

**An Independent Panel Assessment  
of  
An Internal Review of MSHA Enforcement Actions  
at the Upper Big Branch Mine South**

**Requested by  
The Honorable Hilda L. Solis  
Secretary, U.S. Department of Labor**

**March 22, 2012**

**The views expressed by the Independent Panel do not necessarily represent the views of the National Institute for Occupational Safety and Health, the Centers for Disease Control and Prevention, or the U.S. Department of Health and Human Services.**

# Independent Assessment Panel

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## Executive Summary

Following the explosion at the Upper Big Branch Mine South (UBB), the Secretary of the U.S. Department of Labor, Hilda L. Solis, requested that the Director of the National Institute for Occupational Safety and Health identify a panel of individuals with relevant experience to conduct an independent assessment of the Mine Safety and Health Administration (MSHA) Internal Review (MSHA IR) of MSHA enforcement actions at the UBB. Four experts in areas relevant to MSHA's UBB enforcement activities were appointed by the Director to serve as members of an Independent Assessment Panel (IP). In June 2010, the IP met with the MSHA IR Team for the first time. Over the ensuing 18 months, seven conference-call meetings between the IR Team and the IP were held. On February 23, 2012, the MSHA IR Team provided its IR Report to the IP and on March 22, 2012, the Independent Assessment was provided to Secretary Solis.

After reviewing the MSHA IR Report in detail, the IP does not take exception to the Report's conclusion that the mine operator, not MSHA, caused the explosion. However, the IP believes that the characterization of the facts underlying this conclusion understates the role that MSHA's enforcement could have had in preventing the explosion. Had the MSHA IR Team considered the causation issues from a broader viewpoint, the IP believes that the Team could have posed, and addressed, the question: would a more effective enforcement effort have prevented the UBB explosion? The IP believes that had the Team addressed this question, it would be in a better position to help MSHA define and prioritize its recommendations and succeed in implementing them.

In its own consideration of the question of more effective enforcement performance and prevention of the UBB explosion, the IP concentrated on three concurrent and critical events that led to the explosion and loss of life: (1) a frictional ignition at the longwall shear (2) that ignited an accumulation of methane gas, that then caused (3) an accumulation of float dust to explode and then to propagate throughout the mine following a ready supply of float dust fuel.

For event (1), frictional ignition, the IP concluded that MSHA enforcement personnel could not have prevented a frictional ignition from occurring during any given work shift at the UBB. For event (2), accumulation of methane gas, the IP concluded that if MSHA enforcement personnel had completed required enforcement actions during at least one of the four UBB inspections, it is unlikely that a roof fall would have occurred and that airflow would have been reduced as a consequence. With the proper quantity of air, there would not have been an accumulation of methane, thereby eliminating the fuel sources for the gas explosion. For event (3), the dust explosion, the IP concludes that if MSHA enforcement personnel had taken appropriate actions during the inspections in the months prior to the explosion, either dangerous accumulations of explosive coal dust would have been rendered inert, or the mine would have been idled.

In short, even if there had been a gas explosion, it would have lacked sufficient fuel to trigger a massive dust explosion. Therefore, the IP's overall analysis suggests that if MSHA had engaged in timely enforcement of the Mine Act and applicable standards and regulations, it would have lessened the chances of -- and possibly could have prevented -- the UBB explosion.

Finally, the IP provided a set of recommendations that are intended to complement those of the MSHA IR Report and, in particular, to address underlying and structural issues that the IP believes may impair the long term efficacy of the MSHA IR Report's recommendations. The IP recommendations are: (1) modifying the strategic paradigm that informs MSHA enforcement activities; (2) improving the quality of internal investigations that MSHA (or independent investigators) conduct following mine disasters such as UBB; (3) ensuring that corrective actions are effectively implemented; and (4) addressing technical deficiencies in current mining practice that could compromise safety.

## **I. Background**

### **A. Charge from Secretary Solis**

Following the explosion at Performance Coal Company's Upper Big Branch Mine South (UBB), which resulted in the death of 29 miners and serious injuries to two other miners, Hilda Solis, Secretary of the U.S. Department of Labor, requested that the Director of the National Institute for Occupational Safety and Health (NIOSH) identify a panel of individuals with relevant experience to conduct an independent assessment of the Mine Safety and Health Administration's (MSHA) Internal Review (MSHA IR). Secretary Solis asked the UBB Independent Assessment Panel (IP) to assess the MSHA IR Team's processes, conclusions, and recommendations.

### **B. Independent Panel Membership**

The NIOSH Director appointed four experts in areas relevant to the MSHA IR Report and MSHA's UBB enforcement activities to serve as members of the IP. Members of the IP included Lewis Wade, Ph.D., (Chair); Jeffery Kohler, Ph.D. (Executive Secretary); Michael Sapko, M.S; and Alison Morantz, Ph.D., J.D. Biographies of each IP member are provided in Appendix I. Susan Moore, Ph.D., of the NIOSH Office of Mining Safety and Health Research, served as staff assistant to the IP.

### **C. Initiation of MSHA Internal Review**

In April of 2010, Joseph Main, Assistant Secretary of Labor for Mine Safety and Health, instructed the Director of Program Evaluation and Information Resources (PEIR) at MSHA to form a team to conduct an internal review of MSHA enforcement activities at UBB in accordance with applicable MSHA policy and procedures. The PEIR Director assembled a team of MSHA employees without current enforcement responsibilities in Coal Mine Safety and Health District 4 to serve on an internal review panel.

Over a period of nearly two years, the MSHA IR Team reviewed thousands of pages of records, enforcement activities, ventilation and roof control plans, and relevant correspondence files, handbooks, policy manuals, and enforcement inspectors' notes, and interviewed 88 MSHA employees. The MSHA IR Team focused on enforcement and plan approval activities in the 18 months immediately preceding the UBB explosion, but the Team also examined relevant historical information as appropriate.

### **D. Interactions Between Independent Panel and MSHA Internal Review Team**

In June 2010, the IP met with the MSHA IR Team for the first time. At that first meeting, the MSHA IR Team described MSHA's Internal Review Policy and Procedures for conducting an internal review, the methods that the MSHA IR Team would follow in conducting their review of MSHA's actions relating to the UBB, and their progress to date.

