

**VOSH PROGRAM DIRECTIVE: 12-427B****ISSUED: January 15, 2019**

**Subject** Occupational Exposure to Beryllium, General Industry, §1910.1024

**Purpose** **CHANGE V** transmits to field personnel a limited extension of select compliance dates in paragraph (o)(2) of §1910.1024. **CHANGE IV** transmits to field personnel a direct final rule (DFR) revising the Beryllium standard for General Industry and confirmation of the effective date of the direct final rule. **CHANGE III** adopts a stay of compliance dates for the Occupational Exposure to Beryllium Standard for General Industry, §1910.1024. **CHANGE II** ADOPTS a delay of the compliance date for the Beryllium in the Shipyard and Construction industries until August 1, 2018. **CHANGE I** transmits to field personnel the above-referenced standard.

**Scope** This Directive applies VOSH-wide.

**Reference** **CHANGE V:** 83 FR 39351 (August 9, 2018)  
**CHANGE IV:** 83 FR 19936 (May 7, 2018); and 83 FR 31045 (July 3, 2018)  
**CHANGE III:** Memoranda, Dir. Thomas Galassi, OSHA Directorate of Enforcement to Regional Administrators, State Plan Designees (March 2, 2018 and May 9, 2018)  
**CHANGE II:** 82 FR 14439 (March 21, 2017)  
**CHANGE I:** 82 FR 2470 (January 9, 2017)

**Cancellation** VOSH Program Directive 12-427A (September 15, 2018)

**Effective Date** **CHANGES V:** February 15, 2019  
**CHANGE IV:** February 22, 2019  
**CHANGE III:** September 15, 2018  
**CHANGE II:** May 11, 2018  
**CHANGE I:** May 15 2017

**Expiration Date** Not Applicable – remains in effect until cancelled or superseded.

**Action** Directors and Managers shall ensure that field personnel understand the standard in this Directive.

**C. Ray Davenport**  
 Commissioner

*C. Ray Davenport*

*1/11/2019*

Distribution:	Commissioner of Labor and Industry Assistant Commissioner VOSH Directors and Managers VOSH Legal Support & OIS Staffs	Consultation Services Director VOSH Compliance & Cooperative Programs Staffs OSHA Region III & OSHA Norfolk Area Offices
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The following federal terms if, and where they are used, shall be considered to read as below:

<u>Federal Terms</u>	<u>VOSH Equivalent</u>
OSHA	VOSH
Federal Agency	State Agency
Agency	Department
Regional Administrator	Assistant Commissioner
Area Director	Regional Director VOSH Program Director
Regional Solicitor	Attorney General or VOSH Division of Legal Support (DLS)
Office of Statistics	VOSH Research and Analysis
29 CFR	VOSH Standard
Compliance Safety and Health Officer (CSHO)	CSHO

I. **Background**

**CHANGES II, III, IV and V:** On January 9, 2017, federal OSHA published in the *Federal Register* its final rule on the Occupational Exposure to Beryllium and Beryllium Compounds for three industries: General Industry (1910), Shipyard (1915) and Construction (1926) (82 FR 2470). Federal 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.

Subsequently, in accordance with the January 20, 2017, Presidential directive entitled, "Regulatory Freeze Pending Review", OSHA reviewed the Beryllium standards, which were scheduled to become effective on March 10, 2017 (see 82 FR 8346, January 24, 2017).

In compliance with the Presidential directive, on February 1, 2017, OSHA published a final rule in the *Federal Register*, which temporarily stayed the effective date for the Beryllium Standards for the Construction and Shipyards industries until March 21, 2017. The Beryllium Standard for General Industry was not included in the stay of the effective date. This stay gave OSHA the opportunity for review and consideration of new regulations, as required by the Presidential directive (see 82 FR 8901).

On February 16, 2017, the Safety and Health Codes Board adopted federal OSHA's final rule on the Occupational Exposure to Beryllium for Parts 1910, 1915, and 1926, with an effective date of May 15, 2017, and compliance dates identical to federal OSHA's. Commencement of all obligations of these standards were scheduled for March 12, 2018, except for requirements to provide change rooms and showers which would be March 11, 2019, and engineering controls which would be March 10, 2020.

