

## DEPARTMENT OF LABOR

## Occupational Safety and Health Administration

## 29 CFR Parts 1915 and 1926

[Docket No. OSHA-H005C-2006-0870]

RIN 1218-AB76

## Occupational Exposure to Beryllium and Beryllium Compounds in Construction and Shipyard Sectors

**AGENCY:** Occupational Safety and Health Administration (OSHA), Department of Labor.

**ACTION:** Proposed rule; request for comments.

**SUMMARY:** The Occupational Safety and Health Administration (OSHA) proposes to revoke the ancillary provisions for the construction and the shipyard sectors that OSHA adopted on January 9, 2017 but retain the new lower permissible exposure limit (PEL) of 0.2 µg/m<sup>3</sup> and the short term exposure limit (STEL) of 2.0 µg/m<sup>3</sup> for each sector. OSHA will not enforce the January 9, 2017 shipyard and construction standards without further notice while this new rulemaking is underway. This proposal does not affect the general industry beryllium standard published on January 9, 2017.

**DATES:** *Written comments.* Written comments, including comments on the information collection determination described in Section VII of the preamble (OMB Review under the Paperwork Reduction Act of 1995), must be submitted (postmarked, sent, or received) by August 28, 2017.

*Informal public hearings.* The Agency will schedule an informal public hearing on the proposed rule if requested during the comment period. The location and date of the hearing, procedures for interested parties to notify the Agency of their intention to participate, and procedures for participants to submit their testimony and documentary evidence will be announced in the **Federal Register** if a hearing is requested.

**ADDRESSES:** *Written comments.* You may submit comments, identified by Docket No. OSHA-H005C-2006-0870, by any of the following methods:

*Electronically:* You may submit comments and attachments electronically at <http://www.regulations.gov>, which is the Federal e-Rulemaking Portal. Follow the instructions on-line for making electronic submissions. When uploading multiple attachments into *Regulations.gov*, please number all of

your attachments because [www.Regulations.gov](http://www.Regulations.gov) will not automatically number the attachments. This will be very useful in identifying all attachments in the beryllium rule. For example, Attachment 1—title of your document, Attachment 2—title of your document, Attachment 3—title of your document, etc. Specific instructions for uploading documents are found in the Frequently Asked Questions portion and the commenter check list on *Regulations.gov*.

*Fax:* If your submissions, including attachments, are not longer than 10 pages, you may fax them to the OSHA Docket Office at (202) 693-1648.

*Mail, hand delivery, express mail, messenger, or courier service:* You may submit your comments to the OSHA Docket Office, Docket No. OSHA-H005C-2006-0870, Room N-3653, U.S. Department of Labor, 200 Constitution Avenue NW., Washington, DC 20210, telephone (202) 693-2350 (OSHA's TTY number is (877) 889-5627). OSHA's Docket Office accepts deliveries (hand deliveries, express mail, and messenger/courier service) from 10 a.m. to 3 p.m. e.t., weekdays.

*Instructions:* All submissions must include the Agency name and the docket number for this rulemaking (Docket No. OSHA-H005C-2006-0870). All comments, including any personal information you provide, are placed in the public docket without change and may be made available online at <http://www.regulations.gov>. Therefore, OSHA cautions you about submitting personal information such as Social Security numbers and birthdates.

*Docket:* To read or download comments and materials submitted in response to this **Federal Register** notice, go to Docket No. OSHA-H005C-2006-0870 at <http://www.regulations.gov>, or to the OSHA Docket Office at the address above. All comments and submissions are listed in the <http://www.regulations.gov> index; however, some information (e.g., copyrighted material) is not publicly available to read or download through that Web site. All comments and submissions are available for inspection at the OSHA Docket Office.

Electronic copies of this **Federal Register** document are available at <http://www.regulations.gov>. Copies also are available from the OSHA Office of Publications, Room N-3101, U.S. Department of Labor, 200 Constitution Avenue NW., Washington, DC 20210; telephone (202) 693-1888. This document, as well as news releases and other relevant information, is also available at OSHA's Web site at <http://www.osha.gov>.

**FOR FURTHER INFORMATION CONTACT:** *For general information and press inquiries,* contact Frank Meilinger, Director, Office of Communications, Room N-3647, OSHA, U.S. Department of Labor, 200 Constitution Avenue NW., Washington, DC 20210; telephone: (202) 693-1999; email: [meilinger.francis2@dol.gov](mailto:meilinger.francis2@dol.gov). *For technical inquiries,* contact: William Perry or Maureen Ruskin, Directorate of Standards and Guidance, Room N-3718, OSHA, U.S. Department of Labor, 200 Constitution Avenue NW., Washington, DC 20210; telephone (202) 693-1955 or fax (202) 693-1678; email: [ruskin.maureen@dol.gov](mailto:ruskin.maureen@dol.gov).

**SUPPLEMENTARY INFORMATION:** The preamble to this proposed rule on occupational exposure to beryllium and beryllium compounds follows this outline:

- I. Executive Summary and Regulatory Issues
  - II. Pertinent Legal Authority
  - III. Events Leading to the Proposal
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  - V. Preliminary Economic Analysis
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  - VII. OMB Review Under the Paperwork Reduction Act of 1995
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- Authority and Signature  
Amendments to Standards

### I. Executive Summary and Regulatory Issues

On January 9, 2017, OSHA published its final rule *Occupational Exposure to Beryllium and Beryllium Compounds* in the **Federal Register** (82 FR 2470). OSHA concluded that employees exposed to beryllium and beryllium compounds at the preceding permissible exposure limits (PELs) were at significant risk of material impairment of health, specifically chronic beryllium disease and lung cancer. OSHA concluded that the new 8-hour time-weighted average (TWA) PEL of 0.2 µg/m<sup>3</sup> reduced this significant risk to the maximum extent feasible.

Based on information submitted to the record, in the final rule OSHA issued three separate standards—for general industry, for shipyards, and for construction. In addition to the revised PEL, the final rule established a new short-term exposure limit (STEL) of 2.0 µg/m<sup>3</sup> over a 15-minute sampling period and an action level of 0.1 µg/m<sup>3</sup> as an

8-hour TWA, along with a number of ancillary provisions intended to provide additional protections to employees, such as requirements for exposure assessment, methods for controlling exposure, respiratory protection, personal protective clothing and equipment, housekeeping, medical surveillance, hazard communication, and recordkeeping similar to those found in other OSHA health standards.

On March 21, 2017 OSHA published a delay of the effective date for the final beryllium rule to May 20, 2017 in the **Federal Register** (82 FR 14439). This action was based on comments received on OSHA's proposed delay of effective date for the final rule in the **Federal Register** (82 FR 12318). OSHA proposed this delay in accordance with the January 20, 2017 Presidential directive from the Assistant to the President and Chief of Staff, entitled "Regulatory Freeze Pending Review" (82 FR 8346 (1/24/17)) that directed agencies to consider further delaying the effective date for regulations beyond the initial 60-day period.

After a further review of the comments received on the proposed extension, as well as a review of the applicability of existing OSHA standards, OSHA is proposing to revoke the ancillary provisions applicable to the construction and shipyard sectors, but to retain the new lower PEL of 0.2  $\mu\text{g}/\text{m}^3$  and the STEL of 2.0  $\mu\text{g}/\text{m}^3$  for those sectors. In the final rule, OSHA reviewed the exposure data for abrasive blasting in construction and shipyards and welding in shipyards and determined that there is a significant risk of chronic beryllium disease (CBD) and lung cancer to workers in construction and shipyards based on the exposure levels observed. Because OSHA determined that there is significant risk of material impairment of health at the new lower PEL of 0.2  $\mu\text{g}/\text{m}^3$ , the Agency continues to believe that it is necessary to protect workers exposed at this level. However, OSHA is now reconsidering the need for ancillary provisions in the construction and shipyards sectors. OSHA has evidence that beryllium exposure in these sectors is limited to the following operations: Abrasive blasting in construction, abrasive blasting in shipyards, and welding in shipyards. OSHA has a number of standards already applicable to these operations, including ventilation (29 CFR 1926.57) and mechanical paint removers (29 CFR 1915.34). In addition, this proposal provides stakeholders with an additional opportunity to offer

comments on the protections needed for workers exposed to beryllium in the construction and shipyard sectors, including the need for the ancillary provisions in the January 9, 2017 construction and shipyard beryllium standards. This will give OSHA additional information as it further considers the January 9, 2017 final rule's provisions for these sectors.

While the new beryllium rule went into effect on May 20, 2017, compliance obligations do not begin until March 12, 2018. Moreover, OSHA will not enforce the January 9, 2017 shipyard and construction standards without further notice while this new rulemaking is underway.

OSHA requests feedback on issues associated with the proposed regulatory action and requests information that would help the Agency craft the final rule. The Agency welcomes comments concerning all aspects of this proposal. However, OSHA is especially interested in responses, supported by evidence and reasons, to the following questions:

1. OSHA has proposed revoking the ancillary provisions for the construction and shipyard sectors while retaining the new (lower) PEL of 0.2  $\mu\text{g}/\text{m}^3$  and STEL of 2.0  $\mu\text{g}/\text{m}^3$  for those sectors. Does this provide adequate protection to the workers in construction and shipyard sectors considering the other standards that apply? Should OSHA keep any or all of the ancillary provisions of the January 9, 2017 final rule for construction and shipyards? If so, which ones?

2. In particular, what is the incremental benefit if OSHA keeps the medical surveillance requirements for construction and shipyards described in the January 9, 2017 final rule, but revokes the other ancillary provisions? Alternatively, should OSHA keep some of the medical surveillance requirements for construction and shipyards but not others? Which medical surveillance requirements are most appropriate for beryllium-exposed workers in these sectors, if any? For more information, see Regulatory Alternative #21a, PELs plus medical surveillance (lowering the PEL and requiring medical surveillance when exposed above the PEL for operations outside the scope of the proposed rule), in the 2015 NPRM (80 FR 47565 (8/7/15)). OSHA's estimates of the medical surveillance costs changed between the NPRM and final rule because of a change of the medical surveillance trigger from the action level to the PEL; updated exposure data and hire rates; and revised unit costs in response to

comments and conversion from 2010 to 2015 dollars.

3. In addition to the proposal in this notice, OSHA is considering extending the compliance dates in the January 9, 2017 final rule by a year for the construction and shipyard standards. This would give affected employers additional time to come into compliance with its requirements, which could be warranted by the uncertainty created by this proposal.

In the January 9, 2017 final rule, OSHA analyzed the technological and economic feasibility of complying with the rule for the construction and shipyard sectors and found that the rule was technologically and economically feasible for these sectors. Since the changes we propose today will retain the new PELs and eliminate the ancillary provisions, these changes will not affect the feasibility findings. The technological and economic feasibility of the January 9, 2017 final rule is established in the FEA, which is summarized in Sections IV and VI of this preamble.

Table I-1, which is based on the material presented in the 2016 FEA with updated assumptions, provides OSHA's best estimate of the cost savings to shipyard and construction establishments in all affected application groups as a result of this proposal to remove all of the ancillary provision requirements in those sectors. OSHA is proposing to remove the following ancillary provisions: Exposure monitoring, regulated areas (and competent person in construction), a written exposure control plan, protective equipment and work clothing, hygiene areas and practices, housekeeping, medical surveillance, medical removal, and worker training. Note that, because OSHA is not proposing to change the January 9, 2017 PELs and STELs in this proposal, OSHA has not estimated any cost savings related to engineering controls or respirators. Note also that, although not a requirement in the January 9, 2017 beryllium standards, OSHA estimated costs there for rule familiarization. Since some employers may have already incurred familiarization costs in reviewing those published standards, OSHA views them as sunk costs and has not included them in the estimated cost savings. Furthermore, OSHA has added some modest costs in this proposal to reflect the fact that construction and shipyard employers would be expected to devote some time becoming familiar with the revocation of the January 9, 2017 ancillary provisions.

TABLE I-1—TOTAL ANNUALIZED COST SAVINGS, BY SECTOR AND SIX-DIGIT NAICS INDUSTRY, FOR ENTITIES AFFECTED BY THE BERYLLIUM PROPOSAL; RESULTS SHOWN BY SIZE CATEGORY  
[3 percent discount rate, 2016 dollars]

Application group/NAICS	Industry	All establishments	Small entities (SBA-defined)	Very small entities (<20 Employees)
<b>Abrasive Blasting—Construction</b>				
238320 .....	Painting and Wall Covering Contractors .....	\$4,087,412	\$3,445,984	\$2,420,659
238990 .....	All Other Specialty Trade Contractors .....	3,787,418	2,916,925	1,998,054
<b>Abrasive Blasting—Shipyards</b>				
336611a .....	Ship Building and Repairing .....	3,081,907	990,140	524,187
<b>Welding in Shipyards</b>				
336611b .....	Ship Building and Repairing .....	34,217	11,283	6,421
<b>Total</b>				
Construction Subtotal .....	.....	7,874,830	6,362,909	4,418,712
Maritime Subtotal .....	.....	3,116,125	1,001,423	530,608
Total, All Industries .....	.....	10,990,954	7,364,331	4,949,321

Notes: Figures in rows may not add to totals due to rounding.

\* Employers in application group Abrasive Blasting—Shipyards are shipyards employing abrasive blasters that use mineral slag abrasives to etch the surfaces of boats and ships.

\*\* Employers in application group Welding in Shipyards employ welders in shipyards. Some of these employers may do both welding and abrasive blasting.

Source: US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis.

The remainder of this preamble presents the legal requirements of the Occupational Safety and Health Act (OSH Act) (Section II, Pertinent Legal Authority); a summary of the events leading to the proposal (Section III); the technological feasibility summary (Section IV); the preliminary economic analysis for the proposal (Section V); the preliminary economic feasibility findings and the regulatory flexibility certification for the proposal (Section VI); a summary of the analysis of this proposal under the Paperwork Reduction Act of 1995 (Section VII); analyses under various executive orders and a description of the implications for State-Plan States (Sections VIII–XIII); instructions for public participation (Section XIV); and the summary and explanation of OSHA’s proposal to maintain the TWA PEL of 0.2 µg/m<sup>3</sup> and STEL of 2 µg/m<sup>3</sup> for operations in construction and shipyards while revoking the January 9, 2017 ancillary provisions for these sectors (Section XV).

**II. Pertinent Legal Authority**

The purpose of the Occupational Safety and Health Act of 1970 (“the OSH Act” or “the Act”), 29 U.S.C. 651 *et al.*, is “to assure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources.” 29 U.S.C. 651(b). To achieve

this goal, Congress authorized the Secretary of Labor to promulgate occupational safety and health standards pursuant to notice and comment. *See* 29 U.S.C. 655(b).

An occupational safety or health standard is a standard “which requires conditions, or the adoption or use of one or more practices, means, methods, operations, or processes, reasonably necessary or appropriate to provide safe or healthful employment and places of employment.” 29 U.S.C. 652(8).

The Act provides that in promulgating health standards dealing with toxic materials or harmful physical agents, such as the January 9, 2017 final rule regulating occupational exposure to beryllium,

[t]he Secretary . . . shall set the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life.

29 U.S.C. 655(b)(5). The Supreme Court has held that before the Secretary can promulgate any permanent health or safety standard, he must make a threshold finding that significant risk is present and that such risk can be eliminated or lessened by a change in practices. *See Industrial Union Dept., AFL-CIO v. Am. Petroleum Inst.*, 448 U.S. 607, 641–42 (1980) (plurality opinion) (“Benzene”). Thus, section

6(b)(5) of the Act requires health standards to reduce significant risk to the extent feasible. *See id.*

The Court further observed that what constitutes “significant risk” is “not a mathematical straitjacket” and must be “based largely on policy considerations.” *Id.* at 655, 655 n.62. OSHA retains

great discretion . . . under Section 3(8) [of the Act], especially in an area where scientific certainty is impossible. In the first instance, it is the agency itself that determines the existence of a “significant” risk . . . In making the difficult judgment as to what level of harm is unacceptable, the agency may rely on its own sound “considerations of policy” as well as hard factual data . . .

*United Steelworkers v. Marshall*, 647 F.2d 1189, 1248 (D.C. Cir. 1980) (“Lead I”) (internal citations omitted). When evaluating such considerations, OSHA exercises its discretion and its “delegated power to make within certain limits decisions that Congress normally makes itself.” *Industrial Union Dept., AFL-CIO v. Hodgson*, 499 F.2d 467, 475 (D.C. Cir. 1974). Accordingly, OSHA’s discretionary authority under the Act is broad. *See Lead I*, 647 F.2d at 1230. Indeed, “[a] number of terms of the statute give OSHA almost unlimited discretion to devise means to achieve the congressionally mandated goal” of ensuring worker safety and health. *Id.* (citation omitted). Once OSHA makes its significant risk finding, the standard

must be “reasonably necessary or appropriate” to reduce or eliminate that risk within the meaning of section 3(8) of the Act (29 U.S.C. 652(8)) and *Benzene* (448 U.S. at 642). See *Bldg. and Constr. Trades Dep’t v. Brock*, 838 F.2d 1258, 1269 (D.C. Cir. 1988) (“*Asbestos II*”). In choosing among regulatory alternatives, however, “[t]he determination that [one standard] is appropriate, as opposed to a marginally [more or less protective] standard, is a technical decision entrusted to the expertise of the agency.” *Nat’l Mining Ass’n v. Mine Safety and Health Admin.*, 116 F.3d 520, 528 (D.C. Cir. 1997) (analyzing a Mine Safety and Health Administration standard under the *Benzene* significant risk standard). Where there is significant risk below the PEL, OSHA should use its regulatory authority to impose additional requirements on employers when those requirements will result in a greater than de minimis incremental benefit to workers’ health. See *Asbestos II*, 838 F.2d at 1274.

The Act also authorizes the Secretary to “modify” or “revoke” any occupational safety or health standard. 29 U.S.C. 655(b). The Supreme Court has acknowledged that regulatory agencies do not establish rules of conduct to last forever, and agencies may revise their rules if supported by a reasoned analysis for the change. See *Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 42 (1983). “While the removal of a regulation may not entail the monetary expenditures and other costs of enacting a new standard, and accordingly, it may be easier for an agency to justify a deregulatory action, the direction in which an agency chooses to move does not alter the standard of judicial review established by law.” *Id.* at 43.

OSHA is required to set standards “on the basis of the best available evidence,” 29 U.S.C. 655(b)(5), and its determinations are “conclusive” if supported by “substantial evidence in the record considered as a whole,” 29 U.S.C. 655(f). As noted above, the Supreme Court, in *Benzene*, explained that OSHA must look to “a body of reputable scientific thought” in making its determinations, while noting that a reviewing court must “give OSHA some leeway where its findings must be made on the frontiers of scientific knowledge.” 448 U.S. at 656. When there is disputed scientific evidence in the record, OSHA must review the evidence on both sides and “reasonably resolve” the dispute. *Pub. Citizen Health Research Grp. v. Tyson*, 796 F.2d 1479, 1500 (D.C. Cir. 1986). As the D.C. Circuit has noted, where “OSHA has the

expertise we lack and it has exercised that expertise by carefully reviewing the scientific data,” a dispute within the scientific community is not occasion for the reviewing court to take sides about which view is correct. *Id.*

OSHA standards must be both technologically and economically feasible. See *Lead I*, 647 F.2d at 1264. The Supreme Court has defined feasibility as “capable of being done.” *Am. Textile Mfrs. Inst. v. Donovan*, 452 U.S. 490, 509–10 (1981) (“*Cotton Dust*”). The courts have further clarified that a standard is technologically feasible if OSHA proves a reasonable possibility, “within the limits of the best available evidence, . . . that the typical firm will be able to develop and install engineering and work practice controls that can meet the PEL in most of its operations.” *Lead I*, 647 F.2d at 1272.

With respect to economic feasibility, the courts have held that “a standard is feasible if it does not threaten massive dislocation to or imperil the existence of the industry.” *Id.* at 1265 (internal quotation marks and citations omitted). A court must examine the cost of compliance with an OSHA standard in relation to the financial health and profitability of the industry and the likely effect of such costs on unit consumer prices. . . . [T]he practical question is whether the standard threatens the competitive stability of an industry, . . . or whether any intra-industry or inter-industry discrimination in the standard might wreck such stability or lead to undue concentration.

*Id.* (internal citations omitted). The courts have further observed that granting companies reasonable time to comply with new PELs may enhance economic feasibility. See *id.*

Because section 6(b)(5) of the Act explicitly imposes the “to the extent feasible” limitation on the setting of health standards, OSHA is not permitted to use cost-benefit analysis to make its standards-setting decisions. 29 U.S.C. 655(b)(5). An OSHA standard must be cost effective, which means that the protective measures it requires are the least costly of the available alternatives that achieve the same level of protection, but OSHA cannot choose an alternative that provides a lower level of protection because it is less costly. See *Int’l Union, UAW v. OSHA*, 37 F.3d 655, 668 (D.C. Cir. 1994); see also *Cotton Dust*, 452 U.S. at 514 n.32.

Congress itself defined the basic relationship between costs and benefits, by placing the “benefit” of worker health above all other considerations save those making attainment of this “benefit” unachievable. Any standard based on a balancing of costs and benefits by the Secretary that strikes a different balance than that struck by Congress would be

inconsistent with the command set forth in § 6(b)(5).

*Cotton Dust*, 452 U.S. at 509. Thus, while OSHA estimates the costs and benefits of its proposed and final rules, in part to ensure compliance with requirements such as those in Executive Orders 12866 and 13771, these calculations do not form the basis for the Agency’s regulatory decisions.

### III. Events Leading to the Proposal

The first occupational exposure limit for beryllium was set in 1949 by the Atomic Energy Commission (AEC), which required that beryllium exposure in the workplaces under its jurisdiction be limited to 2 µg/m<sup>3</sup> as an 8-hour time-weighted average (TWA), and 25 µg/m<sup>3</sup> as a peak exposure never to be exceeded (Document ID 1323). These exposure limits were adopted by all AEC installations handling beryllium, and were binding on all AEC contractors involved in the handling of beryllium.

In 1956, the American Industrial Hygiene Association (AIHA) published a Hygienic Guide which supported the AEC exposure limits. In 1959, the American Conference of Governmental Industrial Hygienists (ACGIH®) also adopted a Threshold Limit Value (TLV®) of 2 µg/m<sup>3</sup> as an 8-hour TWA (Document ID 0498). In 1970, the American National Standards Institute (ANSI) issued a national consensus standard for beryllium and beryllium compounds (ANSI Z37.29–1970). The standard set a permissible exposure limit (PEL) for beryllium and beryllium compounds at 2 µg/m<sup>3</sup> as an 8-hour TWA; 5 µg/m<sup>3</sup> as an acceptable ceiling concentration; and 25 µg/m<sup>3</sup> as an acceptable maximum peak above the acceptable ceiling concentration for a maximum duration of 30 minutes in an 8-hour shift (Document ID 1303).

In 1971, OSHA adopted, under Section 6(a) of the Occupational Safety and Health Act of 1970, and made applicable to general industry, the ANSI standard (Document ID 1303). Section 6(a) provided that in the first two years after the effective date of the Act, OSHA was to promulgate “start-up” standards, on an expedited basis and without public hearing or comment, based on national consensus or established Federal standards that improved employee safety or health. Pursuant to that authority, in 1971, OSHA promulgated approximately 425 PELs for air contaminants, including beryllium, derived principally from Federal standards applicable to government contractors under the Walsh-Healey Public Contracts Act, 41 U.S.C. 35, and the Contract Work Hours and Safety Standards Act (commonly

known as the Construction Safety Act), 40 U.S.C. 333. The Walsh-Healey Act and Construction Safety Act standards, in turn, had been adopted primarily from ACGIH's TLV's as well as several from United States of America Standards Institute (USASI) (later the American National Standards Institute (ANSI)).

The National Institute for Occupational Safety and Health (NIOSH) issued a document entitled Criteria for a Recommended Standard: Occupational Exposure to Beryllium (Criteria Document) in June 1972 with Recommended Exposure Limits (RELs) of  $2 \mu\text{g}/\text{m}^3$  as an 8-hour TWA and  $25 \mu\text{g}/\text{m}^3$  as an acceptable maximum peak above the acceptable ceiling concentration for a maximum duration of 30 minutes in an 8-hour shift (Document ID 1324). OSHA reviewed the findings and recommendations contained in the Criteria Document along with the AEC control requirements for beryllium exposure. OSHA also considered existing data from animal and epidemiological studies, and studies of industrial processes of beryllium extraction, refinement, fabrication, and machining. In 1975, OSHA asked NIOSH to update the evaluation of the existing data pertaining to the carcinogenic potential of beryllium. In response to OSHA's request, the Director of NIOSH stated that, based on animal data and through all possible routes of exposure including inhalation, "beryllium in all likelihood represents a carcinogenic risk to man."

In October 1975, OSHA proposed a new beryllium standard for all industries based on information from studies finding that beryllium caused cancer in animals (40 FR 48814 (10/17/75)). Adoption of this proposal would have lowered the 8-hour TWA exposure limit from  $2 \mu\text{g}/\text{m}^3$  to  $1 \mu\text{g}/\text{m}^3$ . In addition, the proposal included ancillary provisions for such topics as exposure monitoring, hygiene facilities, medical surveillance, and training related to the health hazards from beryllium exposure. The rulemaking was never completed.

In 1977, NIOSH recommended an exposure limit of  $0.5 \mu\text{g}/\text{m}^3$  and identified beryllium as a potential occupational carcinogen. In December 1998, ACGIH published a Notice of Intended Change for its beryllium exposure limit. The notice proposed a lower TLV of  $0.2 \mu\text{g}/\text{m}^3$  over an 8-hour TWA based on evidence of CBD and sensitization in exposed workers. Then in 2009, ACGIH adopted a revised TLV for beryllium that lowered the 8-hour TWA to  $0.05 \mu\text{g}/\text{m}^3$  (inhalable) (see Document ID 1755, Tr. 136).

In 1999, the Department of Energy (DOE) issued a Chronic Beryllium Disease Prevention Program (CBDPP) Final Rule for employees exposed to beryllium in its facilities (Document ID 1323). The DOE rule set an action level of  $0.2 \mu\text{g}/\text{m}^3$ , and adopted OSHA's PEL of  $2 \mu\text{g}/\text{m}^3$  or any more stringent PEL OSHA might adopt in the future (10 CFR 850.22; 64 FR 68873 and 68906, Dec. 8, 1999).