Over the ensuing 18 months, seven conference-call meetings took place between the MSHA IR Team and the IP. At each of these meetings, the MSHA IR Team briefed the IP on the Team's progress and asked for guidance regarding methods that should be used to examine various aspects of MSHA's actions or inactions related to the UBB. The MSHA IR Team provided the IP with information requested by the IP members, including past MSHA Internal Review Reports, MSHA Internal Policy and Procedures, and MSHA's Ventilation Plan Approval Handbook. The IP conducted an in-depth analysis of all materials provided to it by MSHA, including previous MSHA internal review reports on mine disasters that occurred from 2001 to the present.

On January 11, 2012, the MSHA IR Team provided the IP with a draft IR Report, which was missing several sections including conclusions, recommendations and some appendices, and requested the IP's views. On February 3, 2012, the IP communicated its comments on the draft IR Report to the MSHA IR Team during a conference-call meeting. On February 23, 2012, the MSHA IR Team provided its final IR Report to the IP.

The IP would like to express its appreciation to the MSHA Assistant Secretary and the MSHA IR Team for the support provided to the IP during its assessment process. From the onset of the IP Assessment, the MSHA Assistant Secretary and the MSHA IR Team demonstrated to the IP members that MSHA was focused on producing a thorough internal review of its enforcement actions and inactions related to the UBB and a frank assessment of its IR by the IP.

#### **E. Criteria Used by MSHA Internal Review Team**

MSHA's Administrative Policy and Procedures Manual, Volume III, Section 1200, entitled "Internal Review Policy and Procedures," establishes the objectives, responsibilities, and procedures for conducting an internal review of an incident in an underground mine resulting in three or more fatalities. MSHA Administrative Policy and Procedures Manual, Section 1204 pertaining to Policy, states:

"[T]he policy of the Mine Safety and Health Administration is as follows:

- a. The Agency shall conduct an internal review of its enforcement activities after each mining accident that results in three or more fatalities. There may be other circumstances when the Assistant Secretary will direct that an internal review be conducted.
- b. Internal reviews shall compare actual Agency performance at a mine to the requirements and standards established by the Mine Act and applicable regulations, policies, and procedures.
- c. Internal reviews shall be conducted under the direction of the Office of Program Policy Evaluation.

d. Internal review team members shall not have any current enforcement responsibility in the district being reviewed.

e. The internal review team shall prepare a formal report to the Assistant Secretary documenting its findings, conclusions, and recommendations.

f. The internal review report shall be made public.”

Further, Section 1205, pertaining to Objectives, states: “MSHA conducts an internal review to:

a. Thoroughly and objectively evaluate the quality of its enforcement activities at a mine that has experienced an accident resulting in three or more fatalities.

b. Identify any weaknesses in its enforcement activities at the mine;

c. Provide appropriate recommendations for addressing any weaknesses found; and

d. Disseminate internal review findings, conclusions, and recommendations to Agency managers and employees, members of Congress, and other interested parties.”

The IP reviewed the MSHA IR process, conclusions and recommendations against Section 1205(a), (b) and (c), not against Section 1205(d). It was not possible to evaluate MSHA’s efforts to disseminate the IR “findings, conclusions and recommendations to Agency managers and employees, members of Congress, and other interested parties,” as the IP’s Assessment was completed just as MSHA dissemination activities were beginning.

#### **F. Independent Panel Assessment to Secretary Solis**

Immediately upon completion, the IP Assessment of the process, conclusions and recommendations of MSHA’s IR Report were presented to Secretary Solis on March 22, 2012.

## **II. Assessment of MSHA Internal Review Process**

### **A. General Findings**

The IP was briefed periodically during the eight meetings with the MSHA IR Team on the process methods that were being used by the MSHA IR Team. Following each briefing, the IP provided its thoughts on the process methods used by the MSHA IR Team. The IP believed that the employee interviews conducted by the MSHA IR Team played a critical



informational role in the IR process of determining the role of MSHA's actions or inactions in the UBB explosion. Therefore, the IP requested access to employee interviews to review the interview transcripts in depth and MSHA made all requested interview transcripts available.

## **B. MSHA Employee Interviews**

### **1. Transcripts of Employee Interviews**

The IP's interest in the MSHA IR Team's employee interviews was twofold. First, the IP sought to examine the thoroughness, rigor and depth of the questions posed during the interviews. Second, the IP assessed the extent to which the MSHA IR Team incorporated the information revealed by the interviews in its evaluation of MSHA's UBB enforcement activities.

Given the number and length of the interviews conducted--and the short time available in which to review them--it was impractical for the IP to review all of the interviews. The IP reviewed transcripts for 28 of the 88 MSHA employee interviews. Some interviews were selected randomly and others were selected by name or function.

### **2. Assessment of Employee Interviews**

#### **a. Findings Obtained From Employee Interviews**

The IP's review of the interview transcripts brought to light two common deficiencies in MSHA's enforcement at UBB. First, there were numerous instances in which MSHA's enforcement personnel exhibited a lack of understanding of MSHA's policies and procedures. For example, multiple employees did not demonstrate familiarity with, or comprehension of, MSHA Program Policy Manuals, Procedure Instruction Letters and/or Program Information Bulletins. Second, some interviews of MSHA supervisory personnel suggested that at the time of the explosion, they were unaware of the inadequate quality of MSHA's enforcement performance at UBB.

Both of these deficiencies--MSHA enforcement personnel's unfamiliarity with MSHA enforcement policy and procedure and their failure to perceive enforcement failures at UBB--were fully disclosed by the MSHA IR Team in its Report. The IP discovered no instance in which the MSHA IR Team hid or misrepresented these findings from the employee interviews. The IP concluded that the MSHA IR Team fully and appropriately utilized the information revealed to them in the interview transcripts.

## **b. Interview Technique by MSHA Internal Review Team**

The IP found the interviewers' line of questioning to be unfocused at times. Further, the IP noted that it was not unusual for the MSHA IR Team to pose "leading" questions to the interviewee. The IP notes that the tendency "to help out" the interviewee frustrates the purpose of an interview—to obtain the interviewee's answer, not the interviewers' answer. Despite the observed shortcomings in the MSHA IR Team's interview techniques in several of the transcripts, the IP believes that the interviewing process as a whole yielded important information on both the positive and the negative aspects of MSHA's enforcement activities at UBB. However, the IP believes that utilizing specially trained interviewers—even interviewers from outside the Agency—would be a more effective approach than using MSHA personnel as interviewers.

