Statement of
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Subcommittee on Labor, Health and Human Services,
Education and Related Agencies
of the
Senate Committee on Appropriations

ñThe Utah Mine Disaster and Preventing Future Tragediesò

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Good Morning, Chairman Harkin and distinguished Members of the Subcommittee. My name is Davitt McAteer and I wish to thank you for this opportunity to appear before you today. I am the Vice President of Wheeling Jesuit University where I am responsible for research efforts at the National Technology Transfer Center (NTTC) and Center for Educational Technologies (CET).

In addition, during the past year and one-half, I led investigations into the Sago and Aracoma/Alma No. 1 Mine disasters in West Virginia at the request of West Virginia Governor, Joe Manchin, III, and issued reports on those disasters in July and November of 2006.

From 1994 to 2000, I served as Assistant Secretary of Labor for the Mine Safety and Health Administration (MSHA) and also served as Acting Solicitor of Labor from February, 1996 to December, 1997. I have been involved in mine safety and health issues since 1968 when, following the Farmington Mine disaster in November of 1968, I conducted a study and produced a report and book entitled Coal Mine Safety and Health ï A Case Study of West Virginia.

Tragically, we are here yet again to attempt to make sense of the events which began at 2:48 AM on Monday, August 6, 2007 at the Crandall Canyon Mine near Huntington, Utah, where nine men lost their lives. Based on the information Iôve reviewed, a massive coal bump[1] violently disrupted the mining operation. The bump was of sufficient force to be recorded as a 3.9 magnitude event by the University of Utah Seismograph Station in Salt Lake City and lasted four minutes.

The suggestion that this was a naturally-occurring earth quake has been rejected by every seismologist who has reviewed the evidence. Moreover, rock bursts of this sort are not uncommon in certain U.S. mining regions.[2] In fact, the Utah coal field where the Crandall Canyon mine is located has been known as an area prone to coal ñbumps and bouncesò for decades.[3] Thereôs no doubt that the violent coal burst that occurred on August 6 was directly related to the mining activity at this underground operation. Panels of coal were being extracted in areas where exhaustive longwall mining had previously occurred.

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[1] Coal Bump: Sudden outbursts of coal and rock that occur when stresses in a coal pillar, left for support in underground workings, cause the pillar to rupture without warning, sending coal and rock flying with explosive force. *A Dictionary of Mining Minerals & Related Terms,* Compiled and edited by Paul W. Thrush and the State of the Bureau of Mines, U.S. Department of the Interior, 1968, p. 223.

[2] Mine Safety & Health News; Retsof Salt Mine and Green River Wyoming, Trona Mine Collapse, August 13th Edition.

[3] In 1914, E.H. Weitzel, a company executive with the Colorado Fuel & Iron Company, testified before the U.S. Congress, House Committee on Mines and Mining that in many western coalfields the overburden of rock and strata covering the coal seams are very unstable and that he considered the Rocky Mountain region to be the most hazardous coal-mining area in the country. And in 1926, a U.S. Bureau of Mines representative noted that the practice of pulling pillars (unmined coal left standing between room and pillar entries) in worked-out areas ï more common in the West than in other regions ï made unstable roof conditions more dangerous. (U.S. Congress, House Committee on Mines and Mining, Investigation of Conditions in Coal Mines of Colorado. 63rd Congress, 2d Session, 1914 pp. 1781-1782; Daniel Harrington, Accident Record in Western Coal Mining States, Rocky Mountain Coal Institute, Proceedings 1927; 2:11-16.)

It is my understanding that in February, 2007, the mine operator was mining in the North barrier panel, but in March, a large outburst of coal forced the company to abandon this section of the mine in favor of mining in the South barrier. Under MSHA regulations, a mine operator is required to report to MSHA ña coal or rock outburst that causes withdrawal of miners or which disrupts regular mining activity for more than one hour.ò[4] (It has been reported that the operator failed to file this required report to MSHA, and upon learning of the March 2007 rock burst, MSHA determined that mine operator had not violated the reporting requirement.) In response to the March 2007 rock burst and after consulting with a mining engineering firm, the mine operator submitted a revised mining plan for the Crandall Canyon Mine to MSHA on May 23, 2007, and the agency approved it on June 15, 2007. On the night of August 6th, miners were removing coal from the 158 block when the massive bump and collapse occurred. Sadly, on August 16, during the heroic effort to rescue the six trapped miners, another massive bounce occurred. Three individuals were killed, including a MSHA inspector, Gary L. Jensen, and six others were seriously injured.

