentrations of carbon monoxide after the explosion. Additionally, handheld gas detectors capable of measuring elevated concentrations of carbon monoxide were not provided to District 3 personnel to accurately determine carbon monoxide levels.

All available equipment was not dispatched to the mine emergency including seismic equipment which is further discussed in the next section of this report. MSHA's primary gas chromatograph was not available because it was in use at a mine fire at the West Elk Mine in Colorado. In response to the explosion, a laboratory unit was deployed from Bruceton, Pennsylvania, to the mine site.

The mine emergency unit robot was in a repair shop in Tennessee, receiving necessary repairs, and was not immediately ready for mine emergency work. After deployment, the robot became disabled and did not contribute to the rescue and recovery operation.

During a mine rescue, the safety of rescue personnel is the primary concern. Accordingly, command center personnel did not permit rescue teams to enter the mine due to the absence of gas trending information and the uncertainty of the effects of the ventilation changes made by the mine operator prior to MSHA's arrival. The source of the methane accumulation was not known and the presence of a mine fire would significantly increase the danger to the mine rescue teams. Once gas trending indicated a fire was not present, mine rescue teams were given approval to begin exploration.

Several significant events delayed mine rescue team advancement. Water was accumulating in the main return which had to be pumped. Later, electrical power was found to be present on the underground carbon monoxide monitoring system. In addition, the method of tying in to determine the return air quality slowed the rate of the mine rescue teams.

The rescue operation was initially conservative but consistent with accepted mine rescue practices and guidelines. The underground exploration was initially delayed because of the inability to determine gas trending due to inadequate instrumentation. Events and mine conditions parallel to the rescue operation (borehole intersecting the mine, water in the return, power on the CO system, etc.) slowed exploration. The rate of exploration of 2<sup>nd</sup> Left Parallel was substantially increased, exceeding the 1,000-foot advancement standard, when the command center determined the mine atmosphere had stabilized to a point where it would not be life threatening to mine rescue teams.

The exploration of 2<sup>nd</sup> Left Parallel exceeded the capabilities of the mine rescue teams' communication equipment. As a result, the rescue team established five communication relays between them and the command center on the surface.

The command center and the mine communication system were not secure. The mine office where the command center was located was easily accessible and not guarded to prevent unauthorized entry. Pager phones were located where conversations were easily overheard.

Briefing and debriefing with the MSHA Mine Emergency Unit did not take place on a regular basis.

## Seismic Location System

**MSHA Policies and Procedures:** The *Headquarters Mine Emergency Response Procedures Handbook* outlines general procedures to be followed by MSHA headquarters and selected field organizations in responding to a full scale mine emergency. The handbook establishes a hierarchical chain of communications during a mine emergency. The district manager is instructed to notify the Administrator when a mine emergency occurs. The Administrator in turn notifies the Director of Technical Support. When the district manager requires the assistance of the Mine Emergency Unit (MEU), he or she must make the request through the Administrator.

The District 3 Mine Emergency Response Plan, dated November 2004, sets forth the procedures to be followed by the District Manager, supervisors, and employees in responding to a full-scale mine emergency. The District 3 plan mirrors the headquarters emergency response plan. The plan states that, upon notification of an emergency, the District Manager or other designated District Official shall immediately dispatch appropriate authorized representatives to the mine site. As soon as possible, the District Manager will also determine whether to request the deployment of the Mine Emergency Unit (MEU). Once the MEU has been notified officially by the Administrator, the District Manager will consult directly with the Mine Emergency Response Coordinator (MERC) for the specific mine emergency equipment and/or resources needed. The plan further requires, when an explosion, entrapment of miners or a mine fire lasting more than 2 hours occurs, the Agency's closest or most appropriate MEU and the METT [Mine Emergency Technology Team] shall be notified and deployed to the emergency site. Appropriate equipment shall be promptly readied and deployed with the MEU or METT.

**Statement of Facts:** At approximately 10:00 a.m. on January 2, 2006, the District 3 Staff Assistant notified the Coal Accident Investigation Program Manager in headquarters of the explosion at the Sago Mine. The Coal Accident Investigation Program Manager notified the Chief of Mine Emergency Operations and Special Projects, who mobilized the MSHA Mine Emergency Unit (MEU).

According to the District 3 Mine Emergency Response Plan, it was the responsibility of the District 3 Manager to request seismic location equipment. The District 3 Manager did not request the seismic location equipment. In his interview with the internal review team, the District 3 Manager stated that he thought it would be dispatched automatically. He also stated that he did not think it would have been useful because of the time needed to set up the unit and the limitations of the system.

The seismic location truck, stationed at the Bruceton office, was prepared for mobilization at 12:30 p.m., but was never deployed to the Sago Mine. The mini-seismic system was ready for deployment to the Sago Mine at 2:00 p.m. Jeff Kravitz, Chief of



Mine Emergency Operations and Special Projects, left for the mine with this unit at 5:15 p.m. and arrived at 8:30 p.m.

MSHA Technical Support provided a document to the internal review team that explained the seismic equipment set-up procedures, set-up and usage time frames, and equipment capabilities and limitations. The following table shows the steps and time frames associated with set-up and use of MSHA's seismic equipment.

Step	Procedure	Time Frame
1	Arrival of personnel at the SHTC and preparation to depart for the mine	2 to 4 hours
2	Travel to the mine	3 hours to Sago Mine
3	Briefing at the mine/Site assessments/Physical location assessment	1+ hours
4	Survey set-up location for geophone sub-array placement	4-6 hours or longer
5	Install 7 geophone sub-arrays on surface over search area of the underground mine and test for proper function. <ul style="list-style-type: none"> <li>• Each sub-array consists of 7 geophones that are buried six inches in the ground and covered</li> <li>• Natural and man-made noise sources prevent system set-up</li> </ul>	4 hours
6	Refraction survey including test surface shots	3-5 hours
7	Drill three 20' holes, load, and detonate explosives to alert miners that system is ready for them to sound the roof.	2-3 hours
8	Listen for miner response	1 hour
9	If miners respond, process miner response and coordinate with mine map to determine location of miners	1-2 hours
10	Drill five 20' holes, load, and detonate explosives to notify trapped miners that they have been located	2-3 hours

Some of these steps may be conducted simultaneously; however, the mobilization, transportation, and set-up of the equipment would have taken between 14 to 24 hours from the time of notification. Due to the inclement weather on January 2, it took several hours for the company surveyors to get accurate readings with the global positioning system (GPS) equipment. Determining the exact location on the surface proved to be difficult. The survey used to position the drill for the first borehole would have been the same survey used to position the seismic location system. Surveyors arrived at the

site at 2:00 p.m., but it took until 11:30 p.m. to establish the location above the 2 Left Parallel section. According to the time charts, it would have taken another 10 to 13 hours to set up the seismic equipment to locate the miners. As a result, the earliest the seismic equipment could have been operational was 10:00 a.m. on January 3, 2006.

The seismic location system has never located a trapped miner. For example, the system was set up at the Quecreek Mine after water inundated the mine. However, the missing miners had been already located when a 6-inch drill steel penetrated the coal seam where the miners were trapped. After rising water forced them away from the 6-inch drill hole, the miners were not heard from again until 73 hours after the inundation when a 30-inch drill hole penetrated the mine.

The miners stated that while they were entrapped, they waited for the three-shot signal from the surface. Although no signals were sent from the surface, the miners continued to pound on a roof bolt in an attempt to signal the surface. Their signaling by pounding on the roof bolt was not heard on the surface, even with the seismic listening equipment, due to the high levels of background noise.<sup>11</sup>

The seismic location system was also used following an underground explosion in 1992 at the Southmountain Coal Co., Inc., No. 3 Mine in Wise County, Virginia. That explosion occurred on December 7 at 6:15 a.m. It was December 9 at 2:25 p.m. before the seismic location system was set up and ready to initiate location of the missing miners -- more than 54 hours after the explosion.<sup>12</sup>

MSHA's seismic location equipment is based on 26-year old technology and its accuracy is to within 50 to 100 feet.

**Conclusion:** The seismic system was not deployed to the Sago Mine for several reasons. MSHA officials decided that the approximate location of the miners was known and that mine rescue teams would be able to enter the mine if the downward trend continued. The truck mounted seismic system is obsolete, takes too long to deploy, and has never located a missing miner. The time needed to set up the unit after it arrived at the Sago Mine would have been at least 16 hours, and all rescue operations, including drilling, would have had to cease during use.

The GPS survey used to position the drill for the first borehole would have been the same survey used to determine the position the seismic location system geophone arrays. Significant delays in establishing the borehole location above the 2<sup>nd</sup> Left Parallel section made use of the seismic system impractical.

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<sup>11</sup> *Report of Investigation, Underground Coal Mine Nonfatal Entrapment, Quecreek No. 1 Mine, ID No. 36-08746, Black Wolf Coal Company, Inc., Quecreek, Somerset County, Pennsylvania, July 24, 2002.*

<sup>12</sup> *Report of Investigation, Underground Coal Mine Explosion, No. 3 Mine, ID No. 44-06594, Southmountain Coal Co., Inc., Norton, Wise County, Virginia, December 7, 1992.*

## Compliance Assistance

**Requirement:** Section 2(g) of the Mine Act states: "It is the purpose of this Act (1) to establish interim mandatory health and safety standards and to direct the Secretary of Health, Education, and Welfare and the Secretary of Labor to develop and promulgate improved mandatory health or safety standards to protect the health and safety of the Nation's coal or other miners; (2) to require that each operator of a coal or other mine and every miner in such mine comply with such standards; (3) to cooperate with, and provide assistance to, the States in the development and enforcement of effective State coal or other mine health and safety programs; and (4) improve and expand, in cooperation with the States and the coal or other mining industry, research and development and training programs aimed at preventing coal or other mine accidents and occupationally caused diseases in the industry."

**Statement of Facts:** District 3 and Technical Support personnel conducted numerous compliance assistance activities at the Sago Mine during the 1-year period prior to the explosion.

January 10, 2005: Two MSHA supervisors met with an Anker Energy official at the Bridgeport field office. Projected mining activities were discussed including development of 2 North Mains and 1<sup>st</sup> Right panel. The relationship between mine management and MSHA was also addressed.

January 12, 2005: MSHA's Assistant District Manager - Inspection Division met with the same Anker Energy official at the District 3 Office in Morgantown and discussed the same topics from the previous meeting.

February 2, 2005: A supervisor, a coal mine inspector, and a coal mine inspector-trainee, all from the Bridgeport field office, gave a presentation describing an accident at another mine to the day shift crews at the Sago Mine.

May 2, 2005: A supervisor met with Anker Energy representatives at the Bridgeport field office to discuss what could be done to improve the conditions at the Sago Mine. The supervisor recommended improved compliance with regulations particularly in the following areas: belt conveyor cleanup and maintenance; rock dusting; organization of de-watering operations; maintenance of clear travel ways along belt conveyors; adequate belt examinations; rehabilitation of the No. 1 Entry from the portal to the section; and leveling and ballasting of track. Anker Energy indicated they would commit to improving compliance at the mine.

May 4, 2005: MSHA's District 3 Manager, Assistant District Manager - Inspection Division, two supervisors, and three of MSHA's Approval and Certification Center Applied Engineering Division Accident Prevention Team members met with International Coal Group's (ICG) representatives at the District 3 office in Morgantown.

The company officials reviewed mining plans for ICG mines in District 3 and discussed management of the mines. They welcomed the Accident Prevention Team and indicated they were looking forward to improving conditions in their operations. The supervisors discussed the mining conditions at the Sago Mine including adverse roof, methane liberation, and water accumulations. The Accident Prevention Team gave a presentation of their accident prevention program and discussed a timetable for implementation.

May 23, 2005: MSHA's District 3 Assistant District Manager - Inspection Division, a supervisor and an inspector visited the Sago Mine. The Assistant District Manager gave a safety talk on roof control to the day shift crews and the group went underground. After returning to the surface, they met with ICG representatives and discussed the following topics: Sago Mine accidents and root causes; management's plans to address these root causes; and management's lack of following through on items discussed at previous meetings.

A new mine superintendent had just taken over the mine. He ordered water pumps, assigned engineers to work on a de-watering system, hired new training personnel, and was working closely with state and federal roof control specialists. He committed to ordering a bulk rock dusting machine and additional gravel cars to improve track conditions. The Assistant District Manager offered the services of MSHA's Technical Support and Educational Field Service groups. Assistance was offered to provide training sessions for mine examiners.

August 16, 2005: The District 3 Assistant District Manager - Inspection Division, a supervisor, and a coal mine inspector visited the Sago Mine and met with ICG representatives. A different superintendent was hired since the last meeting in May. Recent accidents, roof conditions, and citations and orders were discussed. The Assistant District Manager again offered MSHA's assistance in training mine examiners. He emphasized the importance of a structured safety program that maintained continuity through any changes in mine management.

August 23, 2005: The District 3 Manager, Assistant District Manager - Inspection Division, and the two field office supervisor met with MSHA's Accident Prevention Team members and Anker Energy's representatives. The Accident Prevention Team presented the initial results of their Accident Analysis and Incident Reduction Study. This study was based on an analysis of mine accidents, interviews with miners, and observations of working conditions and practices, resulting from several visits to the mine. They made numerous recommendations to Sago Mine management. These recommendations are listed in Appendix E.

October 17, 2005: The District 3 Manager met with Anker Energy's management and discussed activities being conducted at each of the company's mines.

December 14, 2005: The District 3 Manager, a supervisor, and a coal mine inspector visited the Sago Mine and traveled underground with ICG officials. Citations and orders were issued for accumulations of loose coal and coal dust, travel ways along belt conveyors, inadequate air velocity in the belt entry, and inadequate rock dusting.

December 15, 2005: The District 3 Manager, Assistant District Managers from the Inspection and Technical Divisions, the field office supervisors, the staff assistant, and a conference litigation representative, met with ICG officials at the company's office in Buckhannon, West Virginia. MSHA's enforcement policies were discussed in detail. MSHA provided the company with inspection manuals, portions of the *Program Policy Manual*, portions of the *Citation and Order Writing Handbook* including details for evaluating significant and substantial determinations, and unwarrantable failure. The conference litigation representative reviewed the District 3 conferencing procedures.

The Assistant District Manager – Technical Division stressed the need for mine management to conduct audits of their safety program to evaluate their effectiveness and the need for standard operating procedures for basic mining processes. He also offered to contact MSHA's Educational Field Services to assist with training. A supervisor offered to provide assistance in training sessions involving mine examinations. The District 3 Manager offered to conduct quarterly meetings with company officials to enhance communication and invited company officials to participate in the district's quarterly stakeholders' meetings.

December 22, 2005: The Assistant District Manager – Technical Division contacted MSHA's Educational Field Services group and requested assistance with the ICG's training issues.

Prior to the explosion, the Coal Administrator had scheduled a meeting for January 6, 2006, with ICG management, to discuss a comprehensive safety program at ICG operations and concerns identified at the Sago Mine.

**Conclusion:** The internal review team determined that District 3 personnel made extensive efforts to improve the compliance level at the Sago Mine during the year preceding the explosion. In addition to increased enforcement, numerous informational meetings were conducted with company officials, and guidance and assistance was provided in many areas. Additionally, personnel from Technical Support, Approval and Certification Center, and Educational Field Services provided assistance at the Sago Mine.

## Management Issues

### Supervisory and Second-level Reviews

**MSHA Policies and Procedures:** The *Coal Mine Safety & Health Supervisor's Handbook* (AH97-III-6) states that to ensure that inspections and investigations are conducted according to Agency policies and procedures, and that inspectors are properly enforcing the provisions of the Mine Act, first line supervisors must review the work performed by their inspectors and specialists. This is accomplished by reviewing their activities, accompanying them on these activities, and rotating mine assignments.

Supervisors are responsible for reviewing work products generated by the inspectors under their supervision. The supervisor is required to review the documentation for at least one complete major inspection activity for each inspector every 6 months. In addition, supervisors must review a representative number of other inspection reports, citations and orders, and appropriate notes. The supervisor must also accompany each inspector or specialist at least 2 days during each 6-month period on one or more major inspection activities. The purposes of accompanied activities are as follows:

- Determine whether inspectors and specialists are properly enforcing the provisions of the Mine Act and the implementing regulations.
- Determine whether inspectors and specialists are properly enforcing the provisions of approved plans, variances, and petitions for modification.
- Determine whether inspectors and specialists are conducting their activities in accordance with the applicable provisions of the Mine Act and MSHA regulations, policies, and procedures.
- Determine whether inspectors and specialists are clearly communicating their findings to mine operators and miners' representatives.
- Give the supervisor a first-hand look at the condition of the mines.
- Identify any extraordinary efforts or accomplishments of the inspector or specialist.
- Correct any weaknesses identified in the performance of inspectors and specialists.

The handbook also states that second-level managers (i.e., assistant district managers) shall oversee supervisory level reviews and accompanied activities conducted by their first-line supervisors. Each second-level manager shall review at least one Field

Activity Review (FAR) conducted by each supervisor and one accompanied activity by each supervisor every 6 months. The second-level manager shall document the reviews of supervisory level Field Activity Reviews and accompanied activities.

**Statement of Facts:** The field office supervisors changed mine assignments at least every year as required. Documentation was kept by District 3 showing the assignments to different inspectors.

The internal review team reviewed a total of 7 supervisory level reviews, 8 accompanied activities, and 2 second level reviews conducted in District 3 in calendar year 2005. The team reviewed the supervisory level reviews (first level) for inspection activities at the Sago Mine. Since there were not any second level reviews of activities at the Sago Mine for 2005, the internal review team assessed second level reviews conducted at other mines.

#### Supervisory Reviews and Accompanied Activities

The first supervisory level review involving the Sago Mine was made on the regular safety and health inspection conducted from January 4 through March 29, 2005. The supervisor identified two areas for continued emphasis by inspectors: deteriorating roof and rib conditions and face ventilation parameters. No deficiencies were documented by the supervisor. The internal review team identified several items and areas missed during the inspection, including: traveling with the preshift examiner; inspecting all required records; inspecting illumination, first aid kit, communications, firefighting equipment, and potable water on the surface; inspecting calibration of the carbon monoxide system; observing a search for smoking articles; observing or discussing 90-day fire drills; and inspecting at least 10 percent of the operator's self-contained self rescuers during each inspection.

The next supervisory level review involving the Sago Mine was made on the regular inspection conducted from April 5 through June 30, 2005. The supervisor identified that the inspector was placing extra emphasis on neglected and deteriorating outby areas. The supervisor did not identify any deficiencies in the report. The internal review team identified several additional items and areas missed during the inspection, including: traveling with the preshift examiner; inspecting all required records; inspecting communications equipment, firefighting equipment, first aid kit, and potable water on the surface; observing a search for smokers articles; inspecting calibration of the carbon monoxide system; and observing or discussing 90-day fire drills.

The last supervisory level review involving the Sago Mine was made on the regular inspection conducted from July 7 through September 30, 2005. The supervisor documented the mine was improving because it had been placed on the section 104(d) sequence, but more improvement was needed. The internal review team identified several items and areas missed during the inspection, including: traveling with the preshift examiner; inspecting all required records; inspecting illumination, firefighting equipment, first aid kit, and potable water on the surface, and substation; observing a

search for smokers articles; inspecting at least 10 percent of the operator's self-contained self rescuers; discussing or observing a 90-day fire drill; and observing calibration of the carbon monoxide system.