Also in 1999, OSHA was petitioned by the Paper, Allied-Industrial, Chemical and Energy Workers International Union (PACE) (Document ID 0069) and by Dr. Lee Newman and Ms. Margaret Mroz, from the National Jewish Health (NJH) (Document ID 0069), to promulgate an Emergency Temporary Standard (ETS) for beryllium in the workplace. In 2001, OSHA was petitioned for an ETS by Public Citizen Health Research Group and again by PACE (Document ID 0069). In order to promulgate an ETS, the Secretary of Labor must prove (1) that employees are exposed to grave danger from exposure to a hazard, and (2) that such an emergency standard is necessary to protect employees from such danger (29 U.S.C. 655(c) [section 6(c)]). The burden of proof is on the Department and because of the difficulty of meeting this burden, the Department usually proceeds when appropriate with ordinary notice and comment [section 6(b)] rulemaking rather than a section 6(c) ETS. Thus, instead of granting the ETS requests, OSHA instructed staff to further collect and analyze research regarding the harmful effects of beryllium in preparation for possible section 6(b) rulemaking.

On November 26, 2002, OSHA published a Request for Information (RFI) for "Occupational Exposure to Beryllium" (Document ID 1242). The RFI contained questions on employee exposure, health effects, risk assessment, exposure assessment and monitoring methods, control measures and technological feasibility, training, medical surveillance, and impact on small business entities. In the RFI, OSHA expressed concerns about health effects such as chronic beryllium disease (CBD), lung cancer, and beryllium sensitization. OSHA pointed to studies indicating that even short-term exposures below OSHA's PEL of  $2 \mu\text{g}/\text{m}^3$  could lead to CBD. The RFI also cited studies describing the relationship between beryllium sensitization and CBD (67 FR at 70708). In addition, OSHA stated that beryllium had been identified as a carcinogen by organizations such as NIOSH, the International Agency for Research on Cancer (IARC), and the Environmental

Protection Agency (EPA); and cancer had been evidenced in animal studies (67 FR at 70709).

On November 15, 2007, OSHA convened a Small Business Advocacy Review Panel to review a draft proposed standard for occupational exposure to beryllium. OSHA convened this panel under Section 609(b) of the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA) (5 U.S.C. 601 *et seq.*). The Panel included representatives from OSHA, the Solicitor's Office of the Department of Labor, the Office of Advocacy within the Small Business Administration, and the Office of Information and Regulatory Affairs of the Office of Management and Budget. Small Entity Representatives (SERs) made oral and written comments on the draft rule and submitted them to the panel.

The SBREFA Panel issued a report on January 15, 2008 which included the SERs' comments. SERs expressed concerns about the impact of the ancillary requirements such as exposure monitoring and medical surveillance. Their comments addressed potential costs associated with compliance with the draft standard, and possible impacts of the standard on market conditions, among other issues. In addition, many SERs sought clarification of some of the ancillary requirements such as the meaning of "routine" contact or "contaminated surfaces."

OSHA then developed a draft preliminary beryllium health effects evaluation (Document ID 1271) and a draft preliminary beryllium risk assessment (Document ID 1272), and in 2010, OSHA hired a contractor to oversee an independent scientific peer review of these documents. The contractor identified experts familiar with beryllium health effects research and ensured that these experts had no conflict of interest or apparent bias in performing the review. The contractor selected five experts with expertise in such areas as pulmonary and occupational medicine, CBD, beryllium sensitization, the Beryllium Lymphocyte Proliferation Test (BeLPT), beryllium toxicity and carcinogenicity, and medical surveillance. Other areas of expertise included animal modeling, occupational epidemiology, biostatistics, risk and exposure assessment, exposure-response modeling, beryllium exposure assessment, industrial hygiene, and occupational/environmental health engineering.

Regarding the preliminary health effects evaluation, the peer reviewers

concluded that the health effect studies were described accurately and in sufficient detail, and OSHA's conclusions based on the studies were reasonable (Document ID 1210). The reviewers agreed that the OSHA document covered the significant health endpoints related to occupational beryllium exposure. Peer reviewers considered the preliminary conclusions regarding beryllium sensitization and CBD to be reasonable and well presented in the draft health evaluation section. All reviewers agreed that the scientific evidence supports sensitization as a necessary condition in the development of CBD. In response to reviewers' comments, OSHA made revisions to more clearly describe certain sections of the health effects evaluation. In addition, OSHA expanded its discussion regarding the BeLPT.

Regarding the preliminary risk assessment, the peer reviewers were highly supportive of OSHA's approach and major conclusions (Document ID 1210). The peer reviewers stated that the key studies were appropriate and their selection clearly explained in the document. They regarded the preliminary analysis of these studies to be reasonable and scientifically sound. The reviewers supported OSHA's conclusion that substantial risk of sensitization and CBD were observed in facilities where the highest exposure-generating processes had median full-shift exposures around  $0.2 \mu\text{g}/\text{m}^3$  or higher, and that the greatest reduction in risk was achieved when exposures for all processes were lowered to  $0.1 \mu\text{g}/\text{m}^3$  or below.

In February 2012, OSHA received for consideration a draft recommended standard for beryllium (Materion and USW, 2012, Document ID 0754). This draft standard was the product of a joint effort between two stakeholders: Materion Corporation, a leading producer of beryllium and beryllium products in the United States, and the United Steelworkers, an international labor union representing workers who manufacture beryllium alloys and beryllium-containing products in a number of industries. They sought to craft an OSHA-like model beryllium standard that would have support from both labor and industry. OSHA considered this draft standard along with other information submitted during the development of the Notice of Proposed Rulemaking (NPRM) for beryllium published in 2015. As described in greater detail in the Introduction to the Summary and Explanation of the final rule, there was substantial agreement between the

submitted joint draft standard and the OSHA proposed standard.

On August 7, 2015, OSHA published its NPRM in the **Federal Register** (80 FR 47565 (8/7/15)). In the NPRM, OSHA made a preliminary determination that employees exposed to beryllium and beryllium compounds at the preceding PEL face a significant risk to their health and that promulgating the proposed standard would substantially reduce that risk. The NPRM (Section XVIII) also responded to the SBREFA Panel recommendations, which OSHA carefully considered, and clarified the requirements about which SERs expressed confusion. OSHA also discussed the regulatory alternatives recommended by the SBREFA Panel in NPRM, Section XVIII, and in the PEA (Document ID 0426).

The NPRM invited interested stakeholders to submit comments on a variety of issues and indicated that OSHA would schedule a public hearing upon request. Commenters submitted information and suggestions on a variety of topics. In addition, in response to a request from the Non-Ferrous Founders' Society, OSHA scheduled an informal public hearing on the proposed rule. OSHA invited interested persons to participate by providing oral testimony and documentary evidence at the hearing. OSHA also welcomed presentation of data and documentary evidence that would provide the Agency with evidence to use in determining whether to develop a final rule.

The public hearing was held in Washington, DC on March 21 and 22, 2016. Administrative Law Judge William Colwell presided over the hearing. OSHA heard testimony from several organizations, such as public health groups, the Non-Ferrous Founders' Society, other industry representatives, and labor unions. Following the hearing, participants who had filed notices of intent to appear were allowed 30 days—until April 21, 2016—to submit additional evidence and data, and an additional 15 days—until May 6, 2016—to submit final briefs, arguments, and summations (Document ID 1756, Tr. 326). In all, the OSHA rulemaking record contained over 1,900 documents, including all the studies OSHA relied on in its preliminary health effects and risk assessment analyses, the hearing transcript and submitted testimonies, the joint Materion-USW draft proposed standard, and the pre- and post-hearing comments and briefs.

In 2016, in an action parallel to OSHA's rulemaking, DOE proposed to update its action level to  $0.05 \mu\text{g}/\text{m}^3$  (81 FR 36704–36759, June 7, 2016). The

DOE action level triggers workplace precautions and control measures such as periodic monitoring, exposure reduction or minimization, regulated areas, hygiene facilities and practices, respiratory protection, protective clothing and equipment, and warning signs (Document ID 1323; 10 CFR 850.23(b)). Unlike OSHA's PEL, however, DOE's selection of an action level is not required to meet statutory requirements of technological and economic feasibility.

On January 9, 2017, OSHA published its final rule *Occupational Exposure to Beryllium and Beryllium Compounds* in the **Federal Register** (82:2470–2757 (1/9/17)). Based on the entire rulemaking record, OSHA concluded that employees exposed to beryllium and beryllium compounds at the preceding PELs were at significant risk of material impairment of health, specifically chronic beryllium disease and lung cancer. OSHA concluded that the new PEL of  $0.2 \mu\text{g}/\text{m}^3$  reduced this significant risk to the maximum extent that is technologically and economically feasible. The final rule also included ancillary provisions to protect employees, such as requirements for exposure assessment, methods for controlling exposure, respiratory protection, personal protective clothing and equipment, housekeeping, medical surveillance, hazard communication, and recordkeeping.

In a change from the NPRM, OSHA included the construction and shipyard industries in the beryllium final rule. OSHA's decision was based on supportive testimony and comments from stakeholders along with exposure data in the record indicating the potential for exposures above the action level for abrasive blasting using coal and copper slags (Document ID 1756; 1782; 1790). OSHA issued three separate standards for general industry, construction, and shipyards in an attempt to tailor requirements to each sector. The final rule also included other changes from the NPRM that were based on OSHA's analysis of the record. These included changes in the scope of the standards, exposure assessment requirements, beryllium work areas, personal protective clothing and equipment, medical surveillance requirements, and compliance dates.

On February 1, 2017, OSHA published a delay of the effective date for the final rule in the **Federal Register** (82:8901 (2/1/17)). OSHA implemented this action based on the Presidential directive as expressed in the memorandum of January 20, 2017, from the Assistant to the President and Chief of Staff, entitled "Regulatory Freeze

Pending Review” (82 FR 8346 (January 24, 2017)). That memorandum directed the heads of Executive Departments and Agencies to temporarily postpone for 60 days from the date of the memorandum the effective dates of all regulations that had been published in the **Federal Register** but had not yet taken effect. OSHA therefore delayed the effective date for the final rule *Occupational Exposure to Beryllium and Beryllium Compounds* to March 21, 2017.

On March 2, 2017, OSHA published a proposed delay of effective date for the final rule in the **Federal Register** (82 FR 12318 (3/2/17)). OSHA proposed this further delay in accordance with the January 20, 2017 Presidential directive from the Assistant to the President and Chief of Staff, entitled “Regulatory Freeze Pending Review” (82 FR 8346 (January 24, 2017)) that directed agencies to consider further delaying the effective date for regulations beyond the initial 60-day period. OSHA preliminarily determined that it would be appropriate to further delay the effective date of the final rule to give the new administration time to review questions of fact, law, and policy raised therein. OSHA therefore proposed extending the effective date to May 20, 2017 and sought comment on its proposal to extend the effective date by an additional 60 days. OSHA received twenty-five unique comments on this proposal with many of the commenters supporting the delay considering the ongoing transition to a new administration. Some of these commenters also requested that OSHA further review the impact of the rule on entities that would be affected by changes from the proposed beryllium

rule. Several commenters opposed the proposed delay of the effective date.

On March 21, 2017, after considering all the comments received, OSHA finalized the delay of the effective date for the final beryllium rule in the **Federal Register** (82 FR 14439 (2/21/17)). This action extended the effective date to May 20, 2017 and provided OSHA with additional time to conduct a further review of the final rule, including consideration of concerns raised by interested parties. After careful consideration, and for reasons explained fully in the Summary and Explanation of this preamble, OSHA is proposing to revoke the ancillary provisions for both construction and shipyards adopted in the January 9, 2017 final rule and retain the new lower PEL of 0.2 µg/m<sup>3</sup> and STEL of 2.0 µg/m<sup>3</sup> for those sectors (see Section XV, Summary and Explanation of the Proposal).

**IV. Technological Feasibility Summary**

*Exposure Profile*

This section summarizes the basis for OSHA’s technological feasibility findings made in the 2016 Final Economic Analysis (FEA) for the January 9, 2017 beryllium final rule (see Docket ID 2042, FEA Chapter IV—Technological Feasibility). It is presented here for informational purposes only. The information in this section is drawn entirely from the 2016 FEA and contains no new information or assessment.

**Abrasive Blasting in Construction and Shipyards**

The primary abrasive blasting job categories include the abrasive blasting

operator (blaster) and pot tender (blaster’s helper or assistant) during open blasting projects. Support personnel such as pot tenders or abrasive media cleanup workers might also be employed to clean up (e.g., by vacuuming or sweeping) and recycle spent abrasive and to set up, dismantle, and move containment systems and supplies (NIOSH, 1976, Document ID 0779; NIOSH, 1993, 0777; NIOSH, 1995, 0773; NIOSH, 2007, 0770; Flynn and Susi, 2004, 1608; Meeker *et al.*, 2005, 0699).

Section 15 of Chapter IV of the 2016 Final Economic Analysis (FEA) for the January 9, 2017 final beryllium rule included a detailed discussion of exposure data and analysis for the development of the exposure profile for workers in abrasive blasting operations. Because OSHA addressed general industry abrasive blasting operations in other general industry sections where appropriate, such as in the nonferrous foundries industry, the exposure profile in Section 15 addressed only exposure data from construction and shipyard tasks. The exposure profile for abrasive blasters, pot tenders/helpers, and abrasive media cleanup workers was based on two National Institute for Occupational Safety and Health (NIOSH) evaluations of beryllium exposure from abrasive blasting with coal slag, unpublished sampling results for abrasive blasting operations from four U.S. shipyards, and data submitted by the U.S. Navy (NIOSH, 1983, Document ID 0696; NIOSH, 2007, 0770; OSHA, 2005, 1166; U.S. Navy, 2003, 0145).

TABLE IV.1—EXPOSURE PROFILE FOR ABRASIVE BLASTING WORKERS

	Number of full-shift PBZ sample results in range (µg/m <sup>3</sup> )						Total number of samples
	<0.1	≥0.1 to ≤0.2	>0.2 to ≤0.5	>0.5 to ≤1.0	>1.0 to ≤2.0	>2.0	
Abrasive Blasters .....	45 30.4%	38 25.7%	22 14.8%	7 4.7%	8 5.4%	28 18.9%	148 100%
Pot Tender .....	9 56.2%	7 43.8%	0 0%	0 0%	0 0%	0 0%	16 100%
Cleanup .....	20 66.6%	8 26.7%	0 0%	0 0%	1 3.3%	1 3.3%	30 100%
Totals .....	74 38.1%	53 27.3%	22 11.2%	7 3.6%	9 4.6%	29 15%	194 100%

Sources: Document ID 0145; OSHA 2005, Document ID 1166; NIOSH 1983, 0696; NIOSH 2007, 0770.

**Notes:** Sample results are expressed as eight-hour time-weighted averages and include sampling durations of 240 minutes or longer.

Non-detected shipyard results are incorporated into the exposure profile by assigning the detection limit value to each result reported as less than the sample limit of detection.

Excludes four results where garnet was used as the abrasive due to high nondetectable reporting limits.



Welding in Shipyards

Similar to the profile for abrasive blasting activities, OSHA used exposure data from the 2016 FEA to develop the exposure profile for welding in

shipyards. OSHA used the exposure data from Chapter IV–10 Appendices 2 and 3 and combined the aluminum base metal and non-aluminum or unknown base material data. OSHA removed shorter duration samples that appeared

in Appendix 3 of FEA Chapter IV–10. Seven maritime welding samples from Appendix 3, Table IV–10.6 with sampling durations of 240 minutes or greater were used in this profile to represent the 8-hour TWA samples.

IV.2—WELDING IN SHIPYARDS—BERYLLIUM 8-HOUR TWA EXPOSURE PROFILE

Number of beryllium samples in range (µg/m³) and percent of total in range

Range	<0.1	>0.1 to ≤0.2	>0.2 to ≤0.5	>0.5 to ≤1.0	>1.0 to ≤2.0	>2.0	Total
Aluminum Base Material Percent ..	4 57%	0 0%	0 0%	2 28.6%	1 14.3%	0 0%	7 100%
Base Material Not Aluminum or Unknown Percent .....	123 96.9%	2 21.6%	0 0%	2 1.6%	0 0%	0 0%	127 100%
Totals .....	127 94.8%	2 1.5%	0 0%	4 3.0%	1 0.7%	0 0%	134 100%

Sources: OSHA Shipyards, 2005, Document ID 1166; U.S. Navy, 2003, Document ID 0145. Beryllium samples below the limit of detection are recast as 0 µg/m³ to reflect likely absence of beryllium in the work materials. Data includes samples collected over periods of 240 minutes or longer, to avoid samples with elevated limits of detection that cannot be meaningfully interpreted.

Technological Feasibility Determination

Overall, based on the information discussed in Chapter IV of Final Economic Analysis of the January 9, 2017 final beryllium rule, OSHA determined that the majority of the exposures in construction and shipyards are either already at or below the new final PEL, or can be adequately controlled to levels below the final PEL through the implementation of additional engineering and work practice controls for most operations most of the time. The one exception is that OSHA determined that workers who perform open-air abrasive blasting using mineral grit (i.e., coal slag) will routinely be exposed to levels above the final PEL even after the installation of feasible engineering and work practice controls, and therefore, these workers will also be required to wear respiratory protection. Therefore, OSHA concluded in the January 9, 2017 final rule that the final PEL of 0.2 µg/m³ is technologically feasible in abrasive blasting in construction and shipyards and in welding in shipyards.

V. Preliminary Economic Analysis

A. Introduction

This Preliminary Economic Analysis (PEA) addresses issues related to the profile of affected application groups, establishments, and employees, the cost savings, and the health effects of OSHA’s proposal to revoke both the construction and shipyard ancillary provisions and make no changes to the January 9, 2017 final rule’s PEL and STEL for the shipyard and construction industries.

The proposed actions are not “economically significant regulatory actions” under Executive Order 12866 or UMRA, nor are they “major rules” under the Congressional Review Act (5 U.S.C. 801 *et seq.*). Neither the benefits nor the costs of these proposed actions exceed \$100 million. In addition, they do not meet any of the other criteria specified by UMRA for a significant regulatory action or the Congressional Review Act for a major rule. However, these actions have been determined to be “significant” under Executive Order 12866.

Under this proposal, employers in shipyards and construction would no longer be required to implement the ancillary provisions adopted by the January 9, 2017 final rule. The nine ancillary provisions being removed by this proposal are: (1) Assess employees’ exposure to airborne beryllium, (2) establish regulated areas or a competent person, (3) develop a written exposure control plan, (4) provide personal protective work clothing and equipment, (5) establish hygiene areas and practices, (6) implement housekeeping measures, (7) provide medical surveillance, (8) provide medical removal for employees who have developed CBD or been confirmed positive for beryllium sensitization, and (9) provide appropriate training. OSHA assumes that these employers have already incurred the costs of familiarizing themselves with the ancillary provisions in the final rule. In addition, the proposal would retain the new PEL and STEL through revisions of the Z Table in 29 CFR 1915.1000 in shipyards and Appendix A to 29 CFR

1926.55 in construction. The changes to these tables are a technical correction, given the proposed changes, and will not affect the PEL and STEL requirements of the final rule. While OSHA still welcomes comment on the applicability of existing standards to the operations covered by this proposal, this PEA provides OSHA’s preliminary assessment of how those standards impact the costs, benefits, and baseline compliance associated with the beryllium rule.

This Introduction to the PEA is followed by:

- Section B: Profile of Affected Application Groups, Establishments, and Employees
- Section C: Cost Savings
- Section D: Health Benefits

B. Profile of Affected Application Groups, Establishments, and Employees

Introduction

In this section, OSHA presents the preliminary profile of industries affected by this proposal to revoke the ancillary provisions for the shipyard and construction sectors (82 FR 2470–2757, 1/9/2017) while retaining the revised PEL and STEL for those sectors. The profile data in this section are drawn from the industry profiles in Chapter III and exposure profiles and data in Chapter IV of the Final Economic Analysis supporting the new beryllium standards (“2016 FEA”; Document ID 2042).

As a first step, OSHA identifies the North American Industrial Classification System (NAICS) industries, both in the shipyard and construction sectors, with potential



worker exposure to beryllium. Next, OSHA provides statistical information on the affected industries, including the number of affected entities and establishments, the number of workers whose exposure to beryllium could result in disease or death (“at-risk workers”), and the average revenue and profits for affected entities and establishments by six-digit NAICS industry.<sup>1</sup> This information is provided for each affected industry as a whole, as well as for small entities, as defined by the Small Business Administration (SBA), and for “very small” entities, defined by OSHA as those with fewer than 20 employees, in each affected industry (U.S. Census Bureau, 2014).

For each industry sector identified, the Agency describes the uses of beryllium and estimates the number of establishments and employees that may be affected by this rulemaking. Employee exposure to beryllium can also occur as a result of certain processes (such as welding) that are found in many industries. This analysis will use the term “application group” to refer to a cross-industry group with a common process.

Beryllium is rarely used by all establishments in any particular industry because of its unique properties and relatively high cost. In Chapter III of the 2016 FEA, OSHA described each application group; identified the processes and occupations with beryllium exposure, including available sampling exposure measurements; and explained how OSHA estimated the number of establishments working with beryllium and the number of employees exposed to beryllium. Those estimates and the new exposure profile for abrasive blasting in construction and shipyards and welding in shipyards are presented in this preamble, along with a brief description of the application groups and an explanation of the derivation of the new exposure profiles. For additional information about these data and the application groups, please see

<sup>1</sup> The Census Bureau defines an establishment as a single physical location at which business is conducted or services or industrial operations are performed. The Census Bureau defines a business firm or entity as a business organization consisting of one or more domestic establishments in the same state and industry that are specified under common ownership or control. The firm and the establishment are the same for single-establishment firms. For each multi-establishment firm, establishments in the same industry within a state will be counted as one firm; the firm employment and annual payroll are summed from the associated establishments. (U.S. Census Bureau, Statistics of U.S. Businesses, Glossary, 2017, <https://www.census.gov/programs-surveys/susb/about/glossary.html> (Accessed March 3, 2017).

Chapter III of the 2016 FEA.<sup>2</sup> Finally, the Agency discusses wage data, the hire rate, and current industry practices.

All costs are estimated in 2016 dollars. Costs reported in 2016 dollars were applied directly in this PEA; wage data were updated to 2016 dollars using BLS data; all other costs reported for years earlier than 2016 were updated to 2016 dollars using the GDP implicit price deflator (OSHA, 2017).

#### Affected Application Groups

OSHA’s 2016 FEA identified one affected application group in the construction sector and two application groups in the shipyard sector. Both the shipyard and construction sectors have employees in the abrasive blasting application group, and the shipyard sector has employees in the welding application group.

In the following sections, OSHA describes the application groups in construction and shipyards that will be affected by this proposal.

#### Abrasive Blasting

Abrasive blasting involves the use of hand-held or automatic equipment to direct a stream of abrasive material at high speed against a surface to clean, abrade, etch, or otherwise change the original appearance or condition of the surface (WorkSafe, 2000, Document ID 0692). Surfaces commonly treated by abrasive blasting techniques include iron, steel, aluminum, brass, copper, glass, masonry (brick, concrete, stone, etc.), sand castings, plastic, and wood (NIOSH, 1976, Document ID 0779). In construction and shipyards, abrasive blasting is primarily used for two purposes:

- Cleaning surfaces by removing unwanted paint, rust, scale, dirt, salts, grease, and flux in preparation for painting, anodizing, welding, or other processes requiring a clean surface.
- Producing a desired matte or decorative finish.

Abrasive blasting systems generally include an abrasive container or blasting pot, a propelling device, and an abrasive blasting nozzle. The three main propelling methods are air pressure, water pressure, and centrifugal force provided by the use of wheels. Air blasting systems use compressed air to propel the abrasive (dry blasting), water blasting systems use either compressed air (wet blasting) or high pressure water (hydroblasting), and centrifugal wheel systems use centrifugal and inertial forces (EPA, 1997, Document ID 0784).

<sup>2</sup> OSHA contractor Eastern Research Group (ERG) provided support for the 2016 FEA. References to ERG’s analytical work appear throughout this PEA.

Abrasive blasting can generate large quantities of dust that contains a variety of metals and toxic air contaminants. Workers can have exposures to multiple air contaminants from both the abrasive and the surface being blasted. The source of the air contaminants includes the base material being blasted, the surface coating(s) being removed, the abrasive being used, and any abrasive contamination from previous blasting operations (Burgess 1991, Document ID 0907). Potential air contaminants that might be associated with abrasive blasting and their sources are listed in Table IV.65 in Chapter IV of the FEA in support of the new beryllium standards.

#### Abrasives

A number of different types of abrasives containing beryllium in trace amounts can be used for blasting media depending on the application. The most commonly used abrasives in the construction industry (e.g., to etch the surfaces of outdoor structures, such as bridges, prior to painting) include coal slag and steel grit (Meeker *et al.*, 2006, Document ID 0698). Copper slag produced as by-product at copper smelters can also be used as an abrasive. Shipyards are large users of mineral slag abrasives. In a survey of 26 U.S. shipyards and boatyards about abrasive media usage conducted for the Navy, the use of coal slag abrasives accounted for 68 percent and copper slag accounted for 20 percent (NSRP, 1999, Document ID 0767). Workers who perform abrasive blasting using either coal or copper slag abrasives are potentially exposed to beryllium (Greskevitch, 2000, Document ID 0701). OSHA requests updates on this assessment of commonly used abrasive blasting media in construction and shipyards.

#### Affected Job Categories

Abrasive blasting is mainly used in construction and shipyard operations by painting contractors and welders. (NIOSH, 1976, Document ID 0779).

The primary abrasive blasting job categories in construction and shipyards include the abrasive blasting operator (blaster) and the pot tender. Support personnel (cleanup helper) might also be employed to clean up (e.g., by vacuuming or sweeping) and recycle spent abrasive, and to set up, dismantle, and move containment systems and supplies (NIOSH, 1995, Document ID 0773).

As explained in its 2016 FEA, OSHA estimated that 80 percent of all shipyard blasting operations and 75 percent of construction blasting operations generate potential beryllium exposures.

OSHA has maintained the same assumption here and invites comment on these estimates.

