

April 2010 Upper Big Branch Mine Explosion—29 Lives Lost

PURPOSE

This case study provides a useful tool for the U.S. Nuclear Regulatory Commission (NRC) staff as it interacts with its stakeholders. It provides the regulated community with the findings of West Virginia Governor Manchin’s appointed independent investigation panel and the results of an investigation conducted by the U.S. Department of Labor’s Mine Safety and Health Administration (MSHA). Many of these findings contrast starkly with the positive safety culture traits that the NRC has incorporated into its safety culture policy statement.

WHAT HAPPENED?

On April 5, 2010, a series of explosions occurred inside the Upper Big Branch (UBB) mine in southern West Virginia. Twenty nine coal miners working for Performance Coal Company (a subsidiary of Massey Energy Company and hereinafter referred to as PCC/Massey) lost their lives in the “largest coal mine disaster in the United States in 40 years.”¹ The company had a thoroughly documented, preexisting history of poor safety performance. “PCC/Massey failed to report accident data accurately. MSHA’s post-accident audit revealed that, in 2009, UBB had twice as many accidents as the operator reported to MSHA.”²

PROBABLE CAUSE

Existing government reports suggest that PCC/Massey “promoted and enforced a workplace culture that valued production over safety including practices calculated to allow it to conduct mining operations in violation of the law.”³ Consistently poor environmental conditions were permitted to exist inside the mine. “Upper Big Branch was cited every month during 2009—64 citations in all (57 from MSHA, seven from the state)—for failure to ventilate the mine according to the approved ventilation plan.”⁴ Poor ventilation was likely a contributor to the accumulation of methane gas. Government investigators believe malfunctioning water sprayers on the machine used to cut coal from the rock may have permitted the ignition source for igniting the methane gas. Additionally, an abundance of coal dust (from inconsistent rock dusting) served as a catalyst to a resulting series of massive explosions. An MSHA follow-up investigation “revealed multiple examples of systematic, intentional and aggressive efforts by PCC/Massey to avoid compliance with safety and health standards, and to thwart detection of that non-compliance by federal and state regulators.”⁵ “While violations of particular safety standards led to the conditions that caused the explosion, the unlawful policies and practices implemented by PCC/Massey were the root cause of this tragedy.”⁶



Photo: Kayna Szymczak @ Getty Images

1. MSHA, Coal Mine Safety and Health, “Report of Investigation—Fatal Underground Mine Explosion, April 5, 2010,” December 6, 2011, p. 1.
2. Ibid., p. 4.
3. Ibid., p. 2.
4. J. Davitt McAteer and Associates, “Upper Big Branch—The April 5, 2010, Explosion: A Failure of Basic Coal Mine Safety Practices,” Report to the Governor, the Governor’s Independent Investigation Panel, May 2011, p. 60.
5. MSHA, Coal Mine Safety and Health, “Report of Investigation—Fatal Underground Mine Explosion, April 5, 2010,” December 6, 2011, p. 2.
6. Ibid., p. 2.

NRC Positive Safety Culture Traits

Evidence of Weak Safety Culture Traits

Leadership Safety Values and Actions in which leaders demonstrate a commitment to safety in their decisions and behaviors.

One specific work process that the PCC/Massey leadership had in place was to illegally provide advance notice to miners of MSHA inspections. This was a flagrant violation of Section 103(a) of the Federal Mine Safety and Health Act of 1977, as amended.⁷

Problem Identification and Resolution in which issues potentially affecting safety are promptly identified, fully evaluated, and promptly addressed and corrected commensurate with their significance.

“...when a worker told [the] foreman about the air reversal, [air moving the opposite direction of where it should have been in order to properly vent the mine] ‘He didn’t say nothing, he just walked away.’”⁸

The preshift, onshift examination system—devised to identify problems and address them before they became disasters—was a “failure.”⁹

Personal Accountability in which all individuals take personal responsibility for safety.

In the weeks preceding the disaster, investigators found that one UBB foreman’s hand held methane detector had not been turned on, even though he filled in examiner’s books as if he had taken gas readings. “This data [integrity issue] raises doubt about the daily and weekly air readings and other data recorded by the crew foreman in the weeks leading up to the disaster.”¹⁰

Work Processes in which the process of planning and controlling work activities is implemented to maintain safety.