The field office supervisor traveled with inspectors on accompanied activities at the Sago Mine a total of 5 days. During these accompanied activities, the supervisor documented traveling extensive areas of the mine, both on active sections and outby areas. This documentation was made on District created worksheets requiring the supervisor to answer questions. The worksheet appears to be thorough, but most questions can be addressed with one word answers. For example, the condition of the mine is documented as either "fair" or "good" on all five visits.

Second level review notes were not provided for any of these activities. On the five accompanied activity pages provided by the field office supervisor, the second level reviewer (who was the inspection division assistant district manager) only initialed the pages. The pages were not dated, and the ADM did not document any deficiencies.

The District 3 technical division conducted three accompanied activities and three field activity reviews involving the Sago Mine, all by the roof control supervisor. The reviews involved two different roof control specialists. Two of the accompanied activities and field activity reviews were conducted concurrently.

The first two accompanied activities and field activity reviews were conducted on non-injury accident investigations. Both investigations were started on February 1; the first was finished on February 2, and the second was finished on February 3. The first level reviewer documented the reviews on District generated worksheets. He indicated both investigations to be thorough and complete.

The internal review team discovered the supervisor did not document the areas traveled or the condition of the mine. (The District generated worksheets did not require this information.) The Uniform Mine File (UMF) also was not signed for either non-injury accident investigation. The general inspection cover sheet for both investigations document the field office was notified on January 31, but there was not any follow-up to ensure the UMF was signed.

The other accompanied activity and field activity review were conducted on a non-injury accident investigation. This investigation began on August 22 and was completed on August 23. The supervisor's review of the investigation indicated the investigation was thorough and complete, with no deficiencies noted. The supervisor did not document the condition of the mine or the areas traveled by inspection personnel. The uniform mine file was not signed for the investigation. A section 103(k) order was issued on August 22 because of the roof fall that initiated the investigation. The section 103(k) order was terminated on the day of issuance, because the mine operator submitted information to District 3 for a roof control plan revision. The roof control plan revision was not approved until August 29.



The internal review team determined the supervisory review of a section 103(i) spot inspection at another mine did not identify that this inspection should not have constituted a part of any other category of inspections and was not directed specifically to the problems, hazards, or conditions under which the mine was classified as a section 103(i) mine. The inspection report documented the inspector conducted cable bolt tension tests and performed a 6-month roof control plan review. There was not any documentation of methane examinations conducted during this spot inspection for methane liberation. This deficiency was noted by the second level review conducted by the District 3 Assistant District Manager – Technical Division.

#### Second Level Reviews

The internal review team could not find any documentation indicating that the District 3 Assistant District Manager – Inspection Division conducted any second level reviews.

The internal review team examined two second level reviews conducted by the District 3 Assistant District Manager - Technical Division. The first review was conducted on a ventilation supervisor's accompanied activity and field activity review of a regular inspection. The Assistant District Manager's review determined that inspection procedures appeared to be followed and the supervisor's documentation was adequate. The review team determined that the first level supervisor did not properly document the field activity review. None of the required information for the field activity review was documented.

The next second level review was conducted on both the accompanied activity and field activity review for a section 103(i) spot inspection for methane liberation. The second level reviewer identified deficiencies in the inspection notes; some pages of notes were missing, and the notes did not document activities made toward the spot inspection. The inspection report cover sheet contained remarks that indicated cable bolt tension tests and a 6-month roof control plan review were performed. Inspection activities did not include checks for methane. The second level review did not identify that the supervisory review did not document the conditions of the mine.

**Conclusion:** The internal review team determined that both the supervisory and second level reviews for inspection activities were not adequate. The first and second level reviews conducted by District 3 managers did not identify several procedural and enforcement deficiencies. The Assistant District Manager - Inspection Division did not document any second level reviews.

The uniform mine file for the Sago Mine was not signed by supervisors and inspectors for several inspections and investigations covered by these reviews.

## Accountability Program

**MSHA Policies and Procedures:** Volume III, Chapter 900 of the *Administrative Policy and Procedures Manual* sets forth requirements for the MSHA Accountability Program. The purpose of the program is to provide reasonable assurance that Agency policies, procedures, and guidance are being complied with consistently, and that the Agency is accomplishing its mission critical activities.

The *Accountability Program Handbook* (AH04-III-10), March 22, 2004, provides administrators and district managers with policy and guidelines for evaluating the quality of enforcement activities by conducting reviews of district activities, and to provide reasonable assurance that policies and procedures are being complied with consistently throughout Coal Mine Safety and Health.

District Peer Reviews are mandatory, and each District will conduct Peer Reviews of selected field offices annually. The purpose of a Peer Review is to provide field managers and supervisors with feedback on the quality and conduct of their enforcement programs, and to facilitate the implementation of timely and effective actions to eliminate the root causes of deficiencies. Because self-diagnosis and management follow-ups are central to the Peer Review process, these reviews will improve each District to the extent that the quality of enforcement and compliance assistance is improved through better monitoring and follow up. Results of Peer Reviews will also be used by Headquarters personnel to ensure enforcement consistency nationwide and to identify systemic weaknesses and trends, as well as potential best practices within MSHA's inspection programs.

The handbook states Peer Reviews will be conducted by supervisory teams within each District to review the inspection activity of internal work groups or field offices to determine if inspections are being conducted in accordance with established policy and procedures.

Peer Reviews will primarily focus on MSHA's enforcement systems to identify deficiencies in the level and consistency of enforcement, concentrating on those activities that most directly affect the safety and health of the Nation's miners. The review team also shall determine compliance with Agency policies and procedures relative to, but not limited to, the following:

- Required examinations
- Enforcement actions
- Proper level of enforcement relative to the conditions observed
- Appropriate termination due times relative to the severity of cited conditions

- Citations/orders terminated in a timely manner
- Face areas inspected for imminent dangers when conducting inspection activities on the working section
- Examination of all required records and record books
- Review of approved plans to determine adequacy

The District Manager is responsible for developing and implementing a plan of corrective actions to address the findings of the Peer Review. The action plan will include steps to correct the root causes of the deficiencies identified during the review, a method to measure the effectiveness of the corrective action(s), and a timeline for implementation and completion.

The handbook also establishes that Headquarters reviews of districts are to be conducted annually. Each Administrator shall develop an annual plan detailing the number and location of the reviews to be conducted. Headquarters Reviews shall focus primarily on MSHA's enforcement systems to identify deficiencies in the level and consistency of enforcement actions.

The review of a District will be comprehensive and will include an in-depth review of the enforcement activities for a selected operation(s). The review will ensure that significant issues identified during previous Peer Reviews and/or Headquarters reviews have been corrected. The team will review the following areas:

- Inspection Activities
- Mine Plans
- Special Investigations
- Safety and Health Hazardous Conditions Complaints
- Alternative Case Resolution Initiative (ACRI)
- Mine-Site Observations at the Selected Operation(s)

**Statement of Facts:** The internal review team obtained and reviewed documentation for the Peer Reviews conducted in District 3 during calendar year 2005. A headquarters accountability review was not conducted in District 3 during calendar year 2005.

#### District Peer Reviews

District Peer Reviews were conducted in all five field offices in District 3 during 2005. After each of these reviews, memoranda were sent from District 3 management to all

District 3 enforcement personnel describing the issues found during the reviews. In four memoranda from the District 3 Manager to District enforcement personnel and one memorandum from the District 3 Manager to the HQ Accountability Coordinator, “insignificant issues” and positive findings were listed. Examples of issues identified as insignificant included the following:

- No documentation that SCSRs were inspected
- Preshift and weekly examiners not accompanied during inspection
- Certain citations were designated as non-S&S when notes supporting the citation indicated the condition met the criteria for S&S
- No 2<sup>nd</sup> shift inspections
- No sections inspected during off-shifts
- The only record books reviewed were the smokers articles search, preshift, weekly, and belt conveyors records

The internal review team identified many of the same issues during its review of enforcement activities at the Sago Mine. For example, during 3 of 4 regular inspections, inspectors: did not document the inspection of SCSRs; did not travel with the preshift examiner; and did not document the examinations of many mine records.

The internal review team reviewed the same inspection report that the District 3 Peer Review conducted on the Bridgeport field office. The internal review team identified several additional deficiencies that were not found during the Peer Review, including the following.

- The carbon monoxide monitoring system was not inspected nor was calibration observed.
- The 90-day fire drills were not observed nor were discussions held with a representative number of miners.
- Several items on the surface were not inspected, including illumination, communication installations, first aid kit, and potable water.

District 3 did not develop written action plans for the Oakland and Morgantown field offices. Information from the District 3 Accountability Coordinator disclosed that, as a follow up to the 2005 Morgantown field office review, the District reviewed the same mine in 2006. The same issues were not found during this second review. The follow-up review for the Oakland office also did not reveal the same issues.

A review of the available District 3 action plans that were implemented as a result of Peer Reviews revealed that root causes of the deficiencies were not identified or included.

#### Headquarters Review

As part of a 2-year cycle for completion of all CMS&H accountability reviews, the headquarters accountability review of District 3 was scheduled for 2006. However, due to the explosion on January 2, 2006, a more in-depth internal review was conducted at the direction of the Acting Assistant Secretary for MSHA.

**Conclusion:** District 3 Peer Reviews were inadequate. Issues identified by the internal review team were not identified by the Peer Review of the Bridgeport field office. Additionally, issues that were identified by the Peer Review remained uncorrected.

The District 3 Manager did not follow all of the policies or guidelines of the *Accountability Program Handbook*. Corrective action plans to address issues found during the Peer Reviews were not submitted by two field offices. Moreover, submitted action plans did not identify root causes of deficiencies. As a result, effective corrective actions were not implemented. While not documented, District 3 did conduct follow-up reviews of the two offices and found that the initial issues had been corrected. By performing another review of the same mine, District 3 may have limited its ability to evaluate the overall performance of enforcement personnel in the field office, but was able to follow-up on previous issues.

With headquarters concurrence, the District 3 Manager improperly identified significant issues as insignificant in memoranda to enforcement personnel. This may have led inspectors to believe they were consistently following Agency policies and procedures when, in fact, they were not.

## **District Communication**

**Requirement:** None

**Statement of Facts:** District 3 management used specialists to assist field office personnel in conducting regular quarterly inspections. At the beginning of any inspection quarter, the district technical division assistant district manager and supervisors developed a list of planned inspection activities for the specialists. The activities list was distributed to field office supervisors and inspectors. The inspectors would focus on required inspection areas, allowing the specialists to focus on their assigned areas.

During interviews, specialists indicated that they attempted to inspect all assigned areas. The specialists attempted to communicate inspection activities to the field office supervisor or inspector. Field office inspectors stated they did not always know when

specialists were visiting a mine. Inspectors did not always have knowledge of citations that were issued and outstanding at the mine. This resulted in enforcement actions that remained outstanding for some time. When these communication breakdowns occurred, some areas would not get inspected, and other areas would get inspected more than once. When recognized, events had to be re-opened in order to complete the inspections. Also, the section 104(d) tracking record, retained in the field office was not maintained up-to-date.

**Conclusion:** Inspection activities were not efficiently organized due to a lack of communication between the district specialists and field office personnel. This resulted in missed inspection items or duplicated inspection activities.

### **Enforcement and Compliance Efforts at the Sago Mine**

In 2005, District 3 personnel recognized the need for an increased level of enforcement at the Sago Mine due to the number of roof falls that were occurring, the increase in the injury rate, and the mine operator's indifference to compliance. District 3 personnel appropriately and intentionally increased the level of enforcement, which is reflected in the number of unwarrantable failure citations and orders issued in 2005. District 3 inspection personnel issued 185 Section 104(a) citations, 16 Section 104(d) citation and orders, and 3 safeguards.

The uniform mine file was routinely reviewed by inspectors conducting regular inspections. The inspectors' notes taken at the Sago Mine were generally descriptive of the conditions and violations observed. Inspections and investigations other than the regular inspections at the Sago Mine were generally conducted in accordance with established procedures. District 3 personnel followed the procedures outlined in the District SOP when approving the roof control and ventilation plans, supplements, and revisions for the Sago Mine.

To emphasize the need for increased compliance at the mine, District 3 personnel held several meetings with Sago Mine management and conducted several informational meetings for the miners. They discussed mining plans and methods to improve the conditions at the mine. The mine's accident history and management's plans to address the root causes of the accidents were also addressed. The importance of having a structured company safety program to provide continuity if mine management changed was stressed.

MSHA's Accident Prevention Team from Technical Support provided compliance assistance to reduce accidents and injuries. In August, 2005, District 3 management and Anker Energy's representatives met with personnel from the team. They presented the initial results of their Accident Analysis and Incident Reduction Study. This study was based on an analysis of mine accidents, interviews with miners, and observations of

working conditions and practices, resulting from several visits to the mine. Numerous recommendations were provided to Sago Mine management.

Approximately 3 weeks before the explosion, on December 14, 2005, the District 3 Manager, a supervisor, and an inspector visited the Sago Mine and traveled underground with ICG officials. Citations and orders were issued for accumulations of loose coal and coal dust, travel ways along belt conveyors, inadequate air velocity in the belt entry, and inadequate rock dusting.

On December 15, 2005, District 3 personnel met with ICG officials and offered the assistance of MSHA's Educational Field Services to help with miner training and to provide a supervisor to assist in training sessions involving mine examinations. A week later, the District 3 Assistant District Manager - Technical Division contacted MSHA's Educational Field Services group and requested assistance with ICG's training issues.

Prior to the explosion, the Coal Administrator had scheduled a meeting for January 6, 2006, with ICG management, to discuss a comprehensive safety program at ICG operations and concerns identified at the Sago Mine.

## Agency Actions Since January 2, 2006

Following is a list of corrective actions MSHA has taken since the fatal explosion at the Sago Mine.

- On March 9, 2006, MSHA issued the Emergency Mine Evacuation rule, as an Emergency Temporary Standard, prior to the enactment of the MINER Act. The standard required prompt incident notification, mandatory lifelines in mines, training, increased quantities of Self-Contained Self-Rescue devices, and for mine operators to report updated SCSR inventories on a quarterly basis.
- On July 19, 2006, MSHA issued a Program Information Bulletin (PIB) which increased the strength requirements for alternative mine seals from 20 psi to at least 50 psi.
- By August 14, 2006, mine operators were required to submit and comply with Emergency Response Plans. Eighty-nine percent of underground coal mines that were active and producing during the week of August 14, 2006, submitted their Emergency Response Plans on time. The remaining operations that did not submit their ERPs on time received citations, but they did submit them shortly thereafter.
- In August 2006, the Agency began distributing a new informational sticker that emphasizes that miners should barricade only when all escapeways and alternate entries are blocked.
- On December 8, 2006, MSHA promulgated the Final Rule for Emergency Mine Evacuations requiring prompt incident notification, mandatory lifelines in mines, training, increased quantities of Self-Contained Self-Rescue devices, and for mine operators to report updated SCSR inventory on a quarterly basis.
- On February 8, 2007, MSHA issued a PIB addressing the MINER Act requirement to provide breathable air to trapped miners.
- On March 22, 2007, MSHA published a final rule that became effective on April 23, 2007. This rule revised the agency's existing civil penalty assessment regulations and codified MINER Act provisions establishing the maximum penalty for flagrant violations and minimum penalties for unwarrantable failures and immediate notification rule violations. The higher penalties in the final rule are intended to increase the incentives for mine operators to prevent and correct violations. It will also encourage them to be more proactive in their overall approach to miner safety and health, as well as target the most serious safety and health violations with escalating penalties.
- On March 28, 2007, MSHA began production and distribution of Key Indicator reports which identify issues related to enforcement activities. These reports were shared with all levels of the management and inspector ranks.



- On May 8, 2007, MSHA created two high-level positions within its Mine Emergency Operations division. The new mine emergency operations manager will be responsible for planning and directing mine emergency preparedness and serve as the technical authority and logistical expert during all MSHA mine emergency responses.
- On May 22, 2007, MSHA issued an Emergency Temporary Standard on Sealing of Abandoned Areas. The Standard includes requirements to strengthen the design, construction, maintenance, and repair of seals, as well as requirements for sampling and controlling atmospheres behind seals. For the construction of new seals, it establishes a three-tiered approach to preventing or withstanding overpressure-loading: (1) Seals may be constructed to withstand 50 psi, but the atmosphere behind them must be monitored and maintained inert. (2) If the atmosphere is not monitored and maintained inert, the seals must be constructed to withstand 120 psi. (3) Where higher explosion pressures are possible within sealed areas that are not monitored or maintained inert, the seals must be constructed to withstand more than 120 psi. Mine operators must submit design and installation applications for MSHA approval. The seal design plan must be certified by a professional engineer, and proper construction must be certified by the operator. Additionally, mine operators must notify MSHA prior to both the commencement and completion of seal construction.
- On June 14, 2007, MSHA sent letters to eight mine operators putting them on notice that they have a potential Pattern of Violations of mandatory health or safety standards under Mine Safety and Health Act. These eight operations represent the first mines to receive such letters under MSHA's enhanced enforcement initiative. The mine operators that received these letters have a potential pattern of recurrent significant and substantial (S&S) violations.

## Root Cause Analysis

The internal review team determined that MSHA's actions at the Sago Mine did not cause or contribute to the fatal explosion on January 2, 2006. Nevertheless, the team identified several deficiencies in MSHA's performance that must be corrected. The internal review team conducted a root cause analysis of each deficiency to identify the source or origin of the deficiency, to provide recommendations for eliminating the root causes of each deficiency, and to prevent its recurrence. There were several deficiencies identified which resulted from the same root causes.

The goal of this analysis is to provide recommendations to produce effective corrective actions in order to implement permanent solutions for the specific deficiencies identified in this report. The findings of this internal review should be communicated to all MSHA personnel who have safety and health responsibilities at coal mines.

### Enforcement Activities

- 1. Deficiency: Inspectors did not conduct thorough and complete inspections of the Sago Mine. They did not: travel with preshift examiners during three of four inspections; examine SCSRs during three of the inspections; or discuss or observe fire drills during any of the inspections. Inspectors did not inspect carbon monoxide monitoring systems as required during any of the inspections and did not observe searches for smoking articles during three inspections. Inspectors did not always examine or document examining required records or record books, including training records, the electrical map, records of carbon monoxide monitor calibrations, and records of certified/qualified persons. Inspectors did not revisit areas that were "too wet" to take rock dust samples during previous inspections. Several areas and items on the surface were not documented as being inspected.**

**Inspectors did not always: interview miners regarding their understanding of how to use their SCSRs, inspect electrical equipment, and discuss emergency procedures with the miners including the responsible person to ensure they were familiar with specific procedures in the event of an emergency. They generally did not provide weekend inspection coverage. Inspectors also did not recognize and cite several violations which were cited by the accident investigation team. Additionally, inspectors did not recognize and cite several violations that were described in their inspection notes.**

**District 3 specialists did not conduct required reviews of the uniform mine file for the Sago Mine or field office personnel did not record the specialists' reviews. The field office supervisor did not document reviewing the uniform mine file for the Sago Mine during 2005.**

**District 3 personnel did not provide adequate weekend inspection coverage of the Sago Mine. There was not any coverage on Saturdays.**

**1.1. Cause:** Inspectors and specialists did not always follow established procedures for conducting inspections and investigations.

