COMMENTS TO PROPOSED RULE: OCCUPATIONAL EXPOSURE TO BERYLLIUM AND BERYLLIUM COMPOUNDS

Submitted on Behalf of the Abrasive Blasting Manufacturers Alliance
Before the Department of Labor Occupational Safety and Health Administration (OSHA)
Docket No. OSHA-H005C-2006-0870

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I. INTRODUCTION

A. The Abrasive Blasting Manufacturers Alliance

These comments are submitted on behalf of an alliance of abrasive blasting manufacturers (the Alliance). The Alliance members collectively produce over 90% of the coal slag abrasives material and 50% of the copper slag abrasives material produced in the United States. Members of the Alliance include:

a. **Abrasives Inc**.: A North Dakota-based abrasives manufacturer and seller of related products and equipment, Abrasives Inc. was founded in 1990 and has grown to 87 employees and expanded geographically to the Minneapolis/St. Paul metro area. Its Black Magic® coal slag abrasive is sold in every state and province in the United States, Canada and Mexico.

b. **Canam Minerals, Inc.**: Headquartered in California with locations also in Washington and Oregon, Canam Minerals has been a manufacturer of abrasives and related products and equipment for 50 years, employing 85 employees currently and hundreds over the years. Canam Minerals sells its Kleen Blast® abrasives and equipment to numerous industries, and also offers a spent abrasives removal service, Kleen Industrial Services, for its customers.

c. **Ensio Resources, Inc.**: A family-owned business with 12 employees, Ensio Resources produces and sells high quality abrasives and related products, including its Patriot-Blast® coal slag abrasive. Ensio Resources has been in business since the 1960's and serves the northeastern United States.

d. **Harsco Minerals**: A leading producer of abrasive materials serving many critical industries, including environmental solutions, railways and energy, Harsco Minerals is a division of Harsco Corporation, a $2 billion publicly-traded, diversified global company with 12,000 employees. Harsco Minerals recycles over 1 million tons of coal slag annually that would otherwise be landfilled. Harsco Minerals traces its roots back to the 1950's, when its signature Black Beauty® coal slag abrasive was first introduced.

e. **Mobile Abrasives, Inc.**: Serving the abrasive blasting markets in Alabama, Mississippi and Florida, Mobile Abrasives has been in business since 2002, employing over 55 persons. Mobile Abrasives is a diversified company, offering coal slag, quartz sand and copper slag for abrasive blasting purposes.

f. **MineralTech Gulf Coast Abrasives, LLC**: Employing 35 persons since its inception in 2010, Mineral Tech produces and sells various products from coal slag and copper slag, including blasting abrasives, roofing granules and products for the cement industry, which are used in the refineries, shipyards and other businesses along the Gulf Coast.

g. **U.S. Minerals, Inc.**: A privately held processor and marketer of slag products, U.S. Minerals serves customers in multiple manufacturing and construction industry segments. In a typical year, U.S. Minerals recycles over 350,000 tons of coal slag to beneficial reuse; thus preventing its disposal in landfills. U.S. Minerals has been producing abrasive blasting products from coal and copper slag

for 25 years and currently employs approximately 100 persons across its network of seven plants.

B. Regulatory Alternatives Addressed by the Alliance's Comments

The Alliance's comments focus on potential Regulatory Alternatives 1a, 1b, 2a and 2b. These potential Regulatory Alternatives would expand the scope of the proposed standard. For reasons that are discussed in detail in these written comments, the Alliance members believe that the scope of the standard should not be expanded as described in these potential Regulatory Alternatives.

Potential Regulatory Alternative 1a would "expand the scope of the proposed standard to include all operations in general industry where beryllium exists only as a trace contaminant; that is, where the materials used contain no more than 0.1% beryllium by weight." 80 FR 47569.

Potential Regulatory Alternative 1b is similar but would exempt "operations where the employer can show that employees' exposures will not meet or exceed the action level or exceed the STEL." 80 FR 47569.

Potential Regulatory Alternative 2a would "expand the scope of the proposed standard to also include employers in construction and maritime." In particular, OSHA has noted this alternative "would cover abrasive blasters, pot tenders and cleanup staff working in construction and shipyards who have the potential for airborne beryllium exposure during blasting operations and during cleanup of spent media." 80 FR 47569.

Potential Regulatory Alternative 2b would "update the 1910.1000 Tables Z-1 and Z-2, 1915.1000 Table Z, and 1926.55 Appendix A so that the proposed TWA PEL and STEL would

apply to all employers and employees in general industry, shipyards and construction, including occupations where beryllium exists only as a trace contaminant. However, all other provisions of the standard would be in effect only for employers and employees that fall within the scope of the proposed rule." 80 FR 47569.

