PUBLIC SUBMISSION

As of: September 02, 2008
Received date: Not specified
Status: Pending_Post
Tracking No. 806ed2be
Comments Due: September 08, 2008
Submission Type: Web

Docket: MSHA-2008-0008
Safety Standards Regarding the Recommendations of the Technical Study Panel on the Utilization of Belt Air and the Composition and Fire Retardant Properties of Belt Materials in Underground Coal Mining

Comment On: MSHA-2008-0008-0001
Safety Standards Regarding the Recommendations of the Technical Study Panel on the Utilization of Belt Air and the Composition and Fire Retardant Properties of Belt Materials in Underground Coal Mining

Document: MSHA-2008-0008-DRAFT-0007
Comment from Jim Tozzi, The Center for Regulatory Effectiveness

Submitter Information

Name: Jim Tozzi
Address:
1601 Connecticut Ave., NW
Suite 500
Washington, DC, 20009
Email: secretary1@mbsdc.com
Phone: 202-265-2383
Organization: The Center for Regulatory Effectiveness

General Comment

Attached are CRE's comments on MSHA Notice of Proposed Rulemaking, RIN 1219-AB59.

Attachments

MSHA-2008-0008-DRAFT-0007.1: Comment from Jim Tozzi, The Center for Regulatory Effectiveness

AB59-COMM-4

Before the
Mine Safety and Health Administration

THE BALANCING DECISION:
Determining that Use of Belt Air Is As At Least As Safe As Non-Belt Air Requires A Smoke Limitation Regulation

In the Matter of	)	
	)	
Safety Standards Regarding the	)	
Recommendations of the Technical	)	
Study Panel on the Utilization of Belt	)	
Air and the Composition and Fire	)	
Retardant Properties of Belt Materials	)	
in Underground Coal Mining	)	RIN 1219–AB59
	)	

The Center for Regulatory Effectiveness
Suite 500
1601 Connecticut Avenue, NW
Washington, DC 20009
202.265.2383
www.TheCRE.com

September 2008

Center for Regulatory Effectiveness

THE BALANCING DECISION:
Determining that Use of Belt Air Is As At Least As Safe As Non-Belt Air Requires A Smoke Limitation Regulation

THE ISSUE

At the heart of this belt air ventilation rulemaking is the determination made by a District Manager (DM), on behalf of the entire agency, on each and every belt air ventilation plan: does the proposed use of belt air "at all times" afford "at least the same measure of protection" to miners as situations where belt haulage entries are not used to ventilate working places?

Unless MSHA adopts a conveyor belt smoke emission limitation simultaneous with the belt air safety standards belt air rule, the DM will not be able to approve a belt air ventilation plan since, without a smoke limitation standard, if there is a fire involving the belt and the ventilation and/or fire suppression controls fail, as happened at Aracoma Alma, use of belt air will result in greater hazard to miners than if belt air were not used to ventilate working places of the mine.

The Center for Regulatory Effectiveness (CRE) thanks the Mine Safety and Health Administration (MSHA) for this opportunity to comment on this underground coal mining safety standards rulemaking. This rulemaking provides MSHA the opportunity to continue demonstrating their vigorous leadership in further improving underground mine safety.

In our comments on MSHA's companion Request for Information (RFI) on "Conveyor Belt Combustion Toxicity and Smoke Density" [RIN 1219–AB60] CRE highlighted:

1. A federal smoke density limitation regulatory standard for elastomers, based on the ASTM E662 test, already exists and can be rapidly adopted by MSHA; and

2. Potentially serious legal infirmities in the instant rulemaking.

CRE's RFI comments are attached to this document and constitute an integral part of our comments on this rulemaking.

I. Federal Smoke Safety Regulations Already Exist and Can be Rapidly Adopted by MSHA

As CRE explained in our attached smoke safety RFI comments, the federal government has about 30 years experience in developing and implementing smoke density limitation regulations to allow people to safely escape from an enclosed burning environment following a disaster.

The Department of Transportation (DOT) adopted limits on smoke emissions, in addition to flame-resistance regulations, after explicitly considering – **and rejecting** – the proposition that preventing flame-propagation was sufficient to protect the public from dangerous levels of smoke.

Federal recognition of the need for both flame-resistance and smoke density requirements goes well beyond DOT. In CRE's presentation at MSHA's public hearing in Birmingham, we noted that **the National Academy of Sciences and the Department of Defense have also concluded that a smoke density limitation based on ASTM E662 is needed in addition to other fire safety test standards**. [1]

As discussed below, unless MSHA adopts a smoke density standard concurrent with the proposed flame resistance test, they will not be able to make the statutorily-required determination that, at all times, the use of belt air to ventilate working places affords at least as much protection as not using belt air ventilation.

Simply put, if there is an Aracoma Alma-type situation where there a fire involving the conveyor belt and the ventilation controls and fire suppression system don't properly function, using belt air in the absence of smoke emission limitations will result in miners being exposed to greater hazards than if belt air were not used. Even if there is not the failure of multiple safety systems, low-smoke belt provides miners with greater safety and enhanced ability to escape than high-smoke belt meeting the same flame-resistance standard.

CRE strongly recommends that MSHA adopt the smoke density limitation for elastomers already in the Code of Federal Regulations: a specific optical density (D_S) ≤ 100 after 1.5 minutes and an (D_S) ≤ 200 after 4.0 minutes as measured using ASTM E662.

II. Conformance of MSHA Proposed Regulations on Use of Belt Air Ventilation to the Statutory Requirements

The Consolidated Appropriations Act, 2008, Div. G, Title I, Sec. 112(a), 121 Stat. 2168, Dec. 26, 2007, 30 U.S.C. § 863, note, provided:

---

[1] National Materials Advisory Board, the National Academies, "Fire and Smoke-Resistant Interior Materials for Commercial Transport Aircraft," 1995, p. 27.

> [The Secretary of Labor shall promulgate regulations that will] require that in any coal mine, regardless of the date on which it was opened, belt haulage entries not be used to ventilate active working places without prior approval from the Assistant Secretary [for Mine Safety and Health]. Further, a mine ventilation plan incorporating the use of air coursed through belt haulage entries to ventilate active working places shall not be approved until the Assistant Secretary has reviewed the elements of the plan related to the use of belt air **and determined** that the plan at **all** times affords at least the same measure of protection where belt haulage entries are not used to ventilate working places. The Secretary shall finalize the regulations not later than December 31, 2008. [Emphasis added.]

This provision contains three elements required for approval:

1. Submission of a mine ventilation plan;

2. Review of the plan by the Assistant Secretary; and

3. A determination by the Assistant Secretary that the mine ventilation plan "at all times affords at least the same measure of protection where belt haulage entries are not used to ventilate working places."

