Technical Assistance Comments on H.R. 2678 and H.R. 2679

Submitted for the Record by

Jeffery L. Kohler, Ph.D.
Associate Director for Mining and Construction Safety and Health Research

National Institute for Occupational Safety and Health (NIOSH)
Centers for Disease Control and Prevention (CDC)
U.S. Department of Health and Human Services (HHS)

Requested by the House Committee on Education and Labor

September 11, 2007

The following technical assistance comments on H.R. 2678 and H.R. 2679 are in response to a written request, which was received on July 30, 2007, from the House Committee on Education and Labor. In that request, the committee asked NIOSH to provide written technical comments on the matters covered by the Mine Safety and Health Administration's (MSHA) written statement to the committee, dated July 26, 2007, that fall within NIOSH's area of responsibility and expertise. The Administration has not formulated a position on the legislation, but these comments provide NIOSH's answers to questions of a technical nature that fall within NIOSH's area of responsibility and expertise, including post accident communications, underground refuges, mine seals, ventilation controls, belt air, and the self-contained self-rescuer (SCSR) inspection program.

Section 4(a), Post Accident Communications:

The National Institute for Occupational Safety and Health (NIOSH) shares the Mine Safety and Health Administration's (MSHA) vision of completely wireless systems, which do not have any vulnerable infrastructure within the mine, and we continue to invest in research leading toward such systems. Our research, however, indicates that wave propagation characteristics in underground coal mines, combined with energy limitations in an explosive environment, will prevent completely wireless systems in most mines for many years to come. Thus, for the near term, there is a need to advance emergency communications technology while providing a foundation for future improvements that will lead to the realization of our shared vision. We also accept that it will be impractical to develop systems that will withstand any disaster scenario in every location within every mine. As such, we believe it is prudent to employ systems that will work in most mines under common disaster scenarios. Our research is demonstrating a practical path forward in which achievable technological developments can be used in the short term to significantly improve emergency communications while providing a platform for future improvements like wireless systems.

The language in the bill is consistent with our recommended approach. While all currently-available systems have vulnerabilities, we believe that systems such as the "leaky feeder" system and the "wireless mesh" system can be made more survivable through both physical and electronic improvements. While the bill uses the term "hardened," this may suggest a focus on physical structures, but there are also enhancements that could be made to the system architecture or electronics that would make the system more survivable, so we suggest substituting the term "improved" or "enhanced." Further, at this time, standard definitions do not exist for the term "hardened," which may lead to some confusion. We believe that the language of the bill as currently written would not interfere with current research and industry efforts to develop and implement a solution that is completely wireless, and consequently, we approve of that language, with the modification noted above.

Section 4(b), Underground Refuges:

We agree with MSHA on the need to allow for refuge alternatives in addition to refuge chambers; allowing alternatives will better balance the need for mines to provide refuge but also facilitate mine evacuations. NIOSH is investigating various refuge alternatives and will make specific recommendations in its report to Congress, which is due in December 2007. Hopefully, the language in the bill will allow a comprehensive use of refuge alternatives in addition to chambers. This will permit mine operators to choose from a suite of alternatives to facilitate both escape and rescue.

NIOSH is also investigating location guidelines for refuge alternatives, such as the maximum distance that a chamber should be placed from the face. Although the distance of 1,000 feet specified in the bill seems reasonable for many situations, it may not be the best metric. For example, the distance could be based on two parameters: the speed at which the mineworkers would be able to travel in zero visibility; and the capacity of their oxygen supply. In some mines, this distance could be significantly greater or less than 1,000 feet. Again, there would be value in referencing these metrics to the findings of the NIOSH research effort on refuge alternatives.

Section 4(c)(2), Mine Seals:

NIOSH Information Circular (IC) 9500, *Explosion Pressure Design Criteria for New Seals in U.S. Coal Mines*, establishes a set of conditions to seal gob areas safely. Scenarios are described that require monitoring of the gob behind the seals, as well as those that do not require monitoring – the Circular explicitly recommends that, if a seal meets a particular strength standard (which depends on the configuration of the sealed area), there is no need for ongoing monitoring. The bill as written would require ongoing monitoring of all newly-sealed gob areas. That is a more stringent standard than is recommended by the Circular, and NIOSH does not believe such a standard is necessary. Further, to the extent that monitoring is to be required, NIOSH does not think it appropriate to include specific monitoring locations and procedures in legislation at this time, as additional research is being conducted. Additionally, NIOSH believes that the bill should be written to accommodate a full range of measures that could be used to

improve safety insofar as gob explosions are concerned, rather than focusing solely on explosion pressure and monitoring practices.