As was estimated in OSHA’s industry profile for the 2016 FEA, for this PEA OSHA estimated there was one pot tender for each at-risk abrasive blaster and one abrasive media cleanup worker for every two abrasive blasters. The Agency invites comment on these estimates.

Final Estimate of Populations at Risk in Abrasive Blasting

In the 2016 FEA, OSHA developed final estimates of the numbers of

workers who perform abrasive blasting. These at-risk populations include workers in the construction sector engaged in blasting building exteriors or blasting ancillary to painting of bridges, tunnels, and related highways; ships; and other non-building construction. Shipyard workers might perform blasting as part of ship surface cleaning and preparation prior to painting or other surface coating. In the 2016 FEA, based on the BLS description of broad occupational classifications, OSHA’s estimates grouped these workers in the categories “painters, construction, and maintenance” or “painters,

transportation equipment.”<sup>3</sup> The same grouping is applied in this PEA.

Below in Tables V–1 and V–2, OSHA presents its estimate of affected blasters and blasting support personnel in construction and shipyards; this estimate, reported in the 2016 FEA, is now the Agency’s preliminary estimate for this NPRM. OSHA requests public comment on the estimate as well as the methodology, described in Chapter III of the 2016 FEA, for estimating affected abrasive blasters and abrasive blasting support personnel in construction and shipyards.

TABLE V–1—PRELIMINARY PROFILE OF ESTABLISHMENTS AND EMPLOYEES IN ABRASIVE BLASTING-CONSTRUCTION AFFECTED BY OSHA’S PROPOSED DEREGULATORY ACTION ON BERYLLIUM

NAICS	Industry/job category	Establishments	Employees	Affected establishments	Affected employees
238320	Painting and Wall Covering Contractors	31,376	163,073	1,090	4,360
	Abrasive Blaster				1,744
	Pot Tender				1,744
	Cleanup				872
238990	All Other Specialty Trade Contractors	29,072	193,631	1,010	4,040
	Abrasive Blaster				1,616
	Pot Tender				1,616
	Cleanup				808
Total		60,448	356,704	2,100	8,400

Note: Data in columns may not sum to totals due to rounding. Sources: U.S. Census Bureau, 2014; US DOL, Directorate of Standards and Guidance, Office of Regulatory Analysis (2017).

TABLE V–2—PRELIMINARY PROFILE OF ESTABLISHMENTS AND EMPLOYEES IN ABRASIVE BLASTING-SHIPYARDS AFFECTED BY OSHA’S PROPOSED DEREGULATORY ACTION ON BERYLLIUM

NAICS	Industry	Establishments	Employees	Affected establishments	Affected employees
336611a	Ship Building and Repairing	689	108,311	689	3,060
	Abrasive Blaster				1,224
	Pot Tender				1,224
	Cleanup				612
Total		689	108,311	689	3,060

Note: Data in columns may not sum to totals due to rounding. Sources: U.S. Census Bureau, 2014; US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis (2017).

Welding

Beryllium exposures can occur in arc and gas welding operations when welding on base materials containing beryllium and when using equipment with electrodes that include beryllium (hereafter generally referred to simply as “welding”). Note that “gas welding” in this context also involves use of electrodes; the gas used is to protect the weld from the atmosphere.

Beryllium exposures during welding are not common and, when observed, are low (see Chapter IV: Section 10 of the 2016 FEA in support of the new beryllium standards for an extended discussion of welding). For this preliminary profile, only arc and gas welding would be affected by the proposed deregulatory action.<sup>4</sup>

The principal area of welding exposures is among workers welding beryllium or beryllium-alloy products

(see Chapter IV: Section 10 of the FEA in support of the new beryllium standards).

Welding in Shipyards

In its 2016 FEA, OSHA included NAICS 336611: Ship Building and Repairing, in the set of industries in the Welding application group affected by the final rule. The number of establishments and employees in this shipyard industry affected by the final

<sup>3</sup> In the Bureau of Labor Statistics’ Occupational Outlook Handbook (BLS, 2017b), the description of the duties of construction and maintenance painters includes the following: A few painters—mainly industrial—use special safety equipment. For example, painting in confined spaces, such as the

inside of a large storage tank, requires workers to wear self-contained suits to avoid inhaling toxic fumes. On some projects they may operate abrasive blasters to remove old coatings, which may require the use of additional clothing and protective eyewear. (See <https://www.bls.gov/ooh/>

*construction-and-extraction/painters-construction-and-maintenance.htm#tab-2*, accessed April 5, 2017.)

<sup>4</sup> The other common type of welding, resistance welding, does not typically generate beryllium exposure.

rule, and therefore affected by this proposal, is displayed in Table V-3. As shown in the table, based on 2015 BLS Occupational Employment Statistics data, OSHA estimates that 28 percent of establishments in NAICS 336611: Ship

Building and Repairing conduct arc and gas welding. Based on analysis by ERG of customer summary data submitted in a comment by Materion, OSHA further estimates that 3.4 percent of these establishments weld beryllium or

beryllium alloy products (ERG, 2015, Document ID 0385, Workbook #8; Kolanz, 2001, Document ID 0091).

OSHA requests public comment on the estimates shown in Table V-3.

**TABLE V-3—PRELIMINARY PROFILE OF ESTABLISHMENTS AND EMPLOYEES IN SHIPYARDS (SHIP BUILDING AND REPAIRING) AFFECTED BY OSHA’S PROPOSED DEREGULATORY ACTION ON BERYLLIUM**

NAICS code	Industry <sup>a</sup>	Total establishments <sup>b</sup>	Total employees <sup>b</sup>	Percent of establishments conducting arc and gas welding <sup>c</sup>	Welding establishments	All employees in welding establishments <sup>d</sup>	Number of welding establishments using beryllium <sup>e</sup>	Welders working on beryllium alloys <sup>f</sup>
336611b .....	Ship Building and Repairing.	689.0	108,311.0	28%	192.9	30,327.1	6.6	26.4

Sources: U.S. Census Bureau, 2014; BLS, 2016; US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis (2017).  
<sup>a</sup>Based on industries with the largest number of positive beryllium samples for welders in the IMIS database (OSHA, 2004). These industries account for over 60 percent of the positive general industry samples for welders.  
<sup>b</sup>U.S. Census Bureau, 2014.  
<sup>c</sup>BLS, 2016.  
<sup>d</sup>Based on average industry size.  
<sup>e</sup>Estimated as the total number of establishments in the industry (689), multiplied by the percentage of establishments employing welders (28%), and further multiplied by the percentage of establishments welding on beryllium alloys (3.4 percent). (Kolanz, 2001, Document ID 0091).  
<sup>f</sup>Based on an ERG estimate of 500 establishments with an average of 4 workers that perform welding on beryllium alloys, or 2.4 percent of establishments with welding. The ERG estimate was derived from Brush Wellman Inc. data reporting approximately 2,000 welders performing welding on beryllium alloys (Kolanz, 2001, Document ID 0091).

**Summary of Affected Establishments and Employers**

As shown in Table V-4, OSHA estimates that a total of 11,486 workers in 2,796 establishments will be affected by this proposal. Also shown are the estimated annual revenues for these entities. Table V-5 presents the Agency’s preliminary estimate of

affected entities defined as small by the Small Business Administration (SBA); Table V-6 presents OSHA’s preliminary estimate of affected establishments and employees by NAICS industries for the subset of small entities with fewer than 20 employees.<sup>5</sup> For the tables showing the characteristics of small and very small entities, OSHA generally assumed

that beryllium-using small entities and very small entities would be the same proportion of overall small and very small entities as the proportion of beryllium-using entities to all entities as a whole in a NAICS industry.

OSHA requests public comment on the profile data presented in Tables V-4, V-5, and V-6.

**TABLE V-4—CHARACTERISTICS OF INDUSTRIES AFFECTED BY OSHA’S PROPOSED DEREGULATORY ACTION FOR BERYLLIUM—ALL ENTITIES**

Application group	NAICS	Industry	Total entities <sup>a</sup>	Total establishments <sup>a</sup>	Total employees <sup>a</sup>	Affected entities <sup>b</sup>	Affected establishments <sup>b</sup>	Affected employees <sup>b</sup>	Total revenues (\$1,000) <sup>a</sup>	Revenues/ entity	Revenues/ establishment
<b>Abrasive Blasting—Construction</b>											
Abrasive Blasting—Construction.	238320 ...	Painting and Wall Covering Contractors.	31,317.0	31,376.0	163,073.0	1,088.0	1,090.0	4,360.0	\$19,595,278	\$625,707	\$624,531
Abrasive Blasting—Construction.	238990 ...	All Other Specialty Trade Contractors.	28,734.0	29,072.0	193,631.0	998.3	1,010.0	4,040.0	39,396,242	1,371,067	1,355,127
<b>Abrasive Blasting—Shipyards*</b>											
Abrasive Blasting—Shipyards.	336611a	Ship Building and Repairing.	604.0	689.0	108,311.0	604.0	689.0	3,060.0	26,136,187	43,271,832	37,933,508
<b>Welding in Shipyards**</b>											
Welding in Shipyards.	336611b	Ship Building and Repairing.	604.0	689.0	108,311.0	5.8	6.6	26.4	26,136,187	43,271,832	37,933,508

<sup>5</sup> Tables V-5 and V-6 indicate that small entities affected by the proposed rule contain 2,714 affected establishments affiliated with entities that are small by SBA standards and 2,365 affected establishments affiliated with entities that employ fewer than 20 employees.

However, the small and very small entity figures in Tables V-5 and V-6 were not used to prepare the cost savings estimates in Section D of this PEA. For costing purposes in Section D, OSHA included small establishments owned by larger entities in the figures in Tables V-5 and V-6 because such establishments do not qualify as “small entities” for the purposes of a Regulatory Flexibility Analysis.

To see the difference in the number of affected establishments by size for costing purpose, consider the example of a “large entity” with 500 employees, consisting of 50 ten-employee establishments. In Section B., each of these 50 establishments would be excluded from Tables V-5 and V-6 because they are part of a “large entity”; in Section D., where all establishments are included because there is no filter for entity size, each would be considered a small establishment.

Thus, for purposes of Section D., there are 2,399 affected establishments with fewer than 20 employees, 369 affected establishments with between 20 and 499 employees, and 28

establishments with more than 500 employees; these estimates were derived in the cost spreadsheet by NAICS industry and in total (see, for example, Columns TK through TM in the “Rule” tab as developed for familiarization cost savings; the totals are in cells TK5 through TM5) (OSHA, 2017). While not shown in the tables or used in the analysis, Census (2015) Statistics of US Businesses data suggest there are also a total of 3,464 establishments affiliated with entities in construction and shipyards employing between 20 and 499 employees, of which approximately 157 would be affected by the rule.

TABLE V-4—CHARACTERISTICS OF INDUSTRIES AFFECTED BY OSHA'S PROPOSED DEREGULATORY ACTION FOR BERYLLIUM—ALL ENTITIES—Continued

Application group	NAICS	Industry	Total entities <sup>a</sup>	Total establishments <sup>a</sup>	Total employees <sup>a</sup>	Affected entities <sup>b</sup>	Affected establishments <sup>b</sup>	Affected employees <sup>b</sup>	Total revenues (\$1,000) <sup>a</sup>	Revenues/ entity	Revenues/ establishment
<b>Total</b>											
Construction Sub-total.	.....	.....	60,051.0	60,448.0	356,704.0	2,086.2	2,100.0	8,400.0	58,991,519	982,357	975,905
Shipyard Subtotal ..	.....	.....	1,208.0	1,378.0	216,622.0	609.8	695.6	3,086.4	52,272,373	43,271,832	37,933,508
Total, All Industries	.....	.....	61,259.0	61,826.0	573,326.0	2,696.0	2,795.6	11,486.4	111,263,893	1,816,286	1,799,629

<sup>a</sup> U.S. Census Bureau, Statistics of U.S. Businesses: 2012, Document ID 2034.

<sup>b</sup> OSHA estimates of employees potentially exposed to beryllium and associated entities and establishments. Affected entities and establishments constrained to be less than or equal to the number of affected employees. Within each NAICS industry, the number of affected entities was calculated as the product of total number of entities for that industry and the ratio of the number of affected establishments to the number of total establishments.

\* Employers in application group Abrasive Blasting—Shipyards are shipyards employing abrasive blasters that use mineral slag abrasives to etch the surfaces of boats and ships.

\*\* Employers in application group Welding in Shipyards employ welders in shipyards. Some of these employers may do both welding and abrasive blasting.

Source: U.S. Dept. of Labor, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis.

TABLE V-5—CHARACTERISTICS OF INDUSTRIES AFFECTED BY OSHA'S FINAL STANDARD FOR BERYLLIUM—SMALL ENTITIES

Application group	NAICS	Industry	SBA small business classification (employees) <sup>a</sup>	Small business entities <sup>b</sup>	Establishments for small entities <sup>b</sup>	Small entity employees <sup>b</sup>	Affected small business entities <sup>c</sup>	Affected small establishments <sup>c</sup>	Affected employees for small entities <sup>c</sup>	Total revenues for small entities (\$1,000) <sup>b</sup>	Revenues per small business entity	Revenues per small business establishment
<b>Abrasive Blasting—Construction</b>												
Abrasive Blasting—Construction .....	238320 .....	Painting and Wall Covering Contractors.	100	31,221.0	31,243.0	133,864.0	1,084.6	1,085.4	3,579.1	\$16,552,251	\$530,164	\$529,791
Abrasive Blasting—Construction .....	238990 .....	All Other Specialty Trade Contractors.	100	28,537.0	28,605.0	143,112.0	991.4	993.8	2,985.9	29,789,492	1,043,890	1,041,409
<b>Abrasive Blasting—Shipyards *</b>												
Abrasive Blasting—Shipyards .....	336611a .....	Ship Building and Repairing .....	1,250	585.0	629.0	27,170.0	585.0	629.0	960	6,043,893	10,331,440	9,608,732
<b>Welding in Shipyards **</b>												
Welding in Shipyards .....	336611b .....	Ship Building and Repairing .....	1,250	585.0	629.0	27,170.0	5.6	6.0	6.6	6,043,893	10,331,440	9,608,732
<b>Total</b>												
Construction Subtotal .....	.....	.....	.....	59,758.0	59,848.0	276,976.0	2,076.0	2,079.2	6,565.0	46,341,743	775,490	774,324
Shipyards Subtotal .....	.....	.....	.....	1,170.0	1,258.0	54,340.0	590.6	635.0	774.2	12,087,785	10,331,440	9,608,732
Total, All Industries .....	.....	.....	.....	60,928.0	61,106.0	331,316.0	2,666.6	2,714.2	7,339.2	58,429,529	958,993	956,200

Data may not sum to totals due to rounding.  
<sup>a</sup> SBA Size Standards, 2016 (Document ID 2026). Data were not available specifically for small entities with more than 500 employees. For SBA small business classifications specifying 750 or more employees, OSHA used data for all entities in the industry.  
<sup>b</sup> U.S. Census Bureau, Statistics of US Businesses: 2012 (Document ID 2034).  
<sup>c</sup> OSHA estimates of employees potentially exposed to beryllium and associated entities and establishments. Affected entities and establishments constrained to be less than or equal to the number of affected employees.  
 \* Employers in application group Abrasive Blasting—Shipyards are shipyards employing abrasive blasters that use mineral slag abrasives to etch the surfaces of boats and ships.  
 \*\* Employers in application group Welding in Shipyards employ welders in shipyards. Some of these employers may do both welding and abrasive blasting.  
 Source: U.S. Dept. of Labor, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis.

TABLE V-6—CHARACTERISTICS OF INDUSTRIES AFFECTED BY OSHA’S FINAL STANDARD FOR BERYLLIUM—ENTITIES WITH FEWER THAN 20 EMPLOYEES

Application group	NAICS	Industry	Entities with <20 employees <sup>a</sup>	Establishments for entities with <20 employees <sup>a</sup>	Employees for entities with <20 employees <sup>a</sup>	Affected entities with <20 employees <sup>b</sup>	Affected establishments for entities with <20 employees <sup>b</sup>	Affected employees for entities with <20 employees <sup>b</sup>	Total revenues for entities with <20 employees (\$1,000) <sup>a</sup>	Revenues per entity with <20 employees	Revenue per estab. for entities with <20 employees
<b>Abrasive Blasting—Construction</b>											
Abrasive Blasting—Construction.	238320 .....	Painting and Wall Covering Contractors.	29,953.0	29,957.0	87,984.0	1,040.6	1,040.7	2,352.4	\$10,632,006	\$354,956	\$354,909
Abrasive Blasting—Construction.	238990 .....	All Other Specialty Trade Contractors.	27,026.0	27,041.0	90,822.0	938.9	939.4	1,894.9	19,232,052	711,613	711,218
<b>Abrasive Blasting—Shipyards*</b>											
Abrasive Blasting—Shipyards.	336611a ...	Ship Building and Repairing.	380.0	381.0	2,215.0	380.0	381.0	381.0	547,749	1,441,445	1,437,661
<b>Welding in Shipyards**</b>											
Welding in Shipyards.	336611b ...	Ship Building and Repairing.	380.0	381.0	2,215.0	3.6	3.6	3.6	547,749	1,441,445	1,437,661
<b>Total</b>											
Construction Subtotal.	.....	.....	56,979.0	56,998.0	178,806.0	1,979.5	1,980.1	4,247.3	29,864,058	524,124	523,949
Shipyards Subtotal ...	.....	.....	760.0	762.0	4,430.0	383.6	384.6	384.6	1,095,498	1,441,445	1,437,661
Total, All Industries	.....	.....	57,739.0	57,760.0	183,236.0	2,363.1	2,364.8	4,632.0	30,959,556	536,198	536,003

Data may not sum to totals due to rounding.  
<sup>a</sup>U.S. Census Bureau, Statistics of US Businesses: 2012 (Document ID 2034).  
<sup>b</sup>OSHA estimates of employees potentially exposed to beryllium and associated entities and establishments. Affected entities and establishments constrained to be less than or equal to the number of affected employees.  
\* Employers in application group Abrasive Blasting—Shipyards are shipyards employing abrasive blasters that use mineral slag abrasives to etch the surfaces of boats and ships.  
\*\* Employers in application group Welding in Shipyards employ welders in shipyards. Some of these employers may do both welding and abrasive blasting.  
Source: U.S. Dept. of Labor, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis.

**Beryllium Exposure Profile of At-Risk Workers**

The exposure profiles for abrasive blasting presented here were taken directly from Chapter IV of the 2016 FEA, and are more fully summarized in Section IV of this preamble. The exposure profile for welding in shipyards, however, is based on data presented in appendices 2 and 3 of Section 10.6 of Chapter IV, and again is more fully summarized in Section IV. Those data measure exposures of shipyard based welders, and OSHA has preliminarily determined that it is a more suitable data set on which to base the exposure profile of welders in shipyards than the data used in the 2016

FEA, which were based on general industry welding exposures.<sup>6</sup> Exposure profiles, by job category, were developed from individual exposure measurements that were judged to be substantial and to contain sufficient accompanying description to allow interpretation of the circumstances of each measurement. The resulting exposure profiles show the job categories with current exposures to beryllium above the new PEL and, thus, the workers for whom beryllium controls would be implemented under the final beryllium standard.

Tables V-7 and V-8 summarize, from the exposure profiles, the number of workers at risk of beryllium exposure and the distribution of 8-hour TWA

beryllium exposures by affected application group and job category. Exposures are grouped into ranges (e.g., >0.05 µg/m<sup>3</sup> and <0.1 µg/m<sup>3</sup>) that represent the percentages of employees in each job category and sector currently exposed at levels within the indicated range.

Table V-9 presents data by NAICS code on the estimated number of workers currently at risk of beryllium exposure for each of the same exposure ranges. As shown, an estimated 2,167 (after rounding) workers currently have beryllium exposures above the final PEL of 0.2 µg/m<sup>3</sup>. OSHA requests public comment on the exposure profile shown in Tables V-7, V-8, and V-9.

TABLE V-7—DISTRIBUTION OF BERYLLIUM EXPOSURES BY APPLICATION GROUP AND JOB CATEGORY OR ACTIVITY

Job category/activity	Exposure range (µg/m <sup>3</sup> )								Total (%)
	0 to ≤0.05 <sup>a</sup> (%)	>0.05 to ≤0.1 <sup>a</sup> (%)	>0.1 to ≤0.2 (%)	>0.2 to ≤0.25 (%)	>0.25 to ≤0.5 (%)	>0.5 to ≤1.0 (%)	>1.0 to ≤2.0 (%)	>2.0 (%)	
<b>Abrasive Blasting—Construction &amp; Shipyards*</b>									
Abrasive Blaster .....	15.2	15.2	25.7	2.5	12.4	4.7	5.4	18.9	100.0
Pot Tender .....	28.1	28.1	43.8	0.0	0.0	0.0	0.0	0.0	100.0
Cleanup .....	33.3	33.3	26.7	0.0	0.0	0.0	3.3	3.3	100.0
<b>Welding—Shipyards**</b>									
Welder .....	47.4	47.4	1.5	0.0	0.0	3.0	0.7	0.0	100.0

Note: Data may not sum to totals due to rounding.

<sup>6</sup> The use of the general industry exposure profile for shipyard welders was inadvertent, and the differences between the exposure monitoring data from the general industry and these welding data

are not significantly different (e.g., the exposure data for the shipyard welders show 94.8 percent of the exposures occurring below 0.1 µg/m<sup>3</sup>, while the general industry estimates show 56.8 percent of the

exposures occurring below 0.1 µg/m<sup>3</sup>) and do not materially change the exposure assessment assumptions.

<sup>a</sup> The lowest exposure range in OSHA's technological feasibility analysis is  $\leq 0.1 \mu\text{g}/\text{m}^3$  (see Chapter IV-02, Limits of Detection for Beryllium Data, in the FEA (Document ID 2042) in support of the new beryllium standards). Because OSHA lacked information on the distribution of worker exposures in this range, the Agency evenly divided the workforce exposed at or below  $0.1 \mu\text{g}/\text{m}^3$  into the two categories shown in this table and in the columns with identical headers in Tables V-8 and V-9. OSHA recognizes that this simplifying assumption may overestimate exposure in these lower exposure ranges; the Agency requests comment as to whether members of the public share this observation.

\* Employers in application group Abrasive Blasting—Shipyards are shipyards employing abrasive blasters that use mineral slag abrasives to etch the surfaces of boats and ships.

\*\* Employers in application group Welding in Shipyards employ welders in shipyards. Some of these employers may do both welding and abrasive blasting.

Source: U.S. DOL, OSHA, Directorate of Standards and Guidance, Office of Technological Feasibility.

**TABLE V-8—NUMBER OF WORKERS EXPOSED TO BERYLLIUM BY AFFECTED APPLICATION GROUP, JOB CATEGORY, AND EXPOSURE RANGE**  
[ $\mu\text{g}/\text{m}^3$ ]

Application group/job category	Exposure level ( $\mu\text{g}/\text{m}^3$ )								Total
	0 to $\leq 0.05$	>0.05 to $\leq 0.1$	>0.1 to $\leq 0.2$	>0.2 to $\leq 0.25$	>0.25 to $\leq 0.5$	>0.5 to $\leq 1.0$	>1.0 to $\leq 2.0$	>2.0	
<b>Abrasive Blasting—Construction</b>									
Abrasive Blaster .....	510.8	510.8	862.7	83.2	416.2	158.9	181.6	635.7	3,360.0
Pot Tender .....	945.0	945.0	1,470.0	0.0	0.0	0.0	0.0	0.0	3,360.0
Cleanup .....	560.0	560.0	448.0	0.0	0.0	0.0	56.0	56.0	1,680.0
<b>Abrasive Blasting—Shipyards*</b>									
Abrasive Blaster .....	186.1	186.1	314.3	30.3	151.6	57.9	66.2	231.6	1,224.0
Pot Tender .....	344.3	344.3	535.5	0.0	0.0	0.0	0.0	0.0	1,224.0
Cleanup .....	204.0	204.0	163.2	0.0	0.0	0.0	20.4	20.4	612.0
<b>Welding—Shipyards**</b>									
Welder .....	12.5	12.5	0.4	0.0	0.0	0.8	0.2	0.0	26.4
<b>Total</b>									
Construction Subtotal .....	2,015.8	2,015.8	2,780.7	83.2	416.2	158.9	237.6	691.7	8,400.0
Shipyards Subtotal .....	746.8	746.8	1,013.4	30.3	151.6	58.7	86.8	252.0	3,086.4
Total, All Industries .....	2,762.7	2,762.7	3,794.1	113.6	567.8	217.6	324.4	943.6	11,486.4

Note: Data may not sum to totals due to rounding.

\* Employers in application group Abrasive Blasting—Shipyards are shipyards employing abrasive blasters that use mineral slag abrasives to etch the surfaces of boats and ships.

\*\* Employers in application group Welding in Shipyards employ welders in shipyards. Some of these employers may do both welding and abrasive blasting.

Sources: U.S. DOL, OSHA, Directorate of Standards and Guidance, Office of Technological Feasibility and Office of Regulatory Analysis-Health.

**TABLE V-9—NUMBER OF WORKERS EXPOSED TO BERYLLIUM BY AFFECTED INDUSTRY AND EXPOSURE RANGE**  
[ $\mu\text{g}/\text{m}^3$ ]

Application group/NAICS	Industry	Exposure level ( $\mu\text{g}/\text{m}^3$ )								Total
		0 to $\leq 0.05$	>0.05 to $\leq 0.1$	>0.1 to $\leq 0.2$	>0.2 to $\leq 0.25$	>0.25 to $\leq 0.5$	>0.5 to $\leq 1.0$	>1.0 to $\leq 2.0$	>2.0	
<b>Abrasive Blasting—Construction</b>										
238320 .....	Painting and Wall Covering Contractors.	1,046.3	1,046.3	1,443.3	43.2	216.0	82.5	123.3	359.0	4,360.0
238990 .....	All Other Specialty Trade Contractors.	969.5	969.5	1,337.4	40.0	200.2	76.4	114.3	332.7	4,040.0
<b>Abrasive Blasting—Shipyards*</b>										
336611a .....	Ship Building and Repairing.	734.3	734.3	1,013.0	30.3	151.6	57.9	86.6	252.0	3,060.0
<b>Welding in Shipyards**</b>										
336611b .....	Ship Building and Repairing.	12.5	12.5	0.4	0.0	0.0	0.8	0.2	0.0	26.4
<b>Total</b>										
Construction Subtotal .....	.....	2,015.8	2,015.8	2,780.7	83.2	416.2	158.9	237.6	691.7	8,400.0
Shipyards Subtotal .....	.....	746.8	746.8	1,013.4	30.3	151.6	58.7	86.8	252.0	3,086.4
Total, All Industries .....	.....	2,762.7	2,762.7	3,794.1	113.6	567.8	217.6	324.4	943.6	11,486.4

Note: Data may not sum to totals due to rounding.