The MSHA NPRM , 73 Fed. Reg. 35026, 35053 3d col., June 19, 2008, requires the following elements for approval of belt air ventilation:

1. Submission of a mine ventilation plan that provides "justification ... that the use of air from a belt entry would afford at least the same measure of protection where belt haulage entries are not used to ventilate working places."

2. Evaluation and approval of the plan by the [MSHA] District Manager.

The plan must also meet certain specified technical requirements, including maximum respirable dust concentrations and their measurement, air velocity in the belt entry, monitoring for carbon monoxide and smoke, and closure of belt airways during emergencies.

The NPRM does not require a "determination" by the Assistant Secretary that the belt ventilation plan "at all times afford at least the same measure of protection where belt haulage entries are not used to ventilate working places." [Emphasis added.] Instead, the DM must only approve a ventilation plan that contains a "justification . . . that the use of air from a belt entry would afford at least the same measure of protection where belt haulage entries are not used to ventilate working spaces." Obviously missing are the requirements for a "determination" that belt air provides equivalent protection "at all times."

Absence of the statutory "determination" requirement is plainly inconsistent with the statute. Under the language of the NPRM, a mine operator could submit a ventilation plan that contains an inadequate "justification," and the DM could "approve" the plan without making the required "determination."

The required determination must be that the belt air ventilation plan will provide equivalent protection "at all times." "All" generally means "all," whether the term is used in a statute, regulations, or a contract. *See, e.g., S. Dakota v. Bourland*, 508 U.S. 679, 690 n. 10 (1993) (Indian tribe's relinquishment of "all claims, rights, and demands" "meant *all*"); *Wyoming v. Oklahoma*, 502 U.S. 437, 803-804 ("all entities"); *Norfolk and Western Ry. Co. v. Am. Train Dispatchers Ass'n*, 499 U.S. 117, 1163-64 (1991) ("all other law"); *Addison v. Holly Hill Fruit Products*, 322 U.S. 607, 610-11 (1944) (regulatory requirement that "all" products be obtained within a distance of 10 miles could not be construed to mean "substantially all," such that procurement of 98 percent or 96.5 percent of products within 10 miles would meet the requirement"); *Baltimore Nat'l Bank v. State Tax Comm'n of Md.*, 297 U.S. 209, 214-15 (1936) ("all shares"); *Choice Hotels Int'l, Inc. v. SM Prop. Mgmt., LLC*, 519 F.3d 200, 210 (4th Cir. 2008) (requirement in arbitration agreement that "all" notices be in writing and served meant just that -- "All means all."); *Sander v. Alexander Richardson Investments*, 334 F.3d 712, 716 (8th Cir. 2003) (contract clause releasing marina from "all" liability meant just that -- "In short, ;2826;2827;2828;2826;2827;2828'all' means all.") (citing Knott v. McDonald's Corp., 147 F.3d 1065, 1067 (9th Cir.1998) (purchase and sale contract); *Nat'l Steel and Shipbuilding Co. v. United States*, 419 F.2d 863, 875 (Ct. Cl. 1969) ("all reasonable effort"); *United States v. Premises Known as 8584 Old Brownsville Rd.*, 736 F.2d 1129 (6th Cir. 1984) ("all proceeds"). The courts sometimes consider that "all" might admit of some exception if such a broad reading would lead to absurd or implausible results, or the meaning of "all" is not clear because the "all of what" is not clear, or there are strong public policy reasons to restrict its breadth. *Cf., e.g., Nat'l Wildlife Fed'n v. Hodel*, 839 F.2d 694, 720-21 (D.C. Cir. 1988); *United States v. State of New York*, 3 F.Supp.2d 298, 310-11 (E.D.N.Y. 1998), *aff'd in part, rev'd in part sub nom Disabled in Action of Metro. N.Y v. Hammons*, 202 F.3d 110, 119 (2d Cir. 2000).

It is important note that, in the context of Public Law 110-161 and this rulemaking, the phrase "at all times" means even in event of the failure of one or more safety systems. This literal reading of the statute does not lead to absurd or implausible results or results that are not in the public interest, but instead to increased miner protection in hazardous situations which have already occurred and, despite the additional important safety measures in the proposed rule, could occur again.

III. The Crucial Role of OMB's "Updated Principles for Risk Analysis" In MSHA's Ventilation Plan Safety Determination

The Data Quality Act and implementing guidance, including OMB's Updated Principles for Risk Analysis, provide the quality standards and the framework MSHA needs to use in making its balancing decision regarding the safety of belt air ventilation plans. The analyses performed in adhering to the risk analysis principles will also provide MSHA with the public record needed to

support their decision to accept or reject a belt air ventilation plan. It should also be noted that each MSHA approval of a ventilation plan is a dissemination of information subject to the standards and, if necessary, administrative correction provisions of the Information Quality Act.

The Risk Analysis Principles Apply to MSHA's Belt Air Safety Determination

The Principles contained in OMB's Memorandum apply to the specific decision MSHA will make on each belt air ventilation plan.[2] As the first General Principle explains,

> *These Principles are intended to be goals for agency activities with respect to the assessment, management, and communication of environmental, health, and safety risks. ... These Principles are intended to provide a general policy framework for evaluating and reducing risk...*[3]

Moreover, the second Principle explains that the "Principles in this document are intended to be applied and interpreted in the context of statutory policies and requirements...."

Since the fundamental twin purposes of the statutorily-mandated balancing decision are to: 1) assess the health and safety risks to workers in a given mine with and without the use of belt air; and 2) choose the lower risk (or at least as low risk) option, the Principles apply to the agency's belt air ventilation plan risk assessment and decision-making processes.

Applying the Risk Assessment Principles

OMB's first specific Risk Assessment Principle, one which is incorporated government-wide and agency-specific Information Quality Guidelines, is that, "Agencies should employ the best reasonably obtainable scientific information to assess risks to health, safety, and the environment."[4] Thus, MSHA will need to give significant weight to "the best available, peer-reviewed science and supporting studies conducted in accordance with sound and objective scientific practices" such as the National Academy of Sciences study which found that smoke density limitation requirements are needed in addition to flame-resistance and other fire safety specifications.

OMB's discussion of the fourth risk assessment principle, that the assessment "should encompass all appropriate hazards," explains that,

---

[2] Susan E. Dudley and Sharon L. Hays, Memorandum for the Heads of Executive Departments and Agencies, M-07-24, "Updated Principles for Risk Analysis," September 19, 2007, found at http://www.whitehouse.gov/omb/memoranda/fy2007/m07-24.pdf.

[3] Ibid., p. 3.

[4] Ibid., p. 5.