C. Slag Abrasives Production and Abrasive Blasting Operations

To put the Alliance's comments in perspective, some background information about the process of producing slag abrasives, as well as an overview of abrasive blasting operations, may be helpful.

1. Slag Abrasives Production

Coal slag abrasives production starts with the excavation of slag material from the boilers of coal-fired power plants. Copper slag starts off as a by-product derived from metal smelting and refining processes. This coal and copper slag would largely be landfilled or stored in retaining ponds if not for the abrasive blasting industry. The abrasives manufacturers obtain the slag and begin their processing by loading the slag into a primary sieve to remove large debris. The remaining material is then conveyed through a furnace or rotary dryer to dry it and it is then further conveyed through a series of size selectors/hoppers and storage silos. The processed material is then conveyed to a bagging operation where the abrasive material is bagged and palletized.

Coal and copper slag and the resulting processed abrasive materials from this slag contain only trace amounts of beryllium. Indeed, the percentage of beryllium by weight in coal slag abrasives is typically 0.0002% or lower. (*E.g.*, Ensio Resources 2015 Safety Data Sheet for its coal slag product, Patriot-Blast®, http://ensioresources.com/forms/SDS_PATRIOT-

BLAST_Coal_Slag_Abrasives_June_2015.pdf). The percentage of beryllium by weight in copper slag abrasives is typically 0.00005% or lower.(E.g., U.S. Minerals 2015 Safety Data Sheet for its copper slag product, Black Diamond®, http://www.us-minerals.com/wp-content/uploads/2015/04/Iron-Silicate-SDS-1.3-2015.pdf). Please note that these levels are approximately three times lower than typical soil (USEPA Office of Solid Waste and Emergency Response, Hazardous Waste Land Treatment, SW-874, April 1983, page 273) and approximately 17,000 to 22,000 times lower than the level of beryllium in some copper beryllium alloy materials (see, for example, Materion Brush, Inc. Safety Data Sheet for "Copper Beryllium Master Alloy"[1]).

2. Abrasive Blasting Operations

OSHA has described the process of abrasive blasting as follows:

> Abrasive blasting uses compressed air or water to direct a high velocity stream of an abrasive material to clean an object or surface, remove burrs, apply a texture, or prepare a surface for the application of paint or other type of coating.
>
> OSHA Fact Sheet: Protecting Workers from the Hazards of Abrasive Blasting Materials. (2013) www.osha.gov/Publications/osha3697.pdf (OSHA Abrasive Blasting Fact Sheet).

As noted in the OSHA Abrasive Blasting Fact Sheet: "abrasive blasting operations can create high levels of dust… ." *Id.* at p. 1. OSHA has also noted that "abrasive material and the surface being blasted may contain toxic materials (e.g., lead paint, silica) that are hazardous to workers." *Id.* (emphasis added).

The OSHA Abrasive Blasting Fact Sheet goes on to note as follows:

[1]Available at http://materion.com/ResourceCenter/EnvironmentalHealthandSafety/MSDS.aspx?filename=%5C%5Cmtrn-shared01%5CENTERPRISE%5CMSDGenDocumentation%5CA17_COPPER%20BERYLLIUM%20MASTER%20ALLOY_SDS-US_English.pdf

> Each abrasive blasting operation is unique, involving different surfaces, coatings, blast material, and working conditions. Before beginning work, employers should identify the hazards and assign a knowledgeable person trained to recognize hazards and with the authority to quickly take corrective action to eliminate them. Use engineering and administrative controls, personal protective equipment (PPE), including respiratory protection, and training to protect workers involved in abrasive blasting activities. Engineering controls, such as substitution, isolation, containment, and ventilation are the primary means of preventing or reducing exposures to airborne hazards during abrasive blasting operations. Administrative controls, including the use of good work and personal hygiene practices, can also reduce exposure. When engineering and administrative controls cannot keep exposures to hazardous materials below OSHA permissible exposure limits, respiratory protection must be used.
>
> OSHA Abrasive Blasting Fact Sheet, p. 2.

The Fact Sheet also contains an extensive table listing the various regulatory standards that apply to abrasive blasting operations. Simply put, abrasive blasting operations are already highly regulated by OSHA. And, importantly, every abrasive blasting operation will be different and will likely be subject to multiple OSHA standards. As just one example pointed out by OSHA: "the removal of lead paint by abrasive blasting will likely require employers to follow provisions of the OSHA lead standard." OSHA Abrasive Blasting Fact Sheet, p.4.

II. Applicable Legal Authority

In *AFL-CIO v. American Petroleum Institute*, 448 U.S. 607, 615 (1980) (plurality opinion) ("the *Benzene* case"), the Supreme Court noted that under Section 3(8) of the Occupational Safety and Health Act of 1970 (the Act), standards must be "reasonably necessary or appropriate to provide safe or healthful employment." The Court then determined that Section 3(8) and Section 6(b) of the Act, together, require the Secretary of Labor (the Secretary) to determine that a proposed OSHA standard is "reasonably necessary and appropriate to remedy a significant risk of material health impairment" before issuing that standard. *Id*. at 639.