While it is early in the investigation and much remains to be learned, I would like to emphasize two points at this time. First, Prevention. Second, Emergency Response. Historically, the most effective and proven way to save miners from disasters is to prevent them from occurring in the first place, by dealing effectively with known risks. Explosions, mine fires, rock bursts, fatal crushing injuries, and black lung disease have all been with us a long time, we have not invented new ways to kill miners. The same hazards that killed miners 50, 20

[4] 30 CFR Part 50.20-5(a)

and 10 years ago, are the same, and the nature of mining---where the workplace is changing minute-by-minute---requires constant vigilance on the part of miners, foremen, mine superintendents, and mine operators.

Of course, MSHA also has a critically important role in prevention, by approving mine operatorsô written plans for ventilation, roof control, etc., and by conducting comprehensive inspections and protecting minersô rights to complain about safety and health concerns without fear of reprisal. Lest the public forget, at its core, MSHA is a law enforcement agency, but as the law states, it is the responsibility of the mine operator to safely operate the mines. It is responsible for enforcing mine safety and health regulations which are proven tools to prevent injuries, illnesses, and deaths. When it comes to protecting our nationôs mine workers, MSHAôs decisions should always err on the side of protecting the miners.

In this context, what do we already know about the situation at the Crandall Canyon mine? The mine plan was either grossly insufficient and led to the disaster, or it was adequate but the mine operator failed to follow it as written. In either case, we need to ensure that mining plans include a sufficient margin of safety, so that if minor deviations from the plan are made in the course of mining, a catastrophic event doesnôt result. The catastrophic event in Utah suggests a serious deficiency in the way the plan was approved by MSHA. In the Sago and Aracoma/Alma disasters, the plans submitted by the mine operators and approved by MSHA did not include a sufficient safety factor, and as a result, miners were not protected and many perished. The MSHA approval process, a vital part in the prevention system, should start with the question: *Will this plan provide a high level of safety to the miners working in accordance*

with it? Ultimately, an MSHA plan approval should convey to the mine operator, the miners and ultimately their loved ones, that the Agency has a high-degree of confidence that the plan, if followed diligently, will provide a robust level of safety for the mine workers.

MSHAôs technical review of plans must certainly rely on the expertise of the agencyôs engineering specialists, but the staff also have available to them a computer modeling program called the ñAnalysis of Room and Pillar Mining Systemsò or ñARPM.ò This computerized modeling system provides a quantitative measure to assess the engineering adequacy of the plan. The ARPM is especially valuable as it relates to pressure risks in coal pillars and ribs. It is my understanding that MSHAôs ARPM was not used to evaluate the Crandall Canyonôs mining plan until *after* the disaster occurred. And, it is my understanding that the evaluation found that the mining plan was ñlacking and under-designed.ò[5]

This technology was previously used to limit mining in dangerous conditions. In 1996, following a double fatality at the Harlan Cumberland mine in eastern Kentucky where a violent coal outburst claimed the lives of miners Mark Skidmore and Randy Lewis, and injured four other men, MSHAôs district office used the ARPM to evaluate the operatorôs plan to continue mining in a section near the fall. When the ARPM analysis showed continued and heightened danger, the plan was rejected and mining was not allowed in that section of the mine.

