

Executive Summary

MSHA's Mandate

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. MSHA has the responsibility to develop and promulgate mandatory safety and health standards, inspect mines to determine whether there is compliance with those standards, and investigate accidents to determine their causes.

Background

On April 5, 2010, a longwall face methane ignition at the Upper Big Branch Mine-South (UBB or Mine) transitioned into a small methane explosion that propagated into a massive coal dust explosion. Twenty-nine miners were killed and two miners were seriously injured in the most deadly U.S. coal mine disaster in nearly 40 years. The MSHA Accident Investigation team determined that the explosion occurred because Performance Coal Company (Operator) and its parent company, Massey Energy Company (Massey), violated fundamental safety standards and failed to take corrective actions to prevent the catastrophic explosion.

Internal Review Policy and Procedures

MSHA policy requires that an internal review of MSHA's enforcement activities be conducted after each mining accident that results in three or more fatalities. Following the explosion at UBB, the Assistant Secretary for Mine Safety and Health instructed the Director of Program Evaluation and Information Resources (PEIR) to form an Internal Review team. The team was comprised of MSHA employees with various specialties and expertise who did not have current enforcement responsibility in Coal Mine Safety and Health District 4.

This Internal Review evaluates MSHA's actions relative to the explosion and makes recommendations to improve the Agency's performance in order to better protect the nation's miners. It compares MSHA actions with the requirements of the Mine Act, applicable standards and regulations, and MSHA policies and procedures. Where appropriate, the internal review also evaluates the effectiveness of MSHA standards, regulations, policies, and procedures in addressing the hazards that caused or contributed to the explosion.

The Internal Review team primarily focused on MSHA enforcement and plan approval activities during the 18 months preceding the explosion. Where appropriate, the team examined relevant historical information beyond the 18-month review period.

Significant Findings

As detailed in the MSHA Accident Investigation report, Massey, through its subsidiary Performance Coal Company, violated numerous, widely-recognized safety standards and failed to prevent or correct numerous hazards that ultimately caused the catastrophic explosion.

The Operator concealed its highly non-compliant conduct in a number of significant ways. The Operator provided advance notice of MSHA inspections, allowing foremen to correct violations before inspectors arrived underground to detect them. It concealed several occupational injuries by failing to report them to MSHA as required. The Operator recorded hazards in internal production reports rather than in the examination books required by MSHA standards. Finally, it intimidated miners into not reporting hazards to MSHA, compromising miners' ability to participate in the identification and correction of hazards, as provided by the Mine Act. These intentional efforts to evade well-established Mine Act provisions, which are intended to provide MSHA the opportunity to determine operator compliance or designed to make available vital safety and health information, interfered with MSHA's ability to identify and require abatement of hazardous conditions at the Mine.

The Internal Review team found that MSHA inspection and management personnel were dedicated to their work and determined to further the Agency's mission. Although at times limited by their inexperience, inadequate direction, training, and supervision, their primary intent was to protect the health

and safety of miners. Nevertheless, the team identified instances where District 4 did not follow established policies and procedures when carrying out its responsibilities under the Mine Act at UBB. Each shortcoming is identified and discussed in the Internal Review report. Some of the deficiencies currently are being addressed or already have been addressed by the Agency. Where appropriate, this report includes recommendations to enhance MSHA's performance and better promote the safety and health of miners.

While the Internal Review team did not find evidence that the actions of District 4 personnel or inadequacies in MSHA safety and health standards, policies, or procedures caused the explosion, the team found several instances where enforcement efforts at UBB were compromised because MSHA and District 4 did not follow established Agency policies and procedures. The Internal Review team also found inspectors would have benefited if certain policies and procedures had been more clearly drafted and more effectively implemented. The following is an overview of the Internal Review team's significant findings.