**1.1.1. Recommendation:** Supervisors should use the Performance Management System to hold inspectors and specialists accountable for following established inspection procedures, conducting complete and thorough inspections, and citing all violations observed.

**1.1.2. Recommendation:** Inspectors should be provided with a detailed checklist to aid in the completion of inspections in accordance with established procedures.

**1.1.3. Recommendation:** Supervisors should closely review individual inspection reports to identify and correct procedural deficiencies, such as lapses in properly inspecting and documenting all items and areas required to be inspected during a regular inspection.

**1.1.4. Recommendation:** Supervisors should use a detailed inspection checklist to determine whether all areas and items are properly inspected and documented.

**1.1.5. Recommendation:** Supervisors should visit each producing mine annually to determine if inspection activity is consistent with conditions in the mine.

**1.2. Cause:** Inspectors misinterpreted instructional memoranda from their supervisors regarding the number of hours to work per day, resulting in failure to travel with preshift examiners.

**1.2.1.** The supervisors should rescind the memoranda and instruct inspectors in the requirement to travel with preshift examiners during every regular inspection.

**1.3. Cause:** District 3 supervisors and managers did not provide adequate oversight of inspection and investigation activities and the supervisor did not follow established procedures for annual review of uniform mine files.

**1.3.1. Recommendation:** Assistant district managers should use the Performance Management System to hold supervisors accountable for effective oversight of their subordinates and for reviewing uniform mine files.

**1.3.2. Recommendation:** Assistant district managers should hold supervisors accountable for conducting effective accompanied activities and field

activity reviews. Assistant district managers should ensure supervisors visit each producing mine in their work groups annually.

**1.3.3. Recommendation:** District management should use Peer Reviews and thorough Second Level Reviews to determine if supervisors are providing effective oversight of their subordinates.

**1.3.4. Recommendation:** The District 3 Manager should use the Performance Management System to hold assistant district managers accountable for effective oversight of their subordinates.

**1.3.5. Recommendation:** The Administrator should use Accountability Reviews and the Performance Management System to hold district managers accountable for deficiencies in their districts.

**1.4. Cause:** Inspectors lacked effective tools to ensure that their inspections were thorough and complete.

**1.4.1. Recommendation:** CMS&H should develop a checklist or tracking system of required inspection items. The checklist or tracking system should be completed by the inspector during each regular inspection, reviewed by the field office supervisor, and evaluated for accuracy at least quarterly by district management.

**1.4.2. Recommendation:** CMS&H and Program Evaluation and Information Resources should develop a database to track the inspection and condition of SCSRs. The database should be integrated with the new SCSR inventory system.

**1.5. Cause:** The Bridgeport field office did not have an effective system in place to ensure that areas that were “too wet” to take rock dust samples were revisited and sampled during subsequent inspections.

**1.5.1. Recommendation:** MSHA should develop a tracking system to ensure that areas that were “too wet” to take rock dust samples are revisited and sampled. (Effective January 2006, MSHA Form 2000-210, Rock Dust Survey Wet Locations Tracking, was approved for use to allow inspectors to track and revisit areas which were previously too wet to sample.)

**1.5.2. Recommendation:** The Administrator should revise the *General Coal Mine Inspection Procedures Handbook* to require inspection reports to contain a completed MSHA Form 2000-210, Rock Dust Survey Wet Locations Tracking.

**1.6. Cause:** The directives relating to emergency evacuations, donning and use of SCSRs, fire and escapeway drills, and atmospheric monitoring systems overlap. The *Carbon Monoxide Inspection Procedures Handbook* is outdated, and does not

address recent developments in computer-based atmospheric monitoring systems and applicable standards.

**1.6.1. Recommendation:** The Administrator should consolidate and update all directives dealing with emergency evacuations, donning and use of SCSRs, fire and escapeway drills, and atmospheric monitoring systems, into one set of instructions.

**1.7. Cause:** Specific guidance for enforcement of 30 CFR 75.320(a) and 75.1501 has not been provided to inspectors.

**1.7.1. Recommendation:** The Administrator should provide specific guidance to inspectors for determining compliance with 30 CFR 75.320(a) and 75.1501.

**1.8. Cause:** Inspectors lacked specialized electrical expertise to identify some of the electrical violations found by the accident investigation team.

**1.8.1. Recommendation:** The District 3 Manager should provide training to regular inspectors to help them identify some electrical violations. (The District 3 Manager provided additional training to regular inspectors to improve their capability to identify electrical violations.)

**1.8.2. Recommendation:** Regular inspectors should be instructed to request assistance of electrical specialists when needed.

**1.8.3. Recommendation:** The District 3 Manager should evaluate the need for additional electrical specialists in the District.

**2. Deficiency:** Although District 3 inspectors appropriately elevated the level of enforcement at the Sago Mine in response to continuing compliance problems, the evaluations of gravity, negligence, and the type of enforcement action were not always appropriate. District 3 supervisors did not submit notes with the inspection reports describing the reasons why enforcement actions were vacated. There were sometimes significant delays from the discovery of a hazard to the issuance of a notice to provide safeguards. Some citations were not terminated in a timely manner.

**2.1. Cause:** District 3 inspectors did not consistently follow the Mine Act, 30 CFR, MSHA policies and procedures, and controlling case law when issuing and terminating citations and orders.

**2.1.1. Recommendation:** Supervisors should use the Performance Management System to hold inspectors accountable for following established procedures, properly evaluating enforcement actions, and issuing and terminating citations and orders.

- 2.1.2. Recommendation:** Supervisors should closely review citations, orders and inspection notes to determine if inspectors are making appropriate determinations of gravity, negligence, and level of enforcement.
- 2.1.3. Recommendation:** Supervisors should visit each producing mine annually to determine if the level of enforcement is consistent with conditions in the mine.
- 2.1.4. Recommendation:** Supervisors and managers should routinely review standard reports to ensure timely termination of citations.
- 2.2. Cause:** District 3 inspectors were adversely influenced by conference officers in their determinations of gravity, negligence, and number of persons affected by hazards addressed in citations and orders.

  - 2.2.1. Recommendation:** The District 3 Manager should closely monitor the Alternative Case Resolution Program and use the Performance Management System to ensure that decisions of the conference officers are in accordance with the Mine Act, 30 CFR, MSHA policies and procedures, and controlling case law.
- 2.3. Cause:** District 3 procedures regarding the issuance of notices to provide safeguards were in conflict with national policy.

  - 2.3.1. Recommendation:** The District 3 Manager should revise district procedures concerning notices to provide safeguards to comply with national policy. The District 3 Manager should ensure District personnel are properly trained in the issuance of notices to provide safeguards.
- 2.4. Cause:** District 3 supervisors and managers did not effectively monitor citations, orders, and inspection notes to determine compliance with MSHA policies and procedures.

  - 2.4.1. Recommendation:** Assistant district managers should hold supervisors accountable for effectively reviewing citations, orders, and inspection notes for compliance with the Mine Act, 30 CFR, MSHA policies and procedures, and controlling case law.
  - 2.4.2. Recommendation:** Assistant district managers should hold supervisors accountable for submitting notes with inspection reports describing the reasons why enforcement actions were vacated.
  - 2.4.3. Recommendation:** District management should use Peer Reviews and thorough Second Level Reviews to determine if supervisors and inspectors are following procedures for correctly evaluating citations and orders.

- 2.4.4. Recommendation:** The District 3 Manager should use the Performance Management System to hold assistant district managers accountable for effective oversight of their subordinates.
- 2.4.5. Recommendation:** The Administrator should use Accountability Program Reviews and the Performance Management System to hold district managers accountable for deficiencies in their program areas.
- 3. Deficiency: The inspectors' documentation for 16 section 104(d) citations and orders issued at the Sago Mine justified proceeding with possible knowing or willful violation reviews. In all 16 cases, however, the inspector recommended that possible knowing or willful violation reviews not be initiated. Subsequent reviews by the supervisors, the assistant district managers, and the Supervisory Special Investigator improperly supported the inspectors' determinations.**
- 3.1. Cause:** District 3 inspectors were not given appropriate guidance when to conclude that a possible knowing or willful violation existed. Several District 3 inspectors incorrectly believed that the operator or his agent should go to jail if they concluded a possible knowing or willful violation existed.
- 3.1.1. Recommendation:** The District 3 Manager should ensure that enforcement personnel follow established guidance on evaluating if a possible knowing or willful violation exists.
- 3.2. Cause:** Subsequent reviews by the supervisors, assistant district managers, the Supervisory Special Investigator, and the District 3 Manager improperly supported the inspectors' determinations.
- 3.2.1. Recommendation:** The Administrator should provide sufficient oversight of the District 3 special investigation program to ensure compliance with the *Special Investigations Procedures Handbook*.
- 3.2.2. Recommendation:** The Administrator should use the Performance Management System to ensure that the District 3 Manager is complying with the *Special Investigations Procedures Handbook*.
- 3.3. Cause:** The Supervisory Special Investigator discouraged possible knowing or willful violation cases because of perceived resource limitations.
- 3.3.1. Recommendation:** The District 3 Manager should use the Performance Management System to hold the Supervisory Special Investigator accountable for appropriately evaluating each case based on its merits and not on resource limitations.
- 3.4. Cause:** The *Special Investigations Procedures Handbook* does not provide adequate guidance for when an inspector or reviewer should conclude that a possible knowing or willful violation exists and a special investigation should

be initiated. There is a 90-day discrepancy in the time frame for initiating a section 110 case between the *Program Policy Manual* and the *Special Investigations Handbook*.

**3.4.1. Recommendation:** MSHA should revise the *Special Investigations Procedures Handbook* to provide clearer guidance.

**3.4.2. Recommendation:** MSHA should resolve the time-frame discrepancies for initiating a section 110 special investigation.

**3.5. Cause:** CMS&H did not use available data to address the abnormally low number of section 110 cases opened in District 3.

**3.5.1. Recommendation:** CMS&H headquarters should use available data to provide proper oversight of the Special Investigations Program.

**4. Deficiency:** MSHA has never issued a section 104(e) order. MSHA has issued only 2 section 104(e) pattern of violation notifications since enactment of the Mine Act.

**4.1. Cause:** The criteria for identifying a mine operator with a pattern of violations were ineffective.

**4.1.1. Recommendation:** MSHA should revise the criteria for identifying an operator with a pattern of violations.

## Alternative Case Resolution Initiative

**5. Deficiency:** A Conference Litigation Representative (CLR) rendered decisions that were not always consistent with the requirements of the Mine Act, 30 CFR, MSHA policy, controlling case law, and the conditions documented in citations, orders, and inspection notes. He improperly modified citations and orders, and did not provide proper justification for the modifications that he made. In one conference held for the Sago Mine, the CLR's conclusion did not reflect information provided on the order or in the inspector's notes. The CLR improperly modified section 104(d) orders to section 104(a) citations, lowered gravity from "reasonably likely" to "unlikely," and changed negligence from "high" to "moderate." As a result, the orders no longer met the criteria for special assessment review and possible knowing or willful violation review. (Several ACR program deficiencies are identical to those documented in the Internal Review of MSHA's Actions at the No. 5 Mine Jim Walter Resources, Inc., released January 24, 2003.)

**5.1. Cause:** A District 3 conference officer acted with autonomy without effective oversight by District 3 management. The CLR substituted his judgment for that of the inspector. The CLR placed more weight on the statements of mine



operators than on statements and information provided by the issuing inspector. The CLR considered CMS&H handbooks to be guidelines, not established policy. The CLR did not consider hazardous conditions in the context of continuing mining operations.

**5.1.1. Recommendation:** The District 3 Manager should use the Performance Management System to hold the conference litigation representative accountable for following the Mine Act, 30 CFR, MSHA policy, controlling case law, and properly considering the conditions documented in citations, orders, and inspection notes.

**5.1.2. Recommendation:** A new worksheet should be developed requiring CLRs to circulate their proposed decisions so that management is aware of the decisions that CLRs are proposing. Proposed decisions, which result in a change to a citation or order, should detail the issuing inspector's position and be routed through district management for concurrence.

**5.1.3. Recommendation:** The Administrator should use the Performance Management System to ensure that the District 3 Manager is holding conference officers accountable for following established policies and procedures.

**5.2. Cause:** Coal headquarters oversight of the ACR program is not effective. Headquarters audits focus on process and procedures. They do not evaluate whether CLR actions were supported by the inspector's notes and other available information; whether CLRs substituted their judgment for that of the inspector; or whether the rationale set forth by the CLR was supported by case law, statutory or regulatory authority, or Agency policy. The audit team does not always include a member who has enforcement experience.

**5.2.1. Recommendation:** Headquarters audits of the ACR program should thoroughly evaluate CLR decisions, particularly those that modify or vacate section 104(d) citations and orders, and examine the CLR's rationale for subsequent actions.

**5.2.2. Recommendation:** Headquarters audits of the ACR program should include discussions with issuing inspectors and their supervisors.

**5.2.3. Recommendation:** Each headquarters audit should include a team member who has enforcement experience.

**5.2.4. Recommendation:** The Administrator should use headquarter audits and the Performance Management System to hold the District 3 Manager accountable for ensuring that conference officers comply with the Mine Act, 30 CFR, MSHA policy, and controlling case law.

- 5.3. **Cause:** Guidance provided by the *Alternative Case Resolution Handbook* issued in March 2004 is inadequate. The handbook focuses on procedural and administrative issues instead of substantive issues.
- 5.3.1. **Recommendation:** The *ACRI Handbook* should be revised to provide more guidance to help the CLR make decisions that conform to the Mine Act, 30 CFR, MSHA policy, and controlling case law.
- 5.3.2. **Recommendation:** The *ACRI Handbook* should be revised to include a conference worksheet that incorporates oversight by district management as part of the conferencing process.
6. **Deficiency: District 3 enforcement personnel often indicated lower gravity, number of persons affected, and negligence on citations and orders even though inspection notes and conditions cited clearly reflected higher degrees of gravity, number of persons affected, and negligence.**
- 6.1. **Cause:** The inspectors were “conference conditioned” to improperly lower their evaluation of gravity, negligence, and number of persons affected.
- 6.1.1. **Recommendation:** District 3 management should reinstruct inspectors in the proper evaluation of citations and orders.
7. **Deficiency: Pre- and post-conference communication between inspectors and the CLR was inconsistent and confrontational. Inspectors were often excluded from providing additional information to support a citation or order. Feedback to enforcement personnel was not always given or provided in a timely manner.**
- 7.1. **Cause:** A District 3 CLR did not always follow the requirements set forth in MSHA's enforcement and procedural handbooks.
- 7.1.1. **Recommendation:** The District 3 Manager should use the Performance Management System to hold the conference officer accountable for complying with applicable procedures for conducting safety and health conferences.
- 7.1.2. **Recommendation:** Each CLR should provide a brief monthly report summarizing each decision rendered and the rationale for subsequent actions. The monthly report should be distributed to each inspector.
8. **Deficiency: A large volume of unmeritorious conference requests used by mine operators for bargaining purposes tied up District 3 resources and contributed to a backlog of conferences. For the past several years, the number of violations conferenced in District 3 has been consistently among the highest of the Coal Mine Safety and Health districts.**

**8.1. Cause:** The District 3 Manager did not exercise discretion in granting safety and health conferences.

**8.1.1. Recommendation:** The District 3 Manager should require mine operators to state why each citation and order should be conferenced. (Effective on March 1, 2007, the District 3 Manager issued a memorandum requiring mine operators to include with their conference request a brief statement explaining why each citation or order should be conferenced. This will allow the District 3 Manager to determine if the request is meritorious.)

## Alternative Seals

**9. Deficiency:** The requirement in 30 CFR 75.335(a)(2) that alternative methods or materials may be approved for seals, if the seal can withstand a horizontal pressure of 20 pounds per square inch (psi), is inadequate.

**9.1. Cause:** MSHA concluded that a 20-psi seal strength requirement, as recommended in a 1971 U.S. Bureau of Mines report on “explosion-proof” seals, provided an adequate level of protection. The 20-psi standard was adopted in a mandatory safety standard promulgated in 1992.

Investigations of past explosions involving seals typically concluded that the seals were subjected to pressures less than 20 psi. As a result, MSHA did not identify the need for seals to withstand a pressure higher than 20 psi.

**9.1.1. Recommendation:** MSHA should re-evaluate the minimum strength requirements for seals and require a prudent level of protection against seal failures. (Effective May 22, 2007, the emergency temporary standard for sealing abandoned areas requires that seals withstand significantly higher overpressures.)

**9.1.2. Recommendation:** Mandatory standards for sealing worked-out areas, to be promulgated pursuant to the MINER Act, should require that seal designs be prepared by a registered professional engineer. (This is required by the May 22, 2007, emergency temporary standard.)

**9.1.3. Recommendation:** MSHA should work collaboratively with NIOSH, the mining industry, and seal manufacturers to have new seal designs tested at higher explosion pressures to verify seal performance and establish ultimate strengths.

**9.2. Cause:** The 1992 rule-making committee lacked the specialized technical expertise to recognize that the 20-psi pressure was inadequate. Determining the pressures that can result from mine explosions is a highly specialized technical field.

**9.2.1. Recommendation:** Future rule-making committees dealing with highly technical subjects should have access to the technical expertise necessary to make informed decisions.

**10. Deficiency:** There were differences between how the 2 North Mains Omega seals were constructed, the provisions of the approved plan, and the way the test seal was built at Lake Lynn.

**10.1. Cause:** Construction specifications for alternative seals are not specific and thorough enough. Alternative seal construction requirements reflected the main provisions of how the seal had been constructed at Lake Lynn rather than being comprehensive and tailored to the specific conditions at the mine.

**10.1.1. Recommendation:** MSHA should require that all alternative seal construction plans be: prepared by a registered professional engineer; tailored to the specific mine conditions where the seals are to be constructed; and reviewed by MSHA. (These requirements are currently in place through the May 22, 2007, emergency temporary standard for sealing abandoned areas.)

**11. Deficiency:** Defects in the construction of alternative seals were not always identified by MSHA during inspections. Alternative seals at the Sago Mine were constructed using faulty construction practices. The 2 North Mains seals were not constructed as approved in the ventilation plan.

**11.1. Cause:** Some construction defects are not evident from visual observation after a seal is completely constructed.

**11.1.1. Recommendation:** Mandatory standards for sealing worked-out areas, to be promulgated pursuant to the MINER Act, should require that comprehensive, mine-specific seal construction specifications be prepared by a registered professional engineer. (This is required by the May 22, 2007, emergency temporary standard for sealing abandoned areas.)

**11.1.2. Recommendation:** Mine operators should be required to certify that seals are constructed in accordance with the approved seal plan. (This is required by the May 22, 2007, emergency temporary standard for sealing abandoned areas.)

**11.1.3. Recommendation:** MSHA inspectors should have a copy of the seal construction requirements with them to consult when inspecting seals.

**11.1.4. Recommendation:** If there is a question about the construction of a block seal, mine operators should be required to remove a portion of the sealant to allow the joints to be examined for proper mortaring and block pattern.

