

Revised Draft Interim Recommendations Based on Comments from Kim McCarter and Walter Arabasz

10. **The State should take all steps necessary to ensure that health and safety concerns associated with liquid hydrocarbons in Utah mines are effectively addressed through federal or state regulation or both.** Testimony from a Utah MSHA inspector before the Commission about the hydrocarbon danger experienced at the Willow Creek Mine and the inadequacy of current law is the basis for this recommendation.

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11. **The State should establish a Research Institute for Mine Safety and Productivity (RIMSP).** This Research Institute would address the gap in support for mining research since Congress eliminated the U.S. Bureau of Mines in 1996 and the state terminated mine research funding from the State Mineral Leasing Fund in 1999. Similar research programs have been established in Illinois and other coal states. The RIMSP would concentrate on developing improved methods for mining under deep cover and other challenging conditions in Utah and other western states, including safety technology such as communication and tracking capability. Having a recognized research program working with industry would help attract additional funding from other sources such as NIOSH, DOE, and BLM. Research projects should be relevant to Utah mining and focus on safety and resource recovery. An Institute Board of Trustees consisting of academic, industry, and miner representatives would identify appropriate research topics in collaboration with the OCMS, MSTAC, MSERC, and WETC. Projects could address new mining methods, mine stress detection, planning ventilation systems, simulating mine fires, seismic monitoring, databases for best practices in bump-prone environments, safety modifications of mine machinery, technology for locating miners following an accident, and improved planning tools. The Technical Advisory Committee suggests \$1 million in initial funding, which could come in part from redirected Mineral Lease revenue or a modest research levy on electrical energy produced by coal. Federal and industry funding support also should be pursued.

12. **The State should upgrade seismic monitoring coverage of the coal-mining region of Central Utah to establish the basic infrastructure for effective regional-scale seismic monitoring of all areas of active coal mining and to enhance seismic monitoring at individual bump-prone active mines.** Utah should seize a one-time opportunity to acquire for permanent use three high-quality, three-component broadband seismometers with associated signal processing, power, and communications equipment. These strategically located stations currently monitor the Wasatch Plateau-Book Cliffs coalfields but are part of a temporary National Science Foundation experiment and will be removed in late 2008 or early 2009. Under the National Science Foundation "Earth Scope" program, this seismic equipment can be purchased for \$110,000 (plus \$5,000

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annual maintenance), a significant savings, and become part of the University of Utah Seismograph Stations' (UUSS) regional network. An additional, relatively low-cost approach to enhance monitoring of mining-induced seismicity (MIS) would be to add a single above-mine digital accelerograph, linked by continuous telemetry to the UUSS, at selected active mines. This would require active cooperation and some support from the mines and would cost about \$15,000 for each installation, with modest installation and ongoing maintenance costs. Three mines currently have such above-mine instrumentation as part of partnering arrangements with the UUSS that entail modest monthly payments from the mines. To extend this type of monitoring capability to other mines, the UUSS is seeking one-time funding from NIOSH to capitalize instrumentation for as many as five mines that might be willing to undertake partnering arrangements similar to existing ones. This type of monitoring arrangement provides an opportunity to correlate mining activity with MIS and may provide important information for risk assessment associated with longwall operations. The state should encourage such arrangements and consider assistance if funding from NIOSH does not materialize.

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14. The Mine Safety Technical Advisory Council (MSTAC) should evaluate the seismic monitoring system and work with the University of Utah Seismograph Stations and the coal operators to determine whether investment should be made to achieve a high-resolution seismic monitoring capability at individual mines involving both in-mine and surface instruments. Professor Arabasz reports that this type of intensive seismic monitoring in coal mines is uncommon in the United States but has been pursued aggressively in Australia, Canada, China, Eastern Europe, and South Africa. The Commission recommends a thorough assessment of safety benefits, feasibility, costs, and public and private financing options, including NIOSH.

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15. The State should organize and sponsor a technical symposium on the causes of mountain bumps in coal mining areas and best practices to improve safety. The symposium may become an annual event to address safety issues specific to Utah and the West. The Commission recommends that this symposium take place in late spring or early summer of 2008 at an appropriate Utah location. The planning committee would consist of representatives from the MSTAC or the Commission's Technical Advisory Committee. The focus of the symposium should be on improving mine safety consistent with a strong coal mining economy in Utah. Topics could include:

- a. Improved safety training focusing on recognition of conditions contributing to bumps;
- b. Methods currently in use to reduce likelihood of damaging bumps;
- c. Summaries and lessons learned from past events;
- d. Strengths and limitations in pillar design procedures and mine layout practices;
- e. Remaining Utah coal resources and probable future coal mining conditions;

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- f. Opportunities for industry, MSHA, NIOSH, BLM, and academia to work together on research designed to improve safety and productivity in Utah coal mines (development of theory, laboratory investigation, and field verification); and
- g. The present and possible roles of government agencies in assuring safety in bump-prone coal mines.

Funding for the symposium could come from sponsors, federal sources, registration fees, and modest state support.

16. The State should provide increased and stable funding for mining engineering education. This support is needed for faculty resources, curricular offerings, and the recruitment and retention of students. A logical source of this support would be to include mining engineering as an essential component of the statewide Engineering Initiative. The Commission has received significant evidence of a serious ongoing and accelerating shortage of mining engineers who are critical to the safety and well-being of coal production in Utah. According to Professor McCarter, Chair of the Department of Mining Engineering, the 12 accredited mining engineering programs in the United States produce about 130 graduates each year, but the annual need for mining engineers is about 300 per year nationwide. About one-fourth of all U.S. faculty positions in mining engineering will become vacant in the next two years. In response to similar conditions in other engineering fields, the Legislature over several years has approved funds to hire faculty and improve facilities to facilitate program improvements and student enrollment. However, this funding has not been used in any substantial way to improve mining engineering education. To meet projected demand, the Department of Mining Engineering needs to expand its faculty to a recommended level of six full-time professors. The inclusion of mining engineering in the Engineering Initiative would assist in achieving this goal.

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17. The State should support a public education campaign focused on Utah public schools and the system of higher education to provide information about careers in energy, mineral, and natural resources.

26. CEU and the Department of Mining Engineering should develop a proposal for an associate degree in mining technology for presentation to the Utah State Board of Regents. This proposal will help in the education and recruitment of needed mining engineers for Utah's coal mines and will provide a significant educational and career opportunity for students attending CEU.

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