- **Inspections** – During the review period, District 4 personnel conducted six regular inspections of UBB. Some portions of the Mine were not inspected during each of these inspections. However, the inspections generally were more complete toward the end of the review period. During the last regular inspection conducted before the explosion, areas not inspected included the Old No. 2 Section and the belt and return entries of Tailgate #22. The MSHA Accident Investigation team determined that the explosion propagated through these and other areas of the Mine. District 4 personnel inspected the longwall tailgate travelway on four occasions after the District Manager approved supplemental roof support requirements for this entry in December 2009. None of these enforcement personnel identified and cited the Operator's failure to install the required level of supplemental roof support in accordance with the approved roof control plan.
- **Use of Elevated Enforcement Tools** – The number and severity of enforcement actions taken by District 4 at UBB were among the highest in the nation. In fiscal year 2009, the Mine was issued more section 104(d) citations and orders than any other mine in the nation. This reflected the inspectors' diligent efforts at a highly non-compliant mine to issue citations and orders in accordance with their understanding of the law and MSHA directives. In the 18 months before the explosion, District 4 personnel identified and cited 684 violations at UBB, and MSHA proposed more than \$1.3 million in civil penalties for these violations. District 4 inspectors determined that 56 of the 684 violations were the result of the Operator's unwarrantable failure to comply with mandatory safety and health standards.

However, MSHA did not effectively use other available elevated enforcement tools. District 4 did not forward eight violations to headquarters for review to determine whether they should be recommended for assessment as "flagrant" violations, even though the violations met the objective criteria for headquarters review. Due to resource limitations, the District did not conduct section 110(c) special investigations in six appropriate situations to determine whether UBB management personnel knowingly violated mandatory standards. On one occasion, due to an error in the MSHA headquarters' computer screening application, UBB was not identified as a mine potentially subject to the Pattern of Violations provisions under section 104(e) of the Mine Act.

- **Float Coal Dust and Rock Dust Sampling** – Inspectors did not identify deficiencies in the Operator's program for cleaning up accumulations of loose coal, coal dust, and float coal dust. They also did not recognize and cite coal dust accumulations in the tailgate entries of the 1 North Longwall and in some other areas identified in the MSHA Accident Investigation report. Inspectors did not effectively use the Operator's examination records to identify the extent of noncompliance with rock dust standards along belt conveyors and to ascertain the Operator's negligence in allowing those accumulations to go uncorrected.

MSHA inspectors did not sample mine dust to determine whether the Operator applied sufficient rock dust in a number of newly-mined areas because inspectors and supervisors continued to

follow superseded rock dust survey procedures. Inspectors did not collect spot samples to determine whether the Operator was maintaining the required incombustible content of mine dust in older portions of the Mine, including areas that previously were identified as too wet to sample. Some of these oversights occurred because MSHA procedures directed inspectors to visually evaluate the adequacy of rock dusting in outby areas rather than collect samples for analysis, a practice that studies have shown to be unreliable. Field office personnel also did not effectively track and re-inspect previously wet areas for sampling.

- **Mine Plans** – Massey engineers failed to develop sound mining plans, and it is apparent they depended on District 4 specialists to correct deficiencies in the plans they submitted to MSHA. The lack of planning and inadequate engineering identified in the MSHA Accident Investigation report were major reasons deficiencies existed in mining plans. While District specialists were able to identify numerous deficiencies in the Operator’s submissions, some significant deficiencies were not identified.
 - **Ventilation Plan.** The District 4 Ventilation Department reviewed two base plans and 75 ventilation plan supplements for UBB during the review period. Of these supplements, the District Manager ultimately approved 37 and denied 24. The remaining 14 had become obsolete, were acknowledged by MSHA, or were withdrawn by the Operator. There was no indication that the District unduly influenced the contents of the Operator’s ventilation plans.

Due to his concerns regarding ventilation at the Mine, the District 4 Ventilation Department supervisor initiated a saturation inspection on March 9, 2010, to simultaneously evaluate the ventilation of the 1 North Longwall, Headgate #22, and Tailgate #22. He also contacted corporate management officials on March 16, 2010, to draw attention to ongoing ventilation problems at UBB that were not being addressed by mine management.

In 2004, MSHA’s Directorate of Technical Support investigated a methane inundation related to floor cracks that developed along a defined geologic zone at UBB. In a follow-up report, Technical Support documented several methods to mitigate inundations that may occur in the future. However, the mine ventilation plan for UBB was not revised to include any of these methods to account for the documented potential for future methane inundations.

When a new base ventilation plan was submitted by the Operator in 2009, plan reviewers were not aware of the potential for methane inundations. The issue was not addressed in the ventilation plan in 2004; thus there were no provisions that could be carried over into the Operator’s plan in effect at the time of the explosion. In addition, the Acting District Manager and Ventilation Department supervisor, who had knowledge of the earlier methane inundations, changed employment in the interim. This left the new District Manager and the new Ventilation Department supervisor without institutional knowledge of the 2004 event. Finally, the 2004 Technical Support reports documenting the inundation potential were not maintained, nor were they required to be maintained, in Ventilation Department files used as a reference by UBB ventilation plan reviewers.