MSHAôs approval of the mining plans is a critical component of its prevention responsibility, but this approval must also be integrated into the inspection process. The front-

[5] Ward, Ken, Tough Questions, Need Answers, Computer Model Found Mine Plan in Utah Lacking; *Charleston Gazette*, Sept 2, 2007.

line inspectors must be given adequate time to coordinate and consult with the technical specialist who reviewed and approved plan. This way, the inspector who will actually visit the mine and see the plan in action, has a thorough understanding of the plan's unique features, and is aware of areas in the mine that should undergo more scrutiny during an inspection. Also, the various divisions of MSHA must work *together* when considering, for example, the demands for appropriate roof control and appropriate ventilation. Each of these safety concerns is equally important and must be reviewed as an integrated mine-safety system, not as independent factors, as if changes in one (e.g. ventilation controls) couldn't have a profound adverse effect on the other (e.g., ground control).

In addition, other federal agencies with responsibilities for safety must be consulted. In the Crandall Canyon disaster, we now understand that Bureau of Land Management (BLM) engineers had not seen the mining plan until after the accident and were not aware "how aggressively they were on retreat mining."[6] The chief of the BLM's solid minerals branch said "I can say with certainty that our mining engineers would have had some questions about it."[6]

In the mode of getting "back to basics" on enforcement to enhance prevention, more emphasis should be paid to the role of MSHA's field and district office supervisors, for their support and enhancement of the front-line mine inspectors. Today many MSHA supervisors are being called on to take on all sorts of additional responsibilities (e.g., stakeholder meetings, special emphasis programs) which may dilute the principle enforcement mission of the agency.

[6] Gehrke R. "Mountain was buckling months before mine collapse." *The Salt Lake Tribune*, August 31, 2007.

Moreover, we know that in certain regions of the county with their unique geological formations, and in particular kinds of mining settings, underground mines are prone to rock bursts (i.e., ñbouncesò and ñbumpsò.) In West Virginia, as well as in Utah, the coal seams and related geology is well understood by mining engineers. Coal ñbumps and bouncesò are not limited to western coal mines. At the Consolidation Coal Companyôs Buchanan No. 1 mine located in western Virginia, several ñbouncesò occurred on July 7, 2007 and they were reported to MSHA. (No injuries to miners resulted from this event at the Buchanan mine, which registered above 3.0 magnitude on the Richter scale at Virginia Tech.) When a mine operator proposes an underground site for secondary mining applications, however, the geologists and mining engineers may know less about how the seams will respond and need to plan the mine design accordingly.

Therefore, I recommend that any mining operation with cover in excess of 1,000 feet, be required to meet a greater level of review and scrutiny before a plan is approved. Just like the special consideration and oversight of mines that liberate high concentrations of methane, we need an additional level of scrutiny for mines with more than 1,000 feet of cover. These mine plans must first make a determination of *whether* the mining can be undertaken while ensuring an adequate margin of safety for the miners. Then, it must include a description of how pressure buildups in the pillars or ribs will be monitored, but also elaborate on the techniques that will be used to (1) monitor the build-up of pressure in the strata, and (2) institute procedures to the release it. The methods to manage safely the risk of coal or rock bursts are well known and have been used extensively in the mines of Poland, South Africa, as well as in certain mines in the United States. They have not been applied on a large scale in the U.S. because they are not

required by Federal law and interfere with rapid coal production. If day-to-day management of pressure build-ups in the pillars and ribs had been adopted at the Crandall Canyon mine, it is likely that minersô lives may have been saved.

Seismic monitoring of mining conditions is a well developed science which has been available as a tool for measuring and graphing rock pressure build-up in strata surrounding the coal seams. In principle, it is a modern version of listening to the rock or roof formation, a practice miners have used since ancient times. As the mining creates voids in the subsurface strata, the rock formations above and below will begin to adjust, in effect, filling the void (as the old saying goes, Mother Nature hates a void). That adjustment results in some cases, roof falls and in other locations in the build-up of pressure in the rock formations above, as well as below the coal seam and void. Typically the coal vein is the softest rock formation, thus pressure can cause bursts and bumps which violently cause the coal and surrounding rock to explode into the void and into the mine tunnel. This phenomenon occurs as well in gold and other metal and nonmetal mines.