> *A good risk analysis should clearly summarize the scope of the assessment, including a description of: the agent, technology and/or activity that is the subject of the analysis; the hazard of concern; the affected entities (populations... critical infrastructure, or other) that are the subject of the assessment; the exposure/event scenarios relevant to the objectives of the assessment; and the type of event-consequence or dose-response relationship for the hazard of concern.*[5]

The key take-away from this Principle is that MSHA needs to explicitly consider the role of smoke hazards for the affected population under various event scenarios, such as the failure of ventilation and/or other safety precautions. This Principle also describes some of the documentation (description of hazards of concern, exposure/event scenarios and event-consequence relations) that need to be included in the agency's record of their determination on each belt air ventilation plan.

MSHA's decision support record will also need to include the "[j]udgments used in developing a risk assessment, such as assumptions, defaults, and uncertainties, [which] should be stated explicitly. The rationale for these judgments and their influence on the risk assessment should be articulated."[6]

With respect to managing risk, OMB states that,

> *In making significant risk management decisions, agencies should analyze the distribution of the risks and the benefits and costs (both direct and indirect, both quantifiable and non-quantifiable) associated with the selection or implementation of risk management strategies. ... Agencies should employ the best available scientific, economic and policy analysis, and such analyses should include explanations of significant assumptions, uncertainties, and methods of data development.*[7]

Since, as data in the RFI docket explains, low-smoke conveyor belts that meet the same proposed flame-resistant requirements as high-smoke belts at similar cost is available, MSHA will need to evaluate the higher risk associated with high-smoke belt in light of the above decision-making criteria.

---

[5] Ibid., pp. 8-9.

[6] Ibid., p. 8.

[7] Ibid., p. 10.

OMB also explained that, in "choosing among alternative approaches to reducing risk, agencies should seek to offer the greatest net improvement in total societal welfare...."[8] There is no question that improving worker safety at *de minimis* cost is an improvement in social welfare.

In summary, since:

1. Long-standing federal regulatory standards limiting smoke emissions for elastomers are in place and can be quickly adopted by MSHA;

2. Multiple federal agencies and the National Academy of Sciences have determined that smoke-emission limitations standards are needed in addition to flame-resistance standards;

3. Low-smoke conveyor belting is available which meets both the recommended NIOSH flame-resistance test and federal regulatory standards for maintaining visibility to help people safely escape an enclosed burning environment; and

4. MSHA is required by statute to determine that, at all times, the use of belt air affords at least the same level of protection to miners as not using belt air, then —

CONCLUSION/RECOMMENDATION: MSHA is compelled by law, OMB guidance, and its own strong dedication to safety, to promulgate smoke density limitations, as described above, concurrent with the proposed belt air/flame-resistance rule.

---

[8] Ibid.

Before the
Mine Safety and Health Administration

COMPREHENSIVE BELT SAFETY:

INTEGRATING SMOKE AND FLAME STANDARDS TO SPEEDILY PROTECT ALL OF AMERICA'S MINERS

COMMENTS ON THE CONVEYOR BELT SMOKE SAFETY REQUEST FOR INFORMATION

In the Matter of	)	
	)	
Conveyor Belt Combustion Toxicity	)	
and Smoke Density	)	RIN 1219–AB60
	)	

The Center for Regulatory Effectiveness
Suite 500
1601 Connecticut Avenue, NW
Washington, DC 20009
202.265.2383
www.TheCRE.com

August 2008

Center for Regulatory Effectiveness

COMPREHENSIVE BELT SAFETY:
INTEGRATING SMOKE AND FLAME STANDARDS TO SPEEDILY PROTECT ALL OF AMERICA'S MINERS

The Center for Regulatory Effectiveness (CRE) thanks the Mine Safety and Health Administration (MSHA) for initiating this proceeding on smoke safety for the conveyor belts used in all underground coal mines. The timing of this smoke safety proceeding to match the proposed increase in conveyor belt flame resistance [RIN 1219–AB59] is particularly appropriate – and necessary – since the agency was notified in 1996 by a major chemical supply company that:

> *It is not uncommon for flame retardants to actually increase the amount of smoke produced* per unit of material burned.... *The net effect of this is often NOT the desired reduction in smoke...sometimes the total smoke generated goes up!*
>
> ***
>
> *...even if less material is consumed as a result flame retardant...total smoke generated could be greater because of the much higher production of smoke per unit of mass consumed. ... Even more significant, this data was generated using formulation very similar to those employed in vinyl mine belt carcasses.*[1]

The Monsanto letter also explained that the,

> *lethality of the toxic species (primarily carbon monoxide) is greatly enhanced by smoke opacity which obscures all visual clues and prevents victims from escaping the threatened area.*

Monsanto concluded that:

> *For these reasons we feel your proposed standard could make an even greater improvement in mine safety if it incorporated a strict smoke and toxic gas specification, and we strongly urge you consider adding such a requirement.*

RECOMMENDATION

CRE reiterates Monsanto's 1996 call for strict smoke safety standards to be incorporated into the new flame resistance proposed standard. Linking two safety standards, smoke density and flame-resistance, is essential since:

1. Congress has mandated that belt air be permitted for ventilation only in instances where the agency has **determined** – not simply approved a mine's justification – that **at all times** the miners are at least as safe as without belt air;

---

[1] Letter to MSHA from David H. Paul, Senior Technologist, and Bobby R. Pickering Jr, Senior MTS Representative, Monsanto, 2/5/96. [Emphasis in original]

2. Increasing flame retardant quantities can lead to more dangerous smoke; and

3. MSHA has estimated that the transition period to new belting formulations can take up to ten years.

CRE also notes that there remain significant unresolved concerns regarding the reliability and reproducibility of the Belt Evaluation Laboratory Test (BELT), concerns that contributed to at least two of the three separate reopenings of the record before the proposed rule was withdrawn.[2]

MSHA has not introduced new data in the current record to support the reliability and reproducibility of the BELT. Moreover, rather than frankly addressing the limitations of the test as the agency did in the 1992 rulemaking when it stated the "development of flammability tests in not an exact science," the 2008 NPRM simply and incorrectly stated that "the BELT method is highly precise and accurate."

Unlike the now-closed 1992 docket, MSHA is not providing for public comment the test results on which MSHA bases it proposed decision to require the BELT, thus potentially rendering any final agency decision on the test arbitrary and capricious.

It also needs to be noted that, with passage of the Data Quality Act in 2001, the agency has a new mandatory legal duty to ensure that the tests they promulgate are reliable and reproducible.

Based on the aforementioned safety mandates and procedural requirements, CRE recommends that MSHA either:

Option 1: Simultaneously Issue: 1) an Interim Final smoke density rule; 2) an Interim Final flame resistance rule; and 3) an Advance Notice of Proposed Rulemaking (ANPRM) on smoke toxicity to set standards for primary toxic agents, including CO and HCl, using existing consensus standard testing methodologies.