**11.2. Cause:** Inspectors did not receive adequate training on how to inspect alternative seals during and after construction. The training provided to inspectors on alternative seals focused on the regulatory requirements. It did not provide information on alternative seal construction requirements and did not explain critical seal construction provisions that should be given special attention during inspections.

**11.2.1. Recommendation:** MSHA should provide seal-related training to coal mine inspection personnel and ventilation supervisors and specialists to raise awareness of critical seal construction requirements and to provide inspection guidance.

**11.3. Cause:** MSHA personnel are not always aware of when seals are being constructed.

**11.3.1. Recommendation:** Mine operators should be required to notify MSHA of seal construction in advance so that MSHA has the opportunity to inspect seals during construction. (This is required by the May 22, 2007, emergency temporary standard for sealing abandoned areas.)

**11.3.2. Recommendation:** Inspection personnel should be instructed to observe the construction of new seals, to the extent feasible, during the course of regular inspections.

**11.4. Cause:** Information on the 20-psi alternative seal construction requirements was not systematically distributed to inspectors to assist them in inspecting existing 20-psi seals. Technical Support provided information to the districts in individual documents. This information was not compiled in a single, formal document that was kept up-to-date.

**11.4.1. Recommendation:** For existing 20-psi seals, the "Guide for Existing Alternative Seals (Built Prior to July 19, 2006)" which has been prepared by MSHA in collaboration with NIOSH should be distributed to the districts and made available to inspectors.

**12. Deficiency: MSHA had not taken action to address the potential for lightning to provide a source of ignition for explosions in sealed areas. Some seals had failed as a result of explosions attributed to lightning.**

**12.1. Cause:** Incidents where lightning was identified as the likely source of ignition of a sealed-area explosion were thought to be isolated occurrences. The potential for electromagnetic energy created by a horizontal lightning discharge to radiate through earth and induce a voltage in a conductor was not recognized.

**12.1.1. Recommendation:** MSHA should investigate requiring that insulated cables and conductors, with the potential to allow lightning to create a

source of ignition, be removed from areas to be sealed. (The May 22, 2007, emergency temporary standard for sealing abandoned areas requires the removal of insulated cables from sealed areas and prohibits extraneous metallic objects passing through or across seals.)

**13. Deficiency: MSHA did not recognize the potential for significant problems from faulty seal construction. Some alternative seals subject to explosions had failed due to faulty construction.**

**13.1. Cause:** MSHA did not have a system in place to evaluate seal accidents and incidents, identify conditions which warranted further evaluation, and recognize the significance of individual incidents occurring in different districts at different points in time.

**13.1.1. Recommendation:** MSHA should assign responsibility for the systematic investigation and evaluation of pertinent seal-related information on all incidents where a seal is subjected to an explosion.

**13.2. Cause:** Information on alternative seal incidents and accidents was available, but the parties involved, i.e., Coal, Technical Support, and EPD, had differing primary concerns of enforcement, technology, and training. There was no mechanism in MSHA's management system to hold an individual or group accountable for identifying potentially widespread problems with seal construction, identifying trends, disseminating information within MSHA, and bringing areas of concern to the attention of the Administrator.

**13.2.1. Recommendation:** Responsibility should be assigned within MSHA for evaluating information on seal incidents, ensuring that seal information is adequately disseminated, and bringing trends and potential problems to the attention of the Administrator. Incidents where quality control or other issues are identified in seal construction should be included.

**13.3. Cause:** Information on seal failures was not widely known within MSHA and the industry.

**13.3.1. Recommendation:** Reports on all seal incidents and accidents should be distributed to the Coal districts and industry to keep interested parties informed of trends related to seals.

## **Enforcement of Specific Safety Standards - Non-contributory Violations**

**14. Deficiency: After bottom mining was conducted, rock dust was not applied to the 2nd Left Mains and the 2 North Mains in by the 2 North Mains seals location. High-pressure rock-dusting machines were not used to apply rock dust at the outby edges of the bottom mined area.**

**14.1. Cause:** District 3 personnel did not understand or follow the policy to require the operator to use high pressure rock dusting machines to apply rock dust to the bottom mined area.

**14.1.1. Recommendation:** The Administrator should direct enforcement personnel to require rock dusting in all underground areas of a coal mine that have not experienced caving due to second (retreat) mining when the outby edges of abandoned areas can be safely accessed.

**14.1.2. Recommendation:** District 3 personnel should ensure that mine operators are familiar with the availability and use of rock dusting equipment.

**15. Deficiency: MSHA has not promulgated standards to implement section 315 of the Mine Act which addresses emergency shelters.**

**15.1. Cause:** MSHA did not believe emergency shelters to be technically feasible in coal mines.

**15.1.1. Recommendation:** Research on the feasibility of emergency shelters in coal mines should be conducted. (Section 13 of the Miner Act of 2006 requires the National Institute of Occupational Safety and Health to conduct research, including field tests, concerning the utility, practicality, survivability, and cost of various refuge alternatives in an underground coal mine environment, including commercially-available portable refuge chambers.)

## **Plan Approvals**

**16. Deficiency: The Mine Emergency Evacuation and Firefighting Program of Instruction had several deficiencies. The Program listed explosions, fires, and gas and water inundations as mine emergencies but had specific evacuation instructions that only addressed fires. The Program instructed miners to barricade when they were trapped by hazardous gases. The donning procedure for the CSE SR-100 self-rescuer contained in the Program of Instruction did not include instructions to activate oxygen when the oxygen actuator tag failed.**

**There were minor deficiencies in the approved roof control plan, ventilation plan, and ventilation map for the Sago Mine. The approved training plan for the Sago Mine had a deficiency that was not found during the District plan review process.**

**16.1. Cause:** District specialists did not adequately review mine plans to identify deficiencies before approval by the District 3 Manager. Inspectors did not adequately review mine plans during regular inspections.

**16.1.1. Recommendation:** Specialists and inspectors should conduct thorough reviews of mine plans. The District 3 Manager should ensure deficiencies in approved training plans are corrected.

**16.1.2. Recommendation:** Supervisors should use the Performance Management System to hold specialists and inspectors accountable for conducting thorough reviews of mine plans.

**16.2. Cause:** Supervisors did not conduct adequate reviews and provide effective oversight of plan reviews to ensure that deficiencies were identified and corrected.

**16.2.1. Recommendation:** The assistant district managers should use the Performance Management System to hold supervisors accountable for providing proper oversight of their subordinates.

**16.3. Cause:** Educational Field Services (EFS) personnel did not adequately review the training plan to identify deficiencies.

**16.3.1. Recommendation:** The assistant district manager should provide technical oversight of EFS personnel assigned to review training plans.

**16.3.2. Recommendation:** The EFS supervisor, in consultation with the assistant district manager, should hold EFS personnel accountable for conducting adequate reviews of training plans.

## **Mine Rescue and Recovery**

**17. Deficiency: The first MSHA employee did not arrive at the mine until 4 hours after the explosion.**

**17.1. Cause:** MSHA was not notified by the Sago Mine operator of the explosion until 84 minutes after the occurrence.

**17.1.1. Recommendation:** Mine operators should be required to provide immediate notification that a reportable accident has occurred. (The Emergency Mine Evacuation Final Rule published in the Federal Register on December 8, 2006, revised 30 CFR 50.10 to require mine operators to notify the Agency immediately, at once, without delay and within 15 minutes after the operator knows or should know that an accident has occurred. MSHA has established a centralized call center where mine operators can immediately report an accident.)

**17.2. Cause:** The explosion occurred on a Federal Holiday. As a result, District 3 employees had to travel from their residences to their offices to obtain equipment and supplies.



- 17.2.1. Recommendation:** MSHA should explore methods, including alternative uses of government vehicles, to enable personnel to decrease response times to mine emergencies.
- 18. Deficiency: Command center personnel could not determine if there was a fire underground until approximately 10 hours after the explosion.**
- 18.1. Cause:** Gas detectors capable of measuring elevated concentrations of carbon monoxide were not available to District 3 personnel to accurately determine gas trending.
- 18.1.1. Recommendation:** Corrected. MSHA has provided each Coal Mine Safety and Health District with advanced gas detecting equipment that is capable of measuring elevated levels of methane and carbon monoxide.
- 18.2. Cause:** MSHA's primary gas chromatograph was not available because it was in use at a mine fire at the West Elk Mine in Colorado.
- 18.2.1. Recommendation:** MSHA should procure additional portable gas chromatograph(s) and make them available at strategic locations.
- 19. Deficiency: There was miscommunication between the mine rescue team and the command center.**
- 19.1. Cause:** The exploration of 2nd Left Parallel exceeded the capabilities of the mine rescue teams' communication equipment. As a result, the rescue team established five communication relays between them and the command center on the surface.
- 19.1.1. Recommendation:** The Director of Technical Support should explore the availability of advanced communication equipment.
- 20. Deficiency: The families received misinformation about the status of the trapped miners.**
- 20.1. Cause:** Information transmitted from underground was not secure. Pager phones were located where conversations were easily overheard. The Command Center in the mine office was located where it was easily accessible and not guarded to prevent unauthorized entry.
- 20.1.1. Recommendation:** The Administrator should establish clear guidelines that provide for adequate control and security of the command center and secure communications between the command center and the mine rescue teams.
- 21. Deficiency: Briefing and debriefing of the MSHA Mine Emergency Unit did not take place on a regular basis.**

**21.1. Cause:** The command center did not follow mine rescue protocol concerning briefing and debriefing of MEU rescue team members.

**21.1.1. Recommendation:** The MSHA official in charge of the command center, along with the Mine Emergency Response Coordinator, should ensure that Mine Emergency Unit rescue team members are briefed and debriefed during rescue and recovery operations.

## Seismic Location System

**22. Deficiency:** The language in the mine operator's approved Program of Instruction, hard hat stickers provided by MSHA, and unfounded confidence in MSHA's seismic location system may have adversely affected the Sago miners' decision to barricade rather than to attempt escape.

**22.1. Cause:** The language in the mine operator's Program of Instruction indicated that seismic location equipment would be used to locate trapped miners.

**22.1.1. Recommendation:** The District 3 Manager should ensure that all Mine Emergency and Firefighting Programs of Instruction contain the proper instructions on when to construct a barricade, and the proper methods of barricade construction. Programs should also ensure that miners are trained to fully understand mine rescue procedures and the limitations of miner locating techniques.

**22.2. Cause:** After the advent of SCSRs, MSHA did not reevaluate the instructions on hard hat stickers that the Agency distributed to miners. The stickers did not emphasize that miners should barricade only when all escapeways and alternate entries are blocked.

**22.2.1. Recommendation:** MSHA should revise hard hat stickers to instruct miners to barricade only when all escapeways and alternate entries are blocked. (In August 2006 the Agency created and distributed a new informational sticker that emphasized that miners should barricade only when all escapeways and alternate entries are blocked.)

**22.3. Cause:** MSHA's seismic location system is obsolete, takes too long to deploy, and has never located a missing miner.

**22.3.1. Recommendation:** The Director of Technical Support should determine the availability of improved technology for locating missing miners.

## Management Issues

**23. Deficiency:** The supervisory and second-level reviews for inspection activities were not adequate. The supervisory and second-level reviews conducted by District 3 supervisors and managers did not identify several procedural and enforcement deficiencies. Documentation of accompanied activities and field activity reviews was not adequate and complete. The Assistant District Manager - Inspection Division did not document any second-level reviews.

**23.1. Cause:** The field office supervisor did not put forth a diligent effort to perform thorough field activity reviews and did not follow established policy and procedures for conducting and documenting supervisory reviews for employees under his supervision.

**23.1.1. Recommendation:** The assistant district manager should provide oversight to ensure the requirements of the *CMS&H Supervisor's Handbook* are followed.

**23.1.2. Recommendation:** The assistant district manager should use the Performance Management System to hold field office supervisors accountable for conducting thorough field activity reviews in accordance with the procedures of the *CMS&H Supervisor's Handbook*.

**23.1.3. Recommendation:** District generated worksheets should be revised to include all information required to be documented. First level reviews should contain detailed notes indicating inspection items reviewed.

**23.2. Cause:** The assistant district manager with oversight responsibility for the Bridgeport Field office did not document that he conducted any second-level reviews during calendar year 2005. The District 3 Manager did not require documentation to ensure that the assistant district manager conducted all required second-level reviews.

**23.2.1. Recommendation:** The District 3 Manager should use the Performance Management System to hold assistant district managers accountable for properly reviewing and documenting second-level reviews and for taking appropriate corrective actions when these reviews identify deficiencies.

**23.2.2. Recommendation:** The Administrator should use the Performance Management System to hold the District 3 Manager accountable for ensuring that his subordinates comply with *CMS&H Supervisor's Handbook*.

**24. Deficiency:** District 3 Peer Reviews were inadequate. Corrective action plans to address issues found during the Peer Reviews were not submitted by two field offices; the Peer Review of the Bridgeport field office did not identify several issues which should have been identified; and some issues identified by the Peer

**Review remained uncorrected. The District 3 Manager improperly identified some significant issues as insignificant in memoranda to enforcement personnel.**

**24.1. Cause:** District 3 personnel did not follow established policy and procedures for conducting Peer Reviews.

**24.1.1. Recommendation:** The District 3 Manager should use the Performance Management System to hold personnel who conduct Peer Reviews accountable for following the *Accountability Program Handbook* and for conducting thorough and effective Peer Reviews.

**24.1.2. Recommendation:** The District 3 Manger should not characterize issues as "significant" or "insignificant."

**24.2. Cause:** District 3 Peer Reviews did not identify root causes of deficiencies, allowing several deficiencies to reoccur.

**24.2.1. Recommendation:** The District 3 Manager should ensure that deficiencies identified in Peer Reviews are analyzed for root causes. Corrective actions must address root causes to eliminate deficiencies and prevent them from being repeated.

**24.2.2. Recommendation:** The Administrator should use the Performance Management System to hold the District 3 Manager accountable for identifying root causes of deficiencies and implementing effective action plans to eliminate those deficiencies.

**24.3. Cause:** CMS&H had not conducted a headquarters accountability review of District 3 for several years. A review was scheduled for 2006 but was postponed pending the outcome of this internal review. As a result, shortcomings in District 3 Peer reviews were not identified by headquarters accountability reviews.

**24.3.1. Recommendation:** CMS&H Headquarters should conduct Accountability reviews in District 3 during 2007 and 2008. The reviews should evaluate the District's progress in addressing issues identified by this internal review and ensure that District 3 is effectively identifying root causes, implementing their action plan, correcting issues, and preventing recurrences. Headquarters should recommend changes to the action plan when appropriate.

**24.3.2. Recommendation:** The Administrator should examine methods to improve the effectiveness of headquarters' reviews of district Peer Review reports. An effective method for identifying and eliminating repetitive issues should be implemented.

## Signature Page

This report is submitted in response to your request that the Directorate of Program Evaluation and Information Resources conduct an internal review of MSHA's actions at the Wolf Run Mining Company Sago Mine.

Respectfully submitted,

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Richard E. Stickler  
Assistant Secretary of Labor for  
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## Appendix A - Persons Interviewed or Providing Information

### District 3 Personnel

Nelson Blake .....Supervisory CMS&H Inspector (Roof Control)  
Josh Brady ..... CMS&H Inspector (Health)  
Mike Brooks ..... CMS&H Inspector (Ventilation)  
Martin Carver ..... CMS&H Inspector  
Marlene Cayton ..... CMS&H Field Office Secretary  
Gary Cole ..... CMS&H Inspector (Roof Control)  
Mike Evanto ..... CMS&H Inspector (Roof Control)  
Greg Fetty ..... Conference/Litigation Representative  
Mardell Hagar ..... CMS&H Inspector (Ventilation)  
Paul Hall ..... Supervisory CMS&H Inspector (Electrical)  
Bunie Harper ..... CMS&H Inspector (Impoundments)  
John Hays ..... CMS&H Inspector (Ventilation)  
Richard Herndon .....Special Investigator  
Tom Hlavsa .....Supervisory CMS&H Inspector (Ventilation)  
Jerry Johnson ..... Supervisory Special Investigator  
Jan Lyall ..... CMS&H Inspector (Roof Control)  
John Mehaulic ..... CMS&H Inspector  
Carlos Mosley ..... Assistant District Manager - Technical Division  
Edward Parrish ..... CMS&H Inspector (Ventilation)  
Bill Ponceroff ..... Assistant District Manager - Inspection Division  
Ronald Postalwait ..... CMS&H Inspector  
Jason Rinehart ..... CMS&H Inspector (Health)  
Barry Ryan ..... Conference/Litigation Representative  
James Satterfield ..... Supervisory CMS&H Inspector  
Willie Spens .....Supervisory CMS&H Inspector (Health)  
William Sperry ..... CMS&H Inspector (Electrical)  
Steven Stankus ..... CMS&H Inspector  
Kevin Stricklin ..... District Manager  
Ken Tenney ..... Supervisory CMS&H Inspector  
Frank Thomas ..... CMS&H Inspector (Electrical)  
Ron Tulanowski ..... CMS&H Inspector (Roof Control)  
Argel Vanover ..... CMS&H Inspector  
Brent Wolfe ..... CMS&H Inspector Trainee  
Ron Wyatt ..... Staff Assistant

## Appendix A (continued)

### Headquarters Personnel

Robert M. Friend ..... Deputy Assistant Secretary  
Ray McKinney ..... Administrator for CMS&H  
Melinda Pon..... Special Assistant to the Administrator, CMS&H  
Peter Montali ..... Special Assistant to the Administrator, M/NM  
Page Jackson ..... Deputy Director, Office of Assessments  
Carolyn James..... Director, Technical Compliance and Investigations Office  
Ronald Miller.....Headquarters ACRI Audit Team Member

### National Mine Health and Safety Academy

David Scott Mandeville..... Mining Engineer (Instructor)  
Roy W. Milam..... Electrical Engineer (Instructor)  
Harold E. Newcomb ..... Manager of Mine Technology Department  
John J. Rosiek ..... Manager of Instructional Services Department

### Technical Support

Mark Skiles..... Director  
Jeffrey Kravitz..... Chief, Special Projects/Mine Emergency Operations  
John Urosek..... Chief, Ventilation Division  
Steven Luzik ..... Chief, Approval and Certification Center  
Clete R. Stephan .....Principal Mining Engineer  
Virgil Brown ..... Mine Emergency Unit Specialist  
Charlie Pogue ..... Mine Emergency Unit Team Leader  
Ron Hixson..... Mine Emergency Unit Team Member  
Gerald Cook..... Mine Emergency Unit Team Member



## Appendix B - Coal Mine Safety and Health Administrator's Response

June 27, 2007

CMS&H Memo No. HQ-07-071-A (SEC-103)

MEMORANDUM FOR RICHARD E. STICKLER

Assistant Secretary for  
Mine Safety and Health

THROUGH:

*Signature on File*  
ROBERT M. FRIEND  
Deputy Assistant Secretary for  
Mine Safety and Health

FROM:

*Signature on File*  
KEVIN G. STRICKLIN  
Administrator for  
Coal Mine Safety and Health

SUBJECT:

Coal Mine Safety and Health Response to Internal Reviews of  
MSHA's Actions at the Wolf Run Mining Company, Sago Mine;  
Aracoma Coal Company, Inc., Aracoma Alma Mine No. 1; and  
Kentucky Darby LLC, Darby Mine No. 1

You requested that Coal Mine Safety and Health (CMS&H) respond to the recommendations in the internal review reports concerning MSHA's actions at the Wolf Run Mining Company, Sago Mine; Aracoma Coal Company, Inc., Aracoma Alma Mine No. 1; and Kentucky Darby LLC, Darby Mine No. 1. You also requested that CMS&H provide a consolidated corrective action plan to address all the issues and recommendations raised in the three reviews. The following is our response and a discussion of the actions planned by CMS&H. The reports of internal review will also be shared with Metal and Nonmetal Mine Safety and Health.