## **C. Limitations of Section 1204(b)**

MSHA's Administrative Policy and Procedures Manual, Volume III, Section 1204(b) states "[T]he policy of the Mine Safety and Health Administration is ...[that] internal reviews shall compare actual Agency performance at a mine to the requirements and standards established by the Mine Act and applicable regulations, policies, and procedures."

The IP notes that Section 1204(b) does not require MSHA to do more than simply catalogue the ways in which its performance at UBB deviated from the requirements and standards imposed by applicable regulations, policies and procedures. Construed narrowly, Section 1204(b) does not require MSHA to probe deeply into the underlying causes of the deficiencies it identifies.

To the extent that the MSHA IR Team felt constrained by a narrow interpretation of Section 1204(b), it may have missed opportunities to identify deeper, structural problems that contributed to MSHA's enforcement performance deficiencies. For example, confining a line of inquiry to the question of whether MSHA personnel were *aware* of a particular statutory provision, regulation, policy procedure -- although meeting the requirements of Section 1204(b) -- fails to uncover the root cause(s) of why an enforcement action was taken (or was not taken). An inspector may be aware of a particular mine requirement, yet fail to take appropriate action due to any number of institutional, psychological, or cultural factors. In neglecting to probe these deeper motivations, MSHA's IR Team missed opportunities to discover practices or mechanisms that might have interfered with employee's ability or willingness to translate their knowledge of applicable laws and regulations (where it existed) into timely and effective enforcement action.

Although the IP understands that the MSHA IR Team felt constrained by Section 1204(b), the IP believes that the effectiveness of the MSHA IR Team's interviewing process may have been constrained by their narrow interpretation of Section 1204(b) that then led to the Team's lost opportunity to pursue a line of questioning to uncover

the root cause(s) of a particular enforcement action or inaction. The IP believes that a fuller understanding of enforcement practices at UBB would be obtained if interviews had been conducted using a broader interpretation of Section 1204(b).

In sum, a broader interviewing approach would provide additional insights into the fundamental root cause(s) for enforcement performance deficiencies beyond whether enforcement personnel have knowledge of existing statutes, regulations, or policy and procedure requirements.

#### **D. IP Conclusions About MSHA IR Process**

The IP concludes that the MSHA IR Team processes were appropriate given its narrow interpretation of Section 1204(b). The processes utilized identified enforcement deficiencies at the UBB. The IP notes that improvements are needed with regard to the interview process.

### **III. Assessment of MSHA Internal Review Conclusions**

#### **A. Mine Operator's Responsibility for the UBB Explosion**

The MSHA IR Report cites the conclusion of the MSHA Accident Investigation Report that the UBB explosion occurred because the mine operator and its parent company violated fundamental and widely recognized safety standards, and failed to correct numerous hazardous conditions that directly led to the explosion. The IP accepts this conclusion.

The MSHA IR Report details that the mine operator concealed its noncompliant conduct, thereby undermining MSHA's capability to detect violations through inspections. The IP understands that concealment activities by the mine operator would have adversely impacted MSHA's enforcement performance at UBB, however the mine operator did not, and could not, conceal readily observable violative conditions such as float dust accumulations throughout the UBB and missing supplemental roof supports.

The IP agrees with the MSHA IR Report's conclusion that the Mine Safety and Health Act places the primary responsibility for mine safety on the mine operator and that "there was no evidence that the actions of District 4 personnel nor any inadequacies in MSHA's safety and health standards, policies, or procedures caused the explosion."

#### **B. MSHA's Enforcement Performance Deficiencies at UBB**

The MSHA IR Team enumerates a variety of specific instances in which MSHA enforcement personnel failed to follow established policies and procedures, resulting in a number of enforcement deficiencies at UBB in the months leading up to the explosion. The IP believes that the MSHA IR Team has done a thorough and careful job of enumerating each instance in which MSHA failed to adequately enforce applicable standards and regulations.

## **C. Causal Connection between MSHA's Enforcement Performance Deficiencies and Its Failure to Prevent the UBB Explosion**

Although the IP does not take exception to the MSHA IR Report's conclusion that the mine operator, not MSHA, caused the explosion, the IP believes that this characterization of the facts understates the role that MSHA's enforcement could have had in preventing the explosion. Had the MSHA IR Team considered the causation issue from a broader point of view, the IP believes that the IR Team might also have posed the following question: "Would a more effective enforcement effort have prevented the UBB explosion?" Because the IP believes that answering this question would help MSHA to define the nature and scope of corrective actions required – and the urgency with which they should be undertaken – it considered this question at some length, focusing on those violative conditions that the mine operator did not, and could not, conceal from MSHA enforcement personnel.

The IP believes that there were three concurrent, critical events that directly led to the explosion: (1) a *frictional ignition* at the longwall shear that (2) ignited an *accumulation of methane gas* that finally caused (3) an *accumulation of float dust* to explode and then to propagate throughout the mine following a ready supply of float dust fuel. In short, there were three opportunities to prevent or minimize the explosion: (1) eliminating the frictional ignition source; (2) eliminating the methane gas that fueled the initial gas explosion, which was the energy source for the dust explosion; and (3) eliminating the float coal dust that fueled the dust explosion. If MSHA's UBB enforcement performance had consistently and timely enforced the Mine Act and its applicable regulations, policies and procedures, could it have prevented or minimized the explosion?

### **1. Preventing Frictional Ignition**

A frictional ignition has been identified as the source of the methane explosion. A frictional ignition occurs when the friction between the cutting pick and the rock being cut reaches a critical temperature at which the resulting "smear" will ignite methane. Frictional ignitions are relatively rare, but they do occur on average 14 times per year on longwall panels.<sup>1</sup> Replacing worn and broken cutting bits in a timely fashion can reduce the number of ignitions, as could properly positioned and operating water sprays.

The working condition of bits and water sprays can fluctuate rapidly. Even if they are in top condition during an inspection, their functionality can become significantly compromised in a short period of time. It is unclear from the MSHA IR Report if MSHA inspectors personally observed missing, broken or worn bits, or inoperative sprays, on the cutting drum. It is also uncertain whether the water sprays, which are typically positioned in front of the pick to reduce

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<sup>1</sup>MSHA Internal Review Report, page 100. Data may be an underestimate since the data reported relies on operator self-reporting.

respirable dust, could have prevented a frictional ignition behind the cutting pick even if they had been fully operational. In any event, the IP believes that MSHA enforcement personnel could *not* have prevented a frictional ignition from occurring during any given work shift.