The Secretary is therefore required to "make a threshold finding that a place of employment is unsafe – in the sense that significant risks are present and can be eliminated or lessened by a change in practice." *Id.* at 642.

The word "significant" is critical. The Court noted that in promulgating the Act "Congress was concerned not with absolute safety, but with the elimination of significant harm." *Id.* at 646. The Secretary must be able to quantify the risk from a toxic substance so as "to characterize it as significant in an understandable way." *Id.*

In the *Benzene* case the court found that the Secretary's support for a new benzene PEL was based on a series of assumptions about risk, rather than actual evidence supporting a finding of significant risk of harm, and thus the proposed new standard failed to meet the statutory requirements. *Id.* at 631-635, 662. The Court found that "the burden was on the Agency to show, on the basis of substantial evidence, that it is at least more likely than not that long-term exposure to 10 ppm of benzene presents a significant risk of material health impairment." *Id.* at 653.

As discussed below, the potential alternatives to the current proposed rulemaking that would regulate materials containing beryllium in trace amounts (Potential Regulatory Alternatives 1a and 1b) and/or cover the construction or maritime industries (specifically focused on the trace amount of beryllium in abrasive blasting materials; Potential Regulatory Alternatives 2a and 2b), do <u>not</u> meet the *Benzene* test.

OSHA has initially determined that potential Regulatory Alternatives 1a, 1b, 2a and 2b should not be including in the proposed rule. This determination is well supported in the rulemaking file and the Alliance fully supports this determination. No evidence of significant

risk of harm from exposure to materials with trace amounts of beryllium has been provided in the extensive rulemaking file and the Alliance is aware of no such evidence. Nor is it technologically feasible to regulate trace amounts of beryllium, since this would often require testing at levels below limits of detection. It also is not technologically feasible to accurately test for beryllium exposure in construction and maritime abrasive blasting, given the unique factors associated with the process of abrasive blasting itself. There is also no evidence in the rulemaking file that that the existing standards are inadequate to protect employees exposed to trace amounts of beryllium in general industry or to the trace amounts of beryllium from abrasive blasting in the construction or maritime industry. Indeed, the evidence is to the contrary – that the existing standards provide adequate protection.

III. Comments to Potential Regulatory Alternative 1a

Potential Regulatory Alternative 1a "would expand the scope of the proposed standard to include all operations in general industry where beryllium exists only as a trace contaminant; that is, where the materials used contain no more than 0.1% beryllium by weight." 80 FR 47569.

OSHA has initially determined that the beryllium standard should *not* be extended to regulate beryllium as a trace contaminant. 80 FR 47774. The Alliance fully supports OSHA's determination.

The *Benzene* case requires that a standard be "reasonably necessary and appropriate to remedy a significant risk of material health impairment." OSHA has conducted an extensive literature search, 80 FR 47567, and the rulemaking file is also extensive. However, it contains no evidence of "significant risk" from working with material containing beryllium in trace amounts, let alone substantial evidence that it is "at least more likely than not" that exposure to beryllium

in trace amounts presents significant risk of harm, as required by the *Benzene* test. 448 U.S. at 653.

Furthermore, the Alliance members collectively have over 200 years of experience producing coal and/or copper slag abrasive material and have employed thousands of employees in this production process. Through the years, Alliance members have worked with and put to beneficial use over 100 million tons of slag material that would otherwise have been landfilled. Despite this extensive history, the Alliance members have no history of employees with beryllium sensitization or beryllium-related illnesses. Indeed, the Alliance members are not aware of a single documented case of beryllium sensitization or beryllium-related illness associated with coal or copper slag abrasive production among their employees, or their customers' employees working with the products of Alliance members.

As noted above, coal and copper slag abrasives contain beryllium in only trace amounts. Thus, the history and experience of the Alliance members provides evidence suggesting that either there is no significant risk of working with materials containing trace amounts of beryllium and/or that the existing OSHA standards are adequate to protect employees working with trace amounts of beryllium. As a result, under either circumstance, revising the beryllium standard to regulate materials containing trace amounts of beryllium would not meet the *Benzene* test.

Amending the proposed standard to regulate beryllium in trace amounts is also just not technologically feasible. It would often require testing for beryllium at levels that just cannot be measured with currently available technology. As an example, please see *NIOSH, Crouch, et al.,* discussed in detail below in which NIOSH found exposure levels to an abrasive blaster helper to be *below* the limits of detection. (*See also*, Beryllium and compounds, as Be: Method 7102,

Issue 2, NIOSH Manual of Analytical Methods, Fourth Edition, 8/15/94. When sampling air for beryllium concentrations, the detection limits decrease as air flow volumes increase. Thus, when sampling short-term exposures such as those found on construction sites, it is just not possible to reach the proposed TWA PEL of 0.2 ug/m^3.)