Section 4(c)(3), Ventilation Controls:

Ventilation controls need to be designed to withstand the normal forces associated with mining and to provide improved resistance to overpressure from mine explosions.

The ventilation controls should be designed and constructed of materials that can handle the geotechnical conditions associated with stress and movement of the rock masses to avoid compromising their performance. For a particular set of conditions, the materials used for the controls may have to withstand movement of the roof and floor rocks, which requires a material that does not break when subjected to squeezing. Thus, ventilation controls should be designed to meet specific performance standards and should not specify use of particular materials. This would include consideration of the amount of overpressure the controls could withstand to ensure that the ventilation system is not completely disrupted in the event of an explosion. This is the approach that has been adopted in Queensland, Australia, in stoppings and overcasts, in their *Schedule 4 Ventilation Control Devices and Design Criteria*, of *Coal Mining Safety and Health Regulations (2001)*. Their stoppings, overcasts, and regulators must be designed to withstand an overpressure ranging from 2 psi to 5 psi depending on the location. Their standard includes design requirements such as "fire resistant and of substantial construction" for certain applications. A similar approach in the bill would result in a higher level of safety.

Section 4(d), Belt Air:

The Technical Study Panel, established by the Mine Improvement and New Emergency Response Act of 2006, is investigating the use of belt air, and is addressing the broad issues of belt flammability and the use of belt air. Their findings can certainly help illuminate the discussion around the practice. Notwithstanding, we are concerned that the language of the bill would not even allow the use of belt air under any circumstances. This could create a significant danger in at least a few mining districts: those in which coal bumps are a problem due to the heavy overburden pressures such as in Utah and deep mines with high methane emission rates combined with significant ground control problems such as in Alabama.

A task force was assembled in 1985 to examine the complex issues of using two-entry longwall mining systems. Ground control ramifications, ventilations, and fire hazards were also reviewed. The technical team consisted of MSHA and U.S. Bureau of Mines staffs. Ground control stability in underground coal mines is influenced by several factors, which include geology, overburden, rock properties and in situ stresses, and mine design. Various combinations or these factors make generalized design recommendations difficult. For example, while it may only influence a small number of western mines in the Central Rocky Mountain region, the use of two-entry systems with a small yielding pillar has resulted in dramatic improvements in stability when extreme, primarily deep, mining conditions were encountered. By reducing the total load carried by the chain pillars, substantial reductions in bumps, roof falls, and floor heave have been

realized. The two-entry gate road designs seem to limit the stress interaction and provide for a more stable mining environment as attested by the bump/bounce, roof fall, and injury/fatality history. Depth is not always the only consideration; different material properties of the coal, coupled with weaker roof and floor, have eliminated bumps in the Southern Appalachian region. The requirements for additional ventilation to remove explosive gases necessitate using multiple intake and return entries with only minor ground control design considerations for controlling the vertical stress concentrations inherent with greater mining depths. While these issues only affect a smaller number of mines, they cannot be ignored and mine-specific variances would help ensure safety for these special circumstances.

Section 4(i), SCSR Inspection Program:

The U.S. Department of Labor (DOL) is required to establish a program for periodic random testing of SCSRs. Testing of these devices is currently being done by NIOSH through its Long Term Field Evaluation (LTFE) Program. This is a program through which NIOSH randomly selects 400 Self-Contained Self Rescuer (SCSR) devices from underground mines across the country (100 from each of the 4 types of SCSRs approved for use in underground mines) and removes them for testing to evaluate their continued functionality. NIOSH believes that its functional sampling schedule under the LTFE Program (http://www.cdc.gov/niosh/npptl/topics/respirators/ltfe/ltfe.html) has sufficient statistical power to ensure the functional performance of SCSRs that pass the manufacturers' inspection criteria. NIOSH lacks the testing capacity to test significantly more SCSRs in a given year. According to MSHA's analysis, this legislation could require the testing of about 20,000 SCSRs per year, and this would far exceed NIOSH's capacity. Further, NIOSH provides new SCSRs to replace each one removed from a mine because NIOSH functional testing results in the destruction of each unit tested. Currently, NIOSH bears the replacement costs although under the legislation these replacement costs would be shifted to industry. If the 5% testing requirement under the legislation is limited to non-destructive visual inspection that would be less objectionable; however, NIOSH would defer to MSHA to make such a determination.

NIOSH would defer to MSHA in determining the appropriate level of initial inspection verification necessary to assure miners are not using devices that do not pass the manufacturers' inspection criteria.