## **2. Preventing a Fuel Source for the Initial Gas Explosion**

The fuel source for the initial gas explosion has been identified as an excess accumulation of methane gas near the tailgate of the longwall. The primary means of maintaining methane below the explosive limit is to maintain an adequate supply of intake air to dilute the potentially explosive gas and render it harmless. The technical evidence presented in MSHA's Accident Investigation Report indicates that a quantity of methane equivalent to several hundred cubic feet supplied the fuel for the initial gas explosion. Had adequate airflow been maintained, such an amount of methane gas would not have accumulated in proximity to the longwall face and tailgate.

The MSHA Accident Investigation Report identified a roof fall in the tailgate entry as being responsible for restricting the airflow across the face at the tailgate. The Report found further that the mine operator had failed to install supplemental supports that would most likely have prevented the roof fall. The MSHA-approved roof control plan required the use of supplemental supports in the tailgate. These supports were to be maintained for a distance of 1000 feet outby the face. MSHA records show that MSHA enforcement personnel inspected the tailgate four times between December 2009, when the supplemental roof support plan was approved, and April 2010, when the explosion occurred. Had inspectors verified compliance with the approved plan, the operator's failure to install supplemental roof supports should have been apparent.

The IP concludes that if MSHA enforcement personnel had completed their required enforcement actions during at least one of the four inspections, it is less likely that a roof fall would have occurred. The airflow would not have been reduced as a consequence. With the proper quantity of air, there would not have been an accumulation of methane, thereby eliminating the fuel source for the gas explosion.

## **3. Preventing the Dust Explosion**

Even if a gas explosion occurred, could the dust explosion have been prevented if MSHA's enforcement actions had conformed to its established policies and procedures? The findings of the MSHA IR Report are quite clear on this point. Inspectors did not identify deficiencies in the mine operator's program for cleaning up loose coal dust and rendering accumulated float coal dust inert by dispersing sufficient quantities of rock dust.

Even when MSHA enforcement inspectors observed excessive accumulations of explosive coal dust, they failed to take appropriate enforcement actions. Moreover, inspectors did not collect spot samples to determine whether the mine operator was maintaining the required incombustible dust content, they did not properly sample in newly mined areas to determine whether sufficient rock dust had been applied, nor did they re-visit inactive sections of the mine to collect samples in areas that had originally been deemed “too wet to sample.” The IP concludes that if MSHA enforcement personnel had taken appropriate enforcement actions during the inspections in the months prior to the explosion, either dangerous accumulations of explosive coal dust would have been rendered inert, or the mine would have been idled. In short, even if there had been a gas explosion, it would have lacked sufficient fuel to trigger a massive dust explosion.

#### **4. Conclusion**

Therefore, the IP's overall analysis suggests that if MSHA had engaged in timely enforcement of the Mine Act, and applicable standards and regulation, it would have lessened the chances of—and possibly prevented—the UBB explosion. Even if a frictional ignition had occurred, there would have been little or no accumulated methane to fuel the gas explosion, and even if a gas explosion had occurred, there would have been insufficient combustible coal dust to fuel a massive explosion.

## **IV. Assessment of MSHA Internal Review Recommendations**

### **A. Major Categories of MSHA Internal Review Recommendations**

The MSHA IR Report contains an extensive set of recommendations designed to correct the enforcement deficiencies observed during the internal review. The MSHA IR Report recommendations can be classified into three major categories.

#### **1. Training**

The IR Report recommends several new or improved training programs to advance the knowledge and skill of MSHA inspectors, specialists, supervisors and managers.

#### **2. Policy Guidance**

The IR Report recommends updates, revisions, and other enhancements for several MSHA's policy manuals and handbooks to address outdated, conflicting or difficult-to-access policies and procedures.

### **3. Administrative and Management Improvements**

The IR Report recommends improved procedures for recordkeeping, increased supervision of critical enforcement activities, redistribution of work between general inspectors and specialists, and improved ease of utilization of MSHA resources.

The IP understands that the MSHA Assistant Secretary, working with the IR Team, has already begun implementing many of the MSHA IR Report's recommendations.

#### **B. Independent Panel's Overarching Concerns with MSHA IR Report Recommendations**

It is beyond the scope of the IP Assessment to evaluate the merit of each of the many specific recommendations made in the MSHA IR Report. However, the IP believes that the recommendations in general may not correct the most significant enforcement performance issues identified in the IR Report.

This concern stems primarily from the IP's familiarity with the history and aftermath of earlier mine disasters. Table 22 in the MSHA IR Report juxtaposes the shortcomings identified by the MSHA IR Team with those identified in the five previous reviews conducted from 2001 to 2007 in the wake of multiple-fatality mine incidents: Crandall Canyon (2010),<sup>2</sup> Darby (2006), Aracoma (2006), Sago (2006), and Jim Walters Resources (2001). There is remarkable overlap in the array of enforcement lapses identified. For example, "failure to identify mine operators' deviations from their approved plans," "incomplete or inadequate inspections and documentation," and "inadequate supervisory/managerial oversight" were identified as deficiencies in all five internal review reports, "[in]effective use of enforcement tools" was cited in all reports except for Crandall Canyon; and lapses in "rock dust sampling" were cited in three of the five reports (Jim Walters Resources, Sago, and Darby).

Each of the previous MSHA internal review reports identifies enforcement performance deficiencies and each contains a detailed list of recommendations to improve training, provide better policy guidance, and improve administration and management. Undoubtedly, specific improvements in MSHA enforcement performance were successfully achieved as a result of recommendations made in previous internal reviews. Nonetheless, a very similar constellation of shortcomings identified in MSHA's IR Report fostered a climate in which agency inspectors missed crucial opportunities to prevent – or at least greatly mitigate – the consequences of the UBB tragedy. The IP's overriding concern is that the recommendations in MSHA's IR Report will meet a similar fate.