Under the *Benzene* case, amending the standard to regulate materials containing trace amounts of beryllium would also require a finding that the existing standards are not adequate to protect workers "from a continuing and significant risk of harm." Existing standards that govern protection of employees from exposure to beryllium in the production of coal or copper slag abrasive material include 29 CFR 1910.94 (Ventilation); 29 CFR 1910.1000 (Beryllium Tables Z-1); 29 CFR 1910.134 (Respiratory Protection); 29 CFR 1910.1200 (Haz-Com); and 29 CFR 1910.141 (Sanitation). There is simply no evidence, let alone substantial evidence, in the rulemaking file that any of these current standards are insufficient to protect workers from materials containing trace amounts of beryllium.

OSHA has identified only two industries (primary aluminum production and coal fired power generation) that it believes would be exempt under the current proposed rule, but not if OSHA expands the scope of the proposed rule to regulate beryllium as a trace contaminant. 80 FR 47730. However, there are many materials and products which can, and often do, contain trace amounts of naturally occurring beryllium. Besides abrasive blasting material and coal, these include fuel oil, rocks, gemstones, soil, water, wood, kitty litter, fertilizers, concrete, detergents, roofing materials, sandpaper, rice, lettuce, kidney beans, peas, and potatoes. *A Naturally Occurring Element*, Beryllium Science & Technology Association, beryllium.eu, http://beryllium.eu/about-beryllium-and-beryllium-alloys/naturally-occurring-element/ (last visited Oct. 29, 2015). At a minimum, a full list of such items and the industries that work with

them would need to be developed and a notice and comment period provided to stakeholders in these industries before a beryllium standard should be extended to them. To simply add them all to a proposed standard that was developed without consideration to any unique circumstances that they may face would deny affected stakeholders adequate notice under Section 6(b)(3) of the Act and basic due process. As just one example of the importance of this issue, the rulemaking file contains no evidence of significant risk from exposure to beryllium in mineral form below the current TWA PEL or STEL, let alone from trace amounts of beryllium in mineral form. And, of course, a technological and economic feasibility analysis would need to be performed with regard to these industries pursuant to Section 6(b) of the Act.

Finally, in the *Benzene* case the Court found that it is insufficient to just make assumptions about an appropriate PEL, rather than relying on actual data. 448 U.S. at 662. There is just not sufficient data in the rulemaking file to support regulation of materials containing trace amounts of beryllium.

IV. Comments to Potential Regulatory Alternative 1b

Potential Regulatory Alternative 1b would include the provisions of Regulatory Alternative 1a but would exempt "operations where the employer can show that employees' exposures will not meet or exceed the action level or exceed the STEL." 80 FR 47569. As noted above, the rulemaking file contains no evidence to support expanding the scope of the standard to cover materials containing trace amounts of beryllium. However, assuming arguendo that OSHA does expand the scope of the standard to regulate such materials, a significant exemption would be needed that goes considerably beyond that contained in Regulatory Alternative 1b to avoid regulating trace amounts of beryllium and imposing substantial costs, particularly on small businesses, where there is no evidence of benefit.

V. Comments to Potential Regulatory Alternative 2a

Potential Regulatory Alternative 2a "would expand the scope of the proposed standard to include employers in construction and maritime." OSHA has noted that this alternative would "primarily" cover abrasive blasting operations in construction and shipyards. 80 FR 47775. As discussed below, abrasive blasting operations are already highly regulated and there is no evidence in the rulemaking file that the existing regulations covering abrasive blasting are inadequate.

Indeed, OSHA has made a preliminary determination to limit the scope of the rulemaking to general industry. 80 FR 47774. The Alliance fully supports OSHA's determination.

OSHA has noted that the data available for other industries such as construction and maritime is "limited." 80 FR 47774. Indeed, OSHA has described at length the evidence of beryllium-related disease that it relies upon, and none of the studies in question discloses evidence of beryllium related disease in construction and/or shipyards generally, or from abrasive blasting in particular (see 80 FR 47595-47605), let alone evidence of significant risk of harm. This may be because beryllium is found only in trace amounts in abrasive blasting material, or because these trace amounts are of the less hazardous mineral form of beryllium, or because existing standards are effective in protecting employees involved in abrasive blasting or some combination of these factors. However, under any of these circumstances, expanding the proposed rule to the construction and maritime industries would not meet the *Benzene* test.

NIOSH has also noted that there is insufficient data to recommend occupational limits for abrasives such as coal slag. See *Abrasive Blasting Agents: Designing Studies to Evaluate*

Relative Risk, Ann F. Hubbs, et al., NIOSH, J. Tox. and Environ. Health, Part A, v. 68, n. 11-12, pp. 999-1016 *(* 2005) (*NIOSH, Hubbs, et al*).