Timing: All conveyor belts purchased for use in underground coal mines would need to meet the new flame resistance and smoke density requirements within one year of publication of the Interim Final Rules. Simultaneous with publication of the Interim Final rules, MSHA would open 60 day notice and comment periods on the interim rules for the purpose of finalizing them and a 60 day comment period of the smoke toxicity ANPRM to allow an expeditious rulemaking on this issue.

Option 2: Simultaneously Issue: 1) a Further Notice of Proposed Rulemaking on Flame Resistance (FNPRM) that contains all available data for public comment as well as the methodologies for determining that belt air mines at all times afford miners at least the same measure of protection as non-belt air mines; 2) an NPRM on Smoke Density; and 3) an ANPRM on smoke toxicity.

---

[2] 67 Fed. Reg. 74770, December 9, 2002. The final reopening of the docket related to the Paperwork Reduction Act under which agencies have to certify, among other requirements, that information has "practical utility," an issue which directly relates to test reliability and reproducibility.

It should be noted that while concerns remain about the BELT, coupling it with specific smoke density limitations based on smoke emission limits already in the Code of Federal Regulations, would ameliorate concerns that the agency may inadvertently diminish mine safety before fully ventilating the issue.

While conveyor belt smoke safety requirements should be applicable to all underground coal mines, they are of heightened importance with respect to the use of belt air ventilation – and thus crucial to the belt air rulemaking – since, as Monsanto explained,

> *...smoke effects are greatly amplified in an underground mine where visibility, escape routes, and access by rescuers are already severely limited. This situation is further worsened by the growing practice of using 'belt air' to ventilate the mine face. This practically guarantees that any smoke and toxic combustion products from a belt fire will be quickly injected to the working areas of the mine.*

Although safety is of paramount concern, it should be noted that Monsanto also stated that "We feel that it is especially noteworthy that the prototype smoke suppressed formulation shown here is not more costly *per yard of belt* than the version made with the conventional...."

OPTION 1:
MSHA ISSUE AN INTERIM FINAL SMOKE DENSITY REGULATION SIMULTANEOUSLY WITH AN INTERIM FINAL FLAME RESISTANCE REGULATION

Why an Interim Final Rule Smoke Density Is Necessary If the Flame Resistance Rule Is Issued

The Administrative Procedure Act (APA) authorizes agencies to issue regulations without a full notice and comment process "when the agency for good cause finds (and incorporates the finding and a brief statement of reasons therefor in the rules issued) that notice and public procedure thereon are impracticable, unnecessary, or contrary to the public interest."[3]

In that it is:

1. Impractical for MSHA to issue an NPRM and final rule on smoke safety and still meet the 2008 target for the flame resistance standard; and

2. It is contrary to the public interest, as demonstrated through a 15 year public record discussed below, to issue a revised flame resistance standard that does not set standards for smoke safety,

---

[3] 5 U.S.C. 553(b).

it is incumbent on the agency to invoke its authority under the APA to issue an Interim Final Rule on smoke density along with an interim final flame resistance rule. Extensive information submitted to the docket demonstrates that:

- Increasing flame resistance standards without controlling smoke emissions results in smoke which is more visually obstructive and toxic – this is true even if there is no fire, *i.e.*, the belt is only smoldering. The result can be a degradation of safety, particularly in instances where the mine uses belt air.

Moreover, as will be discussed, it will not be possible for MSHA to determine, as required by statute, that a belt air ventilation plan "at all times affords at least the same measure of protection where belt haulage entries are not used to ventilate working places" without a smoke safety standard. In short, **there is no point in MSHA issuing a belt air rule without issuing a smoke safety standard since without the standard the District Manager will not be able to make a legally valid approval of any belt air ventilation plan.**

It should also be noted that, because of the complexities of compounding chemistry, changes to a belt's formulation need to balance all relevant safety attributes simultaneously, including flame resistance, smoke density, smoke toxicity, durability, etc. Therefore, the regulatory standards for both flame resistance and smoke safety must be integrated to ensure worker safety.

The record also demonstrates, however, that it is technically and economically feasible to reduce smoke density and toxicity while still meeting the recommended new flame resistance standard. Thus, if MSHA is going to improve underground safety with respect to conveyor belts, they need to set smoke safety and flame resistance standards at the same time.

Furthermore, there is also "good cause" for the agency to promulgate an Interim Final smoke density rule since:

- There is a record dating back to at least 1992 on the dangers of smoke as the first critical hazard a miner will face;

- Specific test data demonstrates that the smoke density from smoldering and burning conveyor belts will increase unless smoke emissions are specifically controlled; and

- MSHA, as detailed below, is able to take advantage of over 30 years of federal research and experience in setting smoke density standards, concurrent with flame resistance standards, to help people escape from enclosed, burning environments following a disaster.

As noted above, MSHA can use the publication of the Interim Final Rule as an opportunity to obtain public comment prior to issuing a Final Rule – without delaying protection for underground miners.

Adopting an Existing Federal Smoke Density Regulation for Conveyor Belts

Federal safety officials have decades of experience in developing and setting standards to limit smoke from elastomers – a category of flexible materials that includes rubber and PVC – for the specific purpose of enhancing the ability of people to safely evacuate an enclosed burning environment. These smoke safety standards were developed in parallel with flame-resistance requirements and are directly applicable to conveyor belts used in underground coal mines.

The federal work in developing and promulgating smoke safety standards included participation by diverse stakeholders including:

- Federal safety officials;
- Consensus standards bodies;
- Industry; and
- Labor.

STAKEHOLDER RECOGNITION OF THE NEED FOR SMOKE SAFETY STANDARDS

Beginning in the early-1990s, diverse stakeholders representing government, industry, and labor have performed research and expressed concerns regarding: 1) the danger of smoke from smoldering as well as flaming conveyor belts; and 2) the increased smoke hazards that can result from increasing flame resistance requirements. The research and stakeholder comments demonstrate the need for smoke safety standards to be an integral part of new belt flame resistance requirements.

Government

Even before Monsanto explained the need for regulatory controls on the density and toxicity of smoke that can be released by underground conveyor belts, the Bureau of Mines (BOM) published research which found that dangerous levels of thick smoke were generated before flame spread, *i.e.*, the smoke danger reached critical levels even without fire propagation.

Specifically, BOM's research determined that,

> *Smoke obscuration was found to be the earliest hazard, reaching critical levels before the stage of belt flame spread.*[4]

---

[4] F.J. Perzak, C.D. Litton, K.E. Mura, and C.P. Lazzara, "Hazards of Conveyor Belt Fires," Bureau of the Mines, Report of Investigations 9570, 1995, Abstract.