- **Roof Control Plan.** The District 4 Roof Control Department reviewed one base plan and four roof control plan supplements during the review period. Of these, the District Manager ultimately approved three and denied two. The Internal Review team did not find any evidence that the District unduly influenced the contents of the Operator’s roof control plans.

In reviewing the Operator’s roof control plan, District 4 did not identify that the plan failed to provide the pillar stability necessary to maintain the air courses used to ventilate some areas of the Mine affected by the explosion. The plan submitted by the Operator did not provide calculations to demonstrate proposed pillars would provide adequate

stability. District 4 did not recognize and address this deficiency because they did not follow directions issued by the Administrator for Coal Mine Safety and Health (Administrator for Coal). This direction instructed the District to obtain coal pillar stability calculations from the Operator for mines such as UBB with complex and non-typical roof control plans. The memorandum also directed the District to review the Operator's coal pillar stability calculations for adequacy prior to approving the roof control plan. Instead, District 4 required the Operator to demonstrate its ability to perform the calculations, rather than requiring the Operator to provide actual calculations for review. The lack of resources contributed to the District 4 practice of using inspectors rather than specialists to conduct six-month roof control plan reviews for complex mines such as UBB, contrary to direction from the Administrator for Coal.

- **Review and Use of Mine Examination Records** – District 4 personnel did not effectively review the Operator's examination record books. During the four months preceding the explosion, there were hundreds of entries recorded in examination records documenting the amount of time hazards existed without corrective actions. This information could have been used by inspectors to augment their inspection activities. Inspectors also did not always use the examination records when determining the Operator's negligence in allowing identified hazards to continue unabated. Finally, inspectors did not recognize and cite the Operator's failure to implement or record corrective actions taken to abate numerous hazards documented in the examination record books.
- **Respirable Dust** – The Operator took advantage of MSHA procedures to avoid being subject to respirable dust standards reduced to concentrations below 2.0 mg/m³ due to the silica content of the Mine dust. District 4 permitted reduced standards for respirable coal mine dust to be re-established at 2.0 mg/m³ when the Operator simply changed Mechanized Mining Unit (MMU) designations by replacing the continuous mining machine. District 4 personnel also allowed the Operator to significantly delay corrective actions to reduce miners' exposures to unhealthy respirable dust concentrations after overexposures were identified.

Underlying Causes

The following is a list of factors that the Internal Review team believes led to many of the shortcomings identified by this review.

- **Resources** – In the years before the 2006 mine disasters, budgetary constraints beyond MSHA's control resulted in significant reductions in the inspection workforce that compromised the Agency's ability to perform its mission. With increased hiring in 2006, District 4 began to re-establish staffing levels. However, by the time of the explosion, the inspection and supervisory staff in District 4 had not fully regained the level of experience it had lost.

As a result of resource limitations, specialists and special investigators were assigned to assist in completing mandated regular inspections, rather than performing their prescribed duties. This limited the technical assistance and advice available to inspectors, exacerbating the problems related to an inexperienced inspection workforce at a complex mining operation like UBB.

- **Inspector Experience** – Because of the reduction in staffing in the years before 2006, many experienced inspectors left MSHA and could not be replaced. As a result, newly-appointed authorized representatives, some of whom had not completed all of their entry-level training, were directed to mentor trainees and oversee their on-the-job training. Inspector inexperience was evident at UBB; all but one of the lead inspectors assigned to conduct regular inspections were hired by MSHA after the 2006 coal mine disasters. A newly-hired trainee needs approximately two years to complete classroom and on-the-job training to become a journeyman inspector. The most experienced lead inspector at UBB had 52 months of MSHA experience; the least experienced had 13 months.
- **Management Turnover** – While the Agency timely sought to fill positions in accordance with established federal government procedures, vacancies in District 4 management positions were

not promptly filled. The repeated turnover in persons temporarily assigned to the district manager position between June 2003 and July 2004 and the resulting lack of continuity adversely affected some plan approval decisions during that time. As a result, District 4 did not require the Operator to upgrade its ventilation plan to incorporate Technical Support recommendations resulting from a 2004 investigation of a methane inundation on a UBB longwall section.