The article summary notes as follows:

> Workers exposed to respirable crystalline silica used in abrasive blasting are at increased risk of developing a debilitating and often fatal fibrotic lung disease called silicosis. The National Institute for Occupational Safety and Health (NIOSH) recommends that silica sand be prohibited as abrasive blasting material and that less hazardous materials be used in blasting operations. However, data are needed on the relative risks associated with exposure to abrasive blasting materials other than silica . . . To provide dose-response data applicable to making recommendation for occupational exposure limits, NIOSH has collaborated with the National Toxicology Program (NTP) to design longer term studies with silica substitutes. (Emphasis added.)

NIOSH, Hubbs, et al., p. 999.

NIOSH, Hubbs, et al. noted that there was not enough information at the time to make appropriate recommendations for silica alternatives, including coal slag. *See* pages 1000-1004. *NIOSH, Hubbs, et al.* notes that the alternatives to silica sand identified by NIOSH for study, including coal slag abrasive materials, were chosen in part because of "inadequacy of current data." *NIOSH, Hubbs, et al.* at page 1003. *NIOSH, Hubbs, et al.* does note that coal slag "appears to produce less pulmonary fibrosis than silica". *NIOSH, Hubbs, et al.*, p. 1004.

NIOSH, Hubbs, et al., further noted:

> Recommendations for use of silica alternatives are not based on potential health risks from exposure to specific blasting agents because of an absence of comprehensive chronic inhalation studies for most of the alternative blasting abrasives (NIOSH, 1992). To address this data gap, NIOSH nominated five abrasive blasting materials for testing . . . .

NIOSH, Hubbs, et al., p. 1000.

One of the five abrasive blasting materials selected was coal slag. *NIOSH, Hubbs, et al.*, p. 1004. *NIOSH, Hubbs, et al.* notes that NIOSH has been recommending that silica sand and other substances containing more than 1% free silica be prohibited as abrasive blasting material and that such silica containing materials be substituted with less hazardous materials for blasting operations since at least 1974. *NIOSH, Hubbs, et al.*, p. 1000. OSHA has also long taken the position that the best way to protect workers from silicosis is substitution of other abrasive blasting materials. OSHA: Abrasive Blasting Hazards In Shipyard Employment, p. 4, https://www.osha/dts/maritime/standards/guidance/shipyard_guidance.html; OSHA Abrasive Blasting Fact Sheet at p. 2.; OSHA: Control Measures-Abrasive Blasting, https://www.osha.ogv/dsg/etools/silica/protect_against/abrasive/abrasive.html.

There are also significant unintended consequences of regulating trace amounts of beryllium in abrasive blasting in construction and shipyards. One will be a greater likelihood that silica-based blasting agents will be utilized despite OSHA's longstanding recommendation of substitution for silica-based materials. Another will likely be millions of tons of slag material going to landfills rather than being used for beneficial purpose.

NIOSH, Hubbs, et al. goes on to note as follows:

> Understanding the relative toxicity of the various abrasive blasting agents is a very important part of a program to decrease occupational disease in the abrasive blasting industry. While there is abundant evidence that silica sand induces disease in abrasive blasters, there are only limited data available on the pulmonary toxicity of the other abrasive blasting agents.

NIOSH, Hubbs, et al., p. 1003.

NIOSH, Hubbs, et al. describes in detail what the authors believed to be the appropriate design elements of inhalation exposure studies so appropriate regulatory recommendations could

be met. Among other things, *NIOSH, Hubbs, et al.* notes that: it is very important that the particles reviewed "be of respirable size (i.e., able to be deposited in the alveolar or gas exchange region of the lungs) in both humans and rats;" that "since the deposition in the respiratory tract is determined by the aerodynamic diameter of the particles, the particle size needs to be consistent among all the different blasting agents;" and that "to fully characterize the exposures, measurements will be made of the airborne particle size distribution, specific surface area, and density of all the abrasive blasting agents in the inhalation exposures." *NIOSH, Hubbs, et al.* at page 1008. *NIOSH, Hubbs, et al.* then concluded as follows:

> Five alternative blasting agents [including coal slag] will be tested to establish their potential to induce lung fibrosis as a result of whole-body inhalation exposure . . . . Testing data is needed because the high production volumes of these agents, the large number of workers exposed, and the inadequacy of present toxicity data to determine safe exposure levels. Data from testing will provide a foundation for recommendations regarding the use of alternatives to silica sand, and should provide dose-response toxicity data for risk assessment and development of occupational exposure limits. (Emphasis added.)

NIOSH, Hubbs, et al. at page 1012.