\* Employers in application group Abrasive Blasting—Shipyards are shipyards employing abrasive blasters that use mineral slag abrasives to etch the surfaces of boats and ships.

\*\* Employers in application group Welding in Shipyards employ welders in shipyards. Some of these employers may do both welding and abrasive blasting.

Sources: U.S. DOL, OSHA, Directorate of Standards and Guidance, Office of Technological Feasibility and Office of Regulatory Analysis-Health.

**Loaded Wages and New Hire Rate**

For this PEA, OSHA updated the 2016 FEA wage estimates from 2015 to 2016 levels using data for base wages by Standard Occupational Classification (SOC) from the March 2017 Occupational Employment Statistics survey of the Bureau of Labor Statistics. OSHA applied a fringe markup (loading

factor) of 46.0 percent of base wages (BLS, 2016c, Document ID 1980);<sup>7</sup>

<sup>7</sup> A fringe markup (loading factor) of 46.0 percent was calculated in the following way. Employer costs for employee compensation for civilian workers averaged \$33.94 per hour worked in March 2016. Wages and salaries averaged \$23.25 per hour worked and accounted for 68.5 percent of these costs, while benefits averaged \$10.70 and accounted for the remaining 31.5 percent. Therefore, the fringe

loaded hourly wages by application group and SOC are shown in Table V-10.

OSHA also updated the new hire rate for manufacturing from its 2016 FEA

markup (loading factor) is \$10.70/\$23.25, or 45.6 percent. Total employer compensation costs for private industry workers averaged \$32.06 per hour worked in March 2016 (BLS, 2016c, Document ID 1980).



estimate of 27.2 percent to a final estimate of 23.9 percent (BLS, 2016b, Document ID 1977). The Agency applied the updated rate (23.9 percent) in this preliminary profile and requests public comment on the preliminary wage and hire rates shown in Table V–10.

#### Baseline Industry Practices and Existing Regulatory Requirements (“Current Compliance”) On Hazard Controls and Ancillary Provisions

Table V–11 reflects OSHA’s estimate of current industry compliance rates, by application group and job category, for each of the ancillary provisions that, under the January 9, 2017 final rule, would affect the establishments that are subject to this preliminary deregulatory action. See Chapter III of the 2016 FEA for additional discussion of the current baseline compliance rates for each provision, which were estimated based on site visits, industry contacts, published literature, and the Final Report of the Small Business Advocacy Review (SBAR) Panel (SBAR, 2008, Document ID 0345). Note that the compliance rate is typically the same for all jobs in a given sector, except for administrative workers, who generally have zero percent compliance with hygiene requirements and 100 percent compliance with PPE (because they are not expected to need PPE during work assignments).

In the 2016 FEA, OSHA estimated that abrasive blasters in construction and shipyards had a 75 percent compliance rate with the PPE requirements in the beryllium standards. However, upon further review of existing OSHA standards, OSHA is revising that estimate to 100 percent compliance for the purpose of this preliminary economic analysis. In construction, OSHA standard 29 CFR 1926.57(f)(5)(v) requires abrasive blasting operators to wear full PPE, including respirators, gloves, safety shoes, and eye protection. Similarly, 29 CFR 1915.34(c)(3) requires full PPE for abrasive blaster operators performing mechanical paint removal in shipyards. Because it would not be appropriate to claim cost savings for withdrawing a rule when existing rules already have the same requirements, for the purpose

of calculating cost savings and foregone benefits in this proposal, OSHA preliminarily estimates that withdrawing the beryllium rule’s PPE requirements for abrasive blaster operators in construction and shipyards would have no effect on PPE compliance because those workers are already required to wear full PPE. In addition, OSHA also found, after a review of shipyard personal protective equipment requirements, that gloves are required under 1915.157(a) to protect workers from hazards faced by welders, such as thermal burns.<sup>8</sup> Therefore, for the purpose of calculating cost savings and foregone benefits in this proposal, the Agency now preliminarily estimates that abrasive blasting operators in shipyards and construction and welders in shipyards are already equipped with full personal protective equipment 100 percent of the time when exposed to beryllium.

Additionally, upon review, OSHA has preliminarily determined that relevant PPE is required by the existing Personal Protective Equipment standard (1926.95) and the existing Hand and Body Protection standard (1915.157) to protect blasting helpers in construction and shipyards, respectively, from dermal exposure to beryllium dust. Therefore, the Agency now preliminarily estimates that all affected employees are already required to be equipped with PPE 100 percent of the time when exposed to beryllium, and uses this preliminary determination in calculating proposed cost savings and foregone benefits.

OSHA requests public comment on this revised approach and on the other preliminary baseline compliance estimates shown in Table V–11, as well as the methodology behind them as set forth in Chapter III of the 2016 FEA.

OSHA also reviewed existing housekeeping requirements and found that some housekeeping is also already required for abrasive blasting operations in construction and shipyards. CFR 1926.57(f)(7) requires that dust not be

allowed to accumulate and that spills be cleaned up promptly. The general industry Ventilation standard requires the same in abrasive blasting in shipyards (see 29 CFR 1910.94(a)(7), 1910.5(c)). 29 CFR 1926.57(f)(3) and (f)(4) also require exhaust ventilation and dust collection and removal systems in abrasive blasting operations in construction. Therefore, compliance with 1926.57(f) and 1910.94(a)(7) already ensures that employers take some steps during the blasting operations to prevent accumulations of dust sufficient to create exposures exceeding the PEL in clean-up after blasting operations are completed.<sup>9</sup> For these reasons, in this proposal, OSHA is only taking a cost savings for housekeeping in abrasive blasting operations in construction and shipyards for the cost of HEPA-filtered vacuums and similar equipment.

In Table V–11, where current labor compliance rates are 100 percent, OSHA indicates that removal of the ancillary provision in question would have no effect on labor compliance rates.

OSHA welcomes comments on the baseline compliance estimates shown in Table V–11, particularly with respect to PPE and housekeeping.

As a final point on baseline industry practices, OSHA acknowledges the possibility of a future decline in the use of coal slag abrasive materials and welcomes comment and information on this issue. To the extent that coal slag abrasives are replaced by other blasting materials which do not have the potential for beryllium exposures of concern, the costs and benefits of the PELs for abrasive blasting operations would also decrease.

<sup>9</sup> As explained in the Abrasive Blasting section of the Technological Feasibility chapter of the FEA, abrasive blasting cleanup workers are those who are “responsible for cleaning up spent abrasive (e.g., by vacuuming or sweeping) at the end of the day’s blasting.” Of the 30 cleanup workers in the exposure profile of the FEA, two had exposures over the new PEL of 0.2 µg/m<sup>3</sup>. One cleanup worker had an 8-hour TWA sample result of 1.1 µg/m<sup>3</sup>, but blasting took place in the area during this worker’s cleanup task and it is likely that the nearby abrasive blasting contributed to the sample result. The other cleanup worker had a sample result of 7.4 µg/m<sup>3</sup>, but that worker’s exposure appears to be associated with the use of compressed air for cleaning in conjunction with nearby abrasive blasting.

<sup>8</sup> In fact, the 0 percent baseline compliance rate for PPE in shipyard welding in the 2016 FEA was simply a mistake insofar as baseline compliance rate for PPE in general industry was 100 percent in the same document. For a discussion of existing welding requirements, see the discussion in Section V.C, Costs, in this preamble.

TABLE V-10—LOADED HOURLY WAGES AND HIRE RATE FOR OCCUPATIONS (JOBS) EXPOSED TO BERYLLIUM AND AFFECTED BY OSHA’S PROPOSED ACTION

Provision in the standard	Job	NAICS	SOC <sup>a</sup>	Occupation	Median hourly wage	Fringe markup percentage, total <sup>b</sup>	Loaded hourly (or daily <sup>d</sup> ) wage
Monitoring <sup>c</sup> .....	Industrial Hygienist Consultant.	N/A	N/A	N/A .....	N/A	N/A	\$164.81
Monitoring <sup>d</sup> .....	IH Technician—Initial .....	.....	.....	.....	.....	.....	<sup>d</sup> 2,642.59
	IH Technician—Additional and Periodic.	.....	.....	.....	.....	.....	<sup>d</sup> 1,321.30
Regulated Area/Job Briefing <sup>e</sup> .	Production Worker .....	31-33	51-0000	Production Occupations .....	\$16.55	46	24.16
Medical Surveillance <sup>e</sup> .....	Human Resources Manager	31-33	11-3121	Human Resources Managers.	49.61	46	72.42
Exposure Control Plan, Medical Surveillance, and Medical Removal <sup>e</sup> .	Clerical .....	31-33	43-4071	File Clerks .....	15.43	46	22.53
Training <sup>e</sup> .....	Training Instructor .....	31-33	13-1151	Training and Development Specialists.	28.32	46	41.34
Medical Surveillance <sup>e</sup> .....	Physician (Employers’ Physician).	31-33	29-1062	Family and General Practitioners.	90.96	46	132.79
Multiple Provisions <sup>f</sup> .....	First Line Supervisor .....	Various	51-1011	First-Line Supervisors of Production and Operating Workers.	28.14	46	41.08

Sources: U.S. Dept. of Labor, OSHA, Directorate of Standards and Guidance.

<sup>a</sup>2010 Standard Occupational Classification System. Bureau of Labor Statistics. <http://www.bls.gov/soc/classification.htm>.

<sup>b</sup>BLS, 2016c, Document ID 1980.

<sup>c</sup>ERG estimates based on discussions with affected industries, and inflated to 2016 dollars (BEA, 2017).

<sup>d</sup>Wages used in the economic analysis for the Silica final rule, inflated to 2016 dollars. Wage rates shown are estimated daily remuneration for industrial hygiene services.

<sup>e</sup>BLS, 2017a.

<sup>f</sup>BLS, 2017a; Weighted average for SOC 51-1011 in NAICS 313000, 314000, 315000, 316000, 321000, 322000, 323000, 324000, 325000, 326000, 327000, 335000, 336000, 337000, and 339000.

TABLE V-11—ESTIMATED CURRENT COMPLIANCE RATES FOR INDUSTRY SECTORS AFFECTED BY OSHA'S PROPOSED DEREGULATORY ACTION ON BERYLLIUM

Application group	Job	Exposure monitoring (%)	Beryllium work areas (%)	Regulated areas (%)	Medical surveillance <sup>a</sup> (%)	Medical removal (%)	Exposure control plan (%)	PPE	Hygiene		Training (%)	Housekeeping labor	Vacuum, bags, labels (%)
									Employee (%)	Establishment (%)			
Abrasive Blasting Construction	All	0	0	0	0	0	0	100% No Effect	75	75	75	100% No Effect	0
Blasting Construction	Abrasive Blaster	0	75	75	75	0	75	100% No Effect	75	75	75	100% No Effect	0
Blasting Construction	Pot Tender	0	75	75	75	0	75	100% No Effect	75	75	75	100% No Effect	0
Blasting Construction	Cleanup	0	75	75	75	0	75	100% No Effect	75	75	75	100% No Effect	0
Blasting Shipyards*	All	0	75	75	75	0	75	100% No Effect	75	75	75	100% No Effect	0
Blasting Shipyards	Abrasive Blaster	0	75	75	75	0	75	100% No Effect	75	75	75	100% No Effect	0
Blasting Shipyards	Pot Tender	0	75	75	75	0	75	100% No Effect	75	75	75	100% No Effect	0
Blasting Shipyards	Cleanup	0	75	75	75	0	75	100% No Effect	75	75	75	100% No Effect	0
Welding Shipyard**	All	0	0	0	0	0	0	100% No Effect	0	0	0	0%	0
Welding Shipyard	Welder	0	0	0	0	0	0	100% No Effect	0	0	0	0%	0

Source: U.S. DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis (OSHA, 2016).

<sup>a</sup> Estimated compliance rates for medical surveillance do not include medical referrals. OSHA estimates that baseline compliance rates for medical referrals are zero percent for all application groups shown in the table.

\* Employers in application group Abrasive Blasting—Shipyards are shipyards employing abrasive blasters that use mineral slag abrasives to etch the surfaces of boats and ships.

\*\* Employers in application group Welding in Shipyards employ welders in shipyards. Some of these employers may do both welding and abrasive blasting.

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### C. Costs of Compliance

#### Introduction

In this section, OSHA estimates the cost savings to shipyard and construction establishments in all affected application groups as a result of this proposal to revoke the ancillary

provisions in the new shipyard and construction beryllium standards. These ancillary provisions to be revoked encompass the following: exposure assessment, beryllium regulated areas (and competent persons in construction), a written exposure control plan, protective work clothing, hygiene areas and practices, housekeeping, medical surveillance, medical removal, and worker training. However, affected employers are estimated to incur a small additional cost to familiarize themselves with the changes to the ancillary provisions in the final rule as a result of this proposal. These cost savings incorporate OSHA's preliminary updated baseline compliance estimates described in section V.B, on which OSHA seeks comment.

These estimates of cost savings are largely based on the cost estimates presented for Regulatory Alternative 2a in the preamble for the new beryllium standards (82 FR 2470, 2612–2615 (January 9, 2017)), which were in turn derived from the Costs of Compliance chapter (Chapter V) of the supporting Final Economic Analysis (“2016 FEA”; Document ID 2042). Note that, as OSHA has not proposed changing the permissible exposure limit (PEL) or short-term exposure limit (STEL) set forth in the new beryllium standards, OSHA has not estimated any cost savings related to engineering controls or respirators. OSHA retained the same calculation methodology from the 2016 FEA and has updated the wages and unit costs from 2015 to 2016 dollars.

OSHA estimates that this proposal would yield a total annualized cost savings of \$11.0 million using a 3 percent discount rate across the shipyard and construction sectors. All cost savings in this section are expressed in 2016 dollars and were annualized using discount rates of 3 percent and 7 percent, as required by OMB.<sup>10</sup> Costs in the 2016 FEA were expressed in 2015 dollars. Cost savings for this proposal have been updated to 2016 dollars. Unit costs developed in

<sup>10</sup> See OMB Memo M–17–21 (April 5, 2017). OSHA included the 3 percent rate in its primary analysis, but Appendix V–A of this PEA also presents costs by NAICS industry and establishment size categories using, as alternatives, a 7 percent discount rate—shown in Table V–22—and a 0 percent discount rate—shown in Table V–23.

this section were multiplied by the number of workers who would have to comply with the provisions, as identified in Section B of this PEA (Profile of Affected Application Groups, Establishments, and Employees). The estimated number of affected workers depends on what level of exposure triggers a particular provision and the percentage of those workers estimated to already be in compliance. In a few cases, costs were calculated based on the number of firms.

The cost methodology is detailed in Chapter V of the 2016 FEA. A discussion of affected workers is presented in Section B of this PEA. Complete calculations are available in the OSHA spreadsheet in support of this PEA (OSHA, 2017). Annualization periods for expenditures on equipment are based on equipment life, and one-time costs are annualized over a 10-year period.<sup>11</sup>

Table V–12 shows, by affected application group and six-digit NAICS code, annualized compliance cost savings for all establishments, for all small entities (as defined by the Small Business Act and the Small Business Administration's (SBA's) implementing regulations; see 15 U.S.C. 632 and 13 CFR 121.201), and for all very small entities (defined by OSHA as those with fewer than 20 employees).

The Agency notes that it did not include an overhead labor cost either in the FEA in support of the January 9, 2017 final standards or in the primary analysis of this PEA. It is important to note that there is not one broadly accepted overhead rate and that the use of overhead to estimate the marginal costs of labor raises a number of issues that should be addressed before applying overhead costs to analyze the costs of any specific regulation. There

<sup>11</sup> Executive Order 13563 directs agencies “to use the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible.” In addition, OMB Circular A–4 suggests that analysis should include all future costs and benefits using a “rule of reason” to consider for how long it can reasonably predict the future and limit its analysis to this time period. Annualization should not be confused with depreciation or amortization for tax purposes. Annualization spreads costs out evenly over the time period (similar to the payments on a mortgage) to facilitate comparison of costs and benefits across different years. In cases where costs occur on an annual basis, but do not change between years, annualization is not necessary, and OSHA may refer simply to “annual” costs.

are several approaches to look at the cost elements that fit the definition of *overhead* and there are a range of overhead estimates currently used within the federal government—for example, the Environmental Protection Agency has used 17 percent,<sup>12</sup> and government contractors have been reported to use an average of 77 percent.<sup>13,14</sup> Some overhead costs, such as advertising and marketing, vary with output rather than with labor costs. Other overhead costs vary with the number of new employees. For example, rent or payroll processing costs may change little with the addition of 1 employee in a 500-employee firm, but those costs may change substantially with the addition of 100 employees. If an employer is able to rearrange current employees' duties to implement a rule, then the marginal share of overhead costs such as rent, insurance, and major office equipment (*e.g.*, computers, printers, copiers) would be very difficult to measure with accuracy (*e.g.*, computer use costs associated with 2 hours for rule familiarization by an existing employee).

If OSHA had included an overhead rate when estimating the marginal cost of labor, without further analyzing an appropriate quantitative adjustment, and adopted for these purposes an overhead rate of 17 percent on base wages, as was done in a sensitivity analysis in the FEA in support of OSHA's 2016 final rule on Occupational Exposure to Respirable Crystalline Silica, the base wages would increase cost savings by approximately \$238,000 per year, or approximately 2.2 percent above the primary estimate of cost savings.<sup>15</sup>

<sup>12</sup> Cody Rice, U.S. Environmental Protection Agency, “Wage Rates for Economic Analyses of the Toxics Release Inventory Program,” June 10, 2002.

<sup>13</sup> Grant Thornton LLP, 2015 *Government Contractor Survey*. (<https://www.granthornton.com/-/media/content-page-files/public-sector/pdfs/surveys/2015/Gov-Contractor-Survey.ashx>).

<sup>14</sup> For a further example of overhead cost estimates, please see the Employee Benefits Security Administration's guidance at <https://www.dol.gov/sites/default/files/ebsa/laws-and-regulations/rules-and-regulations/technical-appendices/labor-cost-inputs-used-in-ebsa-opr-ria-and-pra-burden-calculations-august-2016.pdf>.

<sup>15</sup> OSHA is reluctant to make changes to the primary estimates in this proposal that create cost savings greater than the original costs estimated for the beryllium final rule.

V-12—TOTAL ANNUALIZED COST SAVINGS, BY SECTOR AND SIX-DIGIT NAICS INDUSTRY, FOR ENTITIES AFFECTED BY THE PROPOSED SHIPYARD AND CONSTRUCTION BERYLLIUM STANDARDS; RESULTS SHOWN BY SIZE CATEGORY (3 PERCENT DISCOUNT RATE, 2016 DOLLARS)

Application group/NAICS	Industry	All establishments	Small entities (SBA-defined)	Very small entities (<20 employees)
<b>Abrasive Blasting—Construction</b>				
238320 .....	Painting and Wall Covering Contractors .....	\$4,087,412	\$3,445,984	\$2,420,659
238990 .....	All Other Specialty Trade Contractors .....	3,787,418	2,916,925	1,998,054
<b>Abrasive Blasting—Shipyards *</b>				
336611a .....	Ship Building and Repairing .....	3,081,907	990,140	524,187
<b>Welding in Shipyards **</b>				
336611b .....	Ship Building and Repairing .....	34,217	11,283	6,421
<b>Total</b>				
Construction Subtotal .....	.....	7,874,830	6,362,909	4,418,712
Shipyards Subtotal .....	.....	3,116,125	1,001,423	530,608
Total, All Industries .....	.....	10,990,954	7,364,331	4,949,321

**Notes:** Figures in rows may not add to totals due to rounding.

\* Employers in application group Abrasive Blasting—Shipyards are shipyards employing abrasive blasters that use mineral slag abrasives to etch the surfaces of boats and ships.

\*\* Employers in application group Welding in Shipyards employ welders in shipyards. Some of these employers may do both welding and abrasive blasting.

Source: US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis.

Estimated baseline compliance rates were presented in Table V-11 in Section B of this preamble. The estimated costs for the new beryllium standards represented the additional costs necessary for employers to achieve full compliance. The cost of complying with the new beryllium standards' program requirements therefore depended on the extent to which OSHA believed employers in affected application groups had already undertaken some of the required actions. For example, paragraph (e)(1) of the new beryllium standard for shipyards required employers to provide regulated areas if employee exposures cannot be reduced below the final PEL by using engineering and work practice controls. If all employers in an industry have already provided regulated areas, perhaps by physically isolating high exposure processes and restricting access, then the industry's compliance rate for that requirement would be 100 percent, and that industry would incur no new costs for this provision under the new beryllium standard for shipyards. Similarly, if all employers in shipyards have already provided regulated areas, cost savings from removing this requirement would not include the avoidance of costs already incurred by employers in shipyards prior to enactment of the new beryllium standards.

Throughout this section, OSHA presents cost-saving formulas in the text, usually in parentheses, to help explain the derivation of cost-saving estimates for the individual provisions. Because the values used in the formulas shown in the text are shown only to the second decimal place, while the spreadsheets supporting the text are not limited to two decimal places, the calculation using the presented formula will sometimes differ slightly from the totals presented in the tables.

**Program Cost Savings and Definitions of Affected Worker Populations**

This subsection presents OSHA's estimated cost savings from this proposal due to revoking the ancillary provisions in the new beryllium standards for shipyards and construction. The ancillary provisions contained in the new beryllium standards encompass the following nine employer duties, whose removal would each provide potential cost savings: (1) Assess employees' exposure to airborne beryllium, (2) establish beryllium regulated areas (and competent person in construction), (3) develop a written exposure control plan, (4) provide personal protective work clothing and equipment, (5) establish hygiene areas and practices, (6) implement housekeeping measures, (7) provide medical surveillance, (8) provide medical removal for employees who

have developed CBD or been confirmed positive for beryllium sensitization, and (9) provide appropriate training. In addition, OSHA has estimated that employers would incur a modest cost to familiarize themselves with the changes to the ancillary provisions in the final rule as a result of this proposal.

The affected worker population varies by each program element, as discussed in each subsection below. For example, in the 2016 FEA the regulated area program requirements triggered by the final PEL of 0.2 µg/m³ would apply to a subset of shipyard workers: those for whom feasible engineering controls and work practices are not adequate. In this PEA, OSHA tracks the cost reductions in the same way and would remove those costs.

Cost savings for each removed program requirement are aggregated by employment and by industry. For the most part, unit cost savings do not vary by industry, and any variations are specifically noted.

**Exposure Assessment**

**Overview of Regulatory Requirements in the New Beryllium Standards**

Under the new beryllium standards, the employer must assess the exposure of each employee who is, or who may reasonably be expected to be, exposed to airborne beryllium under either a

performance option or a scheduled monitoring option.  
 The employer must reassess exposures whenever a change in the production, process, control equipment, personnel, or work practices may reasonably be expected to result in new

or additional exposures at or above the action level, or when the employer has any reason to believe that new or additional exposures at or above the action level have occurred.

Proposal Cost-Savings Estimates  
 V-13 shows the unit cost savings for avoided initial monitoring and subsequent monitoring. These savings are identical to the unit costs identified in the 2016 FEA when adjusted to 2016 dollars.

TABLE V-13—EXPOSURE MONITORING UNIT COST SAVINGS

Item	Initial monitoring	Subsequent monitoring
Industrial hygienist daily rate .....	\$2,642.59	\$1,321.30
Total samples collected per day <sup>1</sup> .....	6	6
Industrial hygienist cost per sample .....	\$440.43	\$220.22
Laboratory cost to process sample .....	\$150.79	\$150.79
Total direct cost per time weighted average sample <sup>2</sup> .....	\$591.22	\$371.01
Total direct cost for two STEL samples <sup>3</sup> .....	\$1,182.44	\$742.01
Worker productivity loss per sample <sup>4</sup> .....	\$4.03	\$4.03
HR recordkeeping per sample (includes employee notification) <sup>4</sup> .....	\$6.04	\$6.04
Total cost savings per time weighted average sample .....	\$601.28	\$381.07
Total cost savings for two STEL samples .....	\$1,202.57	\$762.14

**Notes:**

<sup>1</sup> Assumes two workers sampled per day and three samples (one TWA sample and two STEL samples) taken per worker.

<sup>2</sup> Includes the cost for one TWA sample plus laboratory cost to process sample.

<sup>3</sup> Includes the cost for two short-term samples plus laboratory costs to process samples.

<sup>4</sup> Includes the prorated cost for a single sample from a combination of one TWA and two short-term samples.

Sources: OSHA, 2016 (Document ID 2044); BEA, 2016 (Document ID 1970); OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis.

OSHA estimates that the total annualized exposure assessment cost savings would be \$5,359,520 for all affected industries.<sup>16</sup> These cost savings, along with the cost savings for each affected NAICS industry, are shown in Table V-18 at the end of this program cost-savings section.

**Beryllium Regulated Areas (and Competent Persons in Construction)**  
 Overview of Regulatory Requirements in the New Beryllium Standards

The new beryllium standard for shipyards requires the employer to establish and maintain a regulated area wherever an employee's airborne exposure exceeds, or can reasonably be expected to exceed, either the time-weighted average (TWA) permissible exposure limit (PEL) or short term exposure limit (STEL). A regulated area can include temporary work areas where maintenance or non-routine tasks are performed. There is no regulated area requirement for construction.

Employers with employees in regulated areas must comply with specific provisions that both limit employee exposure within the boundaries of the regulated area and

curb the migration of beryllium outside the area.

The new beryllium standard for the construction industry requires that, wherever employees are, or can reasonably be expected to be, exposed to airborne beryllium at levels above the TWA PEL or STEL, the employer designate a competent person to make frequent and regular inspections of job sites, materials, and equipment to implement the written exposure control plan.