- **Supervisory and Managerial Oversight** – District 4 supervisors and managers did not provide adequate oversight of inspections and investigations. Supervisors did not adequately review UBB inspection reports and did not identify significant deficiencies or recognize that some portions of the Mine had not been inspected. The rotation of supervisors in the Mt. Hope field office, including untrained acting supervisors, contributed to the inadequate review of inspection reports. The supervisors and managers did not consistently use Agency oversight tools to identify shortcomings or correct sub-par performance.

In addition, technical departments would have benefited from more effective oversight. There were at least three instances where approved plans contained conflicting requirements due to a lack of coordination between District 4 plan review departments.

- **Directives** – MSHA did not consistently use the Agency Directives System to provide its employees with instructions and information necessary to effectively and efficiently implement program and mission-support activities. Furthermore, the volume of information in MSHA directives exceeds that which an employee could reasonably be expected to learn or retain. In some cases, enforcement personnel had to review multiple directives to find all policy and procedures relevant to a single subject. Some policies and procedures were issued directly to district managers and were not maintained in a manner that readily could be referenced by inspectors and specialists. District 4 inspectors, many of whom had limited MSHA experience, were not aware of or did not know where to locate all policies and procedures they were required to follow.
- **Training** – On-the-job training for entry-level inspectors was inadequate, as entry-level trainees were not always required to demonstrate practical competencies in the field. Many District 4 journeyman inspectors did not receive the two-week retraining, implemented through a 1998 Assistant Secretary memorandum, due to the lack of resources necessary to complete mandated inspections. Acting supervisors in the Mt. Hope field office were not trained to perform their assigned duties. Permanently assigned supervisors in the Mt. Hope field office received only one week of training related to the core administrative duties of a field office supervisor and were not fully trained on the technical aspects of supervising coal mine inspectors.
- **Accountability Program** – MSHA's accountability programs and internal reviews have been successful in identifying deficiencies in the Agency's performance. However, the corrective actions MSHA has implemented have not been as successful in eliminating or preventing many of those deficiencies.
- **Use of Agency Data** – MSHA has an extensive set of enforcement, safety, and health data. The Internal Review team identified several instances where MSHA data could have been used more effectively to monitor and oversee MSHA enforcement programs at the national and district levels.

Corrective Actions

Following the explosion, the Assistant Secretary and the Administrator for Coal initiated a number of corrective actions which address the Internal Review team's findings. Some of these corrective actions are highlighted below.

- MSHA issued an Emergency Temporary Standard, which became a final rule on June 21, 2011, that increased the minimum incombustible content of mine dust to at least 80% throughout a coal mine. MSHA also issued a Program Information Bulletin to provide important information regarding accumulation of combustible materials and rock dust requirements. It advised that

areas downwind of belt transfers, the returns of active sections, the tailgates of longwalls, and the bleeder entries often require continuous rock dusting with bulk dusters, trickle dusters or high-pressure rock dusting machines to maintain the required incombustible content levels and suppress float coal dust accumulations.

- MSHA has initiated rulemaking to better protect miner safety and health. One proposed rule would revise the Agency's existing regulations for pattern of violations at 30 CFR Part 104. Another proposed rule would address the continuing risk of miner exposure to respirable coal mine dust. A third proposed rule would require mine operators to examine and take corrective actions for violations of mandatory health or safety standards and to review quarterly with mine examiners all citations and orders issued in areas where examinations are required.
- MSHA divided District 4 into two separate districts in June 2011. The creation of the new District 12 doubled the number of specialist departments and will increase the number of specialists in the region when District 12 is fully staffed.
- The Assistant Secretary has directed appropriate staff to improve access to active MSHA directives, eliminate outdated directives, and update the *General Coal Mine Inspection Procedures and Inspection Tracking System Handbook* to remove outdated material and incorporate relevant procedural instructions and Coal Mine Safety and Health (CMS&H) memoranda.
- The Assistant Secretary directed the development of a training class for field office supervisors to instruct them in their responsibilities and the duties they must perform, including: Accompanied Activities, Field Activity Reviews, and reviews of inspector evaluations of gravity and negligence associated with cited violations.
- The Assistant Secretary issued an Administrative Policy Letter that established MSHA policies and procedures for continuing education of inspectors and specialists.
- MSHA has begun to implement a plan to provide the National Air and Dust Laboratory with updated computer systems and equipment to facilitate a laboratory information management system integrated into the MSHA database.
- MSHA provided inspectors with a tool on their laptop computers that automatically alerts them when a violation meets the criteria for headquarters' review as a potentially flagrant violation. MSHA also created a flagrant violation oversight report that allows supervisors and managers to identify potentially flagrant violations that have not been reviewed.
- MSHA strengthened its potential pattern of violations (PPOV) review process to hold mine operators to a higher standard. The Agency stiffened the requirements to achieve improvement goals and began monitoring each mine's violation history after the corrective action period. MSHA considers an operator's continued performance in later screenings and enhanced enforcement activities. MSHA also began auditing mines to determine whether they had failed to report injuries that would have affected their PPOV status. Mines that received PPOV notices in 2010 have shown considerable reductions in violation rates and lost-time injury rates since completing the PPOV process.

