From:	Tim Burgess
To:	zzMSHA-OSRVRegulatoryReform
Cc:	Greg Hinshaw; Maria Maza; Carl Sanns; Dave Cooper
Subject:	Regulatory Reform Request
Date:	Wednesday, May 16, 2018 3:49:57 PM
Attachments:	Regulatory Reform_20180516134720.pdf REV-IAS2017_Final_LuminanceMeasurementforUndergroundMineLighting-8847-nd....pdf

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To whom it may concern,
Attached information is to formally request a revision or change to the current electrical face equipment lighting laws, as it pertains to roof bolters, 75.1719-1, 2, and 3.
Thanks

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May 16, 2018

On behalf of J. H. Fletcher & Co., I would like to put forth a suggestion for changes to the CFR regulations concerning electrical face equipment lighting, namely roof bolters. Fletcher has a majority of the roof bolter market in the United States, so our experience and knowledge of roof bolters used in American coal mines accounts for an overwhelming majority of all roof bolting machines used today. The problem is easy to detect, visit any roof bolter underground and you will most likely find a machine where an operator has covered up a light or two. There is a reason for this - it is blinding, probably causing a hazardous situation which leads to the operators decision to shield or blank off the light even though that is in violation of the current lighting law found in 75.1719-1-3.

A great deal of research has been undertaken and is currently ongoing at NIOSH concerning machine lighting. For instance, the current way to measure the light output in the mine is greatly in question with NIOSH reporting that it is impractical to use the Quantum PMEX photometer. Specifically, there are huge measurement variations due to photometer accuracy and mine conditions. The measurement variations ranged from -42.9% when the coal rib was wetted and up to a 67% change when the photometer perpendicularity and tilt to the rib were offset by only 5° (see attachment). Additional errors exist concerning accuracy of the photometer. NIOSH just completed a study that discovered errors up to -27% when using the Quantum PMEX photometer to measure the amber-colored light typically found on roof bolters. The errors were about -17% when measuring white LED lighting. The problem is that photometers are calibrated to an incandescent light source and major errors occur when measuring light sources of a different color. NIOSH will be publishing these findings and will send the paper for MSHA review before submitting the paper for publication.

The current lighting laws were written decades before roof bolters became what they are today and before LED machine lights existed. To complicate matters even more, compact fluorescent light bulbs are being phased out by suppliers and are no longer available, being replaced with much improved LED lights. Today's modern roof bolters are much more complex when it comes to operator interaction with the machine than a drum miner or shuttle car. The roof bolter operator has multiple operator stations on the machine, a tram compartment and drill station. Walk through chassis machines have a walkway connecting the rear of the machine to the front, with no provision for lighting the walkway in the current regulations.

Fletcher has experience with working with coal mining machines all over the world and no other country handles lighting regulations like MSHA. No study or suggestion from any other source outside the US has indicated the US machine lighting is superior to anywhere else in the world. The current lighting law for roof bolters is overly restrictive, limits machine design improvements and creates a hazardous condition of glare that "blinds" our operators and reduces their ability to operate the roof bolter and see hazards.

Instead of lighting up the entire entry to the light level as the current law strives to do, a more operator complimentary task lighting scheme should be used with softer machine lighting provided which will not exasperate glare and blind the operator. With roof bolter designs that incorporate canopies and posts, temporary roof support systems and material handling, it is next to impossible to light the entire entry to the level of light required to meet the law and not blind the operator carrying out his tasks.

75.1719-2, (3) (g) even provides guidance to change the current law, it says; "Lighting fixtures shall be designed and installed to minimize discomfort glare". This is impossible to do on today's roof bolters and meet the current lighting laws.

The lighting law for roof bolters should be changed. NIOSH, MSHA, MCI, and Fletcher, (and others), should meet and undertake study and rewriting of the following parts of the law, (only applicable parts of the 75.1719-1-3 are shown below for reference purposes), which apply to roof bolters:

§75.1719-1 Illumination in working places.

(a) Each operator of an underground coal mine shall provide each working place in the mine with lighting as prescribed in §§75.1719-1 and 75.1719-2 while self-propelled mining equipment is operated in the working place.

(b) *Self-propelled mining equipment; definition.* For the purposes of §§75.1719 through 75.1719-4, "self-propelled mining equipment" means equipment which possesses the capability of moving itself or its associated components from one location to another by electric, hydraulic, pneumatic, or mechanical power supplied by a source located on the machine or transmitted to the machine by cables, ropes, or chains.

(c) The lighting prescribed in this section shall be in addition to that provided by personal cap lamps.

(d) The luminous intensity (surface brightness) of surfaces that are in a miner's normal field of vision of areas in working places that are required to be lighted shall be not less than 0.06 footlamberts when measured in accordance with §75.1719-3.

(e) When self-propelled mining equipment specified in paragraphs (e)(1) through (e)(6) of this section is operated in a working place, the areas within a miner's normal field of vision which shall be illuminated in the working place shall be as prescribed in paragraphs (e)(1) through (e)(6) of this section.