In a 1992 BOM report, "How Smoke Hinders Escape From Coal Mine Fires" federal safety officials recognized:

1. The dangerous synergy of smoke density and toxicity in harming the ability of miners to escape a disaster; and

2. Smoke obscuration is the earliest hazard faced by miners attempting to escape.

Specifically, BOM stated:

> *Smoke clouds irritants play a role in escape from fires. It is well known that smoke clouds contain a variety of sensory irritants that can make it impossible to see or breath. For example, hydrochloric acid (HCl) is a common combustion product in coal mine conveyor belt fires. While not as lethal as carbon monoxide, it is a severe eye, nose and throat imtant* [sic] *... Rasbash (1975) reviewed the impact of smoke cloud irritants. He indicated that eye irritation further decreased visibility.*[5]

The 1992 BOM study concluded:

> *Smoke is a key factor in escape from mine fires. In particular, if a fire is in the early growth stage, escaping miners will meet with visibility problems before any other. The minimum acceptable smoke visibility is reached before the critical maximum carbon monoxide value.*[6]

A 1992 BOM Information Circular specifically highlighted to danger of thick, visually obstructive smoke from smoldering – not flaming – conveyor belts.

> *Those materials with large particle size tend to produce thick smoke. For example, the particles...produced from smoldering PVC belts result in dense smoke as measured by obscuration and OD* [optical density].[7]

Conclusions to be drawn from the BOM studies are:

1. Smoke-induced visibility impairment is the earliest hazard impeding a miner's escape, before dangers from CO and flames. Thick smoke can be produced without fire.

---

[5] F.N. Kissell and C.D. Litton, "How smoke hinders escape from coal mine fires," Technical Papers, Mining Engineering, vol. 44:1, January 1992, p. 79.

[6] *Ibid.*, p. 82.

[7] M.R. Egan, "Smoke, Carbon Monoxide, and Hydrogen Chloride Production From the Pyrolysis of Conveyor Belting and Brattice Cloth," Bureau of Mines Information Circular IC 9304, 1992, p. 11.

2. The smoke's optical density and the irritating toxic compounds in the smoke combine to further reduce effective visibility.

3. Smoke density and toxicity need to be controlled along with belt flammability. Flame resistance controls by themselves, no matter how stringent, are insufficient to protect miner safety.

Industry

MSHA first requested information on the toxicity of conveyor belt combustion products in 1995.[8] In response to that request, a mining company advised MSHA that:

> *...any MSHA rule promulgation recognize a **Total Safety** impact of conveyor regulations and that the consequences of rules that might minimize flammability not also cause a higher probability of fire ignitions or noxious products of combustion in the event of a fire....*
>
> ***
>
> *Another factor that has not been properly researched is the increase in toxicity and smoke from the new more flame resistant belting. If a more flame resistant belt produces fumes that are more toxic and dense, the new rules may cause more harm than good.*[9]

A conveyor belt manufacturer informed MSHA that the WorkCover Authority (workplace safety regulatory agency) of New South Wales, Australia, in a draft document, "Proposal for Developing Test Methods for Fire Resistant Conveyor Belts" stated:

> *Most of the standard fire tests that relate to conveyor belts only address one aspect of the fire hazard and that is self-sustained burning (although some aspects of ignition are also covered). Other parameters that are also important are:*
>
> ***
>
> - *Smoke production rates – an indicator of visibility and toxicity.*
> - *Toxic gas production rates – an indicator of toxicity.*
>
> *These additional parameters define the tenability of conditions to support life....*[10]

---

[8] 60 Fed. Reg. 16591, March 31, 1995.

[9] R.W. Olsen, Vice President and General Manager, Coastal States Energy Company, letter to MSHA, June 2, 1995. [Emphasis in original]

[10] K.B. Kramer and D.J. Maguire, The Goodyear Tire & Rubber Company, letter to MSHA, June 2, 1995.

In subsequent comments in September 1995, the manufacturer explained that:

> *Any new test standard must ensure that the new materials would not result in significantly denser smoke during smoldering or flaming conditions.*

The National Mining Association, in comments to MSHA discussing the flame resistance proposal, explained that:

> *Another concern involves optical smoke density and the potential for elevated, denser levels of smoke to be emitted during the smoldering and burning stages. Witnesses have expressed concern regarding the smoke levels which will be emitted by the new belt formulations. These concerns must be addressed before the new belt formulations are introduced into the mines.*[11]

Recent test data presented before the Technical Study Panel (TSP) demonstrated that conveyor belts using off-the-shelf flame retardants can meet the proposed new flame resistance standard while simultaneously reducing smoke density and smoke toxicity (carbon monoxide and hydrogen chloride) significantly below current levels, even in smoldering conditions where there is no fire.

The test results also demonstrated that – unless controlled – belting meeting the new flame resistance standard, compared with current belt, produces smoke that is 70% thicker (optically dense) and has double the HCl compared – before there is a fire.[12] The test results provide further demonstration of the safety imperative of integrating smoke safety standards with the higher flame resistance standard.

Labor

Preceding MSHA's initial request for information on conveyor belt smoke toxicity by more than two years, a miner wrote to the agency stating that:

> *I feel that MSHA has not taken into consideration that these Proposed Regulations will increase the toxicities that a burning conveyor belt will put off and this will diminish safety rather than increase it. It makes me wonder how many of the miners that escaped from those fires that MSHA mentions would if the conveyor belts had met these new standards.*[13]

The United Mine Workers of America has also expressed their concerns regarding the smoke hazards from conveyor belts. In a letter to agency, the union stated,

---

[11] R.L. Lawson, National Mining Association, Letter to MSHA, December 15, 1995.

[12] http://www.msha.gov/beltair/June%202007/TSP%20Meeting%20June%2020th%202007_Goodyear.pdf

[13] Gary L. Jensen, Concerned Miner, Letter to MSHA, March 13, 1993.

Another serious concern is the black, billowing smoke produced when conveyor belts burn. This heavy smoke has hindered the escape of miners due to visual obscurity and respiratory contamination. R.I. [Report of Investigation] *9380 also supports this contention, stating in part:*

> *"In addition, the levels of smoke and CO produced begin to approach dangerous levels, and lethal levels may subsequently result during the propagation stage."*[14]

Stakeholder Comments: Conclusions

1. Miners and other stakeholders began warning MSHA 15 years ago that increased smoke density and toxicity from higher flame resistance levels, if not controlled, could pose additional hazards to coal miners.

2. Federal safety officials determined that heavy smoke is the first conveyor belt-related danger to reach critical levels – even without flame spread.