OSHA assumed that, in restricting access in construction, employers would use the briefing option half of the time and direct access control the other half.

**Cost Savings Estimates**

Based on OSHA's cost estimates in the 2016 FEA (adjusted to 2016 dollars), the cost savings involved in removing the requirements of setting up the regulated area in shipyards include initial set-up time by a supervisor (\$329), tape to demarcate the regulated area (\$29 annually), and the one-time cost of warning signs to mark the regulated area (\$144). There is also the annual cost for daily use of disposable clothing and two disposable respirators by authorized persons who might need to enter the area in the course of their job duties (\$6,900). The annual total regulated area cost savings in shipyards for the tape, clothing, and respirators is therefore \$6,929, and annualized cost savings is \$55 (including the annualized

value of the one-time labor and sign costs of \$329 and \$144).

In the new beryllium construction standard, a competent person must implement the written exposure control plan to limit access to work areas and ensure that employees use respiratory protection and personal protective clothing and equipment. A competent person may implement the written exposure control plan either by using the briefing option or the direct access control option.

As shown in Table V-14,<sup>17</sup> the annual cost savings of the briefing option are \$90.16 per at-risk worker. These costs savings are drawn directly from the costs in the 2016 FEA, beginning on page V-169, with the adjustments previously described in this document. The labor cost savings for the supervisor to plan and communicate the plan per job (\$10.27 and \$4.11, respectively), plus the labor cost savings per job for the production worker to be briefed (\$9.66) provides a total job briefing cost savings per job of \$24.04. Assuming an average of 15 jobs per year (= 150 working days ÷ 10 day average job length), this equates to a job briefing cost savings per year of (\$360.63 = \$24.04 cost savings per job briefing × 15 jobs per year). If the average number of workers per crew is 4 workers, then the annual cost savings per worker is

<sup>16</sup> The exposure monitoring cost savings are calculated in the cost spreadsheet in the 'Rule' tab in column BL through CY. Initial monitoring cost savings begin in column BT, additional monitoring cost savings begin in column CC, and periodic monitoring cost savings begin in column CI. The annualized cost savings are calculated at 7, 3 and 0 percent in columns CQ through CY.

<sup>17</sup> Note that numbers may not add due to rounding.



(\$90.16 = \$360.63 cost savings per year ÷ 4 workers).

As shown in Table V-14, the annualized cost savings of the direct access control option is \$80.45 per at-risk crew member. This cost savings per at-risk crew member includes the avoided supervisor time to set up the area per job (\$10.27) which, assuming 15 jobs per year, equals \$154.05 per year. Dividing the annual cost savings (\$154.05) by the average number of workers per crew (4) equals the per

worker cost savings for the avoided supervisor time to set up the area (\$38.51). The other unit cost savings are the annualized hazard tape cost savings per worker (\$35.55 = \$9.48 hazard tape cost savings per job × 15 jobs per year ÷ 4 workers per crew). The annualized warning sign cost savings per worker (\$6.38 = \$25.54 warning signs cost savings per year ÷ 4 workers per crew), which total an annualized materials cost savings per worker of \$41.94. Adding the annualized cost savings per worker

to identify and set up the controlled access area (\$38.51) to the annualized materials cost savings per worker (\$41.94) equals the total cost savings of the direct access control option per worker per year (\$80.45). Consequently, as shown in Table V-14, the annualized cost savings of competent persons restricting access to work areas is \$85.30 per at-risk crew member (average of \$90.16 and \$80.45).

V-14—UNIT COST SAVINGS FOR NOT IMPLEMENTING WRITTEN EXPOSURE CONTROL PLAN IN CONSTRUCTION

Item	Value			
<b>Job Frequency and Crew Size Assumptions</b>				
Average crew size (workers) .....	4			
Average job length (days) .....	10			
Working days per year .....	150			
Percentage choosing Option 1 .....	50%			
<b>Option 1: Job Briefing</b>				
Item	Hour burden	Labor cost	Materials cost	Total unit cost
Supervisor time to revise plan per job .....	0.25	\$10.27	N/A	\$10.27
Supervisor and worker time for briefing per job .....	0.10	13.77	N/A	13.77
Total per job .....	0.35	24.04	N/A	24.04
Total cost savings per worker per year .....	1.31	90.16	N/A	90.16
<b>Option 2: Direct Access Control</b>				
Supervisor time to identify and set up work area per job .....	0.25	10.27	N/A	10.27
Supervisor time to identify and set up work area per worker per year .....	0.94	38.51	N/A	38.51
Hazard tape cost savings per job (100 ft.) .....	N/A	N/A	\$9.48	9.48
Hazard tape cost savings per worker per year .....	N/A	N/A	35.55	35.55
One-time warning signs cost savings (3 signs) .....	N/A	N/A	72.23	72.23
Annualized warning sign cost savings (3%, 3 years) .....	N/A	N/A	25.54	25.54
Annualized warning sign cost savings per worker .....	N/A	N/A	6.38	6.38
Total annualized materials cost savings per worker .....	N/A	N/A	41.94	41.94
Total cost savings per worker per year .....	N/A	38.51	41.94	80.45
<b>Weighted Average Annual Unit Cost Savings per Worker</b>				
Average annual unit cost savings per worker .....	N/A	N/A	N/A	85.30

Source: US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis  
 Note: Figures in rows may not add to totals due to rounding.

OSHA estimates the total annualized cost savings of regulated areas and competent person requirements is \$261,099 for all affected shipyard and construction industries, with competent person requirements accounting for \$8,464 of the total.<sup>18</sup> The cost savings for each affected NAICS industry is shown in Table V-18 at the end of this program cost-savings section.

**Written Exposure Control Plan Overview of Regulatory Requirements in the New Beryllium Standards**

Under the new beryllium standards, employers are required, for tasks generating airborne beryllium exposure above the action level, to establish and maintain a written exposure control plan.

Further, employers must update the exposure control plan when:

(A) Any change in production processes, materials, equipment, personnel, work practices, or control methods results or can reasonably be expected to result in new or additional airborne exposures to beryllium;

(B) The employer becomes aware that an employee has a beryllium-related health effect or symptom; or

(C) The employer has any reason to believe that new or additional airborne exposures are occurring or will occur.

Finally, the employer must make a copy of the written exposure control plan accessible to each employee who is, or can reasonably be expected to be, exposed to airborne beryllium.

**Cost Savings Estimates**

The estimated cost savings *per establishment* for an average-sized firm to develop the initial written exposure control plan is \$579.39—based on a manager spending 8 hours, at an hourly wage of \$72.42 (Human Resources

<sup>18</sup> The regulated area cost savings are calculated in the cost spreadsheet in the 'Rule' tab in column CZ through FS. The annualized cost savings are calculated at 7, 3, and 0 percent in columns FK through FS.

Managers, SOC: 11–3121), to develop the plan—for an annualized cost of \$67.92.

In addition, because larger firms with more affected workers will need to develop more complicated written control plans, OSHA estimated that the development of a plan would require an extra thirty minutes of a manager's time per affected employee. The cost for an extra thirty minutes of a manager's time per affected employee to develop a more complicated plan is \$36.21 (0.5 × \$72.42) per affected employee in this PEA, for an annualized cost of \$4.50 per employee.

Because of various triggers under which the employer would have to update the plan annually after the first year, the Agency further estimated that, on average, managers would need 12 minutes (0.2 hours) per affected employee per quarter—or 48 minutes (4 × 12), which equals 0.8 hours, per affected employee per year—to review and update the plan. Thus, the cost for managers to review and update the plan would be \$57.94 (0.8 × \$72.42 per affected employee for years 2–10).

Finally, each year, 5 minutes of clerical time for providing each employee with a copy of the written exposure control plan, at a clerical wage of \$22.53 per hour (File Clerks SOC 43–4071), comes to an annual cost of \$1.88 per employee.

OSHA estimates that the total annualized cost savings for removing the requirements for development, implementation, distribution, and update of a written exposure control plan is \$233,032 for all affected industries in shipyards and construction.<sup>19</sup> These cost savings, along with the cost savings for each affected NAICS industry, are shown in Table V–18 at the end of this program cost-savings section.

#### Personal Protective Clothing and Equipment

##### Overview of Regulatory Requirements in the New Beryllium Standards

Under the new beryllium standards, personal protective clothing and equipment are required for workers in shipyards and construction:

1. Whose airborne exposure exceeds, or can reasonably be expected to exceed, the TWA PEL or STEL; or
2. Where employees' skin can reasonably be expected to be exposed to beryllium.

<sup>19</sup> The written exposure control plan cost savings are calculated in the cost spreadsheet in the 'Rule' tab in column LG through ML. The annualized cost savings are calculated at 7, 3 and 0 percent in columns MA through ML.

For the most part, the cost savings for PPE follow the cost estimates in the 2016 FEA. However, there are two exceptions. First, the new beryllium standards require shipyard welders to wear gloves because it is reasonable to expect that their skin will be exposed to beryllium. In the 2016 FEA OSHA listed the shipyard welders' compliance rate with this PPE requirement at 0 percent, inadvertently suggesting that shipyard welders were not already wearing gloves when, in fact, all shipyard welders are already required to wear gloves. In preparing this proposal, OSHA reviewed its compliance rates and discovered the oversight.<sup>20</sup> As a result of this review, OSHA has preliminarily adjusted estimated shipyard welding compliance rates with the PPE requirement from 0 percent in the FEA to 100 percent for this proposal and calculated proposed cost savings using this preliminary estimate.

Second, for the same reason as with welders, the beryllium standards also require abrasive blasters in shipyards and construction to wear gloves as PPE. In the 2016 FEA, OSHA estimated that abrasive blasters in construction and shipyards had a 75 percent compliance rate with the PPE requirements in the beryllium standard. However, upon review, OSHA has preliminarily revised this estimate because the 2016 FEA inadvertently did not take account of the fact that relevant PPE was actually already required by other OSHA standards for abrasive blasters in construction and shipyards. See 1915.34(c)(3)(iv); 1926.57(f)(5)(v). Additionally, OSHA has determined that relevant PPE is required by the existing Personal Protective Equipment standard (1926.95) and the existing Hand and Body Protection standard (1915.157) to protect blasting helpers in construction and shipyards, respectively, from dermal exposure to beryllium dust. Therefore, for the purpose of calculating cost savings, the Agency now preliminarily estimates that all affected employees are already required to be equipped with PPE 100 percent of the time when exposed to beryllium.

##### Cost Savings Estimates

As discussed above, given the existing PPE requirements, OSHA estimates that there are no estimated cost savings as a result of revoking the PPE requirements

<sup>20</sup> Upon review, the Agency now realizes that, under 1915.157(a) for PPE (as well as under OSHA guidance for shipyards during welding), employers must provide gloves to protect against burns. In addition, OSHA now understands that gloves for shipyard welders are standard industry practice.

for construction and shipyard employers in the beryllium final rule.

#### Hygiene Areas and Practices

##### Overview of Regulatory Requirements in the New Beryllium Standards

The new beryllium standards require affected shipyard and construction employers to provide readily accessible washing facilities to remove beryllium from the hands, face, and neck of each employee exposed to beryllium. The employer must also provide a designated change room in workplaces where employees would have to remove their personal clothing and don the employer-provided protective clothing. The employer must ensure that each employee exposed to beryllium uses these facilities when necessary.

##### Cost Savings Estimates

The Agency included in the 2016 FEA no additional cost for readily accessible washing facilities, under the expectation that employers already have such facilities in place. OSHA notes that employers of abrasive blasters exposed to beryllium in shipyards and construction work are typically already required to provide readily accessible washing facilities to comply with other OSHA standards.<sup>21</sup> Therefore, OSHA is estimating no cost savings from washing facilities due to this proposal.

The Agency is, however, including cost savings for the removal of requirements to add a change room and segregated lockers. OSHA included these costs in the 2016 FEA for acquisition of portable structures, for employers who would need to add these. OSHA estimates that portable structures, adequate for 10 workers per establishment, could be rented annually for \$3,579 (adjusted from Lerch, 2003) and that lockers could be procured for a capital cost of \$448—or \$53 annualized—per establishment (adjusted from Lab Safety, 2004). This results in an annualized cost of \$4,027 (\$3,579 + \$448) per facility for a portable change room with lockers.

OSHA estimated in the 2016 FEA that 10 percent of affected establishments will be unable to meet the final TWA PEL and will, therefore, require change

<sup>21</sup> OSHA's shipyard standard at 29 CFR 1915.58(e) requires handwashing facilities "at or adjacent to each toilet facility" and "equipped with . . . running water and soap, or with waterless skin-cleansing agents that are capable of . . . neutralizing the contaminants to which the employee may be exposed." OSHA's construction standard at 29 CFR 1926.51(f)(1) requires "adequate washing facilities for employees engaged in . . . operations where contaminants may be harmful to the employees. Such facilities shall be in near proximity to the worksite and shall be so equipped as to enable employees to remove such substances."

rooms. The Agency expected that, in many cases, a worker will simply be adding, and later removing, a layer of clothing (such as a lab coat, coverall, or shoe covers) at work, which might involve no more than a couple of minutes a day. However, in other cases, a worker may need a full clothing change. Taking all these factors into account, OSHA estimated that a worker using a change room would need 5 minutes per day to change clothes. The annual cost per employee to change clothes (in a change room) is \$480.54. This cost was based on a production worker earning \$24.16 an hour (Production Occupation, SOC: 51-0000) and taking 5 minutes per day to change clothes for 250 days per year ((5/60) × \$24.16 × 250).

The Agency estimates the total annualized cost savings of removing the provision on hygiene areas and practices to be \$1,573,230 for all affected establishments.<sup>22</sup> The breakdown of these cost savings by NAICS code can be seen in Table V-18 at the end of this program cost-savings section.

Housekeeping

Overview of Regulatory Requirements in the New Beryllium Standards

Housekeeping includes following the written exposure control plan, promptly cleaning up all spills and emergency releases of beryllium, and, when cleaning, using methods such as HEPA-filtered vacuuming. The new beryllium standards prohibits cleaning methods that could cause dust to be airborne, such as dry sweeping or compressed air without adequate LEV, unless proper respiratory equipment is worn. All methods must be in accordance with the written exposure control plan. When a shipyard or construction employer transfers materials containing beryllium to another party for use or disposal, the employer must provide the recipient with a copy of the warning label language.

Cost-Savings Estimates

OSHA estimated the following costs in the 2016 FEA in shipyards (amounts adjusted for 2016 dollars): A one-time annualized cost per worker of a HEPA-filtered vacuum (\$614); the annual cost per worker of the additional time needed to perform housekeeping (\$503); and the annual cost of the warning labels per worker (\$5). The total annual per-employee cost was \$509, updated to 2016 dollars. Upon further review, OSHA preliminarily determined that affected employers in construction are already required to minimize dust accumulations through compliance with 29 CFR 1926.57(f)(7), which requires that dust not be allowed to accumulate and that spills be cleaned up promptly, and 29 CFR 1926.57(f)(3) and (f)(4), which require exhaust ventilation and dust collection and removal systems in abrasive blasting operations in construction. Similarly, the general industry Ventilation standard requires that dust not be allowed to accumulate and that spills be cleaned up promptly in abrasive blasting in shipyards (see 29 CFR 1910.94(a)(7), 1910.5(c)). For these reasons, OSHA preliminarily determined that affected employers would already have to perform some housekeeping, and for the purpose of the cost savings estimates in this proposal, OSHA is only including a cost savings for housekeeping in abrasive blasting operations in construction and shipyards for the cost of HEPA-filtered vacuums and similar equipment.

The Agency estimates that there are 11,460 total affected employees in blasting in construction and shipyards, as well as 26 affected employees in shipyard welding, and that the total annualized cost savings in this proposal of removing this ancillary provision is \$901,335.<sup>23</sup> Of this, \$886,008 is attributed to blasting in construction and shipyards and encompasses only the cost savings for HEPA vacuums and associated equipment. As shown in Table V-11 above, OSHA preliminarily determined that employers in these operations are already fully compliant with any labor requirements due to

existing requirements. The Agency has preliminarily determined that the shipyard welding operation would not already be compliant with any labor requirements; thus, the \$15,327 estimated cost savings in this sector is attributed to both labor and equipment. The breakdown of these cost savings by NAICS code is shown in Table V-18 at the end of this program cost-savings section.

Medical Surveillance

Overview of Regulatory Requirements in the New Beryllium Standards

The new beryllium standards require affected employers in shipyards and construction to make medical surveillance available at a reasonable time and place, and at no cost, to the following employees:

1. Employees who have been, or are reasonably expected to be, exposed at or above the action level for more than 30 days in the last 12 months;
2. Employees who show signs or symptoms of chronic beryllium disease (CBD) or signs or symptoms of other beryllium-related health effects, such as rashes;
3. Employees exposed to beryllium during an emergency; and
4. Employees whose most recent written medical opinion required by this standard recommends periodic medical surveillance.

Cost Savings Estimates

OSHA previously identified the fees and other medical expenses that employers would incur to comply fully with the medical surveillance requirements in the new standards. Those costs would be saved under this proposal and are expressed as cost savings in the tables that follow.

Unit Cost Savings for Medical Surveillance

Table V-15 below lists the direct unit cost savings for removing initial medical surveillance activities including: Work and medical history, physical examination, pulmonary function test, BeLPT, LDCT scan, and additional tests.

TABLE V-15—DIRECT UNIT COST SAVINGS FOR THE MEDICAL SURVEILLANCE PROGRAM

Item	Value
<b>Initial Medical Costs</b>	
Work and medical history .....	\$42.83
Physical examination (skin and respiratory tract) .....	\$128.48

<sup>22</sup> The hygiene areas and practices cost savings are calculated in the cost spreadsheet in the 'Rule' tab in column NO through OU. The annualized cost

savings are calculated at 7, 3 and 0 percent in columns OJ through OU.

<sup>23</sup> The housekeeping cost savings are calculated in the cost spreadsheet in the 'Rule' tab in column

OV through PW. The annualized cost savings are calculated at 7, 3 and 0 percent in columns PO through PW.

TABLE V-15—DIRECT UNIT COST SAVINGS FOR THE MEDICAL SURVEILLANCE PROGRAM—Continued

Item	Value
Pulmonary function test .....	\$60.21
Cost Savings of additional tests deemed appropriate by PLHCP .....	\$220.19
Percent of workers requiring additional tests .....	10%
Total initial medical cost savings per worker .....	\$253.54
<b>Lost Work Time</b>	
Employee hours .....	2.08
Employee wage .....	\$24.16
HR manager hours .....	0.25
HR manager wage .....	\$72.42
Supervisor hours .....	0.33
Supervisor wage .....	\$41.08
Cost Savings of Lost work time .....	\$82.13
<b>Total Medical and Lost Work Time Cost Savings per Employee</b>	
Total cost savings per employee .....	\$335.68
Annualized total cost savings per employee .....	\$211.50
<b>BeLPT</b>	
BeLPT .....	\$313.77
Employee hours .....	0.08
Employee wage .....	\$24.16
Cost Savings of Lost work time .....	\$2.01
Unit BeLPT cost savings per employee .....	\$315.78
Annualized per employee cost savings of biennial BeLPTs for 10 years <sup>1</sup> .....	\$198.97
<b>LDCT Scan</b>	
LDCT scan .....	\$847.74
Review LDCT Scan with specialist .....	\$275.24
Employee hours .....	3.50
Employee wage .....	\$24.16
Cost Savings of Lost work time .....	\$84.56
Unit LDCT scan cost savings per employee .....	\$1,207.54
Annualized per employee cost savings of biennial LDCT scan for 10 years <sup>2</sup> .....	\$612.69
<b>Total Annualized cost savings per employee</b>	
Total .....	\$1,023.17

**Notes:**

<sup>1</sup> Calculated as the annualized discounted present value of \$1,640 for biennial BeLPTs. See following discussion for more detail.

<sup>2</sup> Calculated as the annualized discounted present value of \$3,363 for bi-annual CT scans. See following discussion for more detail.

Sources: National Jewish Medical Center, 2005 (Document ID 2001); Intellimed International, 2003, (Document ID 2012); Cost Helper, 2010; (Document ID 1990); BLS, 2017a; BLS, 2017c; BLS, 2016c (Document ID 1980) ; BEA, 2017 (Document ID 1970); US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis.

### Biennial Examination and Testing and BeLPT Testing

The fees, in 2016 dollars, for the total unit annual cost savings for the avoided medical examinations and tests (excluding the BeLPT test) and the time required for both the employee and the supervisor is \$335.68. The total unit annual cost savings for the avoided BeLPT costs is \$315.78. Because the required medical examination and the BeLPT would each typically occur only every two years, OSHA calculates the annualized cost savings of removing that examination and the BeLPT test as follows: taking the present value (PV) of the costs over 10 years and then annualizing them over 10 years at 3 percent. Using this methodology, the

unit annualized biennial exam cost savings are \$211.50 and the unit annualized BeLPT cost savings are \$198.97.

### LDCT Scans

The new beryllium standards require that a low-dose computed tomography (LDCT scan) be offered to employees eligible for medical surveillance whenever recommended by the licensed physician.

As it did with the 2016 FEA costs for LDCT scans, OSHA has based its cost saving estimates on the eligible employees receiving LDCTs every two years.

The total yearly cost savings for biennial LDCT scans consists of avoided medical costs totaling \$1,122.98,

comprised of an \$847.74 fee for the scan (CT-scan, 2012, Document ID 0568) and the cost of a specialist to review the results, which OSHA estimates would cost \$275.24. The Agency estimates an additional cost savings of \$84.56 of lost work time,<sup>24</sup> for a total of \$1,207.54 (\$1,122.98 + \$84.56). The annualized cost savings for avoided biennial CT scans is \$364.00. The annualized total

<sup>24</sup> Time cost is calculated using a wage rate of \$23.87 (Production Worker, SOC 51-0000) and a total of 3.5 hours lost: 60 minutes to travel to and from the appointment, 60 minutes to administer the scan, 60 minutes to travel to and from a meeting with a specialist to review the results and 30 minutes to review the results with the specialist (updated from ERG, 2013) (Document ID 1781).

cost savings per employee is \$612.69 (\$430.13 + \$139.65 + \$42.91).<sup>25</sup>

Number of Workers Requiring LDCT Scans

In the 2016 FEA, OSHA estimated that the number of workers that the physician recommends to receive LDCT scans would be 25 percent of workers who are exposed above 0.2 in the exposure profile. The estimate of 25 percent was based on the fact that roughly this percentage of workers has 15+ years of job tenure in the durable manufacturing sector (BLS, 2013, Document ID 0672) and that all those

with 15+ years of job tenure and current exposure over 0.2 would have had at least 5 years of such exposure in the past. OSHA uses the same estimate in calculating the cost savings in this PEA.

CBD Diagnostic Center Referrals and Evaluations

For purposes of costing this consultation, OSHA used the marginal costs of a physician's time (wages plus fringe benefits) of \$132.79 per hour (Physicians and Surgeons, All Other, SOC: 29-1069); the physician's cost for the 15 minute consultation is therefore \$33.20 ((15/60) × \$132.79). Similarly the

worker's time for this consultation, with a production worker's hourly wage of \$24.16 (updated from Production Occupations, SOC: 51-0000), results in a cost for the employee's time of \$6.04 ((15/60) × \$24.16). Hence the total employer cost savings of avoiding this consultation is \$39.24 (\$33.20 + \$6.04). These cost savings are included in Table V-16 below.

Table V-16 also lists the direct unit cost savings for a clinical evaluation with a specialist at a CBD diagnostic center.

TABLE V-16—UNIT COST SAVINGS FOR MEDICAL EVALUATION AND TESTING PER WORKER REFERRED TO A CBD DIAGNOSTIC CENTER

Item	Value
<b>All Workers</b>	
Referral examination for new patients <sup>1</sup> .....	\$6,456.80
Employer physician hours .....	0.25
Employer physician wage .....	\$132.79
<b>Travelling Workers</b>	
Employee hours .....	24.25
Employee wage .....	\$24.16
Lost work time <sup>2</sup> .....	\$619.09
Cost-savings of travel & living expenses per employee <sup>3</sup> .....	\$620.71
Total cost savings per travelling employee .....	\$7,696.60
<b>Workers Tested Locally</b>	
Employee hours .....	4.25
Employee wage .....	\$24.16
Lost work time <sup>4</sup> .....	\$135.88
Total cost savings per non-travelling employee .....	\$6,592.68
<b>Weighted Average—All Workers</b>	
Average cost-savings per employee .....	\$7,420.62

<sup>1</sup> Includes an exam with a specialist, blood tests, plethysmography, a pulmonary stress test, bronchoscopy with lung biopsy, and a chest CT scan. The unit costs of the components of the evaluation are considered confidential by Healthcare Facility A.

<sup>2</sup> For ¾ of eligible workers, assumes three 8-hour work days for the employee at \$24.16/hour as well as a 15 minute discussion between the employee and the physician at \$132.79/hour. See following discussion for more detail.

<sup>3</sup> Includes out-of-town travel costs and \$53/day living expenses for ¾ of workers. See following discussion for more detail.

<sup>4</sup> For ¼ of eligible workers, assumes four hours for the employee at \$24.16/hour as well as a 15 minute discussion between the employee and the physician at \$132.79/hour. See following discussion for more detail.

Sources: Healthcare Facility A, 2014 (Document ID 2044); U.S. DOT, 2012 (PEA) (Document ID 2031); OSHA Estimate (PEA) (Document ID 0385); BLS, 2016a (Document ID 1978); BLS, 2016 (Document ID 1980); BEA, 2016 (Document ID 1970); U.S. DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis.

In addition, as shown in Table V-16, there are cost savings for avoided lost productivity and travel.

The total cost of a clinical evaluation with a specialist at a CBD diagnostic center is equal to the cost of the examination plus the cost of lost work-time and the cost for the employee to travel to the CBD diagnostic center. For the two latter types of costs, 75 percent

were based on out-of-town travel to a CBD diagnostic center and 25 percent were based on a local CBD diagnostic center. The resulting weighted-average cost-saving estimates of \$7,420.62 for testing at a CBD diagnostic center are presented in Table V-16.

Employees who are not already diagnosed with CBD can be referred to a CBD diagnostic center if the employee

is confirmed positive (sensitized to beryllium). OSHA estimated in the 2016 FEA that during the first year that the medical surveillance provisions are in effect 14.0 percent of the 640 workers who are tested for beryllium sensitization will be confirmed positive for sensitization (through BeLPT tests) and referred to a CBD diagnostic center.