On March 21, 2017, OSHA finalized a stay of the effective date for the final rule on Beryllium in the *Federal Register* (82 FR 14439) for the Construction and Shipyard industries only. The General Industry Standard effective date was not included and remained the same until OSHA's recent actions discussed below.

This general industry rule became effective nationally on May 20, 2017, following the delays of the original federal effective date of March 10, 2017, and became effective on May 15, 2017 in Virginia. However, compliance obligations both nationally, where federal OSHA has direct enforcement authority, and for VOSH in Virginia was scheduled to begin on March 12, 2018.

OSHA then decided not to enforce the January 9, 2017 Beryllium standards for both the Shipyard and Construction industries, delaying them indefinitely. OSHA also proposed a new rulemaking for the Shipyard Industry, Part 1915, and for the Construction Industry, Part 1926, continuing the delay of enforcement for Parts 1915 and 1926 while the new rulemaking is underway (82 FR 14439).

On November 30, 2017, the Safety and Health Codes Board adopted a delay until August 1, 2018, of the compliance obligations of the Beryllium regulation for the public-sector Shipyard and Construction industries, 16VAC25-100-1915.1024 and 16VAC25-175-1926.1124,

respectively. These regulations are identical to federal regulations 29 CFR 1915.1024 and 29 CFR 1926.1124, which have been subjected to an administrative stay of enforcement by federal OSHA. The compliance date for general industry remained unchanged – March 12, 2018.

In a Memorandum from federal OSHA, dated March 2, 2018, the General Industry Standard for Beryllium and enforcement of the PEL and STEL in the Construction and Shipyard standards, were delayed by 60 days until May 11, 2018, for all sections of the Beryllium Standard for General Industry, §1910.1024, except for paragraphs (i)(2) for change rooms; (i)(3) for showers; and (f) for engineering controls. The compliance dates for these paragraphs remained unchanged.

On May 9, 2018, federal OSHA issued another Memorandum which provided interim guidance and a notice of delay in enforcement for certain provisions of the Beryllium Standards. (*See Attachment B*)

On June 14, 2018, the Safety and Health Codes Board adopted the compliance dates established in the March 2, 2018 memorandum, with an effective date of September 15, 2018.

Also on June 14, 2018, the Board adopted federal OSHA's stay of compliance dates for the Occupational Exposure to Beryllium for General Industry, §1910.1024, based on the May 2, 2018 federal OSHA memorandum (discussed below), with an effective date of September 15, 2018.

On November 8, 2018, the Safety and Health Codes Board adopted the Direct Final Rule (DFR) for Revising the Beryllium for General Industry and the confirmation of the effective date of the DFR, with an effective date of February 15, 2019 **(CHANGE IV)**. Also, during the same board meeting, but in a separate action, the Board adopted a limited extension of select compliance dates in subparagraph (o)(2) of §1910.1024, with an effective date of February 15, 2019. **(CHANGE V)**

**CHANGE I:** The final rule replaces a 40-year old permissible exposure limit (PEL) for beryllium.

OSHA issued a proposed rule in 2015, followed by a months-long public comment period and several days of public hearings.

On February 16, 2017, the Safety and Health Codes Board adopted federal OSHA's Final Rule for the Occupational Exposure to Beryllium, §1910.1024, and Other Related Provisions, with an effective date of May 15, 2017, and with effective dates identical to federal OSHA's for implementation and compliance.

## II. Summary

**CHANGE V:** Federal OSHA revised §1910.1024 (o)(2) of the Beryllium Standard for General Industry to extend the compliance deadline to **December 12, 2018** for certain ancillary provisions to allow time for OSHA to respond to the concerns of stakeholders, to allow OSHA sufficient time to draft and publish the Notice of Preliminary Rulemaking (NPRM), and to give employers sufficient time to comply. Sections affected include the following:

- Methods of compliance, §1910.1024(f);

- Beryllium work areas and regulated areas, §1910.1024(e);
- Personal protective clothing and equipment, §1910.1024(h);
- Hygiene areas and practices, §1910.1024(i);
- Housekeeping, §1910.1024(j);
- Communication of hazards, §1910.1024(m); and
- Recordkeeping, §1910.1024(n)

OSHA began enforcing the above sections on May 11, 2018, and Virginia began enforcing them on **September 15, 2018**.

