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PROGRAM INFORMATION BULLETIN NO. P08-20

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SUBJECT: Surface Drilled Coalbed Methane Wells with Horizontal Branches in the Coal Seam

Who needs this information?
Underground coal mine operators, miner's representatives, coalbed methane producers, independent contractors, state mining agencies, Coal Mine Safety and Health enforcement personnel and other interested parties need this information.

What is the purpose of this bulletin?
The bulletin is intended to inform the mining industry and coalbed methane industry of a methane inundation hazard that may occur if unplugged or inadequately plugged horizontal coalbed methane well systems are intersected during coal mining. Directionally drilling coalbed methane wells from the surface is a relatively new technology and plugging or other methods that will protect coal miners have not been established.

Information
Due to the potential methane inundation hazard to miners, the Mine Safety and Health Administration (MSHA) has determined that the barrier specified in 30 C.F.R. § 75.1700, i.e., 300 feet in diameter, must be maintained by the mine operator to protect miners. This barrier must be maintained around all vertical and horizontal legs and branches of the gas well that are within the coal seam.

Recent coalbed methane extraction technological developments include directionally drilled wells that utilize a vertical well drilled from the surface connecting to multiple horizontal legs that are located within coal seams. The horizontal legs can be developed over large areas (up to 2 square miles) and may contain many interconnected branches. The legs and branches in the coal seam can contain large volumes of pressurized methane that may inundate the coal mine if intersected during mine development. Plugging methods that have been attempted include injecting gel or cement into the well and its horizontal legs and branches. Plugging with gel, however, may not be safe because the gel can blow-out as the pressure builds up. Plugging the well with cement

may be a safer, though a more costly, alternative. Conventional cement plugs can be difficult to place in these wells due to the undulating horizontal nature of the holes, water cutting, gas cutting, numerous branches, length of the holes, and logistics of cement setting times. Plugging is further complicated by potential caving of the hole. Any plug that does not completely fill the system of holes can result in pressurized methane reservoirs in the remaining voids.

Non-plugging methods to control the methane output from the well have been proposed. A system of water infusion seems to work well for the initial intersection. Water is infused at the full hydrostatic head for several months and then is pumped out immediately prior to intersection. The well is left open to the atmosphere or put on vacuum for the intersection. Problems develop when rubber packers are used to seal the holes to prevent the development entries from gassing off after intersection. Recharge pressures build back up and subsequent intersections often involve pressurized voids and methane influx. In-mine degas pipelines and vacuum systems may be useful to control subsequent intersections. Another non-plugging proposal is to "kill" the formation around the wellbore with bentonite slurry infused at hydrostatic or higher pressures. This could reduce the coal seam permeability for some distance around the wellbore and limit the inflow of methane.

If a mine operator proposes to mine within the 300 ft. barrier near a well, the District Manager should consider the accuracy of the well location before permitting this encroachment. Any well location is subject to the normal inaccuracies and errors inherent in surveying of the well head location and the surveying of the mine. In addition, the instrumentation used in directionally drilled wells has a measurement error of approximately one degree [± 17.5 feet (ft.) per 1,000-ft. of hole length]. A petition for modification will be required to mine through the well or mine within the safe barrier as determined by the District Manager.

What is the background for this bulletin?

A development section in an underground coal mine was recently inundated with methane after mining into an inadequately plugged directionally drilled gas well. This well was approximately 700 feet from the surface and had two 4,000-foot horizontal legs in the coal seam. The gel that was intended to plug this well did not contain the gas pressure.

The Mine Safety and Health Administration (MSHA) supports and encourages CBM extraction because it can significantly reduce methane emissions in coal mines and has been proven to decrease the incidence of face ignitions in gassy coal mines. However, procedures to address the potential hazards presented by CBM wells must be developed and implemented to protect the coal miners who will be exposed to these wells. A long history of methane-related coal mine disasters in the United States

underscores the potential hazards that unplugged or incorrectly plugged CBM wells could present during mine intersection.

What is MSHA's authority for this Program Information Bulletin?
The Federal Mine Safety and Health Act of 1977 as amended, 30 U.S.C. § 801 et. seq.; 30 C.F.R. § 75.1700.

Is this Program Information Bulletin on the Internet?
This information bulletin may be viewed on the World Wide Web by accessing MSHA's home page (http://www.msha.gov), choosing "Compliance Info" and "Program Information Bulletins."

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Miners' Representatives-Coal
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