Mining and Industrial Safety Technology and Training Innovation (MISTTI) Project

Project Number: 1H750H009822-01-Revised

Evaluation Report on MISTTI Subtask 5.4 – *Mine Crisis Management Handbook*

A draft version of the *Mine Crisis Management Handbook* was submitted with the October-December 2012 Mining and Industrial Safety Technology and Training Innovation (MISTTI) quarterly report. Between January and March 2013 five technical reviews were solicited. This report represents a summary consolidated report of these five expert reviews.

Expert reviewers:

Comments from five different technical experts were compared and compiled for this evaluation review of the *Mine Crisis Management Handbook*. Three reviewers were mine safety and training instructors who had experience as miners and first responders to mine emergencies. One reviewer was a 27-year veteran underground miner, assistant foreman, and machine operator who worked at both union and nonunion coalmines in West Virginia, Pennsylvania, and Ohio. The fifth reviewer was a 26-year veteran coal miner who served on mine rescue teams for 22 years and was recently inducted into the Coal Mine Rescue Hall of Fame.

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Executive Summary

*Comments that especially highlight the scientific and technical achievements of the **Mine Crisis Management Handbook**, its contribution to NIOSH mine safety goals and objectives, and its potential impact*

Overall Assessment of Handbook's Contribution to Mine Safety and Emergency Rescue

The *Mine Crisis Management Handbook* is concise and understandable, thorough and well written. Use of this handbook before a crisis occurs will help mine management and support personnel become acquainted with the decisions and planning needed to set up a command center. The instructions for planning ahead for establishing a crisis command center are extremely helpful to all mines, but especially for those that have never experienced some type of crisis.

The handbook is organized into two sections. The first features six checklists to guide mine crisis procedures to be followed by supervisors, engineers or mappers, recorders, rescue operations chiefs, public information officers, and staging area managers. The second provides six sections of guidance about what to do before an emergency: be prepared, have an initial response, handle the arrival of officials, establish a command center, deploy rescue teams, and manage rescue and recovery. All of the reviewers agreed that this handbook provides accurate and precise guidelines for establishing plans, locations, supplies, and procedures for a command center before a crisis occurs. Several reviewers pointed out that the mine rescue community nationwide does not have qualified personnel to staff command centers. The rescue teams undergo a rigorous physical and procedural training, but the officials in the command center are not always as well trained.

The *Mine Crisis Management Handbook* was described as a "helpful tool" to encourage command center officials to establish training activities and practices so that even large mine "off shift" foremen or small mine operations are prepared for and capable of responding to an accident. If the editorial changes that are presented in detail below are addressed, this handbook can provide an outline for advance planning and procedures to follow that can prevent logistical disorder from impeding rescue efforts.

Consolidated Summary of Recommendations for Revisions

Specific Editorial Comments and Corrections. Changes that provide additional (and some cases regulated) procedures, further clarification of regulations, or that improve the clarity of the tasks to be done are prioritized in the compilation of editorial comments, corrections, and recommended changes. Pages of the handbook documenting editorial comments to be addressed (4, 5, 6, 7, 8, 9, 11, 14, 15, 16, 22, 26, 30, 31, 34, 35, 36, 37, and 46) have been scanned and provided to the MISTTI training team led by Hope Coffield, who will prepare an updated version of the *Mine Crisis Management Handbook*.

Some of the suggested corrections will have to be reconciled when recommendations for improving the handbook are not exactly in agreement. For example, one reviewer suggests that the Supervisor Checklist on page 4 of the handbook be revised so that checklist boxes are numbered, lined up sequentially, and ordered so that priorities are readily apparent to the responsible person overseeing the command center activities. This reviewer explained that the "person in charge at the mine may or may not have any crisis experience and [may be] making decisions in a hectic atmosphere….It is reassuring to look and see a checklist as a guide and a

stable item at an unstable time." Another reviewer cautioned that anything written as a "checklist must be incident command system (ICS) compliant as everyone else outside the mine is responding to that…and anything written on such a checklist will follow you to court."

Redundancies. Several reviewers identified areas where the handbook was redundant. As one reviewer suggested, emphasis and repetition on critical elements can be helpful, but the presentation format should present key information and procedures in a format that can easily identify critical events, tasks, and procedures in a sequential and non-repetitive format.

Briefing, Debriefing, and Critical Incident Debriefing. Several reviewers recommended that the handbook include an additional new section that addresses critical incident stress debriefing. As one reviewer explains, rescue teams must be regularly *briefed* before going underground and *debriefed* on the surface at the conclusion of their mission. The briefing and debriefing processes are not handled consistently among crisis response managers. In these specific circumstances—explosion, fire, the entrapment of miners, or miners reported missing—further questioning of those debriefed may be essential. Information given during debriefings should be recorded.