To its credit, the MSHA IR Team acknowledges this risk in its Report and the Team lists eight actions that it believes will be needed to achieve successful implementation of their recommendations. The IP commends the IR Team for formulating these corrective

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<sup>2</sup> Note that the review of MSHA's enforcement performance following the Crandall Canyon disaster was conducted by a team external to MSHA which produced a Report containing a set of specific recommendations

actions, most of which are intended to enhance internal monitoring and accountability. Given the scope and urgency of the implementation challenges facing the agency, the IP has formulated a set of overarching recommendations to not only enhance the value of reviews conducted following mine disasters, but also to increase the likelihood that the actions adopted in the wake of the UBB disaster are sufficiently lasting, and undertaken in a sufficiently thoroughgoing manner, to significantly improve MSHA's enforcement performance.

## **V. Independent Assessment Panel Recommendations**

The IP's recommendations are intended to complement those of the MSHA IR Report, and in particular to address underlying and structural issues that the IP believes may undermine the long-term efficacy of the MSHA IR Report's recommendations. The recommendations presented are intended to further four specific goals: (1) modifying the strategic paradigm that currently informs MSHA's enforcement activities; (2) improving the quality of internal investigations that MSHA (or independent investigators) conduct following mine disasters such as UBB; (3) ensuring that corrective actions are fully and effectively implemented; and (4) identifying technical deficiencies in current mining practice that could compromise safety, and thus that are ripe for statutory reform.

The IP believes that MSHA's current enforcement paradigm must be re-examined. The need for a paradigm shift is particularly urgent given the workforce readiness issues illuminated by MSHA's IR Report. In Section A below, the IP recommends that an independent entity consider possible modifications to the current paradigm, and lists examples of strategic-level recommendations that such a group might consider. In Section B, the IP recommends two changes to MSHA's investigatory process that it believes would improve the quality and impact of its internal reviews. Section C, focusing on the implementation level, recommends several concrete measures to ensure that the MSHA IR Team's vision for correcting deficiencies in MSHA's enforcement practices is fully realized. Finally, in Section D, the IP highlights several gaps in current technical knowledge and practice that it believes could compromise future mine safety, and recommends that research be undertaken to establish best practices and to inform subsequent regulatory activities.

### **A. Modifying the Enforcement Paradigm**

Although the Mine Act assigns the responsibility for mine safety to the mine operator, MSHA is still widely regarded as the guarantor of mine safety. The problem is that MSHA cannot continuously monitor every mine in order to catch deviations from regulations, nor is compliance with MSHA regulations necessarily sufficient to ensure mine safety. Moreover, MSHA's IR Report documents clearly that even when given the opportunity to observe and cite critical safety deviations by the mine operator, MSHA's inspectors



sometimes fail to do so. The IP believes that these and other practical realities compromise the utility of the current enforcement paradigm.

For example, a primary drawback of the current paradigm is the enormous breadth and complexity of MSHA inspectors' responsibilities. A mine inspector may be required to check several hundred items during an inspection, and is expected to know all of the processes and details associated with each. With each successive disaster comes more reports and recommendations from Inspectors General, Internal Reviews, and the General Accountability Office (among others), and in some cases new regulations, all of which translate into additional responsibilities. In short, mine inspection has become a job at which few, if any, could be expected to fully succeed. No amount of additional training or revisions to manuals and handbooks can fully address this problem. Nor is an increase in the number of inspectors a viable long-term solution.

These structural problems are exacerbated by changes in the demographic composition of the MSHA inspectorate. Retirements have, and are continuing to decimate the ranks of mining faculty at universities, seasoned mining engineers, mine managers, miners, NIOSH mining researchers, and MSHA inspectors, among others. The pool of potential hires is insufficient to replace the numbers being lost through attrition, and with increasing frequency, the new hires are completely inexperienced in mining. The MSHA IR Report describes in detail a workforce that is unprepared to undertake the full scope and complexity of inspecting the mines and overseeing the enforcement process. The inexperience of the inspectorate was identified as a factor in MSHA's enforcement performance at UBB, and there is no reason to believe that District 4 has a disproportionate number of inexperienced inspectors. Given the paucity of candidates with even modest training or experience in mining-related fields, hiring a large cadre of new inspectors would not be sufficient to remedy MSHA's enforcement deficiencies. The shortage of qualified personnel, which is likely to persist for the foreseeable future, underscores the need for new solutions.

Another hallmark of the current regulatory paradigm is the requirement that mine operators submit roof control and ventilation plans to MSHA for review and approval. Reviewing each plan thoroughly requires the expenditure of significant time and resources by specially trained personnel. Given the volume of plans and plan modifications submitted, there are simply not enough ventilation or roof control specialists available to thoroughly review each submission. Not only do MSHA regulations limit MSHA's discretion regarding which plans to approve, but mine operators are equally constrained in preparing plans for approval. A real danger, which the IR Report suggests is more than theoretical, is that MSHA will "approve" some plans that have not been thoroughly reviewed. In so doing, the agency may not only fail to identify hazards embedded in the original plans, but will also reduce the mine operator's incentives to independently identify and correct such hazards. Obtaining MSHA's "approval" in these circumstances may, in effect, enable some mine operators to evade responsibility for implementing plans that they know – or should know – pose significant hazards.

The IP believes that modifications to the current paradigm are required not only to correct the persistent lapses in enforcement, but to minimize the risks borne by the nation's miners. The IP recommends that an independent body of experts from government, industry, labor, and academia be convened to identify a suite of options that might be used to improve safety and health outcomes by modifying the current enforcement paradigm. Although formulating and evaluating such alternatives is well beyond the scope of the IP's charge, for clarity's sake, we offer a few illustrative suggestions below that an independent body might wish to consider.

### **1. Replacing Technical Rules with Performance Standards**

One possibility would be for MSHA to replace some specific technical criteria (rules) with performance-oriented measures (standards). In lieu of "approving" an operator's ventilation plan, for example, MSHA could "certify" that the operator had utilized accepted engineering approaches in devising a plan to its operational needs; that the operator had demonstrated that its approach would meet or exceed minimum legal standards; or that specific performance expectations must be met.

### **2. Incentivizing Mine Operators to Hire In-House Specialists**

Another approach might be to incentivize mine operators to hire certificated roof control and ventilation officers to oversee plan implementation and to coordinate day-to-day actions. Such an approach would have the virtue of shifting additional responsibility from MSHA onto the operator, thereby lessening the agency's need to hire additional specialists.