As mentioned, seismic monitoring of the pressure build-ups has been practiced in South Africa and Poland for decades, and techniques for diffusing the pressures in a controlled manner have been developed and successfully deployed. This technique has also been deployed in the U.S. in the coal mining industry. Consolidation Coal Company deployed seismic monitors in its Buchanan Mine in the last twenty years, recently, the practice has been discontinued. The science has advanced to the point it is called ñmicro seismic monitoringò and portable wireless

seismographic units have been developed. The U.S. oil industry has employed this technique for oil exploration.

Therefore, I wish to propose that each mine operator of any mine which has experienced pressure buildups, bounces or bumps or which has the potential for such events be required to deploy seismic monitoring systems in their mines. Moreover they be required to utilize techniques already existing to defuse the pressure buildup. Finally, each such operator should be required to have a procedure to remove miners from harm should pressure buildups be detected, and to discontinue mining until steps have been taken to release the pressure to a safe level.

MSHA recently tested a wireless mini-seismic system which according to the manufacturer, the in-mine testing was successful. This portable wireless system could also be adapted for mine rescue to listen for miners trapped below ground.

From a prevention perspective, mining companies and MSHA currently have tools available to them that are designed to assess hazards and prevent the kind of catastrophe that occurred at the Crandall Canyon mine. These must be deployed in the mines today.

Second, the mine emergency system in the United States must be overhauled. It has failed the miners. Rescues have been few and far between, sadly we are not as prepared, quick and nimble as we need to be. The mine rescue operations which have taken place in the last few years have certainly demonstrated the heroic efforts on the part of the rescuers, including all the men at Crandall Canyon. However, the system is not accomplishing what it was established to

do: rescue miners quickly and safely, and with the least amount of risks to those individuals engaged in the rescue itself.

After the mine accident at Sago, a number of State and the Federal governments pushed reforms to equip trapped miners with additional breathing devices, and other essentials to keep them alive until they could be rescued. Today, more self-contained self-rescuers are being stored underground than in the past, and that is a good, positive first step. But, we should never have been satisfied with that minor first step, and I am particularly disturbed at the slow pace of other improvements, notably, emergency response plans, communications and tracking, and rescue chambers.

When the MINER Act of 2006 required mine operators to develop a ñresponse and preparedness planò for mine disasters, it was hoped that mine operators and MSHA would have developed and approved plans, respectively, that reflected the letter and the *spirit* of the new law. An emergency preparedness plan should not simply list the number of SCSRôs available and report that the underground emergency supply skid will contain 1 roll of brattice, 2 lbs. of #8 nails, and 10 gallons of water. Instead, the plan should reflect the mine operatorôs planning and preparedness for an emergency. Examining the emergency response plan for the Crandall Canyon mine, which MSHA approved in June 2007, there is little indication that the operator gave serious thought to the types of emergency scenarios likely to occur at his mine. For a region of the country notorious for rock bursts, and a mine with a history of them, we should expect the mine operator to consider these facts when planning and preparing for an emergency.

I recommended that each mine operator include in his emergency response at least one òworst case scenarioò and how they would respond to this event. The plan should include how they involved miners, local emergency responders and family members in their mock-up exercises, and thoroughly describe the plausible eventualities considered in their preparation.

At Crandall Canyon, we know that precious hours were spent simply getting the site ready for the first drill hole. As the mine advances underground, given the requirement that the emergency response plan must be updated at least every six months, an estimated site for emergency response holes or ñrescue boreholesò be mapped out in advance. In the event of an actual emergency when the command center officials determine that a bore hole is necessary, the site would have been already planned out. These and other steps that could be taken in advance will expedite the mine rescue process and hopefully buy time for the miners awaiting rescue.

MSHA must develop and equip rapid response teams with adequate equipment on-hand and ready to transport when notified of about a mine emergency. Technology from other industries (e.g., oil and gas, aerospace) should be examined for potential transfer to the mine safety world in order to improve the effectiveness and speed with which rescue teams can reach trapped miners. For example, tunnel-boring machines used in the tunneling industry appear to offer significant potential for boring quickly and safely into trapped miners.

At all levels, corporate, state and federal levels, mine rescue must be modernized and made realistic, starting with in-mine rescue exercises in addition to the traditional mine-rescue contests.