I have attached a spreadsheet that specifically describes, for each recommendation, CMS&H's corrective action plan and due date. The spreadsheet compares the reports and shows the similarities and differences of the deficiencies, causes, and recommendations. The corresponding paragraph numbers from each report have also been included. CMS&H will track its implementation progress and work closely with other MSHA program areas to fully address each recommendation with an effective policy and/or program that achieves both short- and long-term results.

Several recommendations have already been implemented. The MINER Act and the Emergency Temporary Standards for Emergency Mine Evacuation, Criteria and Procedures for Proposed Assessment of Civil Penalties, and Sealing of Abandoned Areas have codified several recommendations. Therefore, implementation and enforcement of these new regulations and standards will serve as the corrective actions for these recommendations. Several other recommendations were addressed when CMS&H revised the Coal General Inspection Procedures Handbook.

I have scheduled a meeting at the National Mine Health and Safety Academy on July 11 and 12 with all CMS&H managers, supervisors, and Conference Litigation Representatives. At this meeting, I will discuss each report's findings, as well as CMS&H's corrective actions and measurement strategies. I look forward to your attendance and participation at this meeting.

Attachment

## Corrective Action Plan: Sago, Aracoma, and Darby Internal Reviews

Deficiency	Cause	RS	RA	RD	Recommendation	Corrective Action	Due Date
Incomplete & inadequate inspections & documentation (A: also 103(i) insp inadequate)	Not following procedures, (A,D: also lacked proper attitude)	1.1.1	1.1.1 2.1.1	1.1.1	Supv should use performance management system to hold inspectors accountable	Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook Inform Union	1/1/2008
		1.1.2			Inspectors should use an Inspection Checklist to ensure complete inspections	Included in latest revision of Coal Inspection Handbook - Rollout on 7/1/2007	7/15/2007
		1.1.3	1.1.2 2.1.2		Supervisors scrutinize inspection reports and take corrective action immediately	Perform additional accompanied activities to enhance interaction between managers, supvs, and insp during mine visits Update and clarify the Supv handbook and conduct training	1/1/2008
		1.1.4			Supv should use an inspection checklist to evaluate whether inspections are complete	Included in latest revision of Coal Inspection Handbook - Rollout on 7/1/2007	7/15/2007
		1.1.5	1.1.4	1.1.2	Supervisors should annually visit each producing mine to assess inspection quality	Memo to DMs requiring a supervisory visit to each mine Perform additional accompanied activities to enhance interaction between managers, supvs, and insp during every UG mine visit annually Update and clarify the Supv Handbook and conduct training	1/1/2008
			1.1.3		Use accompanied activities and field reviews to evaluate whether inspections are complete	Perform additional accompanied activities to enhance interaction between managers, supvs, and insp during every UG mine visit annually Update and clarify the Supv Handbook and conduct training	1/1/2008
			1.1.5 2.1.3		Take appropriate action with respect to individuals when issues of misconduct are identified	Update and clarify the Supv Handbook and conduct training	1/1/2008
Field office memo on working hours misinterpreted resulting in no preshift travel.		1.2.1			Rescind memo and reinstruct on preshift travel during regular inspections	Rescind memos that conflict with Natl policy	9/1/2007
Inadequate oversight of inspection activity, no annual UMF review as per procedure.		1.3.1	1.3.1 3.2.6	1.2.1	ADMs should use Performance Management System to hold supervisors accountable for subordinates (S: also UMF reviews)	Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook Inform Union	1/1/2008

Deficiency	Cause	RS	RA	RD	Recommendation	Corrective Action	Due Date
		1.3.2	1.3.2 3.2.4		ADMs should hold supervisors accountable for accompanied activity and annual mine visits	Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook	1/1/2008
		1.3.3	1.3.6		District management should use Peer Reviews and Second Level Review to assess supervisor's performance	Supervisors will be held accountable for repetitive issues that are not addressed ADM will conduct second level reviews and travel with supervisors to determine if repetitive issues exists Update and clarify the Supv Handbook and conduct training	1/1/2008
		1.3.4	1.3.7 3.2.7	1.2.3 1.3.1	DM should use Performance Management System to hold ADMs accountable for their oversight of subordinates	ADM will be held accountable for repetitive issues that are not addressed Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook	1/1/2008
		1.3.5	1.3.8 3.2.8		Administrator should use Performance Management System to hold DMs accountable for district deficiencies	DM will be held accountable for repetitive issues that are not addressed Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook Inform Union	1/1/2008
			1.3.3		Managers should visit a mine with poor compliance at least monthly	Memo from the Administrator to the DM's requiring monthly visits	9/1/2007
			1.3.4		Managers should get periodic report of mines visited by each supervisor	Issue memos to DMs requiring monthly reports summarizing all supv and management mine visits	9/1/2007
			1.3.5	1.2.2	ADM should hold Supv accountable for returning poor work to inspectors to be corrected Gross or repeated failures should be documented and appropriate disciplinary action taken	Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook	1/1/2008
	No effective tools to ensure thorough complete inspections.	1.4.1	1.2.1		Create checklist or tracking system for each regular inspection with supervisor review, management review quarterly	Included in latest revision of Coal Insp Handbook - rollout on 7/1/2007	7/15/2007

Deficiency	Cause	RS	RA	RD	Recommendation	Corrective Action	Due Date
		1.4.2			Create database to track inspection of SCSRs, integrate with new SCSR inventory system	Enhance SCSR inventory database to identify active units prior to an inspection and record inspection results	7/1/2008
	No effective system to assure "too wet" areas were revisited for subsequent rock dust sample collections.	1.5.1			MSHA should develop a tracking system to ensure that areas that were "too wet" to take rock dust samples are revisited and sampled	Created MSHA Form 2000-210 Rock Dust Survey Wet Locations Tracking to ensure tracking and revisiting of "too wet" rock dust sampling areas	Completed 1/1/2006
		1.5.2			Revise Coal Gen Insp Procedures Handbook to require inspection reports to include a completed 2000-210 form	Included in latest revision of Coal Insp Handbook - Rollout on 7/1/2007	7/15/2007
	Rock dust surveys were not conducted in several areas or mapped			1.5.1	Require inspectors to incorporate tracking maps in conjunction with survey stations to ensure all areas of the mine have been surveyed	Use tracking maps from the previous inspection to the ongoing inspection to determine what areas need to have rock dust samples collected	10/1/2007
	Directives overlap on emergency evacuation, drills, SCSRs, and AMS handbook is outdated.	1.6.1		1.7.1	Consolidate and update evacuation, SCSR donning and use, fire and escapeway drills, and AMS systems into one instruction	Update and consolidate directives, issue final document, train on updates	1/1/2008
	Enforcement guidance for 30 CFR 75.320(a) and 75.1501 is lacking.	1.7.1			Provide guidance for 30 CFR 75320(a) and 751501 enforcement	Issue instruction by memos to DMs	10/1/2008
	Regular inspectors have insufficient electrical expertise.	1.8.1			The District 3 Manager should provide training to regular inspectors to help them identify electrical violations	Additional electrical retraining was provided to all District 3 inspectors	Completed 8/1/2006
		1.8.2			Inspectors should request assistance from electrical specialists as needed	Issue instruction by memos to DMs	9/1/2007
		1.8.3			Need for additional electrical inspectors should be evaluated in District 3	Additional electrical inspectors have been hired in District 3	10/1/2007
	Supv and Insp did not maintain and use an effective 103(i) spot inspection tracking system to ensure required time frames were met.		2.2.1		Ensure timeliness of 103(i) inspections are followed, including the use of highlighted calendars with inspector names	FO supervisors should set up the calendar for the respective mines on a 103(i) spot	9/1/2007

Deficiency	Cause	RS	RA	RD	Recommendation	Corrective Action	Due Date
			2.2.2		Provide reports to track timely completion of 103(i) inspections and hold supervisors accountable for deficiencies	FO supervisors should set up the calendar for the respective mines on a 103(i) spot	9/1/2007
	Supv failed to identify and hold Insp accountable for info in notes stating spot and other inspection activities were combined.		2.3.1		Procedures should require all inspection time be dedicated to spot inspections on days when conducted	Issue instruction by memos to DMs	9/1/2007
			2.3.2		Supv and managers should be provided with periodic reports indicating if inspectors conduct spot and other inspection activities on the same day	Issue instructions by memos to DMs; Develop additional standardized reports to be used within the districts	1/1/2008
	Supv did not identify conflicts standard reports, such as spot inspections with no time shown at the mine and inspections with no notes.		2.4.1		After Supv, staff assistants should compare completed standard reports to double check accuracy of inspection activity	Issue instruction by memos to DMs Supv and office staff will assure accuracy with oversight by ADM	10/1/2007
	Supv failed to take action to correct blatant 103(i) errors: many spot inspections only at main mine fans and surface areas.		2.5.1		Quickly review 103(i) reports for adequacy, inform insp of deficiencies and require an additional spot inspection to correct such deficiencies	Better review of inspection notes and closer evaluation of inspector's time and attendance reports Perform additional accompanied activities to enhance interaction between managers, supvs, and insp during mine visits	10/1/2007
			2.5.2		Supv should review time and activity to ensure inspected areas are commensurate with the intent of Section 103(i)	Better review of inspection notes and closer evaluation of inspector's time and attendance reports Perform additional accompanied activities to enhance interaction between managers, supvs, and insp during mine visits	1/1/2008
			2.5.3		Managers should review reports indicating inspector resources relevant to 103(i) spot inspections	District management will monitor resource availability to complete inspections	1/1/2008

Deficiency	Cause	RS	RA	RD	Recommendation	Corrective Action	Due Date
			2.5.4		ADM should use the Performance Management System to hold Supv accountable for ensuring that subordinates follow policies 103(i) inspections	Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook Inform Union	1/1/2008
	Administrator and District 4 management did not adequately oversee surface time spent for 103(i) spot inspections.		2.6.1		Use reports detailing 103(i) inspection time and activity and hold managers accountable for their subordinates' compliance	Develop computerized report that compares T&As with IPAL to allow effective oversight of 103(i) inspections	1/1/2008
	No vent. specialist in field office. Reassignment of specialists, workload of D4 Vent Dept, and the remote location of the field office		6.1.1		Ensure that specialist staffing is adequate to provide technical expertise where specialized knowledge of complex mining systems are required for ensuring quality inspections	Districts have been staffed with specialists as part of the supplemental hiring	10/1/2007
			6.1.2		When specialists are needed for mandated inspections, every effort should be made by to focus their assignments on inspections areas of their expertise	Issue a memo to the DMs indicating that specialist work should be assignend at the beginning of the quarter (when needed for mandated inspections) that will coincide with their area of expertise when possible	9/1/2007
	Supv did not identify errors when they reviewed violations of 30 CFR 75.370.		6.2.1		Supv should ensure that violations are appropriately cited and consult with district specialists when technical guidance is needed	Issue instruction by memos to DMs	9/1/2007
	ADM did not implement established MSHA procedures relevant to 30 CFR 75.370(g).		7.1.1		Revise, implement, and follow SOP for 6-month mine vent plan reviews to comply with the MSHA Mine Vent Plan Approval Procedures hdbk	Issue memo from Administrator to the DMs reiterating 6 month review	9/1/2007
	Although the Coal General Insp Hdbk requires inspection of exam records, no time period is mentioned.			1.6.1	Revise handbook to require the inspector to thoroughly examine and document the inspected records extending back to the previous inspection	Included in latest revision of Coal Insp Handbook - Rollout on 7/1/2007	7/15/2007
	The operator is not required to maintain a record of calibration, no instructions in the Coal Insp Hdbk for checking or documenting this procedure.			2.1.1	The Coal Insp Handbook should be updated to include instructions for Insp to document the calibration checks in their notes	Coal Insp Handbook will require an insp note that the insp observed or determined that gas calibrations are being performed on schedule Issue instruction by memos to DMs	10/1/2007
Improper evals on citations, no notes for vacated citation, delayed safeguards, some terminations not timely (A,D:Insp failed to cite several violations)(D:some abatement times excessive)	Mine Act, 30 CFR, MSHA policies and procedures, and controlling case law not consistently followed (A,D:also lacked proper attitude)	2.1.1	3.1.1	3.1.5	Supervisors should use performance management system to hold inspectors accountable	Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook Inform Union	1/1/2008

Deficiency	Cause	RS	RA	RD	Recommendation	Corrective Action	Due Date
		2.1.2	3.1.3 3.2.2	3.1.3	Supervisors should closely review enforcement actions	Perform additional accompanied activities to enhance interaction between managers, supvs, and insp during mine visits Update and clarify the Supv Handbook and conduct training	1/1/2008
		2.1.3	3.1.4	3.1.1	Supervisors should annually visit each producing mine to assess level of enforcement	Memo to the DM's requiring a supervisory visit at each mine in their district at least one time per year	10/1/2007
		2.1.4	3.1.5	3.1.4	Supervisors should routinely review standard reports to ensure effective enforcement and follow-up	Update and clarify the Supv Handbook and conduct training	1/1/2008
	Improper conference actions influenced inspectors to make lower evaluations of gravity, negligence, and # of persons affected	2.2.1			DM should closely monitor ACRI program and use Performance Management System to ensure that conference officers follow established law, policies, and controlling case law	Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook Inform Union	1/1/2008
	District safeguard issuance policies conflicted with national policy	2.3.1			DM should revise safeguard policies to comply with national policy	Issue memos to DM requiring any policies contrary to national policy be revoked and personnel be reinstructed	9/1/2007
	District management did not effectively monitor enforcement actions and associated notes	2.4.1	3.2.1	4.4.1	ADMs should hold supervisors accountable for reviewing enforcement actions	Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook Inform Union	1/1/2008
		2.4.2			ADMs should hold supervisors accountable for notes regarding vacated citations	Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook Inform Union	1/1/2008
		2.4.3	3.2.3	3.3.2	District management should use Peer Reviews and Second Level Review to assess supervisor's reviews of enforcement actions	Update and clarify the Supv Handbook and conduct training Perform additional accompanied activities to enhance interaction between managers, supvs, and insp during mine visits	1/1/2008
			3.1.2		DM should take appropriate action with respect to individuals when issues of misconduct are identified	Update and clarify the Supv Handbook and conduct training	1/1/2008



Deficiency	Cause	RS	RA	RD	Recommendation	Corrective Action	Due Date
			3.2.5		ADM should visit a mine site at least monthly to ensure enforcement activity is consistent with conditions at the mine	ADM-Enforcement to travel with each inspector in his or her workgroup at least 1 time every 2 months ADM-Technical to travel with different specialist and make at least 2 visits per month Update and clarify the Supv Handbook and conduct training	1/1/2008
			3.2.9	3.3.3	Managers should routinely review standardized reports showing trends in mine enforcement activity and accidents	Develop key indicators report; Update and clarify the Supv Handbook and conduct training	1/1/2008
	Performance Management System for managers and supervisors does not include provisions to evaluate the quality of enforcement actions.	2.4.4 2.4.5		4.6.1	Performance Management System for managers and supervisors should include provisions to evaluate the quality of enforcement actions	Update Performance Management System to include provisions to evaluate the quality of enforcement actions	1/1/2008
	Management did not communicate to inspectors that they would have full support when issuing citations and orders		3.3.1		District managers should ensure that assistant district managers and supervisors support and assist inspectors in taking appropriate enforcement actions	Perform additional accompanied activities to enhance interaction between managers, supvs, and insp during mine visits Update and clarify the Supv Handbook and conduct training	1/1/2008
	The Carbon Monoxide Hdbk is outdated, and has not kept up with current systems		4.1.1		The CO Handbook should be updated to reflect current atmospheric monitoring systems and recent changes to applicable laws	Review and update the CO Insp Handbook as necessary to address new technology and standards	1/1/2008
	Insp did not follow the Carbon Monoxide Hdbk		4.2.1		Insp should be required to document their assessment of the AMS operators' familiarity with his or her responsibilities	Required in new Inspection Procedures Handbook, Rollout 7/1/2007	7/15/2007
	Some Insp did not follow Citation and Order Hdbk guidance on setting abatement times			4.3.1	The Supv should hold the insp accountable for establishing reasonable times for termination of citations	Issue instruction by memos to DMs	9/1/2007

Deficiency	Cause	RS	RA	RD	Recommendation	Corrective Action	Due Date
	Insp did not have sufficient knowledge of atmospheric monitoring systems and applicable laws.		4.3.1		Insp should be provided with training on systematic evaluation of atmospheric monitoring systems	Provide short term instruction via net meeting and augment with revisions to Natl MHS Academy's training program as necessary	1/1/2008
	Insp assumed that standard fire suppression systems for drives were sufficient for entire transfer installations, including take-up assemblies.		5.1.1		Training should be provided for all CMS&H personnel regarding the requirements for fire suppression on belt drives	Provide short term instruction via net meeting and augment with revisions to Natl MHS Academy's training program as necessary	1/1/2008
			5.1.2		Evaluate fire suppression installations at coal mines belt drives, nationally, to determine whether similar systems are in compliance with this standard	Provide short term instruction via net meeting and augment with revisions to Natl MHS Academy's training program as necessary	1/1/2008
			5.1.3		Peer reviews and supervisory reviews should include an inspection of belt conveyor entries	Issue instruction by memos to DMs	9/1/2007
Inspectors and district management improperly performed possible knowing willful (PKW) reviews	Inspectors were given inappropriate guidance on when to conclude a PKW existed	3.1.1			The DM should ensure enforcement personnel follow established guidance	Reenforce existing requirements and instructions through memos to DMs	9/1/2007
	Reviews by District management improperly supported the inspector's determinations	3.2.1			Administrator should ensure D3 SI program follows SI Handbook	Issue instruction by memos to DMs	9/1/2007