### **3. Encouraging the Use of Occupational Safety and Health Management Systems**

Encouraging MSHA and mine operators to consider the use of occupational safety and health management system approaches could improve safety and health outcomes while shifting more of the burden of ensuring miner's safety to the mine operator.

### **4. Evaluate the Requirement that MSHA Inspect all Underground Mines on a Quarterly Basis**

The need to conduct quarterly inspections at all underground mines as well as special inspections at many mines has severely taxed MSHA's workforce, and some outcomes of these demands on limited personnel were in evidence at UBB. The IP recognizes the value of mandatory (scheduled) inspections, but suggests that a more strategic assignment of MSHA's scarce resources might lead to improved safety outcomes by enabling inspectors to target mines meeting specific criteria.

### **5. Evaluation of MSHA's Use of, and the Potential Effectiveness of, MSHA's Enforcement Authorities**

MSHA's IR Report contains many instances where MSHA's use of its enforcement authorities, including the use of elevated enforcement techniques, was called into

question. A systematic evaluation of such enforcement authorities needs to be undertaken. Such an evaluation needs to consider not only the potential effectiveness of such authorities, but also the lessons learned as the result of the UBB experience. This issue is closely related to considerations of MSHA workforce readiness and MSHA's approach to inspections.

## **6. Placing Responsibility for Data Collection on the Mine Operator**

The current system places significant responsibility for measuring potential hazards (such as airflows, respirable dust and rock dust samples) on MSHA inspectors. The burden of collecting and analyzing samples, collecting and reviewing past sample reports, re-sampling areas that were previously inaccessible or too wet to sample, etc., significantly interferes with MSHA's capacity to carry out its core functions.

The IP believes that some, if not all, of these responsibilities should be shifted to the operator. For example, requiring operators to monitor key ventilation parameters and the combustibility of accumulated float dust – and to make that information available to MSHA in a timely manner– not only would enable MSHA personnel to focus on higher-level analytic tasks, but would improve both MSHA's and the mine operators' capacity to identify imminent hazards. Expanded information collection would also improve mine operators' capacity to demonstrate compliance with specific performance goals.

To be sure, expanding the mine operator's responsibility for data collection would represent a significant departure from current practice, and must be undertaken with caution. For example, MSHA would have to ensure that the data collected were reported with sufficient accuracy, frequency and timeliness to provide a meaningful snapshot of conditions at the mine.

## **7. Exploring New Solutions to Improve Workforce Readiness**

A competent inspection workforce is essential to ensure that the Mine Act is being followed. The IP agrees with the MSHA IR Team that MSHA personnel require additional training, oversight, direction and guidance in order to perform their jobs effectively. However, the IP is concerned that the steps recommended in the General Conclusions and Recommendations – such as additional training (and re-training), and consolidation of all policy and procedural guidance – are insufficient to address the problem.

Given that that recent cohorts of mine inspectors have far less practical mining knowledge than their predecessors, the IP believes that new, creative forms of training should be explored, such as new forms of distance learning, web-accessible training modules, software applications that test inspectors' capacity to detect violations in "real time" in simulated mining environments, etc. The IP believes strongly that rather than simply offering "more of the same" training, MSHA should seek out new, creative solutions to the workforce readiness problem.

Relatedly, it is important to recognize that the performance incentives facing the inspectorate affect the way in which they perform their jobs. In the current enforcement regime, MSHA inspectors – particularly inexperienced ones – may focus disproportionately on violations that are readily visible and easy to identify, at the expense of those that are much more consequential yet time-consuming to uncover. As a result, significant yet more difficult-to-assess hazards may go undetected.

The IP believes that the employee performance management system should be analyzed to determine the metrics used to evaluate employee performance, and the incentives that these metrics create for inspectors, supervisors and specialists. If necessary, these incentives should be modified to better align personnel behavior with the agency's expectations and priorities.

### **8. Improving MSHA's Utilization of Information Technology**

The IP identified numerous instances in the MSHA IR Report in which shortcomings in the quality, scope, accessibility, or interconnectivity of MSHA's enterprise database and IT infrastructure compromised the agency's ability to conduct timely and effective enforcement. For example, because of MSHA's antiquated system for tracking methane liberation, only 22% of the TL [total methane liberation] values in the agency's enterprise database during the first quarter of fiscal 2010 accurately reflected the latest air sample analysis results (See IR Report, p. 32.). As a result of database problems, it appeared that UBB and other "gassy" (highly combustible) mines in the district were not inspected with appropriate frequency. The month before the explosion, a MSHA inspector failed to take an air sample at one of three UBB mine entry points because he relied on an outdated ventilation map that did not identify it as a location where sampling was required (See IR Report, p. 15). Similarly, because documents related to a 2004 methane inundation at the mine were not maintained, MSHA staff reviewing a ventilation plan in 2009 were unaware of – and therefore took no steps to mitigate – the potential for methane inundations (See IR Report, p. 3). Perhaps most significantly, due to an error in MSHA's 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. (See IR Report, p. 2.)

To its credit, the MSHA IR Team includes "us[ing] technology more effectively to enhance the quality of inspections and effectiveness of enforcement tools" among its list of general recommendations. Although the IP endorses each of the specific recommendations mentioned in the MSHA IR Report, the IP believes that MSHA would benefit from a more comprehensive, systematic, and multi-dimensional analysis and upgrade of its IT system, and it recommends the formulation of a set of strategic goals that pertain specifically to the agency's use of information technology and its enterprise database.

In conclusion, the IP recognizes and acknowledges the complexity of undertaking such a paradigm shift. Ensuring a prescriptive safety net for all mineworkers while empowering

operators to take more responsibility for safety and health outcomes is a daunting challenge. Given the wide range of ways in which MSHA's role might be re-defined, the IR encourages the an independent group to focus on those that recognize the industry's principal role in mine health and safety, that are realistically achievable in light of the anticipated size and skill set of MSHA's workforce, and that prioritize the most significant ways in which MSHA can contribute to mine health and safety.

## **B. Improving the Scope and Value of MSHA's Internal Reviews**

Regardless of whether future reviews are conducted internally or by an independent entity, the IP recommends that they be modified in two ways to enhance their value to the agency and to the public.