Certain compliance dates outlined in this final rule remain unchanged. Enforcement of the general industry requirements for change rooms and showers will begin for OSHA and VOSH on **March 11, 2019**; and requirements for engineering controls for OSHA and VOSH will begin on **March 10, 2020**.

**For more detail on this amendment:**

<http://townhall.virginia.gov/l/viewstage.cfm?stageid=8468>

**CHANGE IV:** On May 7, 2018, federal OSHA published a direct final rule (DFR) that amended the text of the Beryllium standard for General Industry. The DFR applies to general industry processes, operations, and other areas where workers are at risk of exposure to materials containing trace amounts of beryllium, less than 0.1 percent of beryllium by weight. The DFR adjusts the regulatory text of the general industry beryllium standard to clarify OSHA's intent with respect to certain terms in the initial standard.

It also clarified OSHA's intent with respect to provisions for disposal and recycling and with respect to provisions that OSHA intends to apply only where skin can be exposed to materials containing at least 0.1% beryllium by weight.

The DFR makes changes to certain housekeeping provisions to ensure they apply in all regulated areas.

The DFR became effective for OSHA on July 6, 2018.

**For more detail on this amendment:**

<http://townhall.virginia.gov/l/viewstage.cfm?stageid=8474>

**CHANGE III:** On March 2, 2018, by memorandum from Director Thomas Galassi of the OSHA Directorate of Enforcement Programs, the compliance date of March 12, 2018 for all sections of the Beryllium Standard for General Industry, §1910.1024, was **stayed for 60 days to May 11, 2018**, except for paragraphs (i)(2) for change rooms, (i)(3) for showers and (f) for engineering controls. The compliance dates for paragraphs (i)(2), (i)(3), and (f) were unchanged.

On May 2, 2018, by memorandum from Director Thomas Galassi of the OSHA Directorate of Enforcement Programs (*See Attachment A*), the compliance date for all sections of the Beryllium

Standard for General Industry, §1910.1024, was stayed until June 25, 2018, except for the following paragraphs:

- 1910.1024(c), permissible exposure limits
- 1910.1024(d), exposure assessment
- 1910.1024(g), respiratory protection
- 1910.1024(k), medical surveillance
- 1910.1024(l), medical removal

The compliance dates for paragraphs (i)(2), (i)(3) and (f) of §1910.1024 remain unchanged.

The compliance date for §§1910.1024(c), (d), (g), (k), and (l) is September 15, 2018.

The effective date for the stay of the remaining sections of 1910.1024 is September 15, 2018.

The new Beryllium Standard for General Industry went into effect nationally on May 20, 2017, following the stays of the original federal effective date of March 10, 2017, and became effective on May 15, 2017 in Virginia. However, compliance obligations both nationally, where federal OSHA has direct enforcement authority, and for VOSH in Virginia were scheduled to begin on March 12, 2018.

**CHANGE II:** Unlike federal OSHA's indefinite delay of compliance for Beryllium in the Construction and Shipyards industries, the Safety and Health Codes Board on November 30, 2017, adopted a delay of the compliance obligations of the Beryllium standard for the public-sector Shipyard and Construction Industries until August 1, 2018, to allow the Department of Labor and Industry (DOLI) the opportunity to research certain issues.

**CHANGE I:**

**A. General**

OSHA has amended its existing standards for occupational exposure to beryllium and beryllium compounds because employees exposed to beryllium at the previous permissible exposure limits faced a significant risk of the material impairment to their health. Key provisions of this revised standard:

- Reduce the permissible exposure limit (PEL) for beryllium from 2.0 micrograms ( $\mu\text{g}/\text{m}^3$ ) to 0.2 micrograms ( $\mu\text{g}/\text{m}^3$ ) as an 8-hour time-weighted average. The PELs are the same for all employers covered by the standards. The new 8-hour TWA PEL represents a ten-fold decrease from the previous PEL.
- Establish a new short term exposure limit for beryllium of  $2.0 \mu\text{g}/\text{m}^3$  as a short-term exposure limit, determined over a sampling period of 15 minutes.

The standard also includes other provisions to protect employees, such as:

- requirements for exposure assessment;
- methods for controlling exposure;
- methods for controlling exposure;

- respiratory protection;
- personal protective clothing and equipment;
- housekeeping;
- medical surveillance;
- hazard communication; and
- recordkeeping.