Deficiency	Cause	RS	RA	RD	Recommendation	Corrective Action	Due Date
		3.2.2			The Administrator should use the Performance Management System to ensure DM follows SI Handbook	Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook Inform Union	1/1/2008
	Supv SI discouraged PKW cases because of perceived resource limitations	3.3.1			The DM should use the Performance Management System to hold Supv SI accountable for properly evaluating cases	Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook Inform Union	1/1/2008
	The SI Handbook doesn't provide adequate guidance, discrepancy in time frame between SI handbook and the PPM	3.4.1			Revise the SI handbook to provide better guidance	Revise SI handoobk to provide additional guidance on how to determine that a PKW exists	1/1/2008
		3.4.2			Resolve time-frame discrepancies between SI handbook and PPM	Revise SI handoobk and revise PPM as necessary	1/1/2008
	CMSH didn't use data to address low # of 110 cases	3.5.1			Use available data to provide proper oversight of SI program	Issue memos to DMs requiring them to use data to determine effectiveness of SI program	9/1/2007
MSHA has issued 2 pattern of violation (POV) notifications and no POV orders	The criteria for determining a POV was ineffective	4.1.1			Revise criteria to determine a POV	Revised POV criteria developed and implemented	Completed 6/14/2007
A CLR made improper conference decisions, some ACRI program deficiencies found by Jim Walters Resources Inc (JWR) internal review not corrected.	A CLR acted with autonomy and did not follow policies or properly value enforcement personnel statements (D:Didn't use violation history for neg evals)	5.1.1		4.2.1 5.1.1 5.2.1	The DM should use the Performance Management System to hold CLR accountable for making proper decisions	Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook Inform Union Issue instruction by memo to DMs	1/1/2008
		5.1.2		5.1.2 5.2.2	Develop new worksheet to circulate proposed CLR decisions and inspector positions through management chain	Study alternatives and develop program revisions to circulate proposed CLR decisions and inspector positions through management chain	1/1/2008
		5.1.3		5.3.1	Administrator should use Performance Management System to hold DMs accountable for holding CLR's accountable	Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook Inform Union	1/1/2008
	Coal HQ oversight of ACRI program is ineffective, focuses on procedures not decisions, audit team doesn't always have member with enforcement experience	5.2.1		5.4.3 5.5.3	Coal HQ audits should focus on CLR decisions (D: include recommendations for negligence evals)	Review ACRI handbook and complete revisions as necessary to assure appropriate focus on decisions including neg evaluations	1/1/2008

Deficiency	Cause	RS	RA	RD	Recommendation	Corrective Action	Due Date
		5.2.2			Coal HQ audits should include discussions with inspectors	Review ACRI handbook and complete revisions as necessary to assure adequate communication with inspectors	1/1/2008
		5.2.3			Coal HQ audit teams should include a team member with enforcement experience	Ensure each HQ audit team has a member with enforcement experience	1/1/2008
		5.2.4		5.4.1	The Administrator should use HQ audits and the Performance Management System to ensure DM holds CLR accountable	Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook Inform Union	1/1/2008
				5.4.2	The Deputy Assistant Secretary should use the Performance Management System to hold the administrator accountable for identifying and correcting deficiencies in the ACRI program	Revise performance standards to more directly apply to individual responsibilities	1/1/2008
	ACRI Handbook guidance is inadequate, focuses on administrative not substantive issues	5.3.1		5.3.2	Revise ACRI Handbook to give CLRs guidance on making decisions	Revise ACRI handbook and training to provide additional guidance	1/1/2008
		5.3.2		5.1.3 5.3.2	Revise ACRI Handbook to include a conference worksheet	Study alternatives and develop program revisions to circulate proposed CLR decisions and inspector positions through management chain	1/1/2008
				5.5.2	Revise ACRI Handbook to require use of at least 2 years for negligence evals	Revise ACRI handbook and training to provide additional guidance	1/1/2008
Enforcement personnel marked lower gravity, neg, and persons affected even though notes indicated higher levels and numbers	Inspectors were "conference conditioned"	6.1.1			Reinstruct inspectors to properly evaluate enforcement actions	Request ACRI personnel to attend district training sessions where inspection personnel will be reinstructed on enforcement actions	9/1/2007
				4.2.1	The DM should use the Performance Management System to hold CLR accountable	Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook Inform Union	1/1/2008
	Guidance in PPM and Cit.&Order Hdbk does not give clear guidance for determining gravity, neg, # of persons affected.			4.1.1	Supv should use material including the citation and order writing handbook, PPM and controlling case law when reviewing citations and orders	Update and clarify the Supv Handbook and conduct training	1/1/2008

Deficiency	Cause	RS	RA	RD	Recommendation	Corrective Action	Due Date
				4.1.2	Work through Academy to develop training and resource material to aid insp to properly determining gravity, negligence, and # of persons affected	Compare current training with Cit & Order Handbook for consistency Update and enhance where necessary Request EPD to conduct refresher training in coal districts	1/1/2008
				4.1.3	Revise PPM and Citation and Order Handbook to provide more guidance on evaluating gravity, neg, and # persons affected	Review PPM and Cit and Order Handbook for any necessary revisions Provide short term instruction via net meeting and augment with revisions to Natl MHS Academy's training program as necessary	1/1/2008
Poor pre and post conference communication	A CLR did not always follow MSHA handbooks	7.1.1		4.2.1 5.2.1 5.5.1	The DM should use the Performance Management System to hold CLR accountable	Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook Inform Union	1/1/2008
		7.1.2			Each CLR should develop a monthly report, given to all inspectors, briefly describing each decision	Review ACRI handbook and complete revisions as necessary to provide for the monthly summary reports Issue instruction by memos to DMs	1/1/2008
Many unsubstantial conference requests tied up district resources	DM did not use discretion in granting conferences	8.1.1			DM should use more discretion in granting conferences	DM sent memo on March 1, 2007 requiring operators to explain rationale behind request	Completed 3/1/2007
20 psi horizontal pressure standard for seals is inadequate 75.335(a)(2)	MSHA relied on 1971 US Bureau of Mines report & never identified a need for seals to withstand higher pressures	9.1.1			MSHA should re-evaluate and require a prudent level of protection	Emergency Temporary Standard requiring higher pressure seals published May 22, 2007	Completed 5/22/2007
		9.1.2			Promulgate standards requiring a registered engineer to prepare seal designs	ETS published May 22, 2007	Completed 5/22/2007
		9.1.3			Work with NIOSH, industry, and manufacturers to test new seal designs at higher pressures	Technical Support will continue to work with manufacturers and NIOSH to develop, test, and disseminate information on new seal technology	Ongoing
	The 1992 rule committee relied on a BoM report for 20 psi standard; different engineering expertise should have been applied.	9.2.1			Ensure future rule making committees have necessary expertise	Top staff will ensure that rule making committees have appropriate expertise	9/1/2007

Deficiency	Cause	RS	RA	RD	Recommendation	Corrective Action	Due Date
Differences between Sago seals, approved plan, and Lake Lynn tests (D: The alternative seal construction provisions in the approved vent plan did not address roof straps entry size that could adversely affect the quality of seal construction.)	Construction specs for alternative seals not comprehensive or mine specific	10.1.1		6.1.1	Require alternative seal construction plans to be: prepared by a reg PE; specific to mine; and reviewed by MSHA	ETS published May 22, 2007	Completed 5/22/2007
Seal defects not always seen by MSHA, faulty construction practices used on seals, approved plan not followed	Construction defects can't be seen after seal is completely constructed	11.1.1			Promulgate standards requiring a registered engineer to prepare seal designs	ETS published May 22, 2007	Completed 5/22/2007
		11.1.2		7.1.2	Require operators to certify that seals are constructed in accordance with the approved seal plan	ETS published May 22, 2007	Completed 5/22/2007
		11.1.3		7.1.5	Require inspectors to have a copy of seal construction specs while inspecting seals	Issue memos to DMs requiring them to ensure inspectors understand approved seal requirements and have copy with them when inspecting seals	9/1/2007
		11.1.4		7.1.3	Require operators to remove portion of sealant so joints can be inspected when questions arise	Proper instruction provided to inspectors	Completed 7/1/2006
	Inspectors & specialists were not given training on specific critical seal construction provisions	11.2.1		7.2.1	Train inspectors/specialists on specific critical seal construction provisions	Critical seal design construction will be posted on the www.msha.gov website	1/1/2008
	MSHA is not always aware of new seal construction	11.3.1		7.1.1	Require operators to notify MSHA in advance	ETS published May 22, 2007	Completed 5/22/2007
		11.3.2		7.1.4	Instruct enforcement personnel to inspect new seal construction	Issue memos to DMs requiring inspectors to inspect new seal construction	9/1/2007
				8.1.2	Instruct vent spc or supv to make as many of the six-month ventilation plan reviews as feasible and incorporate inspections of seals during that review	Issue memos to DMs requiring inspectors to inspect new seal construction	9/1/2007
Alternative seal construction requirements were not compiled and provided to inspectors	11.4.1		7.3.1	Provide existing 20 psi seal guide to inspectors	Technical Support provided seal construction catalog to districts	9/1/2007	
MSHA didn't heed seal lightning explosion failures to act on lightning as an ignition source	Lightning as ignition source was considered to be isolated occurrence. Horizontal lightning ignition source never recognized.	12.1.1			Require insulated conductors with the potential to become an ignition source to be removed from areas to be sealed	ETS published May 22, 2007	Completed 5/22/2007
MSHA did not learn from faulty seal construction causing past failures	No system to evaluate seal accidents	13.1.1			Systematically evaluate seal explosion information	ETS published May 22, 2007	Completed 5/22/2007

Deficiency	Cause	RS	RA	RD	Recommendation	Corrective Action	Due Date
	No one responsible for analyzing seal accidents	13.2.1		9.1.1	Assign responsibility for systematically evaluating seal explosion information	ETS published May 22, 2007	Completed 5/22/2007
	Info on seal failures not widely known in MSHA and industry	13.3.1		9.1.2	Distribute seal accident reports to districts	HQ and districts will each apprise the other of seal accidents HQ will ensure distribution of seal reports	9/1/2007
After bottom mining, no rock dust was applied	Not following procedures	14.1.1			Direct enforcement personnel to require rock dusting in uncaved abandoned areas	Issue instruction by memos to DMs	10/1/2007
		14.1.2			Ensure mine operators are familiar with availability and use of rock dusting equip	Distribute information on new or existing rock dusting equip	10/1/2007
MSHA did not promulgate standards to implement refuge chambers.	MSHA didn't believe that emergency shelters were technically feasible	15.1.1			MINER Act requires NIOSH to conduct research concerning refuge chambers	Testing of refuge chambers with NIOSH is ongoing	1/1/2008
Plan reviews and inspections were inadequate for Part 48 training.	Specialists and inspectors did not perform adequately plan reviews.	16.1.1			Conduct thorough reviews of all plans DM ensure training plans are corrected	Memo to the DMs stressing the importance of adequate training plans	9/1/2007
		16.1.2			Supv should use Performance Management System to hold inspectors and specialists accountable	Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook Inform Union	1/1/2008
	Supv did not conduct adequate reviews or provide effective oversight	16.2.1			ADMs should use Performance Management System to hold supervisors accountable for proper oversight	Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook	1/1/2008
	EFS staff did not adequately review training plan	16.3.1			ADM should provide technical oversight of EFS	ADM will work with EFS supervisory personnel when issues arise	9/1/2007
		16.3.2			EFS supv should hold EFS personnel accountable	Use performance standards to more effectively assess performance and hold accountable	1/1/2008
First MSHA employee arrived 4 hours after explosion	ICG didn't notify MSHA 84 minutes after explosion	17.1.1			MSHA should revise 30 CFR 5010 to define immediate reporting of accidents	30 CFR 5010 revised	Completed 12/8/2006
	Explosion occurred on Federal Holiday - MSHA traveled from homes to office to mine	17.2.1			Explore methods to decrease response time	Immediate notification within 15 minutes from mine operator to MSHA call center is now required with increased penalties for not complying	9/1/2007
Command Center took 10 hours to determine if fire existed UG	Gas detectors to measure high CO were not available in district	18.1.1		11.1.1	Provide districts with advanced gas detecting equipment that is capable of measuring elevated levels of methane and carbon monoxide	Gas detectors to measure high CO have been provided in each district	Completed 6/1/2007

Deficiency	Cause	RS	RA	RD	Recommendation	Corrective Action	Due Date
	MSHA's gas analysis van and one primary gas chromatograph were in use at a mine fire in Colorado.	18.2.1			MSHA should procure additional portable gas chromatographs and make them available at strategic locations	Review options for additional portable gas chromatographs and make them available at strategic locations Use newly available high limit gas detectors whenever possible	10/1/2007
Miscommunication between mine rescue teams and the command center	Exploration of 2nd Left Parallel exceeded capabilities of communication equipment. Five communication relays ensued.	19.1.1			The Director of Technical Support should explore the availability of advanced communication equipment	Research and test current technology options for use by mine rescue teams	6/1/2008
Families received misinformation about status of miners	Info transmitted from UG was not secure due to open pager phones and easily accessible Command Center	20.1.1			Establish guidelines for command center control and security and secure communications with mine rescue teams	Issue instruction by memos to DMs Update mine rescue training manual or issue separate instructions	10/1/2007
Briefing and debriefing of MEU did not take place on regular basis	Command center did not follow mine rescue protocol	21.1.1			Ensure that Mine Emergency Unit rescue team members are briefed and debriefed during rescue and recovery operations	Issue instruction by memos to DMs	9/1/2007
Misinformation about seismic location system may have affected Sago miner's decision to barricade	The approved Firefighting program of Instruction indicates that seismic location equipment would be used to locate trapped miners.	22.1.1			Ensure that the Firefighting Programs of Instruction contain the proper instructions and limitations of location systems	Review existing FFE plans to assure correct instructions and add locating system limitations, such as seismic systems	1/1/2008
	After the advent of SCSRs, MSHA did not modify the instructions on hard hat stickers.	22.2.1			Create new mine evacuation instructions	The Agency has created and distributed a new sticker that gives correct instructions on barricading	Completed 8/1/2006
Supv & second-level reviews & documentation of accompanied/field activities not done, incomplete or not adequate, Hdbk not followed	No supv diligent effort to perform thorough field activity reviews, & did not follow established policy for supervisory reviews (D: also accompanied activities)	23.1.1	9.1.3	3.1.2	Provide oversight to ensure the requirements of the CMS&H Supervisor's Handbook are followed	Update and clarify the Supv Handbook and conduct training Perform additional accompanied activities to enhance interaction between managers, supvs, and insp during mine visits	1/1/2008
		23.1.2	9.1.1	3.1.2 3.3.1 8.1.1 16.1.1	Use Performance Management System to hold Supv accountable for conducting thorough field activity reviews in accordance with CMS&H Supervisor's Handbook (D:also accompanied activities, inspect seals during accompanied activities when applicable)	Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook Inform Union	1/1/2008
		23.1.3		16.1.2	District generated worksheets should be revised to include all information required including detailed notes	Revise district generated worksheet	1/1/2008
			9.1.2		Take appropriate action with respect to individuals when issues of misconduct are identified	Update and clarify the Supv Handbook and conduct training	1/1/2008



Deficiency	Cause	RS	RA	RD	Recommendation	Corrective Action	Due Date
	ADM for did not provide adequate oversight. (A: also DM did not hold ADM accountable)	23.2.1	9.3.2	3.4.1 16.2.1 16.3.1	Use Performance Management System to hold ADM accountable for properly reviewing and documenting second-level reviews and for taking corrective actions	Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook Inform Union	1/1/2008
		23.2.2	9.2.1 9.3.1 9.4.1	16.4.3	Administrator should use Performance Management System to hold the DM accountable for ensuring that his subordinates comply with Handbooks	Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook	1/1/2008
Inadequate Peer reviews, corrective action plans deficient, not submitted, or uncorrected. Significant issues identified as insignificant	Not following procedures	24.1.1			Use Performance Management System to hold staff accountable for following the Accountability Program Handbook and for conducting thorough and effective Peer Reviews	Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook Inform Union	1/1/2008
		24.1.2			Do not characterize issues as "significant" or "insignificant"	Make necessary revisions to Accountability Hdbk to eliminate the practice of identifying issues as "insignificant"	1/1/2008
	District Peer Reviews did not identify root causes of deficiencies, current process not effective	24.2.1	8.1.1 8.1.2		Ensure that deficiencies identified in Peer Reviews are analyzed for root causes Corrective actions must address root causes	Issue instruction by memos to DMs	10/1/2007
		24.2.2	8.1.3	16.4.1 16.4.3 17.2.1 17.3.3 17.3.2	Use Performance Management System to hold the DM accountable for identifying root causes of deficiencies and implementing effective action plans (D:also track progress of corrective actions) (DM&ADM)	Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook	1/1/2008
				1.4.1 4.5.1 17.3.1	Redesign the Peer review process to incorporate root cause analyses	Make necessary revisions to Accountability Handbook to incorporate root cause analyses of peer reviews	1/1/2008
	No HQ reviews for several years.	24.3.1	8.3.1	17.2.2	Conduct reviews during next 2 years Evaluate progress in addressing internal review issues & identifying and correcting root causes Recommend changes to the action plan when appropriate	Review results of district peer reviews to ensure that internal review issues are addressed and deficiencies not recurring	12/31/2009
		24.3.2	8.2.1	3.5.1 16.4.2	Examine methods to improve HQ reviews of district Peer Review reports Implement method for identifying and eliminating repetitive issues and root causes	Reviews will be conducted by CMSH Use Performance Management System to address recurring root causes	1/1/2008

Deficiency	Cause	RS	RA	RD	Recommendation	Corrective Action	Due Date
	HQ oversight of Peer Reviews did not recognize or resolve deficiencies.		8.2.1		Examine methods to improve the effectiveness of HQ reviews of district Peer Review reports including eliminating repetitive issues	Reviews will be conducted by CSMH Use Performance Management System to address recurring root causes	1/1/2008
	The Harlan field office supervisor failed to utilize the checklist provided by the assistant district manager in January 2006.			17.1.1	Use Performance Management System to hold the Supv responsible for implementing corrective actions resulting from Peer and Accountability reviews	Revise performance standards to more directly apply to individual responsibilities Conduct training on effective use of Performance Management System Develop a Performance Management System computer tracking system Update Supv Handbook Inform Union	1/1/2008
MSHA data was not adequately used by Supv and managers to monitor, identify, and correct lapses in required activities	Standardized reports are not available or effectively distributed for all potential indicators of performance deficiencies.		10.1.1		Develop and distribute standardized reports for all critical data to be used by managers and supervisors relevant to inspections and investigations	Develop additional standardized reports to be used throughout HQ and districts	1/1/2008
	National SOPs are not available to ensure effective use of data and reports.		10.2.1		SOPs should be developed for effective use of each report and to identify responsibilities for managers and supervisors	Update and clarify the Supv Handbook and conduct training	1/1/2008
			10.2.2		The administrator should mandate the use of national SOPs and require documentation of report reviews	Issue instruction by memos to DMs	1/1/2008
103(k) order did not address safety of persons engaged in rescue & recovery operation, no mods to the order involving the rescue and recovery.	District 7 personnel did not follow established procedures as outlined in section 103k of the Mine Act and Coal General Inspection Procedures Handbook.			10.1.1	A section 103(k) order should be issued to ensure the safety of all persons involved in rescue and recovery This order should be issued to the operator in writing as soon as possible	Issue instruction by memos to DMs	9/1/2007
				10.1.2	All rescue and recovery plans should be reviewed and approved by the senior authorized representative at the mine site prior to implementation	Issue instruction by memos to DMs Update mine rescue training manual or issue separate instructions	9/1/2007
MSHA did not coordinate rescue & recovery ops before & during command center, people & mine rescue teams entered mine & violated many critical well established safety measures.	Person in charge at mine did not follow mine rescue & recovery procedures, in D7 MERP, Coal Insp Hdbk. MSHA did not assume oversight obligations required in the Mine Act			12.1.1	The District 7 MERP should be modified to provide clear and concise direction in authority and delegation of duties of MSHA personnel onsite at rescue and recovery operations	Issue instruction by memos to DMs Update District MERPs, mine rescue training manual or issue separate instructions	9/1/2007
				12.2.2	D7 personnel should be reinstructed to follow the procedures for mine rescue and recovery operations in District MERP and the Coal Insp Handbook	District 7 personnel will have a training session to review the District MERP	9/1/2007

