

The Application of Major Hazard Risk Assessment (MHRA) to Eliminate Multiple Fatality Occurrences in the US Minerals Industry

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Abstract

Major Hazard Risk Assessment (MHRA)¹ is used to help prevent major hazards, e.g., fire, explosion, wind-blast, outbursts, spontaneous combustion, roof instability and chemical and hazardous substances, etc., from injuring miners. The structured process associated with MHRA helps to characterize the major hazards and evaluate engineering, management and work process factors that impact how a mine mitigates its highest risk. The National Institute for Occupational Safety and Health (NIOSH) studied the application of this technique to US mining conditions through a field-oriented pilot project. Risk assessment teams used in the pilot project were primarily composed of mining company personnel. Ten case studies were performed over a wide cross-section of mines. These mines were representative of the important mining commodities in the US minerals industry, i.e. coal, metal, non-metal, and aggregate. Also, the sizes of the mines ranged from small to large and were located across the country.

The ten case studies demonstrate that most US mines have the capability to successfully implement an MHRA and that the MHRA methodology produced additional prevention controls and recovery measures to lessen the risk associated with a select population of major mining hazards. The basic ingredient for a successful MHRA is the desire to become more proactive in dealing with the risks associated with events that can cause multiple fatalities. A successful outcome is marked by a thorough examination of existing prevention controls and recovery measures. When pressed to consider more controls to further mitigate the risk, a well-staffed risk assessment team was able to identify additional controls. For these mining operations, it was important to add additional controls, even if they were not required by existing mining regulations, to lower the risks associated with the major hazards under consideration. If a mining operation is not willing to commit its best people to an MHRA or will not provide them with sufficient time to see the process through to its conclusion, the MHRA output may prove to be useless. Additionally, if a mining operation is not prepared to discuss its major hazards in an open and honest fashion and to present the findings of the risk assessment in a written report, the MHRA output will be unclear, and attempts to monitor or audit important controls may not be possible. A MHRA is most effective when the mining operation possesses 1) a proper understanding of its hazards, 2) experience with informal and basic-formal risk assessment techniques, 3) proper facilities, machinery and equipment, 4) suitable systems and procedures that represent industry Best Practice, 5) appropriate organizational support with adequate staff, communications and training, 6) a formal and thorough plan for emergency response, and 7) a

¹ Also referred to as Principal or Catastrophic Hazard Risk Assessment.

safety risk management approach that is promoted and supported at all levels of the organization.

Executive Summary

Major Hazard Risk Assessment (MHRA) is a process used to evaluate hazards that can cause great harm to a mining operation and its workers if they are not adequately controlled. NIOSH evaluated the MHRA process at ten mining operations. The general consensus was that the MHRA process provided information considered beneficial for a safer work environment. Three of the ten case studies are rated as performing a more-than-adequate risk assessment, five as adequate, and two as less-than-adequate. The degree of success was influenced by the existing risk management culture at the mining operation, the design of the risk assessment, the performance of the risk assessment team, the character of the risk assessment process, the extent of the existing controls, and the quality of the new ideas. Lessons learned focused on improving the scoping document, the need to adequately train the risk assessment team, the important risk assessment tools and techniques, methods to assess the quality and character of the risk assessment team outputs, and the significance of the documentation process.

Fundamental to successful utilization of risk assessment in the MHRA process is company support to form a team with the capability and intentions to address all hazards. It is critical that the risk assessment be designed to capture the strengths of the MHRA approach in order for it to be successful. The strengths of the MHRA approach are its ability to

1. set clear direction to solve specific high-risk problems,
2. focus on priority concerns,
3. establish involvement and commitment from a wide cross-section of the mine's work force,
4. decrease potential losses for mining operations,
5. help to build teams to solve major mining issues,
6. go beyond merely complying with existing mining standards and regulations, and
7. focus upper management attention on issues existing at the operational level.

Conversely, the MHRA approach is unlikely to prove successful if the following issues or concerns take precedence during a risk assessment:

1. inappropriate focus on changes within the existing way the mine conducts business,
2. time taken away from activities directly related to production,
3. focus on additional time constraints being placed on a mining operation's "best people,"
4. the cost of implementing new prevention controls and recovery measures,
5. inappropriate alteration of a mining operation's priorities,
6. need for there to be an existing risk management structure to build upon, and
7. need for an openness in management / labor communications.

This NIOSH pilot project demonstrated that US mines have the capability to successfully implement an MHRA and that the basic requirement for a successful MHRA is the desire to become more proactive in reducing risks associated with events that can cause multiple fatalities. An MHRA can be most effective when the mining operation possesses a proper understanding of

its hazards, has some experience with risk assessment techniques, uses systems and procedures that represent industry best, or attains wide organizational support for the MHRA activity.

The power in the MHRA process comes from the risk assessment team as it examines new ideas that will help to further reduce risk. These new ideas are presented to management in the form of an Action Plan. This Action Plan is contained within a written document that summarizes the risk assessment team's actions and is presented to management. The Action Plan also suggests that management assign a responsible person to evaluate each of these new potential controls and recovery measures in a more in-depth manner. Management can then select the new ideas most appropriate for their mine.

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1.0 - Introduction

The reoccurrence of multiple fatality events in the US Minerals Industry supports the need for improvements in the way major hazards are identified, assessed and managed. Many solutions to reduce mining disasters have been proposed including additional regulations, improved training, more reliable equipment, and better technology. In December of 2006, the National Mining Association's Mine Safety Technology and Training Commission stated that a new paradigm for ensuring safety in underground mines was needed. The Commission recommended that the industry consider a systematic and comprehensive risk management approach (Grayson et al., 2006). In March of 2007 during a congressional hearing, the NMA announced its support of a risk assessment based approach for the mining industry (Watzman, 2007). In another congressional hearing, Davitt McAteer asked that Best Practices be prepared which could be used to hold mine operators to a higher standard of care, i.e. risk assessment and risk control (McAteer, 2007).

The elimination of multiple fatality events is arguably one of the most important safety issues facing the US Minerals Industry. Ten case studies are presented that use a range of practices to lower the risk from site-specific major hazards. These practices ranged from standard to those that are leading the industry. This paper evaluates how the use of Major Hazard Risk Assessment (MHRA) might help to eliminate multiple fatality events. The MHRA process was developed by the Australian mining industry over the last decade as a means of mitigating catastrophic hazards from its mining operations.

Most case studies were viewed as successful by the quality of the barriers, controls and recovery measures produced during the risk assessment and the responses of the individual risk

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