### **1. Revise Section 1204(b)**

The IP recommends that MSHA revise Section 1204 to provide more latitude to investigators so that they do not merely enumerate shortcomings, but go further in seeking out root cause(s) of enforcement deficiencies. The IP believes that broadening the scope of post-accident reviews would enrich any future team's conclusions and recommendations. To its credit, the IP notes that the MSHA UBB IR Team did, on several occasions, enlarge its inquiry beyond the strict constraints of the Mine Safety and Health Act ("Mine Act") and applicable regulations, policies and procedures. However, revising the wording of Section 1204 would help make the search for root causes a central goal of any post-accident review.

### **2. Utilize Specially Trained, Outside Interviewers**

The IP believes that utilizing independent interviewers with special training in interview techniques—as opposed to MSHA personnel—would be more a more effective way for review teams to enhance the depth and breadth of information obtained from interviews. However, the IP does recognize that utilizing interviewers from outside MSHA does pose additional risks. For example, if MSHA personnel feel uncomfortable or intimidated by outside interviewers, they may be reluctant to cooperate and impart useful information. Although aware of such risks, the IP believes that solutions can be found to mitigate those risks, and that on balance, the benefits of using specially trained interviewers from outside MSHA probably outweigh the drawbacks.

## **C. Independent Oversight to Ensure Successful Implementation**

The IP has a significant concern that unless MSHA takes dramatic and unprecedented steps to ensure that the recommendations cited in the MSHA IR Report are followed, the agency will be no more successful in overcoming the enforcement deficiencies identified in the UBB IR Report than it was in implementing the substantially similar recommendations listed in its previous internal reviews. Despite the best intentions of

its personnel, the agency has had persistent and substantial difficulty in parlaying the insights contained in its internal review reports into a process of continuous quality improvement.

The IP Assessment is aligned with the MSHA IR Team's first step that MSHA must specify explicit, objectively quantifiable benchmarks and performance goals; set a deadline for the completion of each task; and formulate a clear chain of accountability that specifies which MSHA staff member is responsible for ensuring compliance with each action item. However, the IP does not believe that such measures are sufficient to ensure that the recommendations contained in MSHA's IR Report and in the IP Assessment – to the extent that they are adopted – will be fully implemented.

Therefore, the IP proposes that the Department of Labor's Chief Evaluation Office (in the Office of the Assistant Secretary for Policy) appoint an Independent Monitor (IM) to oversee implementation of the corrective actions. The IM would be charged with ensuring that MSHA formulates a comprehensive set of reforms; specifies a timetable and deadline for the completion of each action items; documents completion of each specific task; and substantiates at regular intervals its continued adherence to the specified performance goals. Finally, the IM should be empowered to conduct periodic, independent "audits" of MSHA's performance with respect to each of its performance goals. The IP recommends that the IM report its findings directly to the Department of Labor's Assistant Secretary for Policy on a quarterly basis in a transparent fashion.

#### **D. Establishing a Technical Foundation for Improved Practices**

The identification and analysis of engineering gaps that may lead to a diminution of safety is beyond the defined scope of MSHA's IR Team. Nevertheless, it did identify certain technical issues that should be addressed, and its suggested regulatory solutions. Limitations in technical understanding or in best practices can contribute to accidents, and the IP believes that such gaps in knowledge and practice should be highlighted and systematically addressed. The IP notes that important and largely unanswered technical questions have arisen from the accident investigations. In particular, the IP recommends six technical achievement goals:

1. Develop best practices for ventilating the longwall face and its tailgate corner to minimize dangerous accumulations of methane gas;
2. Define the relative merits of bleeder and bleederless ventilation systems for controlling methane accumulation on longwall panels;
3. Develop best practices for the location of monitors on and around the face to readily detect dangerous levels of methane;

4. Develop best practices for employing monitoring systems to detect unexpected changes to the ventilation system and to identify and forecast potentially dangerous conditions;
5. Develop appropriate sampling procedures to detect and determine if adequate inertization of float dust has occurred; and
  
6. Determine the relative merits of applying active and passive barriers in specific circumstances.

The IP believes that guidelines and best practices must be developed and adopted to address these critical gaps in knowledge and practice. Research to support the development of these guidelines and best practices, and to inform future statutory and regulatory efforts, should be conducted expeditiously.

## **VI. Acknowledgements**

The IP wishes to commend the MSHA IR Team for its thoroughness and objectivity in identifying MSHA enforcement performance deficiencies at UBB and for its frankness in presenting its findings to MSHA's management. Although the IP highlighted areas of deficiencies in the MSHA's IR Report, and has offered views beyond those expressed in the MSHA IR Report, the deficiencies identified in no way detract from the MSHA IR Team's vigilant and valuable efforts to improve MSHA's enforcement performance.

## APPENDIX I

### Charge from Secretary Solis

# News Release



U.S. Department of Labor  
Office of Public Affairs  
Washington, D.C.  
Release Number: 10-504-NAT

For Immediate Release  
April 16, 2010  
Contact: Carl Fillichio  
Phone: 202-693-5060 (office) or 202-309-9184 (cell)

## **Independent team of occupational safety experts to examine MSHA's internal review following explosion at Upper Big Branch Mine**

**WASHINGTON** – At the U.S. Department of Labor's request, an independent team of occupational safety experts will examine the process and outcomes of the Mine Safety and Health Administration's internal review in the wake of the explosion at the Upper Big Branch Mine. Both the MSHA internal review and the independent analysis of that review will be made public. This independent assessment is aimed at assuring transparency and accountability, and will evaluate the policy, process and outcomes of MSHA's internal review.

By policy, MSHA is required to review its own actions relating to the mine prior to the explosion. To ensure the integrity of that process, the secretary of labor has asked the director of the National Institute for Occupational Safety and Health, Dr. John Howard, to identify a team with relevant experience to provide an independent analysis of MSHA's internal review.

"I am confident that MSHA will conduct a thorough and complete review of the actions of the mine operator and its own actions at the Upper Big Branch Mine," noted Secretary of Labor Hilda L. Solis. "To ensure accountability, I've asked for an outside team to review the policy, process and substance of MSHA's internal review. This independent evaluation will help ensure that we're doing everything we can to protect the health and safety of America's miners."

