

Explosion-Proof Coal Mine Seals

Current Regulations

- **30 CFR 75.335**
 - (a)(1) Solid concrete blocks**
“Mitchell – Barrett”
 - (a)(2) Alternative methods or materials**
20 psi pass-fail test
- * 1992 ventilation update**

- **Sago mine disaster (January 2, 2006)**
- **Darby mine disaster (May 20, 2006)**

MSHA Response

- PIB P06-11 (June 1, 2006)
 - Moratorium on alternative seals
- PIB P06-12 (June 19, 2006)
 - Reinstated moratorium
- PIB P06-14 (June 21, 2006)
 - Alternative seal monitoring
- PIB P06-16 (July 19, 2006)
 - 50 psi alternative seals

RESCINDED

PIB P06-16

- **New alternative seals**
 - **Must reliably withstand 50 psi overpressure**
 - **Designed for the conditions in which it will be built**
 - **Designed and certified by structural PE**
 - **Construction and materials certified by senior mine management**
- **Existing seals**
 - **MSHA will inspect all seals for correct construction**
 - **Alternative seals**
 - **Mine operator will assess the atmosphere behind seals**
 - **Mine operator will assess seal integrity**

PIB P06-16

- **Existing alternative seals (20 psi)**
 - Explosive atmosphere (3 to 20% CH₄, **+10% O₂**)
 - Remediation
 - Inerting atmosphere
 - Reinforcing seal to withstand 50 psi
 - Constructing additional 50 psi alternative seal
 - Constructing additional Mitchell-Barrett seal
 - **High risk seals** (failure would adversely affect miner safety or seals with poor performance history)
 - Additional actions to better protect miners
 - Periodic monitoring of atmosphere behind seals

PIL 106-V-9

- **Procedures for approval of alternative seals (August 21, 2006)**
- **Instructions for DMs and ventilation personnel**
- **Seal approval for specific conditions**
 - **Geologic/geotechnical conditions**
 - **Mining conditions/opening size**
- **MWGE Division of Tech Support review**
 - **Structural review**

PIL 106-V-9

- **Ventilation plan information/data:**
 - **Map of area to be sealed, seal details, opening size**
 - **Geology and geotechnical data**
 - **Detailed seal design**
 - **Engineering analysis, factor of safety**
 - **Material data, material durability**
 - **Construction drawings and specifications**
 - **Quality control procedures**
 - **PE certification of seal design and application**

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- **DM approves**
 - **Ventilation outby seal**
 - **Monitoring plan for sealed area atmosphere**
 - **Water traps**
 - **Ground control**
 - **Rock dusting**
 - **Lightning/electrical conduction issues**

Ongoing Efforts

- **MINER ACT, Section 10**
 - **Revision of seal standard**
 - **Proposed rule May 2007**
 - **Final rule December 15, 2007**

References

- **Mitchell, DW [1971]. Explosion-Proof Bulkheads – Present Practices. U.S. Department of Interior, Bureau of Mines, Pittsburgh, PA: RI 7581.**
- **Nagy, J [1981]. The Explosion Hazard In Mining. Mine Safety and Health Administration. Pittsburgh, PA: IR 1119.**