The efforts to improve communications between the mining surface and to the underground miners must be redoubled. There are communication and tracking systems which are manufactured and available today for the mining industry. They may not be perfect, and they may not work in every emergency situation, but we must short-circuit the endless search for the holy grail of communication devices that can be used in every location underground. When the vast majority of nationôs electricity is powered by coal, there is no reason that our coal miners donôt have access to the best currently-available communication and tracking equipment. We must make a commitment that every three years or five years, existing equipment will be replaced with the latest state-of-the-art available technology.

Economically, the coal industry is well positioned to adopt improved safety technology, as the past several years have been especially profitable, and production is concentrated in a small number of companies. Of the 612 underground mines that produced coal last year, 81 percent of the coal came from just 145 mines. The vast majority of these mines are controlled by the nationôs seven largest coal mining companies.[7] I know that some of these firmsô mines have begun installing improved communication and tracking systems, however others have not. I recommend that the operators of these 145 top-producing mines, provide MSHA with a report on their current state of communication and tracking systems, as envisioned by the spirit of the Miner Act. We must help to ensure the continuous improvement and application of communication systems for underground miners by encouraging a new approach to applied mine safety engineering, so that the ñresearchò to ñpracticeò to ñproductò cycle is accelerated greatly. One suggested method would allow MSHA to provide grants to equipment entrepreneurs,

[7] Alliance Resources (*NYSE: ARLP*), Arch Coal (*NYSE: ACI*), CONSOL (*NYSE: CNX*), Foundation Coal (*NYSE: FCL*), Massey Energy (*NYSE: MEE*), Murray Energy, Peabody (*NYSE: BTW*)

inventors and coal operators to establish partnerships and collaborate between themselves to test the system components to ensure the equipment is effective and intrinsically-safe for use in an underground mine.

Our failures in the past two years are driven by the lack of knowledge of the location and condition of the miners. Systems exist which can enhance that knowledge, but they have not been adopted. I do not believe that perfection should be the benchmark for mine safety equipment, but rather improvement should be the standard for the deployment of new mine safety equipment, concrete steps to deploy safety equipment should be taken now.

Retreat mining carries a higher risk than other types of mining. It therefore should be looked to only as a mining technique of last resort, and higher safety standards be required in particular when exhaustive mining has been previously conducted and secondary and tertiary mining cycles are being proposed. In fact, the practice of retreat mining in general, and retreat mining in secondary mining situationsð as happened at the Crandall Canyon mineð is an issue which should, I believe, be examined in general. In a study conducted in 2001 for the West Virginia Governor, I concluded that retreat mining which was done in a small number of mines had a disproportionately high rate of fatal and non-fatal accidents.[8] In that report, I urged the restriction and prohibition in many instances of retreat mining as a practice.

[8]In a report to the then Governor: Report to Governor Robert Wise On Mine Safety and Health in West Virginia and Recommendations to make West Virginia Mines the Safest and Healthiest in the Nation, Fall 2001, a recommendation was made to *Improve and Update Requirements related to Roof and Ground Control Methods and Criteria,* including restricting and eliminating retreat mining and pillar removal in certain instances.

Here, I would like to recommend a suspension of approval for retreat mining plan approvals by MSHA until a review of the question of whether retreat mining should be permitted; particularly in cases, as in Crandall Canyon, where extensive mining has previously occurred and where the cover exceeds 1,000 feet and the area is prone to coal bumps and bounces.

In conclusion, the time for the industry and federal government to wait on research before implementing applied engineering improvements is at an end. Crandall Canyon signaled loud and clear it is time for action. Mining in the twenty-first century calls for a new set of criteria, as coal reserves dwindle, as mining conditions change, greater challenges can be expected, and greater scrutiny should be forthcoming. The mining industry must consider whether it wishes to continue in the mining business or not---if it does, it must use the technologies available from other industries and other mining countries (i.e., tunnel boring machines and seismographs, South Africa and Poland) to protect the men and women we send underground. There is a need to overhaul the technology used to protect and defend miners. *The maxim must be if we can't go get them quickly and safely then we should not send them underground!*