(5) *Roof bolting equipment.* In working places in which roof bolting equipment is operated, the areas which shall be illuminated shall be as follows:

(i) *Where the distance from the floor, to the roof is 5 feet, or less:* the face, ribs, roof, floor, and exposed surfaces of mining equipment, which are within an area the perimeter of which is a distance of 5 feet from the machine, when measured parallel to the floor.

(ii) *Where the distance from the floor to the roof is more than 5 feet:* the face, ribs, roof, floor, and exposed surfaces of mining equipment, which are within an area the perimeter of which from the front and sides of the machine is a distance equal to the distance from the floor to the roof and from the rear of the machine a distance of 5 feet, when measured parallel to the floor.

§75.1719-2 Lighting fixtures; requirements.

(g) Lighting fixtures shall be designed and installed to minimize discomfort glare.

§75.1719-3 Methods of measurement; light measuring instruments.

(a) Compliance with §75.1719-1(d) shall be determined by MSHA by measuring luminous intensity (surface brightness).

(b) In measuring luminous intensity the following procedures shall be used:

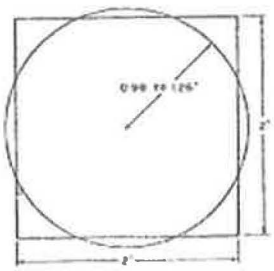
(1) In areas of working places specified in §§75.1719.1(e)(1) through 75.1719-1(e)(3) luminous intensity measurements of the face, ribs, roof, floor, and exposed surfaces of mining equipment, shall be made with the machine idle and located in the approximate center of the working place with the cutting, loading, or drilling head toward the face and not more than 3 feet from the face.

(3) In areas of working places specified in §75.1719-1(e)(5) luminous intensity measurements of the face, ribs, roof, floor, and exposed surfaces of mining equipment, shall be made with the machine idle and located in the approximate center of the working place with the drilling head toward the face and a distance from the face of 5 feet, or the distance from the floor to the roof, whichever is applicable. When the machine is located in the center of the working place and the surfaces of the ribs to be illuminated are not within the perimeter of the area determined in accordance with §75.1719-1(e)(5), the machine shall be positioned the applicable distance from the face and each rib and luminous intensity measurements made for each rib, provided, however, that luminous

intensity measurements may be made of the face, roof, floor, and exposed surfaces of mining equipment with the machine so located without locating the machine in the center of the working place.

(4) In areas of working places specified in §75.1719-1(e)(6), luminous intensity measurements of a coal surface shall be made with the machine idle and located in the approximate center of the working place with the appropriate end toward the face and not less than 9 feet nor more than 10 feet from the face.

(5) The area of surfaces to be measured shall be divided into round or square fields having an area of not less than 3 nor more than 5 square feet as illustrated by the following figure:



DIRECT MEASUREMENT OF LUMINOUS INTENSITY

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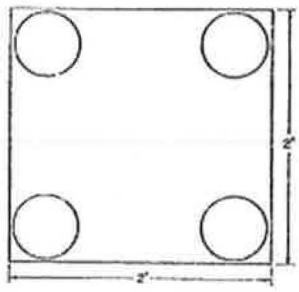
(6) Measurements shall be taken with the photometer held approximately perpendicular to the surface being measured and a sufficient distance from the surface to allow the light sensing element in the instrument to receive reflected light from a field of not less than 3 nor more than 5 square feet. The luminous intensity of each such field shall be not less than 0.06 footlambert.

(7) In areas of working places where clearances are restricted to the extent that the photometer cannot be held a sufficient distance from the surface to allow the light sensing element in the instrument to receive reflected light from a field having an area of at least 3 square feet, luminous intensity shall be considered as the average of four uniformly spaced readings taken at the corners and within a square field having an area of approximately 4 square feet. In such instances, the area of each of the individual readings shall not exceed 100 square inches. The average of the four readings shall be not less than 0.06 footlambert. The method of measurement is illustrated by the following figure:



DETERMINATION OF LUMINOUS INTENSITY BY AVERAGING METHOD

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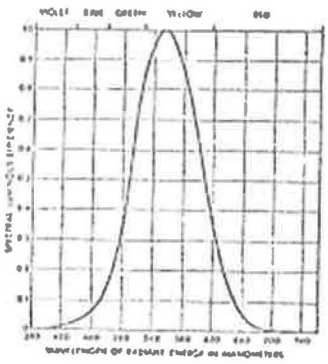
(8) Measurements shall not be made where shadows are cast by roof control posts, ventilation equipment, or other obstructions necessary to insure safe mining conditions.

(9) Where machine-mounted light fixtures are used on equipment, except self advancing roof support systems, measurements shall not be made of surfaces on or within 1 foot of a self-propelled machine.

(c) For the purpose of making illumination measurements, an authorized representative of the Secretary may require the installation of temporary roof supports or the removal of the equipment to a similar working place in which permanent roof supports have been installed.

(d) Light measuring instruments shall be properly calibrated and maintained. Instruments shall be calibrated against standards traceable to the National Institute of Standards and Technology (Formerly the National Bureau of Standards) and color corrected to the Commission Internationale de l'Eclairage (CIE) Spectral Luminous Curve. The CIE Spectral Luminous Curve is as follows:



Sincerely,

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