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U.S. Department of Labor releases are accessible on the Internet at <http://www.dol.gov>. The information in this news release will be made available in alternate format (large print, Braille, audio tape or disc) from the COAST office upon request. Please specify which news release when placing your request at 202-693-7828 or TTY 202-693-7755. The Labor Department is committed to providing America's employers and employees with easy access to understandable information on how to comply with its laws and regulations. For more information, please visit <http://www.dol.gov/compliance>.



## APPENDIX II

### Biographies of Independent Panel Members

**Lewis V. Wade, Ph.D.**, holds a Ph.D. in structural engineering from Carnegie Mellon University and has twice received the Presidential Rank Award for Meritorious Service. Dr. Wade was Research Director to the U.S. Bureau of Mines' Twin Cities Research Center and was Deputy Research Director of the Bureau's Pittsburgh Research Center. Prior to that, Dr. Wade served as Assistant Chief Hydrologist for Information in the Water Resources Division of the U.S. Geological Survey (USGS) and as the Senior Executive for USGS's Yucca Mountain Project. Dr. Wade was appointed the Associate Director for Mining Safety and Health Research just after the Bureau of Mines was organized into the National Institute for Occupational Safety and Health (NIOSH) and served in that capacity until 2005. He served as Senior Science Advisor to the NIOSH Director from 2005 until his retirement from federal service in 2008. Dr. Wade has taught mining engineering classes at West Virginia University and has served on the National Academies' Committee on Rock Mechanics.

**Jeffery Kohler, Ph.D.**, is the Director of the Office of Mine Safety and Health Research in the National Institute for Occupational Safety and Health. Prior to joining NIOSH in 1998 as Director of the Pittsburgh Research Laboratory, he spent 18 years on the faculty at The Pennsylvania State University where he taught courses in mining engineering, conducted research, and advised graduate and undergraduate students. Before his time at Penn State, Dr. Kohler worked as both an electrical and as a mining engineer in the private sector. Dr. Kohler has conducted research and taught courses in mining methods, materials handling, mine ventilation, monitoring, control and communication systems, electrical power systems, and industrial safety and health. He has published over 130 papers and reports on these topics. He served on the Governor's Commission that examined the Quecreek Mine Inundation in 2002 and the National Mine Safety Technology and Training Commission after the Sago, Aracoma and Darby Mine Disasters in 2006. He is a senior member of the Institute for Electrical and Electronic Engineers, a member of the American Institute of Mining, Metallurgical & Petroleum Engineers.

**Michael Sapko, M.S.**, heads Sapko Consulting Services, LLC, which provides specialized technological expertise to federal and state government agencies. In 2007, Mr. Sapko retired from the Office of Mine Safety and Health Research at the National Institute for Occupational Safety and Health as a senior physical scientist on the ventilation and explosion prevention research team. He is the author of more than 100 technical publications, on fire, explosions, and explosive safety, and on instrumentation and devices to improve miner safety and health. Mr. Sapko holds three U.S. patents and has won three R&D 100 Awards for excellence in innovation from R&D Magazine. He began his career as a federal employee with the U.S. Bureau of Mines Pittsburgh Research Center in 1972 and holds a Master of Science degree in chemical engineering from the University of Pittsburgh.

**Alison Morantz, Ph.D., J.D., M.Sc.,** is Professor of Law and John A. Wilson Distinguished Faculty Scholar at Stanford Law School where she teaches first-year and upper-level courses including contracts and employment law. Her research interests include occupational safety and health, workers' compensation law, regulatory federalism, negotiation and alternative dispute resolution, law and economics and legal history. Dr. Morantz is principal investigator for the a National Science Foundation grant, a NIOSH research contract, and a research initiative for Stanford's Gould Center for Conflict Resolution. Dr. Morantz holds a Ph.D. in economics from Harvard University, a J.D. from Yale Law School, and M.Sc. in economics for development from Oxford University. Dr. Morantz was a Rhodes Scholar at Oxford.

## ERRATA SHEET

March 23, 2012

**Page 13**, 1<sup>st</sup> sentence under subheading #5: the words in red below are missing from the paragraph.

MSHA's IR Report contains many instances where *MSHA's* use of its enforcement authorities, *including the use of elevated enforcement techniques, was called into question. A systematic evaluation of such enforcement authorities needs to be undertaken.* Such an evaluation needs to consider not only the potential effectiveness of such authorities but also the lessons learned as the result of the UBB experience. This issue is closely related to considerations of MSHA workforce readiness and MSHA's approach to inspections.

**Page 15**, next to last paragraph: "MSHA IR Report" in the 3<sup>rd</sup> line of this paragraph should be replaced with "IP"; and the word "its" should be replaced with "the MSHA IR"

To its credit, the MSHA IR Team includes "us[ing] technology more effectively to enhance the quality of inspections and effectiveness of enforcement tools" among its list of general recommendations. Although the *MSHA IR Report* IP endorses each of the specific recommendations mentioned in *it's the MSHA IR Report*, the IP believes that MSHA would benefit from a more comprehensive, systematic, and multi-dimensional analysis and upgrade of its IT system, and it recommends the formulation of a set of strategic goals that pertain specifically to the agency's use of information technology and its enterprise database.

**Page 15**, Under #8, the 6<sup>th</sup> line: the words in red below are missing from the sentence.

### 8. Improving MSHA's Utilization of Information Technology

The IP identified numerous instances in the MSHA IR Report in which shortcomings in the quality, scope, accessibility, or interconnectivity of MSHA's enterprise database and IT infrastructure compromised the agency's ability to conduct timely and effective enforcement. For example, because of MSHA's antiquated system for tracking methane liberation, only 22% of the TL [total methane liberation] values in the agency's enterprise database during the first quarter of fiscal 2010 accurately reflected the latest air sample analysis results (See IR Report, p. 32.). As a result *of database problems, it appeared that* UBB and other "gassy" (highly combustible) mines in the district were not inspected with appropriate frequency. The month before the explosion, a MSHA inspector failed to take an air sample at one of three UBB mine entry points because he relied on an outdated ventilation map that did not identify it as a location where sampling was required (See IR Report, p. 15). Similarly, because documents related to a 2004 methane inundation at the mine were not maintained, MSHA staff reviewing a ventilation plan in 2009 were unaware of – and therefore took no steps to mitigate – the potential for methane inundations (See IR Report, p. 3). Perhaps most significantly, due to an error in MSHA's 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. (See IR Report, p. 2.)