Zipf, Richard K. (Karl) (CDC/NIOSH/PRL)

From: Hermuelheim, Walter Dr. (DSK SB BT) [Walter.Hermuelheim@dsk.de]
Sent: Tuesday, February 13, 2007 6:51 AM
To: Zipf, Richard K. (Karl) (CDC/NIOSH/PRL)
Cc: Betka, Andreas (DSK SB BT); Catalano, Ilona (DSK SB BT)
Subject: AW: Review of "Explosion Pressure Design Criteria for New Seals in U.S. Coal Mines"

Attachments: ReviewCommentForm W. Hermuelheim 13. Febr. 2007.doc

ReviewCommentFor
m W. Hermuelhe...

Dear Karl,

congratulations on your excellent paper. I feel it summarizes the subject of sealing in a very comprehensive way and leads to reasonable results and recommendations.

The influence of dynamic pressure may be a little bit over-emphasized since a lot of full-scale-tests showed that it was not so much the (very short) dynamic peak pulse, but the static pressure which really damages a seal. On the other hand the amount of fuel as well as the maximum propagation distance in an experiment is always quite limited in comparison with a real mine. So it should be o. k. to put it on the safe side.

When you go on with the subject of sealing in the future please let me notice that miners always like advice in the form of practical examples. Especially the anchorage of seals into the surrounding rock and coal could still be described with more details and with sketches.

I hope I have filled the form correctly; if you need another signed one (paper original) please let me know.

Best regards,

Walter

-----Ursprüngliche Nachricht-----
Von: Zipf, Richard K. (Karl) (CDC/NIOSH/PRL) [mailto:rbz3@cdc.gov]
Gesendet: Donnerstag, 8. Februar 2007 23:27
An: Hermuelheim, Walter Dr. (DSK SB BT)
Betreff: Review of "Explosion Pressure Design Criteria for New Seals in U.S. Coal Mines"

Dear Walter,

I hope all is well with you since Jurgen and I visit with you several months ago.

Attached is a copy of the NIOSH draft report entitled, "Explosion Pressure Design Criteria for New Seals in U.S. Coal Mines." I would like to ask for your review of this draft report.

This report addresses two critical issues: 1) what explosion pressures can develop during an explosion within a sealed area?, and 2) what are appropriate design criteria for seals that will withstand these pressures?

Based on fundamental knowledge of explosion chemistry and physics and knowledge about sealed areas in mines, NIOSH engineers recommend a three-tiered explosion pressure design criteria for seals in coal mines.

1) For unmonitored seals where there is a possibility of methane-air detonation behind the seal, the recommended design pulse rises to 4.4 MPa (640 psi) and then falls to the 800 kPa (120 psi) constant volume explosion overpressure.
2) For unmonitored seals with little likelihood of detonation, a less severe design pulse that simply rises to the 800 kPa (120 psi) constant volume explosion overpressure, but without the initial spike, may be employed.
3) For monitored seals where the amount of potentially explosive methane-air is strictly limited and controlled, engineers can use a 345 kPa (50 psi) design pulse if monitoring can assure 1) that the maximum length of explosive mix behind a seal does not exceed 5 m (15 ft) and 2) that the volume of explosive mix does not exceed 40% of the total sealed volume.

Based on these explosion pressure loads, NIOSH engineers used a dynamic computer modeling program and other methods to determine minimum seal thickness to resist these explosion pressure loads. The analyses show that resisting the worst case 4.4 MPa (640 psi) design pulse is reasonable using modern materials. For example, a 6.1 m (20 ft) entry that is 1.5 m (60 in) high requires a 0.9 m (36 in) concrete seal, whereas a 2.4 m (96 in) high seam would require a 1.2 (48 in) concrete seal.

The report also provides an alternative to these worst-case scenarios, if the atmosphere behind the seals is monitored and inerted, as is done in many mines abroad. In that case, seals to withstand a pressure of 345 kPa (50 psi) may be adequate.

At this time, I ask for your thoughtful review of this draft report. Please use the attached review form and attach additional comments. I'd like to receive your comments no later than Friday 9 March 2007.

Thank you very much for your time and consideration. I look forward to receiving your comments on this important topic.

Best regards,

Karl Zipf

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Try the new Web Site http://www.cdc.gov/niosh/mining/

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