The Alliance has not found any published study that has followed the *NIOSH, Hubbs, et al.* recommendations. Further, there remains inadequate toxicity data to revise PELs governing beryllium in abrasive material.

The rulemaking file also notes that one of the principal articles OSHA has relied upon studied beryllium exposure at a mining and production facility and found that,

> [t]here was no sensitization or CBD [chronic beryllium disease] among those who worked only at the mine whose exposure to beryllium resulted solely from working with bertrandite ore. The authors concluded that the results of this study indicated that beryllium ore and salts may pose less of a hazard than beryllium metal and beryllium hydroxide.

80 FR 47596.

OSHA has noted that "[t]hese results are consistent with the previously discussed animal studies examining solubility and particle size." *Id*. *See also*, Ralf Wegner, et. al., *Lung function, biological monitoring, and biological effect monitoring of gemstone cutters exposed to beryls*, Occup. Environ. Med. 57:133-139 (2000) (no adverse clinical health effects found in gemstone cutters working with beryllium.) Further, Duebner, et al. have published research showing that beryllium solubility and aluminum content are important variables affecting the toxicity of beryllium. David C. Deubner, MD, MPH, et al., *Solubility and Chemistry of Materials Encountered by Beryllium Mine and Ore Extraction Workers, Relation to Risk*, J. Occup. Environ. Med., Volume 53, Number 10 (October 2011).

Despite these consistent findings, the proposed rule treats all forms of beryllium the same. Doing so is inappropriate. The rulemaking file provides no evidence of significant risk from beryllium in mineral form, let alone at levels below the current TWA PEL or STEL.

NIOSH did engage in a very limited study in 2007 of <u>one</u> abrasive blaster and <u>one</u> abrasive blasting helper. NIOSH Applied Research and Technology Report: *Control Technology and Exposure Assessment for Occupational Exposure to Beryllium: Abrasive Blasting with Coal-Slag*, Keith G. Crouch, Alan S. Echt, Robert Kurimo and Yvonne T. Gagnon, File No. EPHB 263-13a, National Institute for Occupational Safety and Health, Cincinnati, OH, August 2007 (*NIOSH, Crouch, et al.*) at pp. 6, 9, and 11. This study found that the already required respiratory protection worn by the one blaster studied "appeared to provide adequate protection from this potential exposure. . ." *NIOSH, Crouch, et al.*, p. 11.

The *NIOSH, Crouch, et al.* study did not follow the study design recommendations of *NIOSH, Hubbs, et al.,* but did note several problems in its attempt to study the levels of

beryllium in abrasive blasting. This included the presence of large (presumably non-respirable) and loose particles, and overloaded cassettes and impactor stages. *NIOSH, Crouch, et al.,* at pp. 7 and 10.

Such problems with air sampling during abrasive blasting have long been recognized and NIOSH later reviewed this same issue in a 2013 study: Diana Ceballos, et al., *Evaluation of Air Sampling Methods for Abrasive Blasting*, J. Occup. Environ. Hyg., Vol. 10, Issue 3, pp. D34-39 (2013) (*NIOSH, Ceballos, et al.*) In this study, NIOSH determined as follows:

> Current PBZ [Personal Breathing Zone] air sampling techniques are not effective in assessing employee exposures during abrasive blasting. Therefore, sampling methods that can more accurately estimate exposures during abrasive blasting operations are needed. We are not aware of any PBZ sampling methods that are suitable to accurately measure exposures during abrasive blasting outside the blasting hood. Identification of alternative methods for assessing worker exposure during abrasive blasting operations is still needed.

NIOSH, Ceballos, et al., at p. 6 of the HHS Public Access Author Manuscript of the article, at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4465096/.

In sum, not only is there a lack of data to revise a PEL governing beryllium in abrasive material, it is currently not even technologically feasible to do so. This same problem has also been noted under the Alberta Canada Occupational Health and Safety (OHS) Act. Alberta OHS: Diane L. Radnoff and Michelle K. Kutz, *Exposure to Crystalline Silica in Abrasive Blasting Operations Where Silica and Non-Silica Abrasives are Used*, Ann. Occup. Hyg., Vol. 58, No. 1, pp. 19-27 (2014) (see p. 25, citing the *NIOSH, Ceballos, et al*. article and noting that more work is required to develop sampling strategies to accurately measure blaster exposure.)

NIOSH, Crouch, et al. also notes that "when abrasive blasting is performed outdoors, in addition to worker protection considerations, U.S. Environmental Administration (EPA) regulations must be observed." *NIOSH, Crouch, et al.* at p. 11. However, the rulemaking file contains no information of how regulation of beryllium in abrasive blasting in construction and maritime would impact EPA compliance obligations. Such information would be needed to develop an appropriate standard and avoid conflicting regulatory obligations.