3. MSHA first requested information on the toxic combustion products from conveyor belts in 1995.

4. An Australian workplace safety agency stated in 1995 that smoke density and smoke toxicity are important conveyor belt parameters for supporting life.

5. MSHA received a request in 1996 to incorporate "strict smoke and toxic gas" standards into its flame resistance rulemaking along with a warning that failure to do so could make underground mines more hazardous, particularly when belt air is used for ventilation.

6. A conveyor belt manufacturer recently provided test data to the agency demonstrating that conveyor belt flammabilty, smoke density and smoke toxicity can be substantially and simultaneously improved using widely available compounds.

7. Smoke-reducing flame retardants are available for both PVC and rubber conveyor belts. For PVC belts, these compounds have been available for over a decade.

---

[14] Joseph Main, Administrator Department of Occupation Health and Safety, United Mine Workers of America, letter to MSHA, May 2, 1995.

Developing Flammability and Smoke Safety Standards in Tandem

In 1982, the Urban Mass Transportation Administration (UMTA) published for comment its "recommendations for testing flammability and smoke emissions characteristics for materials used in" rail transit vehicles.[15] UMTA explained that increased use of flammable materials, such as plastics and elastomers, increase the fire threat in transit vehicles, a threat that "can be reduced or limited by...considering the materials' flammability and smoke emission characteristics in the material selection process."

UMTA noted that the process of developing the draft recommendations began in 1973 and that the following year the agency published "Proposed Guidelines for Flammability and Smoke Emission Specifications." The draft guidelines and recommendation demonstrate that since the early 1970s, federal officials addressed flame resistance and smoke safety in tandem for setting standards to protect escape viability.

Flammability Standards Alone Are Inadequate

UMTA explicitly addressed the question of whether sufficiently stringent flame resistance standards eliminated the need for smoke safety standards. Specifically, when publishing their recommendations following public comment on their proposal, UMTA stated:

> *An additional comment was that restrictions on flammability are such that the restrictions on smoke emissions...are unnecessary. UMTA diagrees. There is not necessarily a relationship between flammability and smoke emission, so that the flammability test alone does not adequately test for those two characteristics. For example,* some situations may result in very little flame spread, but a great deal of smoke. *The low flammability will not indicate the smoke emission characteristics of such material.*[16]

Thus, UMTA **considered and rejected the notion that preventing flame propagation provides protection against smoke**. Moreover, in the almost 25 years since UMTA's determination, federal safety agencies have expanded on, not contradicted, the fundamental conclusion that both smoke safety and flame resistance regulations are necessary.

UMTA also addressed concerns regarding smoke toxicity as well as smoke density. The agency noted that,

> *Commenters also requested that UMTA address the issue of toxicity of the products of combustion of these materials in the Recommended Practices.*

---

[15] 47 Fed. Reg. 53559, November 26, 1982.

[16] 49 Fed. Reg. 32483-32484, August 14, 1984. [Emphasis added.]

> *UMTA recognizes the need to address this issue, but because of its complexity is not able to do so in the Recommended Practices. Instead...UMTA has initiated a program to develop guidelines for assessing the combustion toxicity of materials. ...UMTA has requested the National Research Council's (NRC) Transportation Research Advisory Board of the Commission on Engineering and Technical Systems to assist in addressing this issue. In response to this request, the NRC has established a Committee on Toxicity Hazards of Materials Used in Rail Transit Vehicles. This committee consisting of representatives of industry and academia will review the present state of knowledge of combustion toxicity, identify specific toxicity hazards related to the use fo polymeric materials...and recommend a plan of action for developing guidelines for testing materials.*

The NRC's combustion toxicity report[17] along with the federal government's conveyor belt-specific combustion toxicity research, provides the basis for MSHA to issue an ANPRM on smoke toxicity.

FRA Adopts UMTA Guidelines

A week after UMTA issued flammabiltiy and smoke emission performance guidelines for materials used in light rail vehicles, the Federal Railroad Administration (FRA) issued similar guidelines for Amtrak and other train passenger cars. In mirroring UMTA guidelines, the agency explained that,

> *FRA believes that all passenger service providers should be aware of the flammability and smoke emission problem in material selection and should adhere to these guidelines....*[18]

An ASTM consensus standard smoke density test (ASTM E-662) was used for determining smoke emission performance for all materials for which there is a smoke emission criteria. Moreover, the guidelines stated that the,

> *ASTM E-662 maximum test limits for smoke emission (specific optical density) should be measured in either the flaming or non-flaming mode, depending on which mode generates the most smoke.*[19]

Thus, the FRA recognized that some materials give off more smoke when they are not flaming, thus re-emphasizing that flame resistance standards are not an appropriate mechanism for controlling smoke emission.

---

[17] Found at http://www.nap.edu/catalog.php?record_id=1869#toc

[18] 49 Fed. Reg. 33076, August 20, 1984, republished with omitted recommended testing methods table, 49 Fed. Reg 44582, November 7, 1984.

[19] 49 Fed Reg 44584, November 7, 1984.

The ASTM E-662 test is a commonly used laboratory-scale test for measuring smoke density. ASTM explains that the "photometric scale used to measure smoke by this test method is similar to the optical density scale for human vision."[20]

The FRA fire safety guidelines including smoke emission criteria for 15 different components of rail passenger cars.[21] Of particular importance is that the FRA recommended the same smoke standards for most materials, *i.e.*, an optical density (D_S) ≤100 after 1.5 minutes of the test, and a D_S ≤200 after 4.0 minutes. 11 of the 15 types of material had the exact same smoke emission performance criteria. The criteria for coated upholstery was slightly weaker, allowing a D_S (4.0) ≤ 250 while FRA recommended a somewhat more stringent standard of D_S (4.0) ≤100 for insulation, ducting panels and uncoated upholstery.

It is not surprising that all of the smoke emissions standards were in the same range since **the visibility requirements to escape from an enclosed burning environment are the same irrespective of the source of the smoke.** It is for this reason that the FRA criteria are directly relevant to conveyor belts used in coal mines.

It should also be noted that another federal agency, the Federal Aviation Administration, requires that cabin materials meet a smoke emission limit of D_S (4.0) ≤200 to help ensure that people have sufficient visibility to escape from an enclosed burning environment following a disaster.[22]

Since there are longer and more challenging areas to transverse in underground coal mines than in train cars to reach safety following a disaster, smoke emission standards for underground conveyor belts are even more crucial than they are for materials used in rail passenger cars. In that use of belt air for ventilation poses a particularly high smoke risk for miners, it is unimaginable that belt air mines could ensure the same level of safety at all times as non-belt air mines without specific conveyor belt smoke standards.