In addition, through a series of "impact inspections," MSHA has leveraged its authority at mines that merit increased attention and enforcement due to poor compliance histories or particular compliance concerns. As of December 31, 2011, MSHA has conducted 387 impact inspections, identifying and requiring correction of almost 7,700 violations. Impact inspections allow the Agency to immediately and comprehensively identify serious health and safety hazards with a team of experienced personnel and diminish operators' opportunities to hide violative conditions and practices through advance notice of inspection. Impact inspections address some issues that the Internal Review team identified as obstacles to the effective enforcement of the Mine Act at UBB.

Even with the significance of actions already undertaken, more must be done to protect the health and safety of the nation's miners. Accordingly, throughout the report, the Internal Review team has recommended specific corrective actions designed to improve the Agency's administration of the Mine Act. Finally, in the "General Conclusions and Recommendations" section of this report, the Internal Review team provides its thoughts on the fundamental changes that must be embraced to address the root causes of the shortcomings we identified.

The Internal Review team is hopeful that the recommendations in this report, in conjunction with actions already instituted by MSHA following the explosion, will further improve the manner in which the Mine Act is administered in District 4, the newly-formed District 12, and in other MSHA districts. The continued effort, determination, and dedication of MSHA personnel is essential for the Agency to successfully administer the provisions of the Mine Act and enforce compliance with mandatory safety and health standards in the nation's mines.

Background

At approximately 3:02 p.m. on April 5, 2010, a massive coal dust explosion occurred at UBB, resulting in the deaths of 29 miners and injuries to two miners who survived. This tragic event resulted in more fatalities than any other U.S. coal mine disaster in nearly four decades.

At the time of the explosion, UBB was under the jurisdiction of MSHA's Coal Mine Safety and Health District 4 office located in Mt. Hope, West Virginia.¹ A regular safety and health inspection was started on April 5, the day of the explosion. One District 4 inspector was in the Mine that day and inspected a working section in the southern portion of the Mine, approximately four miles from where the explosion originated. The inspector had finished his inspection activities for the day and had left the Mine before the explosion occurred.

After the explosion, MSHA promptly began a comprehensive investigation into its cause. A team of MSHA managers, inspectors, specialists, and technical experts were assigned to conduct the investigation. The team members were not employed in District 4. The investigation included extensive inspection and testing of physical evidence, a review of pertinent documents, and interviews of persons having relevant information.

The MSHA Accident Investigation team determined that methane had accumulated at the tailgate of the longwall. When the shearer cut out at the tailgate, worn shearer bits and missing water sprays created an ignition source for methane on the longwall. Evidence indicated that the flame from the initial methane ignition then ignited a larger accumulation of methane in the tailgate area, triggering a localized explosion. Coal dust, including float coal dust, propagated the explosion throughout the northern area of the Mine.

MSHA's *Report of Investigation, Underground Coal Mine Explosion, April 5, 2010, Upper Big Branch Mine-South, Performance Coal Company, Montcoal, Raleigh County, West Virginia, ID No. 46-08436*, was made available to the public on December 6, 2011.

Purpose, Scope, and Methodology

On April 29, 2010, the 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 UBB. The Internal Review team evaluated MSHA's actions relative to the April 5, 2010, explosion at the Mine and made recommendations to improve the Agency's performance in order to better protect the nation's miners from similar disasters in the future.

¹ MSHA divided District 4 into two separate districts in June 2011. District 4 now oversees field offices in Mt. Hope, Mt. Carbon, Madison, and Summersville. The newly-formed District 12 oversees field offices in Pineville, Logan, and Princeton.