Deficiency	Cause	RS	RA	RD	Recommendation	Corrective Action	Due Date
Critical info, not relayed, compromised the ability to direct a safe rescue and recovery operation, when advancing the fresh air base, ventilation changes were made into unexplored areas.	Mine rescue teams did not follow established mine rescue protocol. The command center did not ensure communication with the fresh air base and mine rescue teams during the mine rescue and recovery.			13.1.1	The MSHA official in charge of the command center should ensure the safety of all persons involved in rescue and recovery through the use of the section 103(k) order	Issue instruction by memos to DMs Update mine rescue training manual or issue separate instructions	9/1/2007
				13.1.2	Inform each team entering mine of the mine status, locations of teams, fresh air base, back-up teams, and communication requirements, proper apparatus, constant communications, and proper back-up personnel	Issue instruction by memos to DMs Update mine rescue training manual or issue separate instructions	9/1/2007
				13.1.3	Ensure that established guidelines in coal insp handbook and in the mine emergency response plan are followed	Issue instruction by memos to DMs Update mine rescue training manual or issue separate instructions	9/1/2007
The response time in deploying the MEU unit resulted in a delay to outfit and equip onsite MSHA MEU members.	The MEU unit was not notified for 2 hours following the explosion.			14.1.1	Notify MEU immediately following any explosion, entrapment or reportable mine fire, members should get their equipment ready and remain ready for deployment	Included in revised HQ MERP	9/1/2007
	The Mobile Command Center is not situated close enough to District 7 to provide effective and timely support.			14.2.1	Perform a feasibility study, determine need for MEU units located throughout country to reduce response times to emergencies	Review options for improved MEU deployment of personnel and equipment	1/1/2008
MSHA did not conduct an analysis of rescue and recovery operations following the Darby Mine explosion.	There are currently no procedures in place to review and analyze MSHA's rescue and recovery efforts.			15.1.1	Form an ad hoc review committee for the purpose of evaluating MSHA's response to each mine emergency that involves rescue and recovery	Natl MERC and appropriate personnel will perform a review following each mine rescue and recovery op	1/1/2008

<b>KEY</b>	
Alternative Case Resolution Initiative	ACRI
Assistant District Manager	ADM
Atmospheric Monitoring System	AMS
Cause Aracoma	CA
Cause Darby	CD
Conference Litigation Representative	CLR
Cause Sago	CS
Deficiency Aracoma	DA
Deficiency Darby	DD
District Manager	DM
Deficiency Sago	DS
Mine Emergency Evacuation and Fire Fighting Program of Instruction	FFE
Inspector's Portable Application for Laptops	IPAL
Mine Emergency Response Coordinator	MERC
Mine Emergency Response Plan	MERP
Mine Emergency Unit	MEU
Pattern of Violations	POV
Recommendation Aracoma	RA
Recommendation Darby	RD
Recommendation Sago	RS
Time and Activity	T&A
Underground	UG
Uniform Mine File	UMF

## **Appendix C - Recommendations from MSHA's Accident Prevention Team**

On August 23, 2005, the District 3 Manager, Assistant District Manager – Inspection Division, and the two field office supervisors met with MSHA's Accident Prevention Team members and Anker Energy's representatives. The Accident Prevention Team presented the initial results of their Accident Analysis and Incident Reduction Study. This study was based on an analysis of mine accidents, interviews with miners, and observations of working conditions and practices, resulting from several visits to the mine. They made the following recommendations to Sago Mine management.

- Adopt a structured new inexperienced miner program and also have a structured program for the newly employed experienced miners.
- Display more safety awareness material.
- Provide structured safety meetings on a regular basis.
- Install an engineered dewatering system to reduce slips, tripping and stumbling type injuries from traveling in wet muddy conditions.
- Modify track equipment brakes and ergonomics of riding compartments.
- Improve installation and maintenance of track.
- Improve overall training by conducting various schools on equipment operation and supervisory skills.
- Consider modification in the warning reflectors of the second to last row of roof bolts.
- Review procedures ensuring compliance with Federal and State Personal Protective Equipment regulations and policies.
- Improve housekeeping around power centers and feeder areas.
- Consider employing a roof bolting crew on the midnight shift to eliminate unbolted places existing for extended periods of time.
- Review the dust control plan to eliminate exposure to fugitive dust from the continuous mining machines.
- Clarify methods used to eliminate draw rock issues.
- Communicate with miners the work planned on the track and improvement in the track equipment.
- Provide adequate manpower to accomplish the job. Provide proper training to foremen as to what is expected. Foremen are responsible for the section and the safety of the people.
- Provide training in proper lifting techniques and look at labor saving devices.
- Provide training in maintenance of face ventilation devices.
- Purchase ladders for use in installing face ventilation curtains in high areas and designate storage locations.
- Provide training focused on practicing caution and patience during emergency situations.
- Provide improved facilities at mantrip stations.

- Consider using smaller gravel on the travel way out of the pit area to reduce tripping and stumbling hazards.
- Place covers over pipes in the area between the bath house and lamp house.
- When setting up new work areas make an effort to eliminate site specific hazards.
- Analyze individual accidents and communicate alternative methods to all miners.

## Appendix D - MSHA Inspection Events at the Sago Mine (01/01/2005 - 12/31/2005)

<b>*Event No.</b>	<b>Activity Code</b>	<b>Inspection Activity</b>	<b>Beginning Date</b>	<b>Ending Date</b>
4054553	AAA	Regular Safety and Health Inspection	01/04/2005	03/29/2005
4077028	AFC	Non-Injury Accident Investigation	02/01/2005	02/02/2005
4077421	AFC	Non-Injury Accident Investigation	02/01/2005	02/03/2005
4077564	CEF	Other Technical Investigation	03/01/2005	03/01/2005
4077603	CCC	Ventilation Technical Inspection	03/02/2005	03/17/2005
4054745	E01	Regular Safety and Health Inspection	04/05/2005	06/30/2005
4077722	E12	110(c), 110(d) Investigation	04/21/2005	06/16/2005
4077645	E08	Non-Injury Accident Investigation	04/25/2005	04/25/2005
4054749	E01	Regular Safety and Health Inspection	07/07/2005	09/30/2005
4351051	E08	Non-Injury Accident Investigation	08/02/2005	08/02/2005
4077386	E07	Non-Fatal Accident Investigation	08/11/2005	08/29/2005
4077387	E08	Non-Injury Accident Investigation	08/22/2005	08/23/2005
4077391	E20	Roof Control Technical Investigation	09/30/2005	10/06/2005
4054434	E01	Regular Safety and Health Inspection	10/03/2005	02/13/2006
4077666	E08	Non-Injury Accident Investigation	11/28/2005	11/28/2005
4077397	E08	Non-Injury Accident Investigation	12/07/2005	12/12/2005





## Appendix E - Enforcement Actions Taken by MSHA at the Sago Mine (01/01/2005 - 12/31/2005)

<b>Violation No.</b>	<b>Date Issued</b>	<b>Type Action</b>	<b>S&amp;S</b>	<b>30 CFR</b>	<b>Description</b>
7097102	01/06/2005	104(a) Citation	No	75.340(a)	Underground Electrical Installations
7097101	01/06/2005	104(a) Citation	No	75.370(a)(1)	Mine Ventilation Plan
7097103	01/09/2005	104(a) Citation	Yes	75.400	Accumulations of Combustible Materials
7097106	01/10/2005	104(a) Citation	No	75.400	Accumulations of Combustible Materials
7097104	01/10/2005	104(a) Citation	No	75.520	Switches
7097105	01/10/2005	104(a) Citation	No	75.807	Installation of High-Voltage Cables
7148704	01/24/2005	104(a) Citation	No	75.1100-2(e)(2)	Firefighting Equipment
7148705	01/24/2005	104(a) Citation	Yes	75.1725(c)	Machinery and Equipment
7148707	01/24/2005	104(a) Citation	Yes	75.370(a)(1)	Mine Ventilation Plan
7148706	01/24/2005	104(a) Citation	No	75.370(a)(1)	Mine Ventilation Plan
7097122	02/02/2005	104(a) Citation	No	75.1101-8(a)	Water Sprinkler Systems
7097121	02/02/2005	104(a) Citation	No	75.312(e)	Mine Fan Examinations and Records
7097123	02/02/2005	104(a) Citation	Yes	75.340(a)(2)(i)	Underground Electrical Installations
7148634	03/03/2005	104(a) Citation	No	75.364(b)(1)	Weekly Examinations
7148635	03/03/2005	104(a) Citation	No	75.370(a)(1)	Mine Ventilation Plan
7097588	03/16/2005	104(a) Citation	No	70.207	Bimonthly Sampling
7097717	04/06/2005	104(a) Citation	No	75.370	Mine Ventilation Plan
7097718	04/06/2005	104(a) Citation	No	75.601-1	Short Circuit Protection of Trailing Cables
7097719	04/06/2005	104(a) Citation	No	75.601-1	Short Circuit Protection of Trailing Cables
7097720	04/07/2005	104(a) Citation	Yes	75.517	Power Wires; Insulation and Protection
7097722	04/11/2005	104(a) Citation	Yes	75.503	Permissible Equipment Maintenance
7097721	04/11/2005	104(a) Citation	Yes	75.517	Power Wires; Insulation and Protection
7097723	04/11/2005	104(a) Citation	Yes	75.1725(a)	Machinery and Equipment
7097724	04/12/2005	104(a) Citation	Yes	75.517	Power Wires; Insulation and Protection
7097725	04/12/2005	104(a) Citation	Yes	75.517	Power Wires; Insulation and Protection
7097726	04/12/2005	104(a) Citation	Yes	75.370(a)(1)	Mine Ventilation Plan
7097728	04/13/2005	104(a) Citation	No	70.208	Bimonthly Sampling
7097727	04/13/2005	104(a) Citation	No	75.1107-16(b)	Fire Suppression Devices
7097729	04/18/2005	104(a) Citation	No	75.400	Accumulations of Combustible Materials
7097731	04/18/2005	104(a) Citation	Yes	75.517	Power Wires; Insulation and Protection
7097730	04/18/2005	104(b) Order		75.1107-16(b)	Fire Suppression Devices
7097732	04/20/2005	104(a) Citation	No	75.333(c)(1)	Ventilation Controls
7097734	04/26/2005	104(a) Citation	Yes	75.517	Power Wires; Insulation and Protection
7097735	04/26/2005	104(a) Citation	No	75.1107-16(b)	Fire Suppression Devices
7097736	04/26/2005	104(a) Citation	No	75.1107-16(b)	Fire Suppression Devices
7097733	04/26/2005	104(a) Citation	No	75.601-1	Short Circuit Protection of Trailing Cables
7097739	04/27/2005	104(a) Citation	Yes	75.400	Accumulations of Combustible Materials
7097740	04/27/2005	104(a) Citation	Yes	75.400	Accumulations of Combustible Materials
7097742	04/27/2005	104(a) Citation	Yes	75.400	Accumulations of Combustible Materials
7097737	04/27/2005	104(a) Citation	No	75.1107-16(b)	Fire Suppression Devices
7097738	04/27/2005	104(a) Citation	No	75.1107-16(b)	Fire Suppression Devices
7097741	04/27/2005	104(a) Citation	Yes	75.1725(a)	Machinery and Equipment
7097743	04/27/2005	104(a) Citation	Yes	75.360(a)(1)	Preshift Examinations
7096480	05/02/2005	104(a) Citation	Yes	75.517	Power Wires; Insulation and Protection
7096481	05/02/2005	104(a) Citation	No	75.807	Installation of High-Voltage Cables
7097229	05/02/2005	104(a) Citation	Yes	75.1725(a)	Machinery and Equipment

<b>Violation No.</b>	<b>Date Issued</b>	<b>Type Action</b>	<b>S&amp;S</b>	<b>30 CFR</b>	<b>Description</b>
7096478	05/02/2005	104(a) Citation	Yes	75.1725(a)	Machinery and Equipment
7096479	05/02/2005	104(a) Citation	Yes	75.1725(a)	Machinery and Equipment
7096483	05/03/2005	314(b) Safeguard		75.1403	Other Safeguards
7097805	05/03/2005	104(a) Citation	No	50.20(a)	MSHA Form 7000-1
7096482	05/03/2005	104(a) Citation	Yes	75.1725(a)	Machinery and Equipment
7097810	05/04/2005	104(a) Citation	No	75.400	Accumulations of Combustible Materials
7097808	05/04/2005	104(a) Citation	Yes	62.130(a)	Noise Permissible Exposure Level
7097809	05/04/2005	104(a) Citation	No	75.1714-3(e)	Self-rescue Devices
7097807	05/04/2005	104(a) Citation	Yes	75.1725(a)	Machinery and Equipment
7097806	05/04/2005	104(a) Citation	Yes	75.1725(a)	Machinery and Equipment
7097811	05/05/2005	104(a) Citation	Yes	75.1725(a)	Machinery and Equipment
7097812	05/10/2005	104(a) Citation	No	70.208	Bimonthly Sampling
7097804	05/10/2005	104(a) Citation	No	75.403	Rock Dust
7097823	05/19/2005	104(a) Citation	No	70.207(a)	Bimonthly Sampling
7097824	05/19/2005	104(a) Citation	No	75.1725(a)	Machinery and Equipment
7097825	05/20/2005	104(d)(1) Citation	Yes	75.400	Accumulations of Combustible Materials
7097826	05/20/2005	104(a) Citation	Yes	75.202(a)	Protection from Falls of Roof, Face and Ribs
7097827	05/20/2005	104(d)(1) Order	Yes	75.360(a)(1)	Preshift Examinations
7097833	05/31/2005	104(a) Citation	No	75.400	Accumulations of Combustible Materials
7097834	05/31/2005	104(a) Citation	No	75.333(d)(3)	Ventilation Controls
7097835	06/02/2005	104(d)(1) Order	Yes	75.340(a)(1)(i)	Underground Electrical Installations
7097836	06/02/2005	104(a) Citation	No	75.360(e)	Preshift Examinations
7097925	06/14/2005	314(b) Safeguard		75.1403	Other Safeguards
7097926	06/14/2005	314(b) Safeguard		75.1403	Other Safeguards
7097927	06/14/2005	314(b) Safeguard		75.1403	Other Safeguards
7097843	06/14/2005	104(a) Citation	Yes	75.1725(a)	Machinery and Equipment
7097924	06/14/2005	104(a) Citation	Yes	75.1725(a)	Machinery and Equipment
7097842	06/14/2005	104(a) Citation	Yes	75.1725(a)	Machinery and Equipment
7148268	06/28/2005	104(a) Citation	Yes	77.208(d)	Storage of Materials
7097945	07/12/2005	104(a) Citation	No	75.503	Permissible Equipment Maintenance
7097946	07/12/2005	104(a) Citation	No	75.516	Power Wires; Support
7097943	07/12/2005	104(a) Citation	No	75.1107-16(b)	Fire Suppression Devices
7097944	07/12/2005	104(a) Citation	No	75.1107-16(b)	Fire Suppression Devices
7097942	07/12/2005	104(a) Citation	Yes	75.1725(a)	Machinery and Equipment
7097941	07/12/2005	104(d)(2) Order	Yes	75.203(b)	Mining Methods
7097947	07/12/2005	104(a) Citation	No	75.360(a)(1)	Preshift Examinations
7097950	07/13/2005	104(a) Citation	No	75.503	Permissible Equipment Maintenance
7097953	07/13/2005	104(a) Citation	No	75.503	Permissible Equipment Maintenance
7097951	07/13/2005	104(a) Citation	No	75.503	Permissible Equipment Maintenance
7097954	07/13/2005	104(a) Citation	No	75.503	Permissible Equipment Maintenance
7097952	07/13/2005	104(a) Citation	No	75.503	Permissible Equipment Maintenance
7097949	07/13/2005	104(a) Citation	No	75.512	Maintenance of Electric Equipment
7097948	07/13/2005	104(a) Citation	No	75.601-1	Short Circuit Protection of Trailing Cables
7097956	07/15/2005	104(a) Citation	Yes	75.517	Power Wires; Insulation and Protection
7097958	07/15/2005	104(a) Citation	No	75.202(a)	Protection from Falls of Roof, Face and Ribs
7097957	07/15/2005	104(a) Citation	No	75.383(a)	Escapeway Maps and Drills
7097959	07/18/2005	104(a) Citation	No	75.400	Accumulations of Combustible Materials
7097961	07/18/2005	104(a) Citation	No	75.904	Identification of Circuit Breakers
7097960	07/18/2005	104(a) Citation	No	75.380(g)	Escapeways
7097962	07/18/2005	104(a) Citation	No	75.601-1	Short Circuit Protection of Trailing Cables

<b>Violation No.</b>	<b>Date Issued</b>	<b>Type Action</b>	<b>S&amp;S</b>	<b>30 CFR</b>	<b>Description</b>
7097963	07/19/2005	104(a) Citation	Yes	75.503	Permissible Equipment Maintenance
7098105	07/19/2005	104(a) Citation	Yes	75.503	Permissible Equipment Maintenance
7098104	07/19/2005	104(a) Citation	Yes	75.517	Power Wires; Insulation and Protection
7098106	07/20/2005	104(a) Citation	Yes	75.1403	Other Safeguards
7098107	07/20/2005	104(a) Citation	No	75.400	Accumulations of Combustible Materials
7098123	08/01/2005	104(a) Citation	Yes	75.1403	Other Safeguards
7098125	08/01/2005	104(a) Citation	No	75.503	Permissible Equipment Maintenance
7098124	08/01/2005	104(a) Citation	No	75.503	Permissible Equipment Maintenance
7098129	08/01/2005	104(a) Citation	No	75.523	Electric Face Equipment; Deenergization
7098126	08/02/2005	104(a) Citation	Yes	75.1403	Other Safeguards
7098127	08/02/2005	104(a) Citation	Yes	75.1403	Other Safeguards
7098128	08/02/2005	104(a) Citation	Yes	75.202(a)	Protection from Falls of Roof, Face and Ribs
7098130	08/03/2005	104(a) Citation	Yes	75.1403	Other Safeguards
7098131	08/03/2005	104(a) Citation	No	75.325(b)	Air Quantity
7098132	08/08/2005	104(a) Citation	Yes	75.1403	Other Safeguards
7098134	08/08/2005	314(b) Safeguard		75.1403	Other Safeguards
7098133	08/08/2005	104(a) Citation	No	75.325(a)	Air Quantity
7098137	08/09/2005	104(a) Citation	No	75.1718	Drinking Water
7098136	08/09/2005	104(a) Citation	Yes	75.517	Power Wires; Insulation and Protection
7098135	08/09/2005	104(a) Citation	No	75.1107-16(b)	Fire Suppression Devices
7149365	08/11/2005	103(k) Order			
7098153	08/16/2005	104(d)(2) Order	Yes	75.202(a)	Protection from Falls of Roof, Face and Ribs
7098155	08/16/2005	104(a) Citation	Yes	75.211(d)	Roof Testing and Scaling
7098159	08/16/2005	104(d)(2) Order	Yes	75.340(a)(1)(i)	Underground Electrical Installations
7098158	08/16/2005	104(d)(2) Order	Yes	75.364(b)(1)	Weekly Examinations
7098154	08/16/2005	104(d)(2) Order	Yes	75.380(d)(1)	Escapeways
7098156	08/16/2005	104(a) Citation	Yes	75.380(d)(1)	Escapeways
7098157	08/16/2005	104(a) Citation	Yes	75.380(d)(1)	Escapeways
7149368	08/22/2005	104(a) Citation	Yes	75.1725(b)	Machinery and Equipment
7149367	08/22/2005	104(a) Citation	Yes	75.220(a)	Roof Control Plan
7149366	08/22/2005	103(k) Order			
7098175	08/29/2005	104(a) Citation	No	75.400	Accumulations of Combustible Materials
7098174	08/29/2005	104(a) Citation	Yes	75.517	Power Wires; Insulation and Protection
7098173	08/29/2005	104(a) Citation	Yes	75.1722(b)	Guards
7098172	08/29/2005	104(a) Citation	Yes	75.1725(a)	Machinery and Equipment
7098178	08/30/2005	104(a) Citation	No	70.208	Bimonthly Sampling
7098177	08/30/2005	104(a) Citation	Yes	75.1403	Other Safeguards
7098176	08/30/2005	104(a) Citation	Yes	75.517	Power Wires; Insulation and Protection
7098179	08/31/2005	104(a) Citation	Yes	75.517	Power Wires; Insulation and Protection
7098180	08/31/2005	104(a) Citation	Yes	75.1725(a)	Machinery and Equipment
4890530	09/07/2005	104(a) Citation	No	75.1403	Other Safeguards
4890528	09/07/2005	104(a) Citation	Yes	75.1403	Other Safeguards
4890532	09/07/2005	104(a) Citation	Yes	75.1403	Other Safeguards
4890531	09/07/2005	104(a) Citation	No	75.507	Power Connection Points
4890527	09/07/2005	104(a) Citation	No	75.325(b)	Air Quantity
4890533	09/07/2005	104(a) Citation	No	75.364(b)(2)	Weekly Examinations
4890529	09/07/2005	104(a) Citation	No	75.370(a)(1)	Mine Ventilation Plan
4890537	09/12/2005	104(d)(2) Order	Yes	75.1403	Other Safeguards
4890538	09/12/2005	104(a) Citation	Yes	75.1722	Equipment Guards
4890535	09/12/2005	104(d)(2) Order	Yes	75.400	Accumulations of Combustible Materials