“In instances in which a section boss did halt production because of a dangerous condition, such as wholly inadequate ventilation, he was instructed to write only ‘downtime.’ He was not to create a record acknowledging a potentially deadly situation.”¹¹

NRC Positive Safety Culture Traits

Evidence of Weak Safety Culture Traits

<p>Continuous Learning in which opportunities to learn about ways to ensure safety are sought out and implemented.</p>	<p>“Testimony indicates that PCC/Massey inadequately trained their examiners, foreman and miners in health and safety...especially in hazard recognition, performing new job tasks and required annual refresher training. This left miners unequipped to identify and correct hazards.”¹²</p>
<p>Environment for Raising Concerns in which a safety-conscious work environment is maintained where personnel feel free to raise safety concerns without fear of retaliation, intimidation, harassment, or discrimination.</p>	<p>“Witness testimony revealed that miners were intimidated by UBB management and were told that raising safety concerns would jeopardize their jobs. As a result, no whistleblower disclosures were made in the 4 years preceding the explosion, despite an extensive record of PCC/Massey safety and health violations at the UBB mine during this period.”¹³</p>
<p>Effective Safety Communication in which communications maintain a focus on safety.</p>	<p>“Workers at UBB were treated in a ‘need to know’ manner. They were not apprised of conditions in parts of the mine where they did not work. Only a privileged few knew what was really going on throughout UBB.”¹⁴</p>
<p>Respectful Work Environment in which trust and respect permeate the organization.</p>	<p>“Miners also mentioned disrespectful written messages they received” from [a senior manager]. Others, were intimidated by [a manager’s] “nasty notes” and didn’t say anything because they were “job-scared.”¹⁵</p>
<p>Questioning Attitude in which individuals avoid complacency and continuously challenge existing conditions and activities in order to identify discrepancies that might result in error or inappropriate action.</p>	<p>“Testimony revealed that UBB’s miners were intimidated to prevent them from exercising their whistleblower rights. Production delays to resolve safety-related issues often were met by UBB officials with threats of retaliation and disciplinary actions.”¹⁶</p>

7. Ibid., p. 9.

8. J. Davitt McAteer and Associates, “Upper Big Branch—The April 5, 2010, Explosion: A Failure of Basic Coal Mine Safety Practices,” Report to the Governor, the Governor’s Independent Investigation Panel, May 2011, p. 19.

9. Ibid., p. 97.

10. Ibid., p. 19.

11. Ibid., p. 99.

12. MSHA, Coal Mine Safety and Health, “Report of Investigation—Fatal Underground Mine Explosion, April 5, 2010,” December 6, 2011, p. 5.

13. Ibid., p. 2.

14. J. Davitt McAteer and Associates, “Upper Big Branch—The April 5, 2010, Explosion: A Failure of Basic Coal Mine Safety Practices,” Report to the Governor, the Governor’s Independent Investigation Panel, May 2011, p. 99.

15. Ibid., p. 100

16. MSHA, Coal Mine Safety and Health, “Report of Investigation—Fatal Underground Mine Explosion, April 5, 2010,” December 6, 2011, p. 5.

WHAT CAN ORGANIZATIONS LEARN FROM THIS ACCIDENT?

This accident reinforces the need for, and importance of, promoting a positive safety culture by routinely evaluating an organization’s safety culture activities and initiatives and by making enhancements and adjustments to ensure that an organization remains proactive and appropriately focused on this important area. This case study points to the following key lessons:

- Senior management dictates the tone for the balance between safety and corporate performance. These two items are not mutually exclusive and can and must successfully coexist. However, a strong safety culture demands a safety first approach to business.
- No single event led to this catastrophe. Instead, it resulted from a series of events that were precipitated by a work environment in which workers were not encouraged to raise safety concerns and managers may have been discouraged from halting production in order to address an unsafe condition.
- This disaster may have been avoided had there been a more robust, positive safety culture in which workers and managers were encouraged to raise concerns.

Sources of Information:

1. MSHA, Coal Mine Safety and Health, “Report of Investigation—Fatal Underground Mine Explosion, April 5, 2010,” December 6, 2011.

2. J. Davitt McAteer and Associates, “Upper Big Branch—The April 5, 2010, Explosion: A Failure of Basic Coal Mine Safety Practices,” Report to the Governor, the Governor’s Independent Investigation Panel, May 2011 (<http://online.wsj.com/public/resources/documents/wvamine0519.pdf>).

3. Briefings by the U.S. Department of Labor and MSHA on the disaster at PCC/Massey’s UBB mine in southern West Virginia at the request of President Barack Obama, April 2010.

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Note that the NRC has not conducted a formal analysis of the events discussed herein for, or in conjunction with the US Dept. of Labor’s, Mine Safety and Health Administration, the Governor’s Independent Investigation Panel or any other government or private organization. The NRC compiled the information presented and discussed herein from government sources that were publicly available at the time of publishing, as identified.