<sup>25</sup> The components represent the annualized unit cost-saving elements of the LDCT scan, reviewing the LDCT scan with a specialist, and lost work time.

Based on these unit costs and the number of employees requiring medical surveillance estimated above, OSHA estimated that the removal by this proposal of the medical surveillance and referral provisions would result in an annualized total cost savings of \$1,414,112.<sup>26</sup> These cost savings by NAICS code are shown in Table V–18 at the end of the program cost-savings section.

Medical Removal Provision

Overview of Regulatory Requirements in the New Beryllium Standards

For affected construction and shipyard establishments, if an employee works in a job with airborne exposure at or above the action level, is diagnosed with CBD or confirmed positive, and provides documentation of the employee’s diagnosis of CBD or confirmed positive status to the employer, that employee is eligible for medical removal and has two choices:

- i. Removal from the current job, or
- ii. Remain in a job with airborne exposure at or above the action level while wearing a respirator in accordance with paragraph (g) of the standards.

If the employee chooses removal, the employee must accept comparable work if such work is available. If comparable work is not available the employer must offer the employee paid leave for six months or until such time as comparable work becomes available, whichever comes first. During that six-month period, whether the employee is re-assigned or placed on paid leave, the employer must continue to maintain the

employee’s base earnings, seniority and other rights and benefits that existed at the time of removal.

Cost Savings Estimates

Revoking the medical removal provision would provide cost savings due to workers no longer being eligible for medical removal. OSHA estimated that, under the January 2017 final standards for construction and shipyards, 332 workers would be eligible for medical removal in the first year and 26 workers each year would be eligible in subsequent years. OSHA estimated an average medical removal cost per worker assuming that 75 percent of firms would be able to find the employee an alternate job, and the remaining 25 percent of firms would not. With updated hourly wages for a production worker of \$24.16 (Production Occupations, SOC: 51–0000) and for a clerical worker of \$22.53 (File Clerks, SOC: 43–4071), the weighted average of these costs is \$7,266 per worker (0.75 × \$1,363 + \$273<sup>27</sup>) + 0.25 × (\$24,161).

Based on the above unit costs, OSHA estimates that revoking the medical removal provision in this proposal would result in an annualized total cost savings of \$471,601.<sup>28</sup> The breakdown of these cost savings by NAICS code can be seen in Table V–18 at the end of this program cost section.

Familiarization Costs

Overview of Regulatory Requirements in the New Beryllium Standards

In the new beryllium standards, OSHA included familiarization costs to account for employers’ time to

understand the ancillary provisions and the other new and revised components of the applicable new standard.

Cost Estimates

As some employers may already have been reviewing the 2016 FEA, in an effort to be conservative, OSHA has not assumed any familiarization cost savings. In the 2016 FEA, the amount of familiarization time required depended, in part, on the range of beryllium-related operations. As the focus of this proposal is on removing the ancillary requirements, this variability of required familiarization time has been largely eliminated. Employers would thus only need to spend a brief amount of time reviewing this proposal (if it became final) to look at the changes from the 2016 FEA. Therefore, OSHA expects that if this proposal is adopted, employers would spend one-tenth of one hour per firm (or 6 minutes) reviewing its changed requirements.

Table V–17 shows the unit costs, by establishment size, of reviewing the changes in this proposal as a result of removing the ancillary provisions. These costs will likely be one-time costs incurred during the first year in which this PEA becomes final, but the aggregate costs are annualized for consistency with the other estimates for this proposal. Based on the unit familiarization (negative) cost savings in Table V–17, the total annualized familiarization costs of this proposal are estimated to be \$1,346.<sup>29</sup> The breakdown of these costs by NAICS code can be seen in Table V–18 at the end of this program cost-savings section.

TABLE V–17—FAMILIARIZATION—CONSTRUCTION AND SHIPYARDS ASSUMPTIONS AND UNIT COST SAVINGS

	Small (<20)	Medium (20–499)	Large (500+)
Hours per establishment .....	0.1	0.1	0.1
Total cost savings per establishment .....	(\$4.11)	(\$4.11)	(\$4.11)
Annualized cost savings .....	(\$0.48)	(\$0.48)	(\$0.48)

**Note:** Based on supervisor wage of \$41.08, inclusive of benefits (BLS, 2016) (Document ID 1980).

Source: U.S. DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis, based on OSHA (2017) (Document ID 2044).

Training

Overview of Regulatory Requirements in the New Beryllium Standards

As specified in both the new shipyard and construction beryllium standards and the existing OSHA standard 29 CFR

1910.1200 on hazard communication, the employer must provide initial training and repeat annual training for each employee who is, or who can reasonably be expected to be, exposed to airborne beryllium. The initial training

is required by the time of initial assignment, and will be applicable to affected shipyard and construction employers.

<sup>26</sup> The medical surveillance cost savings are calculated in the cost spreadsheet in the ‘Rule’ tab in column FT through KK. The annualized cost savings are calculated at 7, 3 and 0 percent in columns JT through KK.

<sup>27</sup> The cost of the salary differential for 6 months of work in a job with exposures less than the AL plus one month of re-training.

<sup>28</sup> The medical removal cost savings are calculated in the cost spreadsheet in the ‘Rule’ tab in column KL through LF. The annualized cost

savings are calculated at 7, 3 and 0 percent in columns KX through LF.

<sup>29</sup> The familiarization cost savings are calculated in the cost spreadsheet in the ‘Rule’ tab in column TP through UZ. The annualized cost savings are calculated at 7, 3 and 0 percent in columns UF through UZ.

### Cost Savings Estimates

The cost savings track the training costs in the 2016 FEA to educate employees about the new requirements of beryllium standards. This additional training would not be necessary if the only impact on construction and shipyards is a change to the PEL. In the 2016 FEA, OSHA determined that training, which includes hazard communication training, will likely be conducted by in-house safety or supervisory staff with the use of training modules and videos. It is estimated that this training will last, on average, eight hours. (Note that this estimate does not include the time taken for hazard communication training that is already required by 29 CFR 1910.1200.) The Agency anticipated that establishments will be able to purchase sufficient training materials at an average cost of

\$2.12 per worker, encompassing the cost of handouts, video presentations, and training manuals and exercises. For initial and periodic training, OSHA estimated an average class size of five workers (each at a wage of \$24.16 (updated from Production Occupations, SOC: 51-0000)) with one instructor (at a wage of \$41.34 (Median Wage for Training and Development Specialists, SOC: 13-1151)) over an eight hour period. The estimated per-worker cost of initial training is \$259.43 ( $= (8 \times \$24.16) + (8 \times \$41.34/5) + \$2.12$ ).<sup>30</sup>

Annual retraining of workers is also required by the new beryllium standards. OSHA estimated the same unit costs as for initial training, so retraining would require the same per-worker cost of \$259.43.

<sup>30</sup>Note that wages are rounded and may not total exactly.

Finally, using these calculations, as well as accounting for industry-specific baseline compliance rates (from Section V.B. of this PEA), and based on a 25.7 percent new hire rate (BLS 2016a, annual manufacturing new hire rate),<sup>31</sup> OSHA preliminarily estimates that the removal of the training requirements in this proposal would result in an annualized total cost savings of \$778,371.<sup>32</sup> The breakdown of these cost savings by NAICS code is presented in Table V-18 below.

<sup>31</sup>OSHA used the same hire rate for abrasive blasters in construction, judging that abrasive blasters in construction are more like skilled production workers (including abrasive blasters) in manufacturing and shipyard than day laborers in construction.

<sup>32</sup>The training cost savings are calculated in the cost spreadsheet in the 'Rule' tab in column PX through QO. The annualized cost savings are calculated at 7, 3 and 0 percent in columns QJ through QO.



**TABLE V-18—ANNUALIZED COST SAVINGS OF PROGRAM REQUIREMENTS FOR INDUSTRIES AFFECTED BY THE PROPOSED BERYLLIUM STANDARD BY SECTOR AND SIX-DIGIT NAICS INDUSTRY**  
 [In 2016 dollars using a 3 percent discount rate]

Application group/NAICS	Industry	Rule familiarization	Exposure assessment	Regulated areas	Beryllium work areas***	Medical surveillance	Medical removal provision	Written exposure control plan	Protective work clothing & equipment****	Hygiene areas and practices	House-keeping	Training	Total program cost savings
<b>Abrasive Blasting—Construction</b>													
238320	Painting and Wall Covering Contractors.	-\$525	\$2,037,910	\$4,393	\$0	\$536,953	\$179,409	\$88,335	\$0	\$610,420	\$337,085	\$293,431	\$4,087,412
238990	All Other Specialty Trade Contractors.	-486	1,888,339	4,071	0	497,544	166,241	81,852	0	565,618	312,345	271,895	3,787,418
<b>Abrasive Blasting—Shipyards*</b>													
336611a	Ship Building and Repairing .....	-332	1,430,277	252,463	0	376,852	125,915	60,706	0	393,508	236,578	205,940	3,081,907
<b>Welding—Shipyards**</b>													
336611b	Ship Building and Repairing .....	-3	2,994	172	0	2,762	36	2,139	0	3,684	15,327	7,106	34,217
<b>Total</b>													
Construction Subtotal .....		-1,011	3,926,250	8,464	0	1,034,497	345,650	170,187	0	1,176,038	649,430	565,325	7,874,830
Shipyards Subtotal .....		-335	1,433,271	252,635	0	379,615	125,951	62,845	0	397,192	251,905	213,046	3,116,125
Total, All Industries .....		-1,346	5,359,520	261,099	0	1,414,112	471,601	233,032	0	1,573,230	901,335	778,371	10,990,954

Note: Totals may not sum due to rounding.

Source: U.S. DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis.

\* Employers in application group Abrasive Blasting—Shipyards are shipyards employing abrasive blasters that use mineral slag abrasives to etch the surfaces of boats and ships.

\*\* Employers in application group Welding in Shipyards employ welders in shipyards. Some of these employers may do both welding and abrasive blasting.

\*\*\* The 2016 FEA also included a requirement for beryllium work areas. As that provision only applied to general industry, it is not relevant, nor discussed, in this proposal, and all references show a zero-dollar cost savings.

Total Annualized Cost Savings using a 3 percent discount rate, is estimated to be about \$11.0 million. As shown in Table V-19, the total annualized cost savings of this proposal,

TABLE V-19—ANNUALIZED COST SAVINGS TO INDUSTRIES AFFECTED BY THE PROPOSED BERYLLIUM STANDARD, BY SECTOR AND SIX-DIGIT NAICS INDUSTRY  
[In 2016 dollars using a 3 percent discount rate]

Application group/NAICS	Industry	Engineering controls and work practices	Respirator costs	Program costs savings	Total cost savings
<b>Abrasive Blasting—Construction</b>					
238320 .....	Painting and Wall Covering Contractors .....	\$0	\$0	\$4,087,412	\$4,087,412
238990 .....	All Other Specialty Trade Contractors .....	0	0	3,787,418	3,787,418
<b>Abrasive Blasting—Shipyards</b>					
336611a .....	Ship Building and Repairing .....	0	0	3,081,907	3,081,907
<b>Welding—Shipyards</b>					
336611b .....	Ship Building and Repairing .....	0	0	34,217	34,217
<b>Total</b>					
Construction Subtotal .....	.....	0	0	7,874,830	7,874,830
Shipyards Subtotal .....	.....	0	0	3,116,125	3,116,125
Total, All Industries .....	.....	0	0	10,990,954	10,990,954

**Note:** Figures in rows may not add to totals due to rounding.  
Source: U.S. DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis.

Time Distribution of Costs effect. As shown in Table V-20, and program start-up expenditures has been incurred. Costs are then essentially flat with relatively small variations for the following years. OSHA analyzed the stream of (un-annualized) compliance costs for the first ten years after the rule would take compliance cost savings are expected to decline from year 1 to year 2 by more than half after the initial set of capital

TABLE V-20—DISTRIBUTION OF UNDISCOUNTED COMPLIANCE COST SAVINGS BY YEAR  
[2016 Dollars]

Year	Program cost savings	Respirators	Engineering	Rule familiarization	Total
1 .....	\$24,009,232	\$0	\$0	-\$11,484	\$23,997,748
2 .....	8,173,911	0	0	0	8,173,911
3 .....	8,951,304	0	0	0	8,951,304
4 .....	8,332,508	0	0	0	8,332,508
5 .....	8,834,132	0	0	0	8,834,132
6 .....	8,418,670	0	0	0	8,418,670
7 .....	8,770,344	0	0	0	8,770,344
8 .....	8,466,731	0	0	0	8,466,731
9 .....	8,733,739	0	0	0	8,733,739
10 .....	8,494,159	0	0	0	8,494,159

**Note:** Figures in rows may not add to totals due to rounding.  
Source: U.S. DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis.

Table V-21 breaks out total costs by each application group for the first ten years. Each application group follows the same pattern of a sharp decrease in compliance costs between years 1 and 2, and then remains relatively flat for the remaining years.

TABLE V-21—TOTAL UNDISCOUNTED COST SAVINGS OF THE NEW BERYLLIUM STANDARDS BY YEAR  
[2016 Dollars]

Application group	Year									
	1	2	3	4	5	6	7	8	9	10
Abrasive Blasting—Construction .....	\$17,383,709	\$5,814,352	\$6,382,594	\$5,930,492	\$6,296,968	\$5,993,216	\$6,250,595	\$6,028,337	\$6,223,603	\$6,048,622
Abrasive Blasting—Shipyards .....	6,547,501	2,331,174	2,538,176	2,373,155	2,506,984	2,396,331	2,489,764	2,409,125	2,480,258	2,416,188
Welding—Shipyards .....	66,538	28,385	30,533	28,861	30,180	29,123	29,985	29,268	29,877	29,348
Total .....	23,997,748	8,173,911	8,951,304	8,332,508	8,834,132	8,418,670	8,770,344	8,466,731	8,733,739	8,494,159

**Note:** Figures in rows may not add to totals due to rounding.  
Source: U.S. DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis.

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compliance cost savings using alternative discount rates of 7 percent and 0 percent. Tables V-22 and V-23 present—for 7 percent and 0 percent discount rates, respectively—total annualized cost savings for affected employers by NAICS industry code and employment size class (all establishments, small entities, and very small entities).  
As shown in these tables, the choice of discount rate has only a minor effect on total annualized compliance costs—for example, annualized costs for all establishments increase from \$11.0 million using a 3 percent discount rate to \$11.5 million using a 7 percent discount rate, and decline to \$10.8 million using a 0 percent discount rate.

**Appendix V-A**  
**Summary of Annualized Costs by Entity Size Under Alternative Discount Rates**

In addition to using a 3 percent discount rate in its cost analysis, OSHA estimated

V-22—TOTAL ANNUALIZED COST SAVINGS, FOR ENTITIES AFFECTED BY THE NEW BERYLLIUM STANDARDS; RESULTS SHOWN BY SIZE CATEGORY, BY SECTOR, AND BY SIX-DIGIT NAICS INDUSTRY  
[7 percent discount rate, in 2016 dollars]

Application group/NAICS	Industry	All establishments	Small entities (SBA-defined)	Very small entities (<20 employees)
<b>Abrasive Blasting—Construction</b>				
238320 .....	Painting and Wall Covering Contractors .....	\$4,280,908	\$3,605,768	\$2,527,303
238990 .....	All Other Specialty Trade Contractors .....	3,966,713	3,050,668	2,084,462
<b>Abrasive Blasting—Shipyards *</b>				
336611a .....	Ship Building and Repairing .....	3,217,754	1,026,481	542,567
<b>Welding—Shipyards **</b>				
336611b .....	Ship Building and Repairing .....	35,196	11,599	6,601
<b>Total</b>				
Construction Subtotal .....	.....	8,247,620	6,656,436	4,611,766
Shipyards Subtotal .....	.....	3,252,950	1,038,080	549,167
Total, All Industries .....	.....	11,500,570	7,694,516	5,160,933

**Notes:** Figures in rows may not add to totals due to rounding.  
"NA" indicates not applicable because OSHA determined there were no affected entities in a particular industry of a particular size.  
Source: U.S. DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis.  
\* Employers in application group Abrasive Blasting—Shipyards are shipyards employing abrasive blasters that use mineral slag abrasives to etch the surfaces of boats and ships.  
\*\* Employers in application group Welding in Shipyards employ welders in shipyards. Some of these employers may do both welding and abrasive blasting.

TABLE V-23—TOTAL ANNUALIZED COST SAVINGS, FOR ENTITIES AFFECTED BY THE NEW BERYLLIUM STANDARDS; RESULTS SHOWN BY SIZE CATEGORY, BY SECTOR, AND BY SIX-DIGIT NAICS INDUSTRY [0 percent discount rate, in 2016 dollars]

Application group/NAICS	Industry	All establishments	Small entities (SBA-defined)	Very small entities (<20 employees)
<b>Abrasive Blasting—Construction</b>				
238320 .....	Painting and Wall Covering Contractors .....	\$4,002,659	\$3,375,763	\$2,373,392
238990 .....	All Other Specialty Trade Contractors .....	3,708,886	2,858,041	1,959,635
<b>Abrasive Blasting—Shipyards *</b>				
336611a .....	Ship Building and Repairing .....	3,021,057	973,324	515,607
<b>Welding—Shipyards **</b>				
336611b .....	Ship Building and Repairing .....	33,823	11,135	6,336
<b>Total</b>				
Construction Subtotal .....	.....	7,711,545	6,233,805	4,333,027
Shipyards Subtotal .....	.....	3,054,880	984,460	521,943
Total, All Industries .....	.....	10,766,425	7,218,264	4,854,970

Notes: Figures in rows may not add to totals due to rounding.

"NA" indicates not applicable because OSHA determined there were no affected entities in a particular industry of a particular size.

Source: U.S. DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis.

\* Employers in application group Abrasive Blasting—Shipyards are shipyards employing abrasive blasters that use mineral slag abrasives to etch the surfaces of boats and ships.

\*\* Employers in application group Welding in Shipyards employ welders in shipyards. Some of these employers may do both welding and abrasive blasting.

**Appendix V-B**

**Summary of Annualized Cost Savings by Cost Type Under Alternative Discount Rates**

In addition to using a 3 percent discount rate in its cost analysis, OSHA estimated

compliance cost savings using alternative discount rates of 7 percent and 0 percent. Tables V-24 and V-25 present—for 7 percent and 0 percent discount rates, respectively—total annualized cost savings for affected

employers by NAICS industry code and type of cost savings.

TABLE V-24—ANNUALIZED COMPLIANCE COST SAVINGS FOR EMPLOYERS AFFECTED BY THE NEW BERYLLIUM STANDARDS BY SECTOR AND SIX-DIGIT NAICS INDUSTRY [7 percent discount rate, in 2016 dollars]

Application group/NAICS	Industry	Engineering controls and work practices	Respirator costs	Program costs	Total costs
<b>Abrasive Blasting—Construction</b>					
238320 .....	Painting and Wall Covering Contractors .....	\$0	\$0	\$4,280,908	\$4,280,908
238990 .....	All Other Specialty Trade Contractors .....	0	0	3,966,713	3,966,713
<b>Abrasive Blasting—Shipyards *</b>					
336611a .....	Ship Building and Repairing .....	0	0	3,217,754	3,217,754
<b>Welding—Shipyards **</b>					
336611b .....	Ship Building and Repairing .....	0	0	35,196	35,196
<b>Total</b>					
Construction Subtotal .....	.....	0	0	8,247,620	8,247,620
Shipyards Subtotal .....	.....	0	0	3,252,950	3,252,950
Total, All Industries .....	.....	0	0	11,500,570	11,500,570

Note: Figures in rows may not add to totals due to rounding.

Source: U.S. DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis.

\* Employers in application group Abrasive Blasting—Shipyards are shipyards employing abrasive blasters that use mineral slag abrasives to etch the surfaces of boats and ships.

\*\* Employers in application group Welding in Shipyards employ welders in shipyards. Some of these employers may do both welding and abrasive blasting.

TABLE V-25—ANNUALIZED COMPLIANCE COST SAVINGS FOR EMPLOYERS AFFECTED BY THE NEW BERYLLIUM STANDARDS BY SECTOR AND SIX-DIGIT NAICS INDUSTRY

[0 percent discount rate, in 2016 dollars]

Application group/NAICS	Industry	Engineering controls and work practices	Respirator costs	Program costs	Total costs
<b>Abrasive Blasting—Construction</b>					
238320 .....	Painting and Wall Covering Contractors .....	\$0	\$0	\$4,002,659	\$4,002,659
238990 .....	All Other Specialty Trade Contractors .....	0	0	3,708,886	3,708,886
<b>Abrasive Blasting—Shipyards*</b>					
336611a .....	Ship Building and Repairing .....	0	0	3,021,057	3,021,057
<b>Welding—Shipyards**</b>					
336611b .....	Ship Building and Repairing .....	0	0	33,823	33,823
<b>Total</b>					
Construction Subtotal .....	.....	0	0	7,711,545	7,711,545
Shipyards Subtotal .....	.....	0	0	3,054,880	3,054,880
Total, All Industries .....	.....	0	0	10,766,425	10,766,425

**Note:** Figures in rows may not add to totals due to rounding.

Source: U.S. DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis.

\* Employers in application group Abrasive Blasting—Shipyards are shipyards employing abrasive blasters that use mineral slag abrasives to etch the surfaces of boats and ships.

\*\* Employers in application group Welding in Shipyards employ welders in shipyards. Some of these employers may do both welding and abrasive blasting.

#### D. Foregone Benefits

Estimated Foregone Benefits and Net Benefits by Construction and Shipyards for the Final Standards for Occupational Exposure to Beryllium

In the 2016 FEA, OSHA estimated that, in addition to other health benefits, the rule would, at the final steady state after a gradual 45-year phase in period, prevent 86 cases of fatal Chronic Beryllium Disease, 46 cases of non-fatal CBD morbidity, and 4 fatal cases of lung cancer annually, the large majority of these cases falling within General Industry (see FEA Chapter VII, Benefits and Net Benefits in Document ID 2042). OSHA estimated the net benefits for the rule as a whole would be worth \$487 million (\$561 million in benefits minus \$74 million in costs). These estimates were midpoints of a very wide range of estimates. Factors contributing to the range included varying risk models, varying approaches to occupational tenure, and widely varying estimates of the effects of ancillary provisions. The construction and shipyard sectors were only a small fraction of this total. Specifically, as indicated in Table VIII-12 in the preamble to the January 9, 2017 final rule (82 FR 2613), the Agency estimated, using the mid-point of a range of benefits, that the rule would prevent 4 cases of fatal and 2 cases of non-fatal CBD annually in these two sectors. Almost all of these estimated benefits were the result of the ancillary provisions. Given uncertainties about

possible benefits from lowering the PEL, the FEA attributed no benefits to implementing the PEL alone for abrasive blasting operations.<sup>33</sup> These sectors accounted for an estimated \$11.9 million in costs, or 16.1 percent of the costs of the final rule, and an estimated \$27.6 million in benefits, or 4.9 percent of the total benefits of the final rule. Without the benefits derived from the construction and shipyards sectors, the net benefit of the rulemaking was reduced by \$15.7 million, or 3.2 percent of the total net benefits of the rule.

This distribution was due both to the much larger number of workers exposed in general industry, compared to construction and shipyards, and uncertainties about how many residual benefits would remain in abrasive blasting operations after existing regulatory requirements were taken into account. In short, the net benefits attributable to these sectors were both small and uncertain.

#### Review of FEA Benefits Analysis

In the FEA, OSHA expressed uncertainty about whether there would be benefits from reduced airborne exposure related to abrasive blasting

<sup>33</sup> See footnote 3 on p. VII-10 of Chapter VII, Benefits, for the FEA for the final beryllium standards. This footnote states: "Given uncertainties about the level of existing respirator use among other workers involved in abrasive blasting operations, OSHA conservatively assigned no benefits related to a reduction in their airborne exposure to beryllium."

operations in both shipyards and construction, as well as a limited number of welders in the shipyards sector.<sup>34</sup> OSHA noted that abrasive blasting operators in construction are already required to wear respirators and assumed that additional engineering and work-practice controls for the operators were infeasible. As explained in this proposal, abrasive blasters in shipyards are often required to wear respirators under the requirements of the Mechanical paint removers standard, 29 CFR 1915.34. However, these standards do not necessarily cover pot tenders or clean-up workers, and may not have required some pot tenders or clean-up workers exposed above the revised PEL of 0.2 µg/m<sup>3</sup> to wear respirators. The exposure data show some pot tenders or clean-up workers are exposed above the revised PEL, but the data do not show whether any of these pot tenders or clean-up workers exposed above the revised PEL were wearing respirators. This uncertainty about baseline respirator use led OSHA to take a conservative approach in the 2016 FEA: In the benefits analysis, OSHA assumed no new benefits from the PEL requirements (thereby potentially underestimating benefits related to the lower PEL), but in the cost analysis, to err on the side of overestimating costs, OSHA assumed

<sup>34</sup> In the 2016 FEA Industry Profile, OSHA estimated that there were 26 welders in shipyards who would be affected by the final rule.

that only 75 percent of abrasive blaster helpers, including cleanup workers, were already provided with the respiratory protection required by the new standard.

Welders in shipyards also have some exposures above the PEL. However, employers are already required to provide welders with ventilation and air-line respirators under 29 CFR 1915.51. Nevertheless, in the cost section of the 2016 FEA, OSHA again provided a conservative estimate for the cost of one new respirator and added a small increment to benefits as result of the new PEL.

#### Estimate of Foregone Benefits

As explained in the Summary and Explanation of this preamble, OSHA has decided to retain the 0.2 µg/m<sup>3</sup> PEL portion of the current standards for construction and maritime. Therefore, the key question with respect to the magnitude of the benefits foregone for this rule is the effect of the ancillary provisions (over and above their effect in ensuring compliance with the PEL) in reducing illnesses and fatalities.

In the FEA, the Agency attributed some reduction in disease to the standards' new lower PEL and the standards' ancillary provisions. However, as explained in the FEA, there was uncertainty of the efficacy of the ancillary requirements across different work environments. For General Industry, the efficacy was estimated to range from no effect to reducing as much as 90 percent of the CBD cases not averted by the new PEL. The FEA referenced several case studies from general industry where benefits at the high end of this scale had come to pass empirically, on top of whatever engineering controls had been implemented. These benefits were attributed most specifically to the introduction of a combination of dermal and respiratory PPE, as well as more aggressive housekeeping.