The standard also includes Appendix A to §1910.1024 – Control Strategies to Minimize Beryllium Exposure (Non-Mandatory).

**III. Implementation/Compliance Schedule**

**CHANGE V:**

Beryllium Implementation/Compliance Schedule for Part 1910	Compliance Deadline extended: OSHA Direct Enforcement States	Compliance Deadline extended: Virginia
Effective date of standard	May 11, 2018	May 11, 2018
	June 25, 2018	June 25, 2018
§1910.1024(f), methods of compliance	December 12, 2018	February 15, 2019
§1910.1024(e), beryllium work areas and regulated areas	December 12, 2018	February 15, 2019
§1910.1024(h), personal protective clothing and equipment	December 12, 2018	February 15, 2019
§1910.1024(i), hygiene areas and practices	December 12, 2018	February 15, 2019
§1910.1024(j), housekeeping	December 12, 2018	February 15, 2019
§1910.1024(m), communication of hazards	December 12, 2018	February 15, 2019
§1910.1024(n), recordkeeping	December 12, 2018	February 15, 2019

**CHANGE III:** To help employers comply with the updated final standards and protect their workers, VOSH, like OSHA, provided staggered compliance dates to ensure that employers have sufficient time to meet the requirements and get the right protections in place. Where feasible, VOSH has adopted federal OSHA’s effective dates:

Beryllium Implementation/Compliance Schedule for Part 1910	OSHA Direct Enforcement States	Virginia
Effective date of standard	May 11, 2018	May 11, 2018
Commencement of all obligations of §1910.1024, <u>except:</u>	June 25, 2018	June 25, 2018
§1910.1024(c), permissible exposure limits	May 11, 2018	September 15, 2018
§1910.1024(d), exposure assessment	May 11, 2018	September 15, 2018
§1910.1024(g), respiratory protection	May 11, 2018	September 15, 2018
§1910.1024(k), medical surveillance	May 11, 2018	September 15, 2018

§1910.1024(l), medical removal	May 11, 2018	September 15, 2018
Requirement to provide change rooms (i)(2) and showers in paragraph (i)(3)	March 11, 2019	March 11, 2019
Requirement for engineering controls required in paragraph (f)	March 10, 2020	March 10, 2020

**CHANGE II:** To help employers comply with the updated final rule and protect their workers, OSHA provided staggered compliance dates to ensure that employers have sufficient time to meet the requirements and get the right protections in place.

Beryllium Implementation/Compliance Schedule for Part 1910	OSHA Direct Enforcement States	Virginia
Effective date of standards	May 20, 2017	February 15, 2018
Commencement of all obligations of this standard <u>except:</u>	May 11, 2018	May 11, 2018
Requirement to provide change rooms (i)(2) and showers in paragraph (i)(3)	March 11, 2019	March 11, 2019
Requirement for engineering controls required in paragraph (f)	March 10, 2020	March 10, 2020

**CHANGE I:** To help employers comply with the updated final standards and protect their workers, VOSH, like OSHA, provided staggered compliance dates to ensure that employers have sufficient time to meet the requirements and get the right protections in place. Where feasible, VOSH has adopted federal OSHA's effective dates:

Beryllium Implementation/Compliance Schedule for Part 1910	OSHA Direct Enforcement States	Virginia
Effective date of standards	May 20, 2017	May 15, 2017
Commencement of all obligations of this standard <u>except:</u>	March 12, 2018	March 12, 2018
Requirement to provide change rooms (i)(2) and showers in paragraph (i)(3)	March 11, 2019	March 11, 2019
Requirement for engineering controls required in paragraph (f)	March 10, 2010	March 10, 2020



**CHANGE V**

**Occupational Exposure to Beryllium in General Industry, §1910.1024 (o)(2);  
Limited Extension of Select Compliance Dates**

As Adopted by the  
Safety and Health Codes Board

Date: November 8, 2018



VIRGINIA OCCUPATIONAL SAFETY AND HEALTH PROGRAM

VIRGINIA DEPARTMENT OF LABOR AND INDUSTRY

Effective Date: February 15, 2019

When the regulations, as set forth in OSHA's Final Rule on the Limited Extension of Select Compliance Dates for the Occupational Exposure to Beryllium in General Industry, §1910.1024(o), are applied to the Commissioner of the Department of Labor and Industry and/or to Virginia employers, the following federal terms shall be considered to read as below:

Federal Terms

VOSH Equivalent

29 CFR

VOSH Standard

Assistant Secretary

Commissioner of Labor and Industry

Agency

Department

August 9, 2018

February 22, 2019

**Amendments to Standards**

For the reasons stated in the preamble of this final rule, OSHA amends 29 CFR part 1910 as follows:

**PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS****Subpart Z—Toxic and Hazardous Substances**

- 2. Amend § 1910.1024 by revising paragraph (o)(2) to read as follows:

**§ 1910.1024 Beryllium.**

\* \* \* \* \*

(o) \* \* \*

(2) *Compliance dates.* (i) Obligations contained in paragraphs (c), (d), (g), (k), and (l) of this standard: March 12, 2018;

(ii) Change rooms and showers required by paragraph (i) of this standard: March 11, 2019;

(iii) Engineering controls required by paragraph (f) of this standard: March 10, 2020; and

(iv) All other obligations of this standard: December 12, 2018.

\* \* \* \* \*

[FR Doc. 2018–17106 Filed 8–8–18; 8:45 am]

BILLING CODE 4510–26–P

**CHANGE IV**

**Revising the Beryllium Standard for General Industry, §1910.1024; Direct Final Rule; and  
Confirmation of Effective Date of the Direct Final Rule**

As Adopted by the  
Safety and Health Codes Board

Date: November 8, 2018



VIRGINIA OCCUPATIONAL SAFETY AND HEALTH PROGRAM

VIRGINIA DEPARTMENT OF LABOR AND INDUSTRY

Effective Date: February 22, 2019

16VAC25-90-1910.1024, Beryllium, §1910.1024

When the regulations, as set forth in the Direct Final Rule on Revising the Beryllium Standard for General Industry, § 1910.1024, and the Confirmation of the Effective date of the Direct Final Rule, are applied to the Commissioner of the Department of Labor and Industry and/or to Virginia employers, the following federal terms shall be considered to read as below:

Federal Terms

VOSH Equivalent

29 CFR

VOSH Standard

Assistant Secretary

Commissioner of Labor and Industry

Agency

Department

July 6, 2018

February 22, 2019

**PART 1910—OCCUPATIONAL SAFETY  
AND HEALTH STANDARDS**

**Subpart Z—Toxic and Hazardous  
Substances**

- 2. Amend § 1910.1024 as follows:

- a. Revise the definition of "Beryllium work area" in paragraph (b);
- b. Add definitions for "Contaminated with beryllium and beryllium-contaminated" and "Dermal contact with beryllium" in alphabetical order in paragraph (b);
- c. Revise the definition of "Emergency" in paragraph (b);
- d. Revise paragraph (f)(2);
- e. Revise paragraph (h)(3)(ii);
- f. Revise paragraphs (i)(3)(i)(B), (i)(3)(ii)(B), (i)(4)(i) and (ii); and
- g. Revise paragraphs (j)(1)(i), (j)(2)(i) and (ii), and (j)(3).

The revisions and additions read as follows:

**§ 1910.1024 Beryllium.**

(b) \* \* \*  
*Beryllium work area* means any work area:

- (i) Containing a process or operation that can release beryllium and that involves material that contains at least 0.1 percent beryllium by weight; and
- (ii) Where employees are, or can reasonably be expected to be, exposed to airborne beryllium at any level or where there is the potential for dermal contact with beryllium.

*Contaminated with beryllium and beryllium-contaminated* mean contaminated with dust, fumes, mists, or solutions containing beryllium in concentrations greater than or equal to 0.1 percent by weight.

*Dermal contact with beryllium* means skin exposure to:

- (i) Soluble beryllium compounds containing beryllium in concentrations greater than or equal to 0.1 percent by weight;
- (ii) Solutions containing beryllium in concentrations greater than or equal to 0.1 percent by weight; or
- (iii) Dust, fumes, or mists containing beryllium in concentrations greater than or equal to 0.1 percent by weight.

*Emergency* means any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment, which may or does result in an uncontrolled and unintended release of airborne beryllium that presents a significant hazard.