OSHA has also questioned whether further regulation of beryllium in abrasive blasting in the construction and maritime industries is needed to help protect helpers such as pot tenders, and cleanup crews. 80 FR 47775. Please note that the helper studied by *NIOSH, Crouch, et al.* was determined to be exposed to beryllium below the limits of detection. See *NIOSH, Crouch, et al.*, Table 1 at p. 14 and Table 3 at p. 16.

The *NIOSH, Crouch* study is also limited in value because it did not take into account that the manner in which an abrasive blaster works can dramatically impact on the amount of dust generated in the breathing zone. *NIOSH, Crouch, et al.* observed that sometimes substantial dust was generated by the blasting operation and sometimes not. *NIOSH, Crouch, et al.* p. 9. Factors that impact a blaster's breathing zone exposure to dust and beryllium, which would need to be studied and taken into account before reaching conclusions about any revised exposure levels in such operations, include the pressure used, how close the blaster stands to the surface being blasted, the nature of the surface being blasted, the position of the blaster's body, the angle at which the blasting is performed, and whether the blaster is properly using PPE.

OSHA has also expressed a desire to expedite the rulemaking process by limiting the scope of the rulemaking to general industry. 80 FR 47774. Indeed, any attempt to expand the

scope of the proposed rule to cover construction or maritime, or any material containing beryllium in trace amounts, would require far more study, and the development of far more extensive data, once it is technologically feasible to do so.

As also noted above, NIOSH has acknowledged that currently required PPE is adequate to protect abrasive blasting workers. *NIOSH, Crouch, et al.*, p. 11. And OSHA has also acknowledged that to address the potential exposure to various other hazardous chemicals in abrasive blasting, employers must already use extensive engineering controls, administrative controls and PPE. 80 FR 47775. These subjects are already highly regulated. The lengthy list of existing standards governing abrasive blasting includes the following:

1. Construction
    a. 29 CFR 1926.57 (ventilation)
    b. 29 CFR 1926.55 (gases, vapors, fumes, dusts and mists)
    c. 29 CFR 1926.62 (lead)
    d. 29 CFR 1926.1118 (inorganic arsenic)
    e. 29 CFR 1926.1127 (cadmium)
    f. 29 CFR 1926.1126 (chromium VI)
    g. 29 CFR 1926.103 (respiratory protection, with reference to 29 CFR 1910.134).
    h. 29 CFR 1926.52 (noise exposure)
    i. 29 CFR 1926.101 (hearing protection)
    j. 29 CFR 1926.55 Appendix A (beryllium PEL)
    k. 29 CFR 1926.55 Appendix A (silica PEL)
    l. 29 CFR 1926.59 (Haz-Com, with reference to 1910.1200)

m. 29 CFR 1926 subpart E (PPE)

n. 29 CFR 1926.51 (sanitation)

2. Maritime

a. 29 CFR 1915.33 and 29 CFR 1915.34 (chemical & mechanical paint removers)

b. 29 CFR 1915.1000 (Table Z-Air contaminants – shipyards)

c. 29 CFR 1915.25 (lead)

d. 29 CFR 1915.1018 (inorganic arsenic)

e. 29 CFR 1915.1027 (cadmium)

f. 29 CFR 1915.1026 (chromium VI)

g. 29 CFR 1915.154 (respiratory protection, with reference to 29 CFR 1910.134)

h. 29 CFR 1910.95 (noise exposure – with reference to shipyard "tool bag" directive, CPL 02-00-182)

i. 29 CFR 1915.1000 (Table Z (beryllium PEL))

j. 29 CFR 1915.1000 (Table Z (silica PEL))

k. 29 CFR 1915.1200 (Haz-Com – with reference to 29 CFR 1910.1200)

l. 29 CFR 1915 subpart I (PPE)

m. 29 CFR 1915.88 (sanitation)

The photos and images contained in the OSHA Abrasive Blasting Fact Sheet, OSHA's guidance document on Control Measures for Abrasive Blasting and OSHA's guidance document on Abrasive Blasting Hazards in Shipyard Employment, all cited above, accurately portray the

extensive PPE worn during abrasive blasting operations. This includes an air supplied respirator and hood protecting an employee's head, neck and shoulders, a free shield protecting an employee's face, hearing protection, gloves, protective overalls and safety boots.

Please note that this extensive PPE is worn not because of potential exposure to trace amounts of beryllium, but because abrasive blasting involves potential exposure to a large number of potentially hazardous chemicals from both the abrasive material as well as the surface being blasted. And because every blasting operation will be different it is not possible to determine with specificity in each case what substances may be generated during the blasting operation. The end result is that the PPE worn for abrasive blasting is already at least as, and typically much more, extensive than would be required for potential exposure to beryllium, particularly exposure to beryllium in trace amounts.