Throughout the rulemaking process, OSHA has been aware that the situations in shipyards and construction may be substantially different from those in general industry. Baseline usage of respirators and PPE is far higher in construction and shipyards. While the general industry "model" for the efficacy of the ancillary provisions may apply relatively well at other places in general industry (since it was based largely on the experience at Materion facilities), it might be less effective for construction and shipyards. As indicated in the FEA, most workers in construction and shipyard abrasive blasting and shipyard welding operations are already required by other

standards to wear respirators, and it is unclear how many of the abrasive blasting workers would benefit from additional dermal protection requirements. As a result, compared to the earlier (2015) PEA, the Agency estimated a much lower range of benefits to the ancillary provisions for construction and shipyards. Between the 2015 PEA and the FEA, the Agency judged that the benefits estimated for abrasive blasting should be even lower than in the 2015 PEA (which had estimated them at half that of general industry, or a range of 0 to 45 percent), and halved them again to 0 to 22.5 percent in the FEA. The high end of this range was simply an estimate of 25 percent of the range used in general industry, as a way of accounting for the extensive use of respirators and PPE in these two sectors.

Upon further review, OSHA believes that this estimate of 0 to 22.5 percent is too high. While the FEA estimates recognized a high baseline level of compliance, the benefit estimates did not account for compliance with PPE and housekeeping provisions by shipyard welders and construction and shipyard abrasive blasting workers. As a result, based on OSHA's preliminary revised baseline compliance estimates, there should have been limited to no benefits in terms of reduced cases of CBD attributed to the ancillary provisions for the construction and shipyards standards in the January 2017 rule. OSHA also, upon review, found that shipyard welders already use extensive PPE, and thus, based on OSHA's preliminary revised baseline compliance estimates, should have had more limited benefits attributable to the ancillary provisions than originally estimated in the January 2017 rule. This issue of baseline compliance, along with the estimates underlying OSHA's proposed revised baseline compliance rates, was discussed in section V.B, Profile of Affected Application Groups, Establishments, and Employees, of this preamble. Based on the proposed revised compliance rates discussed there, OSHA has therefore preliminarily concluded that abrasive blasting workers in construction and shipyards and welders in shipyards will have limited to no foregone benefits as a result of withdrawing the ancillary provisions.

Using the proposed revised baseline compliance rates in section V.B of this PEA would also lower the estimate of benefits for the construction and shipyard sectors by lowering the baseline estimate of illnesses and fatalities. (Such an issue was not relevant for general industry because

there were not such high levels of baseline compliance.)

#### Conclusions

For the reasons discussed above, OSHA has preliminarily concluded that there are limited to no foregone benefits (due to reducing the number of cases of CBD) as a result of revoking the ancillary provisions of the beryllium final standards for Construction and Shipyards because based on the proposed revised baseline compliance estimates presented in section V.B. of this PEA, the benefits attributed to the ancillary provisions in those sectors were overestimated. The Agency continues to believe that the new PEL will ensure that workers receive additional protection from exposure to beryllium.<sup>35</sup>

## VI. Economic Feasibility Analysis and Regulatory Flexibility Certification

### Economic Feasibility Analysis

#### Shipyards

OSHA is proposing to revoke the ancillary provisions in shipyards and amend the Z Table with the new lower PEL and STEL. OSHA preliminarily concludes that the proposed removal of these provisions for shipyards from the new beryllium standards would reduce costs for shipyard employers. Because these revisions do not create new requirements, OSHA has preliminarily determined that neither new costs nor compliance burdens would be incurred by shipyard employers. Instead there would be cost savings as compared to the January 9, 2017 final standard for occupational exposure to beryllium in shipyards.

#### Construction

OSHA is proposing to revoke the ancillary provisions in construction and amend Appendix A of 1926.55 with the new lower PEL and STEL. OSHA preliminarily concludes that the proposed removal of these provisions for the construction sector would reduce costs for construction employers. Because these revisions do not create new requirements, OSHA has preliminarily determined that neither new costs nor compliance burdens would be incurred by construction

<sup>35</sup> The FEA attributed benefits to lowering the PEL for welders in shipyards. While there are also benefits among abrasive blasting pot tenders and cleanup workers for lowering the PEL, in order to avoid overestimating benefits in the FEA, OSHA took the conservative approach of estimating no benefits for these workers due to uncertainty about the extent of baseline respirator use. The new lower PEL may also result in more protective respirators being used in abrasive blasting operations, and will protect workers in the event that respirators fail, although this is difficult to quantify.

employers. Instead there would be cost savings as compared to the January 9, 2017 final standard for occupational exposure to beryllium in construction.

*Economic Feasibility Determination*

Based on the preceding discussion, it is clear that no shipyard or construction employer would incur new costs as a result of this proposal beyond the minimal cost of familiarization. Because there are no new requirements, OSHA preliminarily concludes that the proposed rule is economically feasible. The Agency welcomes comment on this preliminary finding.

*Regulatory Flexibility Certification*

In accordance with the Regulatory Flexibility Act, 5 U.S.C. 601 *et seq.* (as amended), OSHA has examined the regulatory requirements of the proposal for shipyards and construction to determine whether they would have a significant economic impact on a substantial number of small entities. The proposal would remove ancillary provisions for shipyards and construction from the new beryllium rule, resulting in a reduction of overall costs. Furthermore, because OSHA is proposing no new requirements, the Agency believes that this proposal would not impose any costs on small entities covered by this proposal. The 2016 FEA analysis showed that the costs, and thus the cost savings, would not represent a significant impact on a substantial numbers of small entities and, therefore, the cost savings in this proposal would not have a significant impact on the construction and shipyard subset of those small entities. The Agency certifies that the proposal would not have a significant economic impact on a substantial number of small entities.

*Executive Order 13771: Reducing Regulation and Controlling Regulatory Costs*

Consistent with Executive Order 13771 (82 FR 9339, February 3, 2017) we have estimated the total annualized cost savings of this proposed rule, using a 3 percent discount rate, to be about \$11.0 million, or using a 7 percent discount rate, to be about \$11.5 million.

Therefore, this proposed rule, if finalized, is expected to be an Executive Order 13771 deregulatory action.

**VII. OMB Review Under the Paperwork Reduction Act of 1995**

*A. Overview*

The current beryllium standards for occupational exposure to beryllium—general industry (29 CFR 1910.1024), construction (29 CFR 1926.1124), and shipyard (29 CFR 1915.1024)—contain collection of information (paperwork) requirements that have been approved by the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995 (PRA), and approved under OMB Control number 1218–0267. The proposal would revoke the beryllium standards, and their collections of information, in the shipyard and construction sectors, while retaining the new lower permissible exposure limits. The PRA defines “collection of information” to mean “the obtaining, causing to be obtained, soliciting, or requiring the disclosure to third parties or the public, of facts or opinions by or for an agency, regardless of form or format” (44 U.S.C. 3502(3)(A)).

Under the PRA, a Federal agency cannot conduct or sponsor a collection of information unless OMB approves it, and the agency displays a currently valid OMB control number (44 U.S.C. 3507). Also, notwithstanding any other provision of law, no employer shall be subject to penalty for failing to comply with a collection of information if the collection of information does not display a currently valid OMB control number (44 U.S.C. 3512). The major collections of information found in the standards are listed below.

*B. Solicitation of Comments*

OSHA prepared and submitted a revised Information Collection Request (ICR) to OMB removing the Beryllium Shipyard and Construction collections of information from the existing OMB approved paperwork package in accordance with 44 U.S.C. 3507(d). The Agency solicits comments on the removal of the collection of information requirements and reduction in

estimated burden hours associated with these requirements, including comments on the following items:

- Whether collections of information are necessary for the proper performance of the Agency’s functions, including whether the information is useful;
- The accuracy of OSHA’s estimate of the burden (time and cost) of the collections of information, including the validity of the methodology and assumptions used;
- The quality, utility, and clarity of the information collected; and
- Ways to minimize the compliance burden on employers, for example, by using automated or other technological techniques for collecting and transmitting information (78 FR 56438).

*C. Proposed Information Collection Requirements*

As required by 5 CFR 1320.5(a)(1)(iv) and 1320.8(d)(2), the following paragraphs provide information about this ICR.

1. *Title:* The Occupational Exposure to Beryllium.

2. *Description of the ICR:* The proposal would remove both the Shipyard and Construction Standards from the currently approved Beryllium ICR.

3. *Brief Summary of the Information Collection Requirements*

The proposed ICR does not contain the collection of information requirements in the construction and shipyard industries. The proposal to remove standards for construction and shipyards is based on the Agency’s reconsideration of the need for ancillary provisions in those sectors.

Below is a summary of the collection of information requirements identified in the currently approved Beryllium Information Collection. In this proposed rulemaking, the Agency is proposing to remove the construction and shipyard standards and retain the general industry standard in the Beryllium rule. A copy of this ICR is available to the public at: <http://www.reginfo.gov/public/do/PRAOMBHistory?ombControlNumber=1218-0267>.

Retaining collections of information	Removing collections of information	
	Maritime industry	Construction industry
§ 1910.1024(d)(2) Performance Option .....	§ 1915.1024(d)(2) Performance Option .....	§ 1926.1124(d)(2) Performance Option.
§ 1910.1024(d)(3)(i), (ii), & (iii) Scheduled Monitoring Options.	§ 1915.1024(d)(3)(i), (ii), & (iii) Scheduled Monitoring Options.	§ 1926.1124(d)(3)(i), (ii), & (iii) Scheduled Monitoring Options.
§ 1910.1024(d)(3)(iv), (v), & (vi) Scheduled Monitoring Options.	§ 1915.1024(d)(3)(iv), (v), & (vi) Scheduled Monitoring Options.	§ 1926.1124(d)(3)(iv), (v), & (vi) Scheduled Monitoring Options.
§ 1910.1024(d)(4) Reassessment of Exposure ..	§ 1915.1024(d)(4) Reassessment of Exposure ..	§ 1926.1124(d)(4) Reassessment of Exposure.



Retaining collections of information	Removing collections of information	
General industry	Maritime industry	Construction industry
§ 1910.1024(d)(6)(i) & (ii) Employee Notification of Assessment Results.	§ 1915.1024(d)(6)(i) & (ii) Employee Notification of Assessment Results.	§ 1926.1124(d)(6)(i) & (ii) Employee Notification of Assessment Results.
§ 1910.1024(e)(2)(i) & (ii) Demarcation of Beryllium Work Area and Regulated Areas—	§ 1915.1024(e)(2) Regulated Areas—Demarcation.	§ 1926.1124(e)(2) Competent Person.
§ 1910.1024(f)(1)(i), (ii), & (iii) Methods of Compliance—Written Exposure Control Plan.	§ 1915.1024(f)(1)(i), (ii), & (iii) Methods of Compliance—Written Exposure Control Plan.	§ 1926.1124(f)(1)(i), (ii), & (iii) Methods of Compliance—Written Exposure Control Plan.
§ 1910.1024(g)(2) Respiratory Protection Program.	§ 1915.1024(g) Respiratory Protection Program.	§ 1926.1124(g) Respiratory Protection Program.
§ 1910.1024(h)(2)(v) Personal Protective Clothing and Equipment—Removal and Storage.	§ 1915.1024(h)(2)(v) Personal Protective Clothing and Equipment—Removal and Storage.	§ 1926.1124(h)(2)(v) Personal Protective Clothing and Equipment—Removal and Storage.
§ 1910.1024(h)(3)(iii) Personal Protective Clothing and Equipment—Cleaning and Replacement.	§ 1915.1024(h)(3)(iii) Personal Protective Clothing and Equipment—Cleaning and Replacement.	§ 1926.1124(h)(3)(iii) Personal Protective Clothing and Equipment—Cleaning and Replacement.
§ 1910.1024(j)(3)(i) & (ii) Housekeeping—Disposal.	§ 1915.1024(j)(3) Housekeeping—Disposal ....	§ 1926.1124(j)(3) Housekeeping—Disposal.
§ 1910.1024(k)(1), (2), & (3) Medical Surveillance.	§ 1915.1024(k)(1), (2), & (3) Medical Surveillance.	§ 1926.1124(k)(1), (2), & (3) Medical Surveillance.
§ 1910.1024(k)(4) Medical Surveillance—Information Provided to the PLHCP.	§ 1915.1024(k)(4) Medical Surveillance—Information Provided to the PLHCP.	§ 1926.1124(k)(4) Medical Surveillance—Information Provided to the PLHCP.
§ 1910.1024(k)(5)(i), (ii), & (iii) Medical Surveillance—Licensed Physician’s Written Medical Report for the Employee.	§ 1915.1024(k)(5)(i), (ii), & (iii) Medical Surveillance—Licensed Physician’s Written Medical Report for the Employee.	§ 1926.1124(k)(5)(i), (ii), & (iii) Medical Surveillance—Licensed Physician’s Written Medical Report for the Employee.
§ 1910.1024(k)(6) Medical Surveillance—Licensed Physician’s Written Medical Opinion for the Employer.	§ 1915.1024(k)(6) Medical Surveillance—Licensed Physician’s Written Medical Opinion for the Employer.	§ 1926.1124(k)(6) Medical Surveillance—Licensed Physician’s Written Medical Opinion for the Employer.
§ 1910.1024(k)(7) Medical Surveillance—Referral to the CBD Diagnostic Center.	§ 1915.1024(k)(7) Medical Surveillance—Referral to the CBD Diagnostic Center.	§ 1926.1124(k)(7) Medical Surveillance—Referral to the CBD Diagnostic Center.
§ 1910.1024(l)(1) Medical Removal .....	§ 1915.1024(l)(1) Medical Removal .....	§ 1926.1124(l)(1) Medical Removal.
§ 1910.1024(m)(1) Communication of hazards ..	§ 1915.1024(m)(1) Communication of hazards ..	§ 1926.1124(m)(1) Communication of hazards. N/A.
§ 1910.1024(m)(2) Warning Signs .....	§ 1915.1024(m)(2) Warning Signs .....	§ 1926.1124(m)(3) Warning labels.
§ 1910.1024(m)(3) Warning labels .....	§ 1915.1024(m)(3) Warning labels .....	§ 1926.1124(m)(4)(iv) Employee Information.
§ 1910.1024(m)(4)(iv) Employee Information .....	§ 1915.1024(m)(4)(iv) Employee Information ..	§ 1926.1124(n)(1)(i), (ii), & (iii) Recordkeeping—Air Monitoring Data.
§ 1910.1024(n)(1)(i), (ii), & (iii) Recordkeeping—Air Monitoring Data.	§ 1915.1024(n)(1)(i), (ii), & (iii) Recordkeeping—Air Monitoring Data.	§ 1926.1124(n)(2)(i), (ii), & (iii) Recordkeeping—Objective Data.
§ 1910.1024(n)(2)(i), (ii), & (iii) Recordkeeping—Objective Data.	§ 1915.1024(n)(2)(i), (ii), & (iii) Recordkeeping—Objective Data.	§ 1926.1124(n)(3)(i), (ii), & (iii) Recordkeeping—Medical Surveillance.
§ 1910.1024(n)(3)(i), (ii), & (iii) Recordkeeping—Medical Surveillance.	§ 1915.1024(n)(3)(i), (ii), & (iii) Recordkeeping—Medical Surveillance.	§ 1926.1124(n)(4)(i) & (ii) Recordkeeping—Training.
§ 1910.1024(n)(4)(i) & (ii) Recordkeeping—Training.	§ 1915.1024(n)(4)(i) & (ii) Recordkeeping—Training.	

1. *Title:* Beryllium (29 CFR 1910.1024).
2. *Type of Review:* Revision.
3. *OMB Control Number:* 1218–0267.
4. *Affected Public:* Business or other for-profit. This standard would only apply to employers in general industry.
5. *Number of Respondents:* 4,008 employers.
6. *Frequency of Responses:* On occasion; quarterly, semi-annually, annual; biannual.
7. *Number of Responses:* 142,679.
8. *Average Time per Response:* Varies from 5 minutes (.08 hours) for a clerical worker to generate and maintain an employee medical record, to more than 8 hours for a human resource manager to develop and implement a written exposure control plan.
9. *Estimated Annual Total Burden Hours:* 83,787. This is a reduction of 47,791 hours from the existing annualized 131,578 burden hours.

10. *Estimated Annual Cost (capital-operation and maintenance):* \$20,584,209. This is an annualized cost savings of \$9,980,781 from the existing annualized cost of \$30,564,990.

*D. Submitting Comments*

Members of the public who wish to comment on the revisions to the paperwork requirements in this proposal must send their written comments to the Office of Information and Regulatory Affairs, Attn: OMB Desk Officer for the Department of Labor, OSHA (RIN–1218 –AB76), Office of Management and Budget, Room 10235, Washington, DC 20503, Telephone: 202–395–6929/Fax: 202–395–6881 (these are not toll-free numbers), email: [OIRA\\_submission@omb.eop.gov](mailto:OIRA_submission@omb.eop.gov). The Agency encourages commenters also to submit their comments on these paperwork requirements to the rulemaking docket (Docket Number

OSHA–H005C–2006–0870), along with their comments on other parts of the proposed rule. For instructions on submitting these comments to the rulemaking docket, see the sections of this **Federal Register** notice titled **DATES** and **ADDRESSES**. Comments submitted in response to this notice are public records; therefore, OSHA cautions commenters about submitting personal information such as Social Security numbers and dates of birth.

*E. Docket and Inquiries*

To access the docket to read or download comments and other materials related to this paperwork determination, including the complete Information Collection Request (ICR) (containing the Supporting Statement with attachments describing the paperwork determinations in detail) use the procedures described under the section of this notice titled **ADDRESSES**.

You also may obtain an electronic copy of the complete ICR by visiting the Web page at: <http://www.reginfo.gov/public/do/PRAMain>, scroll under “Currently Under Review” to “Department of Labor (DOL)” to view all of the DOL’s ICRs, including those ICRs submitted for proposed rulemakings. To make inquiries, or to request other information, contact Mr. Todd Owen, Directorate of Standards and Guidance, OSHA, Room N-3609, U.S. Department of Labor, 200 Constitution Avenue NW., Washington, DC 20210; telephone (202) 693-2222.

### VIII. Federalism

OSHA reviewed this proposed beryllium rule according to the most recent Executive Order (“E.O.”) on Federalism, E.O. 13132, 64 FR 43255 (Aug. 10, 1999). The E.O. requires that Federal agencies, to the extent possible, refrain from limiting State policy options, consult with States before taking actions that would restrict States’ policy options, and take such actions only when clear constitutional authority exists and the problem is of national scope. The E.O. allows Federal agencies to preempt State law only with the expressed consent of Congress. In such cases, Federal agencies must limit preemption of State law to the extent possible.

Under Section 18 of the Occupational Safety and Health Act (the “Act” or “OSH Act”), 29 U.S.C. 667, Congress expressly provides that States may adopt, with Federal approval, a plan for the development and enforcement of occupational safety and health standards. OSHA refers to States that obtain Federal approval for such plans as “State-Plan States.” 29 U.S.C. 667. Occupational safety and health standards developed by State-Plan States must be at least as effective in providing safe and healthful employment and places of employment as the Federal standards. Subject to these requirements, State-Plan States are free to develop and enforce their own occupational safety and health standards.

This proposed rule would revoke the ancillary provisions for the construction and shipyard industries, but retain the recently revised PEL of 0.2  $\mu\text{g}/\text{m}^3$  and STEL of 2.0  $\mu\text{g}/\text{m}^3$  for those industries. This would provide more flexibility to State-Plan States to develop and enforce their own standards, provided those standards require workplaces to be at least as safe and healthful as federal OSHA standards. Additionally, standards promulgated under the OSH Act do not apply to any worker whose

employer is a state or local government. 29 U.S.C. 652(5).

This proposed rule complies with E.O. 13132. In States without OSHA-approved State plans, Congress expressly provides for OSHA standards to preempt State occupational safety and health standards in areas addressed by the Federal standards. In these States, this rule would limit State policy options in the same manner as every standard promulgated by the Agency. In States with OSHA-approved State plans, this rulemaking would not limit State policy options to adopt stricter standards.

### IX. State-Plan States

When Federal OSHA promulgates a new standard or a more stringent amendment to an existing standard, the States and U.S. territories with their own OSHA-approved occupational safety and health plans (“State-Plan States”) must revise their standards to reflect the new standard or amendment. The State standard must be at least as effective as the Federal standard or amendment, and must be promulgated within 6 months of the publication date of the final Federal rule. 29 CFR 1953.5(a). Currently, there are 28 State-Plan States.

Of the 28 States and territories with OSHA-approved State plans, 22 cover public and private-sector employees: Alaska, Arizona, California, Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virginia, Washington, and Wyoming. The remaining six states and territories cover only public-sector employees: Connecticut, Illinois, New Jersey, Maine, New York, and the Virgin Islands.

This rule, if adopted as proposed, would eliminate the ancillary provisions for the construction and shipyard industries, but retain the recently revised PELs of 0.2  $\mu\text{g}/\text{m}^3$  as an 8-hour time-weighted average and 2.0  $\mu\text{g}/\text{m}^3$  as a 15 minute short-term exposure limit for those industries. It would leave the beryllium standard for general industry intact. Therefore, no new State standards would be required beyond the revision of the PELs and those already required by the promulgation of the beryllium standard for general industry.

If the proposal is adopted, State-Plan states may nonetheless choose to conform to the January 9, 2017 construction and shipyards ancillary provisions, although they would no longer be required to do so.

### X. Unfunded Mandates Reform Act

Under Section 202 of the Unfunded Mandates Reform Act of 1995 (“UMRA”), 2 U.S.C. 1532, an agency must prepare a written “qualitative and quantitative assessment” of any regulation creating a mandate that “may result in the expenditure by the State, local, and tribal governments, in the aggregate, or by the private sector, of \$100,000,000 or more (adjusted annually for inflation)” in any one year before promulgating a final rule. OSHA’s rule does not place a mandate on State or local governments, for purposes of the UMRA, because OSHA cannot enforce its regulations or standards on State or local governments. 29 U.S.C. 652(5). Under voluntary agreement with OSHA, some States require public sector entities to comply with State standards, and these agreements specify that these State standards must be at least as protective as OSHA standards. The OSH Act does not cover tribal governments in the performance of traditional governmental functions, though it does cover tribal governments when they engage in commercial activity. However, this proposed rule will not require tribal governments to expend, in the aggregate, \$100,000,000 or more in any one year for their commercial activities. Thus, this proposed rule does not trigger the requirements of UMRA based on its impact on State, local, or tribal governments.

Based on the analysis presented in the Preliminary Economic Analysis (see Section V above), OSHA concludes that this proposed rule would not impose a Federal mandate on the private sector in excess of \$100 million (adjusted annually for inflation) in expenditures in any one year. As noted below, OSHA also reviewed this proposed rule in accordance with E.O. 13175 on Consultation and Coordination with Indian Tribal Governments, 65 FR 67249 (Nov. 9, 2000), and determined that, if adopted, it would not have “tribal implications” as defined in that Order.

### XI. Protecting Children From Environmental Health and Safety Risks

E.O. 13045, 66 FR 19931 (Apr. 23, 2003), requires that Federal agencies submitting covered regulatory actions to OMB’s Office of Information and Regulatory Affairs (“OIRA”) for review pursuant to E.O. 12866, 58 FR 51735 (Oct. 4, 1993), must provide OIRA with (1) an evaluation of the environmental health or safety effects that the planned regulation may have on children, and (2) an explanation of why the planned

regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the agency. E.O. 13045 defines “covered regulatory actions” as rules that may (1) be economically significant under E.O. 12866 (*i.e.*, a rulemaking that has an annual effect on the economy of \$100 million or more, or would adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities), and (2) concern an environmental health risk or safety risk that an agency has reason to believe may disproportionately affect children. In this context, the term “environmental health risks and safety risks” means risks to health or safety that are attributable to products or substances that children are likely to come in contact with or ingest (*e.g.*, through air, food, water, soil, or product use).

This proposed beryllium rule would not be economically significant under E.O. 12866 (*see* Section V of this preamble). In addition, OSHA is not aware of any studies showing that exposure to beryllium in workplaces disproportionately affects children, who typically are not allowed in workplaces where such exposure exists. OSHA is also not aware that there are a significant number of employees under 18 years of age who may be exposed to beryllium, or that employees of that age are disproportionately affected by such exposure. OSHA also does not believe that beryllium particles present in abrasive blasting media or welding fume residue that might be brought home on work clothing, shoes, and hair would result in exposures at or near the action level as defined in the January 9, 2017 standards. Therefore, OSHA believes that this proposed beryllium rule would not constitute a covered regulatory action as defined by E.O. 13045.

## XII. Environmental Impacts

OSHA has reviewed this proposed beryllium rule according to the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 *et seq.*), the regulations of the Council on Environmental Quality (40 CFR part 1500), and the Department of Labor’s NEPA procedures (29 CFR part 11). OSHA has made a preliminary determination that this proposed rule would have no significant impact on air, water, or soil quality; plant or animal life; the use of land or aspects of the external environment.

## XIII. Consultation and Coordination With Indian Tribal Governments

OSHA reviewed this proposed rule in accordance with E.O. 13175 on Consultation and Coordination with Indian Tribal Governments, 65 FR 67249 (Nov. 9, 2000), and determined that it does not have “tribal implications” as defined in that order. The OSH Act does not cover tribal governments in the performance of traditional governmental functions, so the proposal will not have substantial direct effects on one or more Indian tribes in their sovereign capacity, on the relationship between the Federal government and Indian tribes, or on the distribution of power and responsibilities between the Federal government and Indian tribes. On the other hand, employees in commercial businesses owned by tribes or tribal members will receive the same protections and benefits of the standard as all other covered employees.

## XIV. Public Participation

OSHA encourages members of the public to participate in this rulemaking by submitting comments on the proposal.

*Written Comments.* OSHA invites interested persons to submit written data, views, and arguments concerning this proposal. When submitting comments, persons must follow the procedures specified above in the sections titled **DATES** and **ADDRESSES**.

*Informal public hearings.* The Agency will schedule an informal public hearing on the proposed rule if requested during the comment period.