FRA Expands their Smoke Emission Guidelines

In early 1989, the FRA reissued their material fire safety guidelines.[23] The FRA stated that the updated guidelines "provides an additional performance criteria for...elastomers" *i.e.*, a smoke emission standard.

---

[20] http://www.astm.org/Standards/E662.htm.

[21] At the time the guidelines were first published, there was no smoke emission performance standard for elastomers. As discussed below, FRA added a smoke emission standard for elastomers in 1989.

[22] See Part V, "Test Method To Determine the Smoke Emission Characteristics of Cabin Materials," Appendix F to Part 25 of Title 14, Code of Federal Regulations. ASTM F814–83 is identical to ASTM E-662 other than a modified sample holder to allow testing of certain plastics.

[23] 54 Fed. Reg. 1837, January 17, 1989.

Thus, the FRA recognized that virtually *every* component of rail cars needed a smoke emission limit as well as a flame resistance standard.[24]

The FRA stated that additional information in the guidelines, including the smoke emission limitation for elastomers,

> *was obtained from a more exhaustive review of available fire standards, both in the USA and in Europe.*

The FRA's smoke emission criteria for elastomers was set at D_s (1.5) ≤ 100 and D_s (4.0) ≤ 200, the same as for most other materials. Thus, the **elastomer smoke emission limit guidelines reflects a strong consensus of the maximum optical density consistent with ensuring that people have sufficient visibility to escape from an enclosed burning environment following a disaster**; it is the limitation on smoke emission which is the crucial issue, not the specific material emitting the smoke.

It should be noted that even though the FRA uses different flame resistance tests, depending on the material being tested, ASTM E-662 is the only smoke emission test used in the guidelines.

Turning Guidelines Into Regulations

The FRA published an Advance Notice of Proposed Rulemaking (ANPRM) on a wide range of passenger equipment safety standards, including smoke safety requirements.[25] The ANPRM was the first step in the agency's process converting the material fire safety guidelines into regulations.

The FRA examined three basic fire safety questions in the ANPRM, one of which dealt with smoke. The three fire safety issues addressed in the NPRM were whether regulations or more detailed guidelines were needed to:

> *(1) Prevent fire or retard its growth?*
> *(2) Detect and suppress fire?*
> *(3) Protect occupants from the effects of fire?*

Thus, the FRA, in a rulemaking process, explicitly considered the issue of whether flame resistance and suppression was sufficient to protect human lives, or whether smoke safety standards were also needed.

An appendix to the ANPRM contained a "detailed set of equipment design provisions" for consideration and comment. The ANPRM contained two separate smoke safety provisions.

---

[24] The only exception was for structural floor materials which were required to meet an ASTM test to ensure that they retained their structural integrity in a fire.

[25] 61 Fed Reg 30672, June 17, 1996.

> *6. All materials and finishes used or installed in the construction of the trainset shall have sufficient resistance to fire, smoke and fume production to allow sufficient time for fire detection, for the trainset to stop and for safe evacuation of passengers before lethal conditions develop. ...*
>
> *7. At a minimum, the materials used for the construction of cab interiors including but not limited to walls, floors ceilings, seats, doors, windows, electrical conduits, air ducts and any other internal equipment shall meet FRA guidelines published in the Federal Register on January 17, 1989.*[26]

The National Transportation Safety Board Highlights the Danger of Smoke and the Need for Smoke Safety Standards

In 1997, before the FRA published the NPRM, the National Transportation Safety Board (NTSB) issued a detailed Accident Report, including recommendations, following a 1996 collision between a commuter train and an Amtrak train near Silver Spring, MD. The NTSB highlighted the dangers of smoke. According to an NTSB document issued soon after the accident, of the three crewmembers and 20 passengers on the commuter train "Two crewmembers and 7 passengers died of smoke inhalation, and 1 crewmember and 1 passenger died as a result of impact injuries...."[27]

In the formal 1997 Accident Report, NTSB included witness accounts of the immediate aftermath of the accident,

> *One student, who was sitting next to an emergency window on the last seat in the rightrear section of control cab car 7752, described the smoke as extending from about 2 feet above the floor to the car ceiling. ...*
>
> *Another student stated that the conductor with another person came from the front of the car shouting, "everybody run to the back" and the conductor had reached the midpoint of the car when the collision occurred. The student reported that after the collision, he was thrown between the seats, the lights went out, smoke came into the car, and that other students were screaming and running to the rear of the car. ... He slid to the floor because he could not see or breathe with the smoke.*[28]

Another witness,

---

[26] 61 Fed. Reg. 30709, June 17, 1996. [Emphasis added]

[27] National Transportation Safety Board, R-96-7, March 12, 1996.

[28] National Transportation Safety Board, Railroad Accident Report, NTSB/RAR-97/02, p. 31.

> *recounted that he proceeded immediately after the crash to the rear door exits, that he felt the heat from the fire on his back, and that smoke quickly filled the car. He reported that he looked "high and low" for "handles or gadgets or something to open the doors" but smoke obscured his vision and that he could find nothing to open the doors.*[29]

Although burning diesel fuel was the primary cause of the fire and smoke, NTSB tested materials in the train in accordance with "FRA recommendations for testing the flammability and smoke emission characteristics for commuter and intercity rail vehicle materials."[30] The NTSB found that several materials failed either the smoke emissions limitations in flaming or non-flaming mode and/or the flame resistance criteria.

While NTSB did not believe, in this specific instance, that the materials meeting standards would have made a difference to accident outcome "because of the presence of diesel fuel as an ignition source" "the Safety Board is concerned that the interior materials in the MARC passenger cars did not meet existing performance criteria for flammability and smoke emissions characteristics."[31]

Moreover,

> *The Safety Board concludes that because other commuter passenger cars may also have interior materials that may not meet specified performance criteria for flammability and smoke emission characteristics, the safety of passengers in those cars could be at risk.*[32]

NTSB's recommendations to the Department of Transportation, which would be referenced in FRA's NPRM issued soon thereafter, included the recommendation to,

> *Review the testing protocols within the various modal administrations regarding the flammability and the smoke emissions characteristics of interior materials and coordinate the development and implementation of standards for material performance and testing with the Federal Railroad Administration and the Federal Transit Administration.*[33]

Thus, the NTSB emphasized the importance of materials meeting both flame resistance and smoke limitation standards.

---

[29] Ibid.

[30] Ibid., p. 36.

[31] Ibid., pp. 63-64.

[32] Ibid., p. 64.

[33] Ibid., p. 76.