It is also not appropriate to regulate abrasive blasting on a chemical-by-chemical basis. It is a process that is currently regulated as a whole in 29 CFR 1910.94, 1926. 57, 1915.33 and 34 (with additional requirements imposed by still other standards as noted above). And, indeed abrasive blasting needs to be regulated as a whole. OSHA has recognized that "employers must protect workers from hazardous dust levels and toxic metals that may be generated from both the blasting material and the underlying substrate and coatings being blasted." OSHA Fact Sheet on Abrasive Blasting, p. 1. The Fact Sheet recognizes that the various commonly used abrasives contain multiple chemicals and that the various types of underlying substrate coatings being blasted will vary significantly from project to project. The Fact Sheet recognizes that "each abrasive blasting operation is unique, involving different surfaces, coatings, blast material and working conditions." OSHA Fact Sheet on Abrasive Blasting, p. 2.

To suggest that the primary rules governing abrasive blasting operations should be governed by a standard that addresses a trace element in abrasive blasting, just makes no sense. It would be a regulatory tail wagging the dog.

The Alliance also notes that the current proposed standard was drafted for general industry and does not take into account the unique circumstances found on construction and maritime worksites. Such circumstances have resulted in an entirely distinct set of industry-specific standards for these two industries. See 29 CFR Part 1926 and 29 CFR Part 1915. Any regulation of beryllium in these industries needs to be industry-specific as well, and any such regulation would need to be subject to notice and comment from applicable stakeholders. As just a few examples, unique issues exist for these industries with regard to the following and in each case further review, input from affected stakeholders, and resolution would be needed:

- Work areas and regulated areas (proposed 29 CFR 1910.24(e) and (m)). Abrasive blasting involves potential exposure to a number of hazardous chemicals and thus the beryllium-specific signs required in 1910.24(m) are not likely to be appropriate for construction and shipyard abrasive blasting. The rules for work areas and regulated areas are also inconsistent with the specific rules for abrasive blasting in construction and shipyards (29 CRF 1926.57(f) and 1915.34) which would not always require such designated areas.

- The locations where abrasive blasting takes place. The substantial amount of abrasive blasting that takes place outdoors in construction and shipyard work and the fact that blasting often takes place in multiple areas on such worksites also require further study.

- Respiratory protection (proposed 29 CFR 1910.24(g)). This subsection does not match the specific respiratory protection requirements imposed for abrasive blasting for construction and shipyard work (29 CFR 1926.57(f) and 1915.34).

- Other PPE (proposed 29 CFR 1910.24(h)). This subsection also does not match the specific PPE requirements currently imposed for abrasive blasting for construction and shipyard work (29 CFR 1926.57(f) and 1915.34).

- Hygiene areas and practices (proposed 29 CFR 1910.24(h)). The hygiene areas specified in this subsection exceed current requirements in construction and shipyard for abrasive blasting (29 CFR 1926.57(f) and 1915.34).

- Housekeeping (proposed 29 CFR 1910.24(j)). This subsection contains different standards for housekeeping than those specified in the construction and shipyard standards (29 CFR 1926.57(f) and 1915.34).

- Medical surveillance and medical removal (proposed 29 CFR 1910.24(k)). These provisions require onerous and highly detailed beryllium-specific medical protocols. As discussed above, the substances that an abrasive blaster is exposed to vary greatly, depending in great part on the surface and material being subject to the blasting. It would not be appropriate to require more costly medical procedures for beryllium as a trace element than for other hazardous substances to which abrasive blasters may be exposed and for which substantial evidence of health risks exist, unlike for beryllium as a trace element.

VI. Comments to Potential Regulatory Alternative 2b

Potential Regulatory Alternative 2b "would update the 1910.1000 Tables Z-1 and Z-2, 1915.1000 Table Z, and 1926.55 Appendix A so that the proposed TWA PEL and STEL would apply to all employers and employees in general industry, shipyards and construction, including occupations where beryllium exists only as a trace contaminant. However, under this alternative all other provisions of the standard would be in effect only for operations that otherwise fall within the scope of the proposed rule." 80 FR 47569.

Alternative 2b fails for the same reasons as previously noted. No evidence has been presented of "significant risk" from beryllium as a trace contaminant or in abrasive blasting. Potential Regulatory Alternative 2b is inappropriate on this basis alone.

Please also see the Alliance's comments to Potential Alternatives 1a and 1b which are also applicable here, with regard to attempting to regulate beryllium as a trace contaminant. Doing so is inappropriate for all the reasons the Alliance has previously noted.

Further, OSHA and NIOSH have both acknowledged that existing standards are sufficient to protect employees working with beryllium in the construction and maritime/shipyard industries. There is no additional "significant risk" to regulate.

CONCLUSION

For all of the foregoing reasons, the members of the Abrasive Blasting Manufacturers Alliance believe that the scope of the proposed standard should not be expanded to include Regulatory Alternatives 1a, 1b, 2a and 2b.