<b>Violation No.</b>	<b>Date Issued</b>	<b>Type Action</b>	<b>S&amp;S</b>	<b>30 CFR</b>	<b>Description</b>
4890534	09/12/2005	104(d)(2) Order	Yes	75.400	Accumulations of Combustible Materials
4890536	09/12/2005	104(d)(2) Order	Yes	75.400	Accumulations of Combustible Materials
4890539	09/12/2005	104(d)(2) Order	Yes	75.360(a)(1)	Preshift Examinations
7093329	09/20/2005	104(a) Citation	No	75.512	Maintenance of Electric Equipment
7093331	09/20/2005	104(a) Citation	No	75.370(a)(1)	Mine Ventilation Plan
7093330	09/20/2005	104(a) Citation	No	75.601-1	Short Circuit Protection of Trailing Cables
7093333	09/20/2005	104(a) Citation	Yes	77.404(a)	Operation and Maintenance of Machinery
7093332	09/20/2005	104(a) Citation	Yes	77.404(a)	Operation and Maintenance of Machinery
7093338	09/23/2005	104(a) Citation	No	75.1722(b)	Guards
7093337	09/23/2005	104(a) Citation	No	75.364(b)(2)	Weekly Examinations
7098384	09/30/2005	104(a) Citation	Yes	75.202(a)	Protection from Falls of Roof, Face and Ribs
7098385	09/30/2005	104(a) Citation	Yes	75.360(a)(1)	Preshift Examinations
7149383	10/03/2005	104(a) Citation	Yes	75.326	Mean Entry Air Velocity
7098349	10/04/2005	104(a) Citation	No	75.503	Permissible Equipment Maintenance
7098351	10/04/2005	104(a) Citation	No	75.515	Cable Fittings
7098350	10/04/2005	104(a) Citation	No	75.1100-2(e)(2)	Firefighting Equipment
7098353	10/05/2005	104(a) Citation	No	75.400	Accumulations of Combustible Materials
7149291	10/05/2005	104(a) Citation	No	75.1107-16(b)	Fire Suppression Devices
7098352	10/05/2005	104(a) Citation	No	75.333(c)(2)	Ventilation Controls
7098354	10/05/2005	104(a) Citation	No	75.342(a)(4)	Methane Monitors
7149290	10/05/2005	104(a) Citation	No	75.380(d)(2)	Escapeways
7098355	10/05/2005	104(a) Citation	No	77.410(b)	Automatic Warning Devices
7098357	10/06/2005	104(a) Citation	No	75.1100-2(b)	Firefighting Equipment
7098356	10/06/2005	104(a) Citation	Yes	75.1725(a)	Machinery and Equipment
7098358	10/11/2005	104(a) Citation	No	75.1713-7(b)	First Aid Equipment
7098366	10/18/2005	104(a) Citation	No	75.1100-2(e)(2)	Firefighting Equipment
7098365	10/18/2005	104(a) Citation	Yes	75.202(a)	Protection from Falls of Roof, Face and Ribs
7098363	10/18/2005	104(a) Citation	Yes	75.220(a)(1)	Roof Control Plan
7098364	10/18/2005	104(d)(2) Order	No	75.330(b)(1)	Face Ventilation Control Devices
7098367	10/18/2005	104(a) Citation	No	75.330(b)(2)	Face Ventilation Control Devices
7098369	10/24/2005	104(a) Citation	No	75.1100-2(b)	Firefighting Equipment
7098370	10/24/2005	104(a) Citation	No	75.1101-8(a)	Water Sprinkler Systems
7098371	10/24/2005	104(a) Citation	No	75.1103-11	Tests of Fire Hydrants and Hoses
7098368	10/24/2005	104(a) Citation	No	75.1702-1	Smoking Programs
7098380	11/01/2005	104(a) Citation	Yes	75.517	Power Wires; Insulation and Protection
7098377	11/01/2005	104(a) Citation	Yes	75.202(a)	Protection from Falls of Roof, Face and Ribs
7098379	11/01/2005	104(a) Citation	Yes	75.204(f)(7)	Roof Bolting
7098375	11/01/2005	104(a) Citation	No	75.220(a)(1)	Roof Control Plan
7098378	11/01/2005	104(a) Citation	Yes	75.220(a)(1)	Roof Control Plan
7098376	11/01/2005	104(a) Citation	Yes	75.370(a)(1)	Mine Ventilation Plan
7149863	11/08/2005	104(a) Citation	No	75.400	Accumulations of Combustible Materials
7098544	11/08/2005	104(a) Citation	Yes	75.202(a)	Protection from Falls of Roof, Face and Ribs
7149864	11/08/2005	104(a) Citation	Yes	75.202(a)	Protection from Falls of Roof, Face and Ribs
7098546	11/08/2005	104(a) Citation	No	75.220(a)(1)	Roof Control Plan
7148620	11/08/2005	104(a) Citation	No	75.220(a)(1)	Roof Control Plan
7148619	11/08/2005	104(a) Citation	No	75.220(a)(1)	Roof Control Plan
7149865	11/08/2005	104(d)(2) Order	Yes	75.360(f)	Preshift Examinations
7098545	11/08/2005	104(a) Citation	Yes	75.380(d)(1)	Escapeways
7098535	12/07/2005	104(a) Citation	No	75.400	Accumulations of Combustible Materials
7098536	12/07/2005	104(a) Citation	No	70.207(a)	Bimonthly Sampling

<b>Violation No.</b>	<b>Date Issued</b>	<b>Type Action</b>	<b>S&amp;S</b>	<b>30 CFR</b>	<b>Description</b>
7098542	12/14/2005	104(a) Citation	Yes	75.1403	Hoisting and Mantrips
7098543	12/14/2005	104(a) Citation	Yes	75.1403	Hoisting and Mantrips
7098539	12/14/2005	104(a) Citation	No	75.400	Accumulations of Combustible Materials
7098540	12/14/2005	104(a) Citation	No	75.400	Accumulations of Combustible Materials
7098644	12/14/2005	104(d)(2) Order	No	75.400	Accumulations of Combustible Materials
7098541	12/14/2005	104(a) Citation	No	75.351(e)(3)	Atmospheric Monitoring Systems
7098645	12/18/2005	104(a) Citation	Yes	75.220(a)(1)	Roof Control Plan
7098646	12/18/2005	104(a) Citation	Yes	75.220(a)(1)	Roof Control Plan
7098650	12/20/2005	104(a) Citation	No	75.503	Permissible Equipment Maintenance
7098647	12/20/2005	104(a) Citation	Yes	75.220(a)(1)	Roof Control Plan
7098613	12/21/2005	104(a) Citation	No	77.1110	Examination and Maintenance of Firefighting Equipment
7098614	12/21/2005	104(a) Citation	Yes	77.205(b)	Travelways at Surface Installations



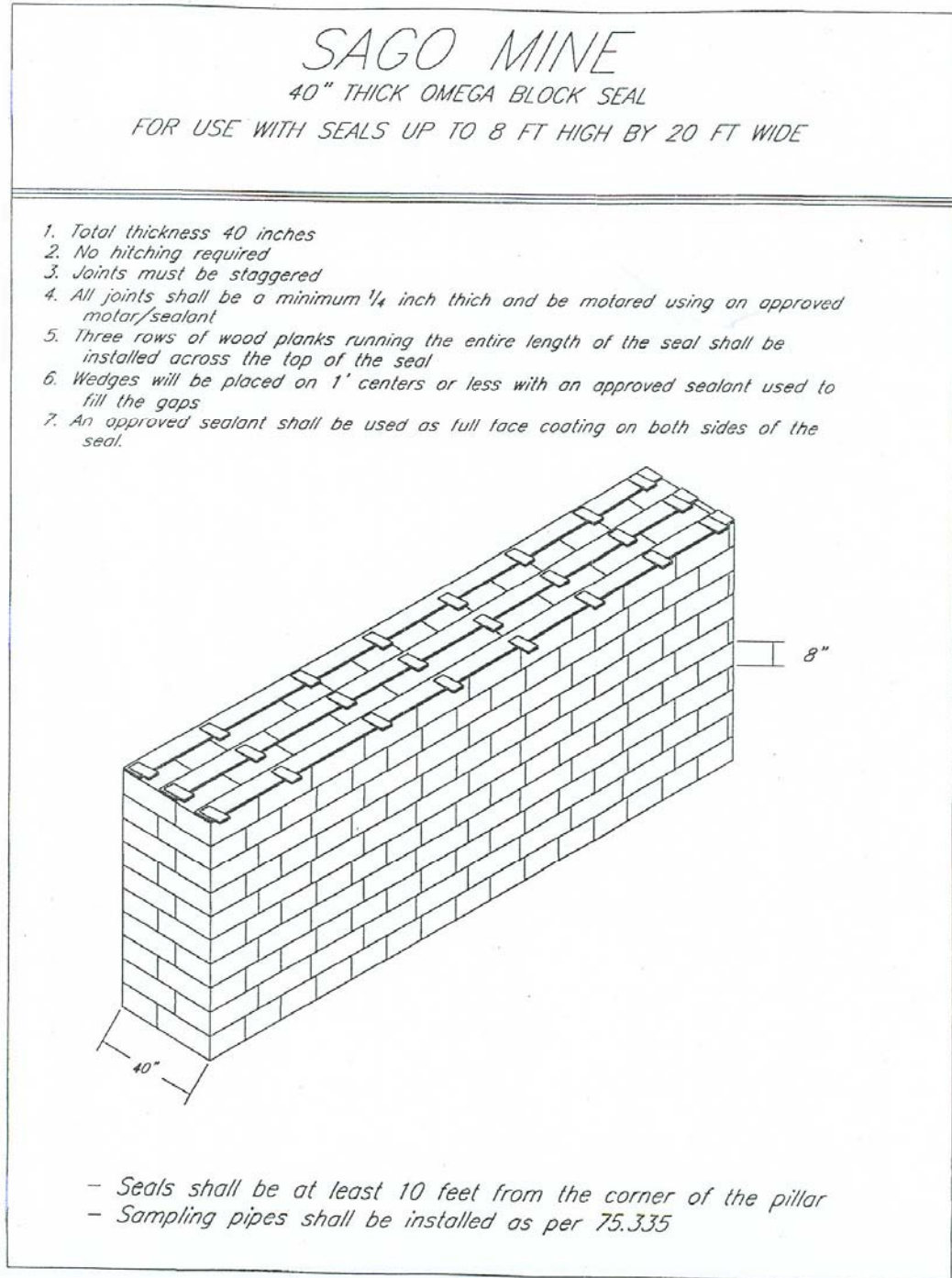
## Appendix F - Explosions in or Affecting Sealed Areas

Case	Date	Mine Name and ID Number	Type of Seal and Outcome	Quality of Seal Construction	Estimated Explosion Pressure	Source of Ignition
1	10-7- 1986	Roadfork No. 1 Mine (ID No. 15-10753)	Concrete block seals failed.	No information available.	No information available	Friction from roof fall or metal strap tearing from anchorage
2	8-22-1993	Mary Lee No. 1 Mine (ID No. 01-00515)	Pumpable cementitious seals failed.	Accident report indicates: "Apparently constructed in accordance with the approved ventilation plan."	No information available	Lightning strike
3	4-5-1994	Oak Grove Mine (ID No. 01-00851)	Concrete block seals failed.	Questionable due to 25 - foot width of entry.	Approximately 5 psi	Lightning strike
4	6-(9-16)-1995	Gary No. 50 Mine (ID No. 46-01816)	Pumpable cementitious seals withstood explosion.	No information available.	Approximately 5 to 7 psi (based on evidence when sealed area re-entered)	Either lightning strike or frictional ignition from roof fall.
5	1-29-1996	Oak Grove Mine (ID No. 01-000851)	Pumpable cementitious seals failed.	Compressive strength of samples of seal material found to be significantly less than requirements.	Less than 5 psi (based on evidence in area of seals)	Lightning strike

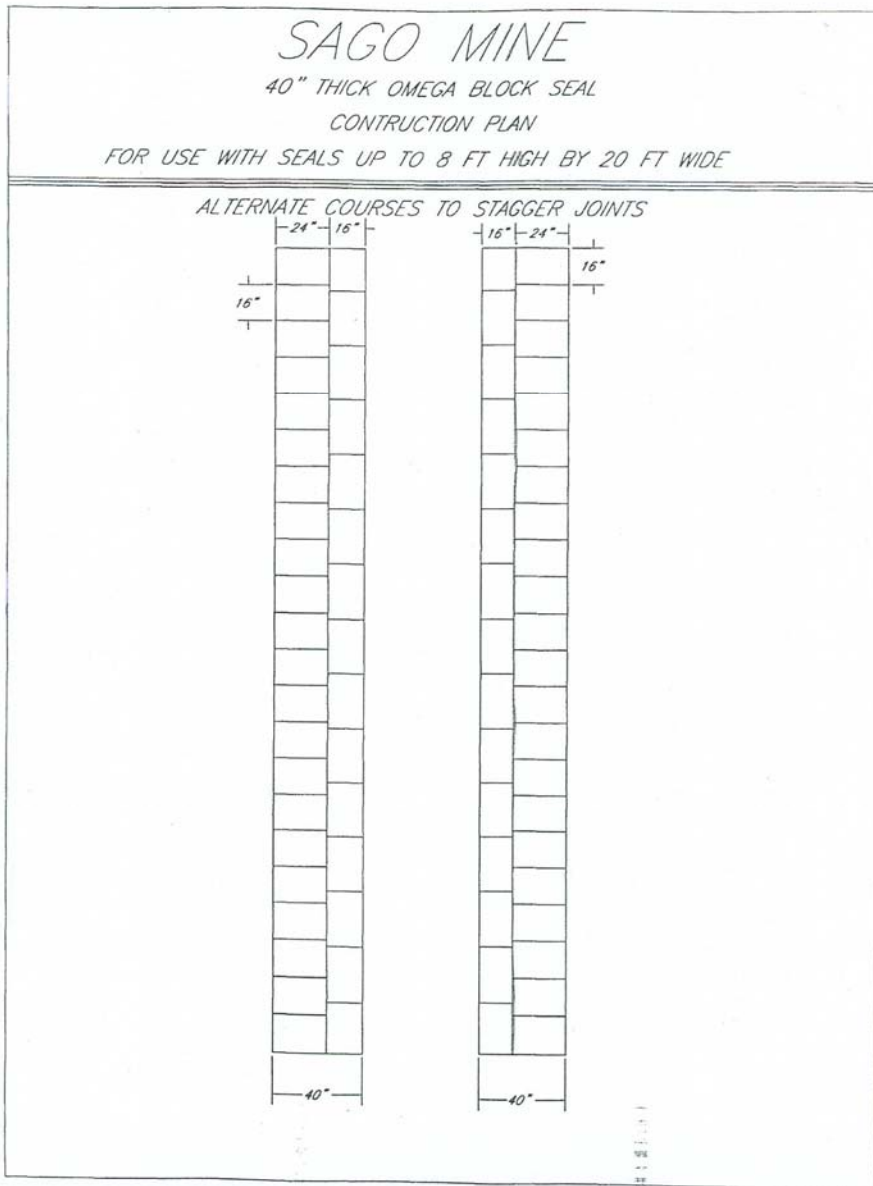
Case	Date	Mine Name and ID Number	Type of Seal and Outcome	Quality of Seal Construction	Estimated Explosion Pressure	Source of Ignition
6	5-15-1996	Mine No. 1 (ID No. 46-07273)	Polyurethane/ gravel core seals failed	Failed seal showed evidence that polyurethane had not cured properly	Less than 20 psi, possibly as low as 2-3 psi, based on presence of intact stopping nearby.	Lightning strike or frictional ignition from roof fall
7	6-22-1996	Mine No. 1 (ID No. 46-07273)	Polyurethane/ gravel core - result of explosion unknown.	Unknown whether any seals failed; mine sealed following explosion.	No estimate made; mine was sealed with no investigation of explosion area	Lightning strike or frictional ignition from roof fall
8	7-9-1997	Oak Grove Mine (ID No. 01-00851)	Pumpable cementitious seals failed.	Low compressive strength; extraneous materials within seals	Possibly >20 psi, but evidence not conclusive due to uncertainty of quality of seal construction	Lightning strike
9	5-18-2001	Gary No. 50 Mine (ID No. 46-01816)	Polyurethane/ gravel core withstood explosion	No information available	No information available	Lightning strike
10	2-1-2002	Big Ridge Mine Portal No. 2 (ID No. 11-02997)	Pumpable cementitious seal failed	No information available	No information available	Unknown
11	11-27- 2005	McClane Canyon Mine (ID No. 05- 03013)	Lightweight cementitious block seals failed.	Problems with seal thickness, mortaring of vertical joints, etc. (Preliminary information only)	Less than 5 psi (preliminary information)	Information not available at this time.



## Appendix G - Omega Block Seal Construction Requirements



# Appendix G (Continued)



# Appendix H - Sago Mine Map