## XV. Summary and Explanation of the Proposal

This section of the preamble explains the changes that OSHA proposes to make to the beryllium standards, including Agency’s explanation of the reasoning behind the proposed changes.

As noted in the January 9, 2017 final rule, OSHA has evidence that beryllium exposure above 0.2  $\mu\text{g}/\text{m}^3$  as an 8-hour time-weighted average can occur in abrasive blasting in construction, abrasive blasting in shipyards, and welding in shipyards. OSHA determined that exposures at that level create a significant risk of material impairment of health, including developing CBD and lung cancer. These operations, however, are already regulated by other OSHA construction and shipyards standards. OSHA requested, but did not receive, additional data during the previous rulemaking about exposures in these operations and about protections

provided by other OSHA standards. In light of the limited information regarding exposures and the potential that other OSHA standards may offer protection from beryllium exposures, OSHA is proposing, as an alternative to the comprehensive January 9, 2017 final rule, to revoke the ancillary provisions for construction and the ancillary provisions for shipyards while retaining the new lower PELs for these sectors. This proposal allows OSHA to open the rulemaking record to receive more information about exposures, controls, and procedures in operations within the construction and shipyard sectors.

In addition, this NPRM provides stakeholders with an additional opportunity to offer comments on the January 9, 2017 construction and shipyard standards, including comments on the regulatory text and whether the ancillary provisions are necessary in these sectors.

## Significant Risk in Construction and Shipyards

### A. Summary of Relevant Exposure Data

#### 1. Abrasive Blasting

Despite the low concentrations of beryllium in the blast material, airborne concentrations of beryllium have been measured above the previous TWA PEL of 2  $\mu\text{g}/\text{m}^3$  when blast material containing beryllium is used as intended. In OSHA’s exposure profile in the January 9, 2017 rule, summarized above in Section IV, 56 percent of abrasive blasting operators had beryllium exposures at or below 0.2  $\mu\text{g}/\text{m}^3$ , and 19 percent exceeded 2.0  $\mu\text{g}/\text{m}^3$ . For pot tenders, all samples in the exposure profile were less than or equal to 0.2  $\mu\text{g}/\text{m}^3$ . Of those samples, 75 percent were non-detectable for beryllium. For cleanup workers, 94 percent of samples were less than or equal to 0.2  $\mu\text{g}/\text{m}^3$ .

Eighty-three percent of the abrasive media cleanup worker samples were non-detectable for beryllium. One cleanup worker had an 8-hour TWA sample result of 1.1  $\mu\text{g}/\text{m}^3$ ; however, it is likely that this sample result was elevated due to nearby abrasive blasting. Another cleanup worker had a sample result of 7.4  $\mu\text{g}/\text{m}^3$  as an 8-hour TWA, but this appeared to be associated with the use of compressed air for cleaning in conjunction with nearby abrasive blasting. The available data in the previous rulemaking record suggested that most pot tenders and cleanup workers have low beryllium exposures. The median exposure levels for both of these job categories were less than 0.1  $\mu\text{g}/\text{m}^3$  and nearly all results were less than or equal to 0.2  $\mu\text{g}/\text{m}^3$ . It should be

noted that the exposure profile for pot tenders and cleanup workers is based on limited data (16 and 30 air samples, respectively), and given this information, OSHA believes some of these workers are exposed above 0.2  $\mu\text{g}/\text{m}^3$ .

#### Welding in Shipyards

As described in Section 10, Appendix 2 of the Technological Feasibility chapter of the January 9, 2017 final rule (Document ID 2042), 127 personal breathing zone (PBZ) samples collected on welders welding non-specified or non-beryllium-containing materials in U.S. shipyards and Navy facilities range from 0.02  $\mu\text{g}/\text{m}^3$  to 0.74  $\mu\text{g}/\text{m}^3$ , with a mean of 0.13  $\mu\text{g}/\text{m}^3$  and a median of 0.08  $\mu\text{g}/\text{m}^3$  (OSHA Shipyards, 2005, Document ID 1166; U.S. Navy, 2003, 0145). Of the 127 samples, 123 samples (approximately 97 percent) were non-detectable for beryllium. This pattern was also confirmed in an observation by the Navy Environmental Health Center, which indicated that beryllium has not generally been found in welding fumes (NEHC Jan24, 2005, Document ID 1236).

#### B. Summary of Significant Risk Finding

As noted in the January 9, 2017 final rule, OSHA has evidence that workers are exposed to beryllium above 0.2  $\mu\text{g}/\text{m}^3$  in abrasive blasting in construction, abrasive blasting in shipyards, and welding in shipyards. Abrasive blasters and ancillary abrasive blasting workers, such as pot tenders and cleanup workers, are exposed to beryllium from coal slag and other mineral slags such as copper slag. Beryllium is a trace contaminant in these materials, but despite the low concentration of beryllium, airborne beryllium concentrations above 0.2  $\mu\text{g}/\text{m}^3$  have resulted from the blasting process and may lead to harmful exposures to abrasive blasting operators and others in the vicinity of the blasting operation. In the January 9, 2017 final rule, OSHA determined that exposures at that level create a significant risk of developing CBD and lung cancer.

In comments on the 2015 proposal, the American Blasting Manufacturers Alliance argued that OSHA had not established significant risk associated with blasting operations. In particular, it argued that “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” (Document ID 1673, p. 9). However, ABMA presented no studies or rigorous scientific evidence to support this statement, and as OSHA noted in the January 9, 2017 final rule, such anecdotal reports are not compelling evidence, especially where there is no surveillance program, required or otherwise (see 82 FR 2642). Rather, the best available evidence indicates that there is a significant risk of CBD and lung cancer to workers in construction and shipyards based on the exposure levels observed. However, OSHA welcomes further data and comment on the risks of sensitization, CBD, and lung cancer among workers involved in abrasive blasting and welding operations in shipyards and construction.

#### Current Applicable Standards

In the January 9, 2017 final rule, OSHA identified that the requirements for new PELs and for ancillary provisions such as medical surveillance, personal protective clothing and equipment, and beryllium-specific training provided needed protections (82 FR 2637). OSHA stated that it adopted ancillary provisions for construction and shipyards “to ensure that workers exposed to beryllium in the construction and shipyard industries are provided protection that is comparable to the protection afforded workers in general industry.” (82 FR 2639–40). However, given that other OSHA construction standards cover abrasive blasting operations, where the available data shows that beryllium exposures primarily occur, OSHA is further considering the need for ancillary provisions for the construction sector.

Similarly, abrasive blasting in shipyards and welding in shipyards are already regulated by OSHA in various ways that limit exposure to beryllium among workers in these operations, and OSHA is also giving further consideration to the need for the ancillary standards for those operations.

#### A. Construction

Workers in the construction sector are protected by the permissible exposure limits (PELs) set forth in 29 CFR 1926.55 Appendix A. The January 9, 2017 final rule lowered the PELs to 0.2  $\mu\text{g}/\text{m}^3$  as an 8-hour time-weighted average and 2.0  $\mu\text{g}/\text{m}^3$  as a 15-minute short term exposure limit. In addition to these PELs, workers in construction are already protected from beryllium exposure through other standards.

The ventilation standard in construction at 1926.57(f)(2)(ii) requires

“[t]he concentration of respirable dust or fume in the breathing zone of the abrasive-blasting operator or any other worker” to remain “below the levels specified in 1926.55,” which OSHA proposes to lower to 0.2  $\mu\text{g}/\text{m}^3$  as an 8-hour time-weighted average and 2.0  $\mu\text{g}/\text{m}^3$  as a short term exposure limit.<sup>36</sup> Through the construction ventilation standard, workers performing abrasive blasting are required to wear extensive PPE, including respirators, under certain conditions, including where beryllium concentrations dispersed by blasting may exceed the PEL and the operator is not already physically separated from the nozzle and blast material. 29 CFR 1926.57(f)(5)(ii). In addition, the construction ventilation standard requires some housekeeping measures. 29 CFR 1926.57(f). 29 CFR 1926.57(f)(7) requires that dust not be allowed to accumulate outside abrasive blasting enclosures and that spills be cleaned up promptly. 29 CFR 1926.57(f)(3) and (f)(4) also require exhaust ventilation and dust collection and removal systems in abrasive blasting operations in construction. Compliance with those housekeeping measures during abrasive blasting should also reduce the amount of beryllium-containing dust to be cleaned, thereby protecting clean-up workers who clean spent abrasive blasting media after blasting operations are completed.

Furthermore, the general industry Respiratory Protection standard at 1910.134 applies to construction and requires employers to provide a respirator to each employee when necessary to protect the employee’s health. Additionally, OSHA requires construction employers to train their employees in the recognition and avoidance of unsafe conditions. 29 CFR 1926.21. In particular, section 1926.21(b)(3) requires employers to instruct employees who handle harmful substances “regarding the safe handling and use, and be made aware of the potential hazards, personal hygiene, and personal protective measures.” The hazard communication standard, which applies to the construction industry, also requires training, including the hazards of the chemicals in the work area and the “appropriate work practices, emergency procedures, and personal protective equipment to be used.” 1910.1200(h)(3).

<sup>36</sup>The January 2017 final rule lowered the PELs in construction in 29 CFR 1926.1124. Because OSHA is now proposing to revoke the comprehensive construction standard while retaining the lower PELs, this proposal would amend the PELs in Appendix A of 29 CFR 1926.55 to reflect the new lower PELs.

## Shipyards

Workers in shipyards are protected by the PELs set forth in 29 CFR 1915.1000 Table Z. In the January 9, 2017 final rule, OSHA lowered the PELs to 0.2 µg/m<sup>3</sup> as an 8-hour time-weighted average and 2.0 µg/m<sup>3</sup> as a 15-minute short term exposure limit. The January 2017 final rule lowered the PELs in shipyards in 29 CFR 1915.1024. Because OSHA is now proposing to revoke the ancillary provisions for shipyards while retaining the lower PELs, this proposal would amend the PELs in Table Z of 29 CFR 1915.1000 to reflect the new lower PELs. In general, hazards not covered by shipyard industry standards may be covered by general industry standards in 29 CFR part 1910. If a hazard is covered by both the shipyard industry standards and the general industry standards, only the shipyard industry standards are cited in OSHA inspections (29 CFR 1910.5). In addition to these exposure limits, workers in shipyards are already protected from beryllium exposure through other standards.

### 1. Abrasive Blasting

Abrasive blasting in shipyards is covered by the Mechanical paint removers standard. 29 CFR 1915.34. OSHA expects that most abrasive blasting in shipyards involves paint removal. In a comment on the previous proposal, the Shipbuilders Council of America commented that “[i]n shipyards beryllium is primarily encountered in in abrasive blasting operations. Coal slag particulates are used as a blast grit for removing paints, coatings, and rust from steel components prior to painting and coating.” (Document ID 1618, p. 3). OSHA seeks comment on whether there are abrasive blasting operations in shipyards that are not covered by 1915.34. The shipyards standard at 29 CFR 1915.34(c)(3) requires respiratory protection and other appropriate personal protective equipment in abrasive blasting operations for both abrasive blasting operators and helpers working in the area. The general industry respirator standard at 1910.134 applies to shipyards and requires employers to provide a respirator to each employee when necessary to protect the employee’s health. Additionally, the hazard communication standard requires training, including the hazards of the chemicals in the work area and the “appropriate work practices, emergency procedures, and personal protective equipment to be used.” 1910.1200(h)(3).

Certain provisions of OSHA’s Ventilation standard for abrasive

blasting (29 CFR 1910.94(a)) also apply to abrasive blasting in shipyards. OSHA guidance on the application of the exhaust ventilation paragraph of the general industry standard (29 CFR 1910.94(a)(4)) states that all blast-cleaning enclosures must have sufficient exhaust ventilation to prevent a buildup of dust-laden air and reduce the concentrations of hazardous air contaminants, as well as to increase operator visibility and prevent leakage of dust to the outside of the enclosure. The Ventilation standard also contains housekeeping requirements in the subparagraph on abrasive blasting (29 CFR 1910.94(a)(7)). Compliance with those housekeeping measures during abrasive blasting should also reduce the amount of beryllium-containing dust to be cleaned, thereby protecting clean-up workers who clean spent abrasive blasting media after blasting operations are completed. In addition, exhaust ventilation systems must be constructed, installed, inspected, and maintained according to the OSHA Ventilation standard for abrasive blasting (29 CFR 1910.94(a)). OSHA seeks comment on current industry practices and legal requirements regarding PPE use for abrasive blasting workers, including pot tenders and clean-up workers.

Abrasive blasting sometimes occurs in confined spaces in shipyard work. OSHA’s standard covering confined and enclosed spaces in shipyard employment requires an employer to ensure that confined or enclosed spaces that contain or have contained toxic liquids, gases, or solids are inspected visually by a competent person to determine the presence of toxic residue contaminants and tested by a competent person before entry by an employee to determine the air concentration of toxic substances. 29 CFR 1915.12. Employees may not enter a space whose atmosphere exceeds a PEL except for emergency rescue, or for a short duration for installation of ventilation equipment, provided that the atmosphere in the space is monitored continuously and respiratory protection and other necessary and appropriate PPE and clothing are provided. If the beryllium PEL is exceeded in a space, the space must be labeled “Not Safe for Workers” and ventilation must be provided to reduce air concentrations to below the PEL. OSHA requests information on the prevalence of blasting in confined or enclosed spaces in shipyards.

### 2. Welding

Welding in shipyards is likewise covered by OSHA standards. OSHA

found, after a review of shipyard personal protective equipment requirements, that gloves are required under 29 CFR 1915.157(a) to protect workers from hazards faced by welders, such as thermal burns. 29 CFR 1915.51 requires that ventilation be used to keep welding fumes and smoke within safe limits, and 29 CFR 1915.51(d)(2)(iv) specifically covers welding involving beryllium: “Because of its high toxicity, work involving beryllium shall be done with both local exhaust ventilation and air line respirators.” These safe limits in 1915.51 are defined by the PELs in 29 CFR 1915.1000 Table Z, which currently has a beryllium TWA PEL of 2.0 µg/m<sup>3</sup> and which OSHA proposes to lower to 0.2 µg/m<sup>3</sup>, along with a STEL of 2.0 µg/m<sup>3</sup>.<sup>37</sup> And, as previously discussed, OSHA standard 1915.12 includes protections for shipyard employees who perform welding in confined or enclosed spaces, limiting access to enclosed spaces where beryllium exposures exceed the PEL and requiring exposure monitoring, ventilation, warning signs, and PPE including respiratory protection in such spaces. The training provisions of the hazard communication standard apply to shipyard welding operations as well. OSHA seeks comment on beryllium exposures and existing protections among shipyard welders, and on whether the reduced beryllium PEL and STEL provides sufficient protection to these workers.

### I. Consultation With the Advisory Committee on Construction Safety and Health

Under 29 CFR 1911.10(a), OSHA must consult with the Advisory Committee on Construction Safety and Health (ACCSH) “in the formulation of a rule to promulgate, modify, or revoke a standard.” In May 2014, OSHA presented options to ACCSH for the promulgation of the beryllium rule. These options were (1) reducing the exposure limits in construction to the same level as the proposed exposure limits in general industry, (2) reducing the exposure limits and including a medical surveillance requirement, and (3) including construction in the scope of the rule and including the same ancillary provisions as in general industry. OSHA discussed the types of ancillary provisions that would be included but did not provide regulatory text. Some ACCSH members asked

<sup>37</sup> The January 2017 final rule lowered the PELs in shipyards in 29 CFR 1915.1024. Because OSHA is now proposing to revoke the ancillary provisions for shipyards while retaining the lower PELs, this proposal would amend the PELs in Table Z of 29 CFR 1915.1000 to reflect the new lower PELs.

OSHA for more information, including draft regulatory text, before providing OSHA with a recommendation. Without that information, ten members voted for the third option, and four members abstained from voting.

The January 9, 2017 final rule followed ACCSH's recommendation. However, ACCSH's recommendation was not unanimous, and as discussed above, OSHA is reconsidering the ancillary provisions for construction. This is based on the fact that the available data show exposures of concern only in abrasive blasting operations, and workers engaged in those operations are already provided protection by a number of other standards. OSHA notes that this proposal is the first option that was presented to ACCSH at the May 2014 meeting.

## II. Proposed Regulatory Text

OSHA proposes, based on feedback from interested parties and a reevaluation of the applicability of existing OSHA standards, to remove the ancillary provisions of the comprehensive health standards in both construction and shipyards, but maintain the new lower PEL of 0.2  $\mu\text{g}/\text{m}^3$  and the STEL of 2.0  $\mu\text{g}/\text{m}^3$ . This would entail revoking both 29 CFR 1915.1024 and 29 CFR 1926.1124. It would also require amending 29 CFR 1915.1000 Table Z, and 29 CFR 1926.55 Appendix A. The entry for beryllium and beryllium compounds in section 1915.1000 Table Z would be amended to include a "STEL" designation after the ".002" entry to indicate that 2  $\mu\text{g}/\text{m}^3$  (.002  $\text{mg}/\text{m}^3$ ) is a short term exposure limit, not an 8-hour TWA PEL. The entry would also be amended to add a ".0002" to reflect the change from an 8-hour TWA PEL to .2  $\mu\text{g}/\text{m}^3$  (.0002  $\text{mg}/\text{m}^3$ ). The references to 1915.1024 would be removed. OSHA would also add a new subparagraph, 29 CFR 1915.1000(a)(3), explaining that a STEL is a short term exposure limit as measured over a fifteen-minute period, and amend the text to footnote \* to include similar text. Similarly, the entry for beryllium and beryllium compounds in Appendix A to 29 CFR 1926.55 would be amended to include a "STEL" designation after the ".002" entry to indicate that 2  $\mu\text{g}/\text{m}^3$  (.002  $\text{mg}/\text{m}^3$ ) is a short term exposure limit, not an 8-hour TWA PEL. The entry would also be amended to add a ".0002" to reflect the change from an 8-hour TWA PEL to .2  $\mu\text{g}/\text{m}^3$  (.0002  $\text{mg}/\text{m}^3$ ). The references to 1926.1124 would be removed. OSHA would also amend footnote \* to explain that a STEL is a short term exposure

limit as measured over a fifteen-minute period.

Because OSHA has determined that significant risk remains at the PEL of 0.2  $\mu\text{g}/\text{m}^3$  and several OSHA construction and shipyard standards rely on the PEL for a portion of their provisions, the Agency believes it is necessary to protect workers in construction and shipyards using the permissible exposure limits promulgated in the January 9, 2017 final rule. When considering the need for ancillary measures in the January 9, 2017 final rule, OSHA stated that it adopted ancillary provisions for construction and shipyards "to ensure that workers exposed to beryllium in the construction and shipyard industries are provided protection that is comparable to the protection afforded workers in general industry." (82 FR 2639–40). As discussed above, OSHA is reconsidering the need for the ancillary provisions, given the limited operations that are covered and the other OSHA standards that apply to those operations. This proposal to revoke the ancillary provisions for construction and shipyards while retaining the new PELs is intended to provide opportunity for further comment on these issues, and will allow OSHA to craft a new final rule with more extensive and detailed stakeholder input than the January 9, 2017 final rule.

## III. Request for Comment on This Proposal and the Application of the January 9, 2017 Final Rule to the Construction and Shipyard Industries

OSHA provided adequate legal notice to interested parties in its 2015 NPRM by including regulatory alternatives that expanded the scope of the standard to the construction and shipyard sectors and including preliminary technological feasibility and economic feasibility analyses for those sectors. Many parties took note and commented on the application of the standard to construction and shipyards (e.g., ABMA, Document ID 1673; NABTU, Document ID 1679). However, despite the notice, other interested parties in the construction industry did not comment until the proposed delay of the effective date. (See Document ID 2058). Without robust participation from the construction and shipyard sectors, the Agency had limited data on which to proceed.

While OSHA continues to believe that the best available evidence in the rulemaking record in January 9, 2017 supported the expansion of the scope of the rule to construction and shipyards, it is also within OSHA's discretion to reevaluate that decision in light of the

limited data and concern from the regulated community. OSHA therefore seeks comment on this proposal to revoke the ancillary provisions for construction and shipyards while retaining the lower PEL and STEL. In particular, OSHA seeks input from interested stakeholders on the degree to which each provision, or combination thereof, provides (or does not provide) additional protections to exposed workers. OSHA requests that commenters provide data to support their position. In addition, OSHA seeks information on the steps that employers are currently taking to protect exposed employees. OSHA also seeks additional information and data commenters may have on the costs of compliance with the measures required by the January 9, 2017 final rule, including in particular the costs that small entities would incur.

In addition to the proposal in this notice, OSHA is considering extending the compliance dates in the January 9, 2017 final rule by a year for the construction and shipyard standards. This would give affected employers additional time to come into compliance with its requirements, which could be warranted by the uncertainty created by this proposal. OSHA also seeks comment on that possibility, and also the amount of additional time employers would need to come into compliance with the current proposal, if adopted. As noted in the introduction above, while the entire beryllium rule will go into effect on May 20, 2017, OSHA will not enforce the January 9, 2017 shipyard and construction standards without further notice while this new rulemaking is underway.

## List of Subjects in 29 CFR Parts 1915 and 1926

Beryllium, Cancer, Chemicals, Hazardous substances, Health, Occupational safety and health.

## Authority and Signature

This document was prepared under the direction of Dorothy Dougherty, Deputy Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, 200 Constitution Avenue NW., Washington, DC 20210.

The Agency issues the sections under the following authorities: 29 U.S.C. 653, 655, 657; 40 U.S.C. 3704; 33 U.S.C. 941; Secretary of Labor's Order 1–2012 (77 FR 3912 (1/25/2012)); and 29 CFR part 1911.

Signed at Washington, DC, on June 15, 2017.

Dorothy Dougherty, Deputy Assistant Secretary of Labor for Occupational Safety and Health.

Amendments to Standards

For the reasons set forth in the preamble, Chapter XVII of Title 29, parts 1915 and 1926, of the Code of Federal Regulations is proposed to be amended as follows:

PART 1915—OCCUPATIONAL SAFETY AND HEALTH STANDARDS FOR SHIPYARD EMPLOYMENT

1. The authority citation for part 1915 continues to read as follows:

Authority: 33 U.S.C. 941; 29 U.S.C. 653, 655, 657; Secretary of Labor's Order No. 12-71 (36 FR 8754); 8-76 (41 FR 25059), 9-83 (48 FR 35736), 1-90 (55 FR 9033), 6-96 (62 FR 111), 3-2000 (65 FR 50017), 5-2002 (67 FR 65008), 5-2007 (72 FR 31160), 4-2010 (75 FR 55355), or 1-2012 (77 FR 3912); 29 CFR part 1911; and 5 U.S.C. 553, as applicable.

§ 1915.1024 [Removed].

2. Remove § 1915.1024.

§ 1915.1000 [Amended]

3. Amend § 1915.1000 by redesignating paragraph (a)(2) as paragraph (a)(3), and adding new paragraph (a)(2) to read as follows:

(a)(2) Substances with Short-Term Exposure Limits ("STEL"). An

employee's exposure to any substance in Table Z—Shipyards, the exposure limit of which is designated as a "STEL," shall not exceed the exposure limit given for that substance over a sampling period of 15 minutes.

\* \* \* \* \*

4. In § 1915.1000 amend Table Z—Shipyards, by revising the entry for "Beryllium and beryllium compounds (as Be)," removing reference to § 1915.1024, revising footnote \*, and removing footnote q.

The revisions read as follows:

§ 1915.1000 Air contaminants.

\* \* \* \* \*

TABLE Z—SHIPYARDS

Table with 5 columns: Substance, CAS No., ppm, mg/m³, and Skin designation. Row 1: Beryllium and beryllium compounds (as Be), 7440-41-7, 0.0002; 0.002 STEL.

\*The PELs are 8-hour TWAs unless otherwise noted; a (C) designation denotes a ceiling limit; a STEL designation denotes a 15-minute short-term exposure limit. They are to be determined from breathing-zone air samples.

aParts of vapor or gas per million parts of contaminated air by volume at 25 °C and 760 torr.

bMilligrams of substance per cubic meter of air. When entry is in this column only, the value is exact; when listed with a ppm entry, it is approximate.

\* \* \* \* \*

PART 1926—SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION

Subpart D—Occupational Health and Environmental Controls

5. The authority citation for subpart D of part 1926 continues to read as follows:

Authority: 40 U.S.C. 3704; 29 U.S.C. 653, 655, 657; Secretary of Labor's Order No. 12-71 (36 FR 8754), 8-76 (41 FR 25059), 9-83 (48 FR 35736), 1-90 (55 FR 9033), 6-96 (62

FR 111), 3-2000 (65 FR 50017), 5-2002 (67 FR 65008), 5-2007 (72 FR 31160), 4-2010 (75 FR 55355), or 1-2012 (77 FR 3912); 29 CFR part 1911; and 5 U.S.C. 553, as applicable.

Section 1926.61 also issued under 49 U.S.C. 5101 et seq.

Section 1926.62 also issued under 42 U.S.C. 4853.

Section 1926.65 also issued under 126 of Pub. L. 99-499, 100 Stat. 1613.

§ 1926.1124 [Removed].

6. Remove § 1926.1124.

7. In § 1926.55, amend appendix A by revising the entry for "Beryllium and beryllium compounds (as Be),"

removing reference to § 1926.1124, revising footnote \*, and removing footnote q.

The revisions read as follows:

§ 1926.55 Gases, vapors, fumes, dusts, and mists.

\* \* \* \* \*

Appendix A to § 1926.55—1970 American Conference of Governmental Industrial Hygienists' Threshold Limit Values of Airborne Contaminants Threshold Limit Values of Airborne Contaminants for Construction

Table with 5 columns: Substance, CAS No., ppm, mg/m³, and Skin designation. Row 1: Beryllium and beryllium compounds (as Be), 7440-41-7, 0.0002; 0.002 STEL.

\*The PELs are 8-hour TWAs unless otherwise noted; a (C) designation denotes a ceiling limit; a STEL designation denotes a 15-minute short-term exposure limit.

aParts of vapor or gas per million parts of contaminated air by volume at 25 °C and 760 torr.

bMilligrams of substance per cubic meter of air. When entry is in this column only, the value is exact; when listed with a ppm entry, it is approximate.

\* \* \* \* \*