Integration of New Technologies and Equipment. Reviewers and those calling for this new mine crisis handbook have identified the need for employing new and different technologies as part of ongoing efforts to improve mine safety incident response practices. On page 48 of the existing handbook, a reviewer notes that a portable mine rescue communication system or sound-powered communication system should be added to the equipment list. As new technologies are developed and approved, they should be quickly added to the equipment list. For example, emergency breathing devices for miners to use in escapes from underground mine fires or explosions should be integrated as part of the support for emergency escape and rescue operations in the *Mine Crisis Management Handbook*. Some of these new technologies are described in a National Academies publication, *Improving Self-escape from Underground Coal Mines*[1]. Investigations of major mining accidents that have occurred within the last eight years have centered on understanding both how to prevent or mitigate emergencies and what capabilities are needed by miners to self-escape to a place of safety successfully. The *Improving Self-escape from Underground Coal Mines* report focuses on preparations for self-escape.

Integrate Lessons from Experiences. A theme that was recalled by all reviewers was that the checklists and guidelines for planning a command center should benefit by the lessons learned from previous events. Maps have been a problem during several mine rescue/recovery operations. A system for collecting maps and notes and other materials at the onset and updating these maps and notes during the entire rescue/recovery operation so that they are available as official documents is imperative. In addition to informing procedures and planning, the lessons learned may be made available through a robust data collection, careful and constructive assessment of emergency response plans, feedback mechanisms from miners and mine operators to identify residual challenges and remedies, and active engagement with technology suppliers. Mine operators and other industry stakeholders should take steps to empower self-escape in a mine emergency. Efforts should include, but not be limited to, training, technology, equipment, and emergency response plans that are fully integrated and coordinated to establish unified, efficient, and effective protocols.

Alternative Formats. Several reviewers suggested that a first responder pocket book on hard,

[1] Downloaded from http://www.nap.edu/catalog.php?record_id=18300#description

waterproof stock that included diagrams to help responder verify rope layout would help. This and all materials outlining procedures must be readable in low light conditions and should be designed to allow a quick-ready search and reference to information needed. Responders on the surface would make use of a smart phone or other electronic version of handbook or checklist procedures, but an electronic support system would supplement the required print materials that must be completed.

Expand Audience. The handbook should primarily address the needs for responding to coal incidents, but should be expanded for all mining audiences.

Assessment of the use of resources: Does the *Mine Crisis Management Handbook* reflect appropriate integration of existing resources to support management of mine incident response? The checklists presented must be incident command system compliant and consistent with all current applicable regulations. Each state has its own requirements to address the Department of Natural Resources, Division of Resources Management mine safety rescue team training requirements. It would help if the *Mine Crisis Management Handbook* provided a list of resources that a command center plan must adhere to with links to the state and federal organizations that provide policy and regulatory oversight as well as helpful materials and contacts.

Links with other projects and/or programs: Does the *Mine Crisis Management Handbook* reflect satisfactory input and engagement with related national/international programs, standards, and crisis response networks? The *Mine Crisis Management Handbook* must reflect ICS requirements as well as all applicable mine safety and health regulations. For example, one reviewer noted an addition to the WHOM TO NOTIFY section on the Supervisor Checklist (p. 4 of the handbook): The Mine Safety and Health Administration (MSHA) must be notified if a fire is not extinguished within 10 minutes of finding. Reviewers also noted that requirements and procedures for deploying rescue team are outlined by MSHA as part of its mine rescue training program. These guidelines are posted online at www.msha.gov/MineRescue/Training/MSHA3026(coal%2011&%20MNM.

Are applicable ethical, policy-related/regulatory, safety, and gender issues handled appropriately? In the wake of 2006 disasters, the U.S. Congress passed the Mine Improvement and New Emergency Response Act of 2006 (MINER Act), which was designed to strengthen existing mine safety regulations and set forth new measures aimed at improving accident preparedness and emergency response in underground coal mines. The handbook should include a link to the MSHA web page that was established to support implementation of the MINER Act: http://www.msha.gov/MinerAct/MinerActSingleSource.asp.

How will revisions to the existing *Mine Crisis Management Handbook* be documented? Before the *Mine Crisis Management Handbook* is distributed, the evaluator will review the handbook to make sure the revisions proposed are addressed, or if revisions are not made, an explanation is provided that is accepted by the evaluator and the MISTTI project PI.

How will the revised *Mine Crisis Management Handbook* be disseminated? As part of the completion of the *Mine Crisis Management Handbook*, the revision team will describe its plans for dissemination of the revised document. The *Mine Crisis Management Handbook* revisions and explanations will be completed by Aug. 16, 2013.