FRA Rulemaking Responds to NTSB: Creating A Systems-Based Approach to Comprehensive Fire Safety

The FRA's NPRM noted that the agency "has specifically responded in § 238.105 (Fire protection program) of this NPRM to the Board's recent recommendation concerning the flammability and smoke emission characteristics of interior materials in existing passenger cars."[34]

There are two sections of the proposed rule concerned with fire safety, one setting standards for flame resistance and smoke emission limitations for all materials used in passenger cars and rail cabs, and other setting a systems-based approach to fire safety analogous to MSHA's multi-faceted belt air rulemaking, which included among it requirements that railroads "Reasonably ensure that a ventilation system does not contribute to the lethality of a fire."[35]

The proposed "system safety program," based on the Defense Department's Military Standard: System Safety Program Requirements (MIL-STD-882(C)), included two fire safety analyses, each of which required railroads to consider the role of smoke emissions characteristics of materials used in areas that could harm passengers and workers. With respect to the second fire safety analysis, the NPRM directed railroads to:

> *Complete a final fire safety analysis (equivalent to that required for new equipment in this section) for any category of existing equipment and service evaluated during the preliminary fire safety analysis as likely presenting an unacceptable risk of personal injury, including consideration of the extent to which interior materials comply with the test performance criteria for flammability and smoke emission characteristics contained in Appendix B to this part or alternative standards approved by FRA under this part;*[36]

The FRA's fire safety analysis is analogous to the decision MSHA District Managers would be required to make under the belt air rulemaking regarding a mine owner's,

> *justification in the plan that the use of air from a belt entry would afford at least the same measure of protection where belt haulage entries are not used to ventilate working places.*[37]

The FRA proposed (and mandated in the Final Rule) that consideration of smoke emission characteristics be an integral component of fire safety analysis. As will be discussed in CRE's comments

---

[34] 62 Fed Reg. 49751, September 23, 1997.

[35] Ibid., p. 49800.

[36] Ibid., p. 49801. [Emphasis added.]

[37] 73 Fed. Reg. 35053, June 19, 2008. . [Emphasis added.]

on the belt air NPRM, **evaluation of smoke emission characteristics will also be a non-discretionary component of MSHA's balancing decision on whether a ventilation plan actually does at all times "afford at least the same measure of protection" as not using belt air** – it will not be possible for a mine owner to demonstrate equal protection at all times without specific smoke emission criteria.

Final Rule: Consolidating and Implementing Smoke Safety Requirements

In comments to the FRA, the Brotherhood Railway Carmen (BRC, now part of the Transportation Communications International Union) emphasized the need for stringent smoke and flame safety requirements and advocated that requirements be made even stricter. The BRC,

> *stated that interior materials in passenger equipment must be required to meet strict standards for flammability and smoke emission. The BRC believed that compliance with the current guidelines alone is insufficient for safety, and that additional technology, preventative measures, and fire safety standards must be considered.*[38]

Another commenter, stressing the need for smoke safety, informed the agency that,

> *he considered FRA's fire safety guidelines good in some but not all respects. The commenter stated in particular that the current acceptance levels of smoke emission are inadequate to protect passengers from toxic levels of smoke...*

In the final rule, based on public comment, FRA consolidated the sections on "fire safety planning and analysis requirements" and the section on flame resistance and smoke emissions standards. The final rule clarified that not only were interior materials to comply with smoke and flame safety standards but also the agency "intended that 'exterior' materials used in constructing passenger cars and locomotive cabs comply with test performance criteria for flammability and smoke emission characteristics."[39]

With respect to when the adherence to smoke and flame standards take effect, the agency explained,

> *Simply put, if material is introduced into passenger cars and locomotive cabs during any kind of rebuild, refurbishment, or overhaul of the equipment, the material must comply with the test performance criteria for flammability and smoke emission characteristics....*[40]

Although the final rule allows companies to request agency permission to use "alternative standards issued or recognized by an expert consensus organization in lieu of" the smoke safety and fire resistance

---

[38] 64 Fed. Reg. 25555, May 12, 1999.

[39] Ibid., p. 25589.

[40] Ibid.

standards specified in the rule, at no time does the safety agency entertain the notion that flame resistance standards alone are sufficient to protect workers and passengers from smoke. Instead, FRA recognized that tandem standards for smoke limitation and flame resistance is a fundamental fire safety principle.

Updating and Reaffirming Smoke Safety Requirements

In issuing its final rule responding to petitions for reconsideration related to fire safety, the FRA made minor technical clarifications and updated the version of the smoke density test required. Specifically, the FRA required use of the 2001 version of the test (ASTM E 662-01) instead of the 1997 version. The E–662 test is the only smoke density test contained in the final rule.

Fire Safety Rulemaking: Lessons Learned

There are several key lessons from the UMTA/FRA multi-decade fire safety standard research and development program that are directly applicable to MSHA and underground mine safety:

1. Evaluation of smoke emission characteristics is an essential component of a fire safety analysis – an analysis that will be required for belt air mines.

2. Flame resistance standards are not a sufficient or appropriate means of controlling smoke emissions.

3. Materials should have a maximum optical density between 100-200 using ASTM E-662 to allow people the visibility to escape from an enclosed burning environment.

OPTION 2:
MSHA ISSUE A FLAME RESISTANCE FURTHER NOTICE OF PROPOSED RULEMAKING SIMULTANEOUSLY WITH A SMOKE DENSITY NPRM

In lieu of publishing simultaneous Interim Final Rules for smoke density and flame resistance, MSHA could opt to publish a Notice of Proposed Rulemaking on smoke safety and a Further Notice of Proposed Rulemaking on flame resistance.

Flame Resistance FNPRM

As will be detailed in CRE's comments on the belt air NPRM, in the current belt air rulemaking, MSHA has <u>not</u>:

- Accurately characterized the reliability and reproducibility of the BELT;

- Included in the rulemaking docket for public review and comment the test data on which the agency's assertions are based;

- Determined, using current conveyor belting samples, the extent to which the BELT correlates to the large scale gallery test it is intended to mimic, or its repeatability using current samples;

- Assessed whether the flammability test meets the requirements of the Data Quality Act and implementing guidelines; and

- Explained the methodology, consistent with OMB guidance, mine owners and MSHA officials are to use in determining that belt air ventilation plans "at all times affords at least the same measure of protection" as when belt air is not used.

In the FNPRM, MSHA will need to present the above data for public review and comment.

Smoke Density NPRM

Simultaneous with the above FNPRM, MSHA must publish an NPRM that allows the agency to set the smoke safety standards necessary to ensure that workers are able to escape from the mine following a disaster.

Smoke Toxicity ANPRM

Simultaneous with the above rulemaking, MSHA must publish an ANPRM based on federally-developed and other stakeholder data that allows the agency to set the smoke toxicity limits, using consensus standard testing methodologies, necessary to help ensure that workers are able to escape from the mine following a disaster.

CONCLUSION

- MSHA will not be able to approve belt air ventilation plans without having a smoke density standard.