(f) \* \* \*

(2) *Engineering and work practice controls.* (i) The employer must use engineering and work practice controls to reduce and maintain employee airborne exposure to beryllium to or below the PEL and STEL, unless the

employer can demonstrate that such controls are not feasible. Wherever the employer demonstrates that it is not feasible to reduce airborne exposure to or below the PELs with engineering and work practice controls, the employer must implement and maintain engineering and work practice controls to reduce airborne exposure to the lowest levels feasible and supplement these controls using respiratory protection in accordance with paragraph (g) of this standard.

(ii) For each operation in a beryllium work area that releases airborne beryllium, the employer must ensure that at least one of the following is in place to reduce airborne exposure:

- (A) Material and/or process substitution;
- (B) Isolation, such as ventilated partial or full enclosures;
- (C) Local exhaust ventilation, such as at the points of operation, material handling, and transfer; or
- (D) Process control, such as wet methods and automation.

(iii) An employer is exempt from using the controls listed in paragraph (f)(2)(ii) of this standard to the extent that:

- (A) The employer can establish that such controls are not feasible; or
- (B) The employer can demonstrate that airborne exposure is below the action level, using no fewer than two representative personal breathing zone samples taken at least 7 days apart, for each affected operation.

(h) \* \* \*  
 (3) \* \* \*

(ii) The employer must ensure that beryllium is not removed from beryllium-contaminated personal protective clothing and equipment by blowing, shaking, or any other means that disperses beryllium into the air.

(i) \* \* \*  
 (3) \* \* \*  
 (i) \* \* \*

(B) Employee's hair or body parts other than hands, face, and neck can reasonably be expected to become contaminated with beryllium.

(ii) \* \* \*  
 (B) The employee's hair or body parts other than hands, face, and neck could reasonably have become contaminated with beryllium.

(4) \* \* \*  
 (i) Beryllium-contaminated surfaces in eating and drinking areas are as free as practicable of beryllium;

(ii) No employees enter any eating or drinking area with beryllium-contaminated personal protective

clothing or equipment unless, prior to entry, surface beryllium has been removed from the clothing or equipment by methods that do not disperse beryllium into the air or onto an employee's body; and

(j) \* \* \*  
 (1) \* \* \*

(i) The employer must maintain all surfaces in beryllium work areas and regulated areas as free as practicable of beryllium and in accordance with the written exposure control plan required under paragraph (f)(1) and the cleaning methods required under paragraph (j)(2) of this standard; and

(2) \* \* \*

(i) The employer must ensure that surfaces in beryllium work areas and regulated areas are cleaned by HEPA-filtered vacuuming or other methods that minimize the likelihood and level of airborne exposure.

(ii) The employer must not allow dry sweeping or brushing for cleaning surfaces in beryllium work areas or regulated areas unless HEPA-filtered vacuuming or other methods that minimize the likelihood and level of airborne exposure are not safe or effective.

(3) *Disposal and recycling.* For materials that contain beryllium in concentrations of 0.1 percent by weight or more or are contaminated with beryllium, the employer must ensure that:

(i) Materials designated for disposal are disposed of in sealed, impermeable enclosures, such as bags or containers, that are labeled in accordance with paragraph (m)(3) of this standard; and

(ii) Materials designated for recycling are cleaned to be as free as practicable of surface beryllium contamination and labeled in accordance with paragraph (m)(3) of this standard, or place in sealed, impermeable enclosures, such as bags or containers, that are labeled in accordance with paragraph (m)(3) of this standard.

**DEPARTMENT OF LABOR****Occupational Safety and Health  
Administration****29 CFR Part 1910**

[Docket No. OSHA-2018-0003]

RIN 1218-AB76

**Revising the Beryllium Standard for  
General Industry****AGENCY:** Occupational Safety and Health Administration (OSHA), Labor.**ACTION:** Final rule; confirmation of effective date.

**SUMMARY:** OSHA is confirming the effective date of its direct final rule (DFR) adopting a number of clarifying amendments to the beryllium standard for general industry to address the application of the standard to materials containing trace amounts of beryllium. In the May 7, 2018, DFR, OSHA stated that the DFR would become effective on July 6, 2018, unless one or more significant adverse comments were submitted by June 6, 2018. OSHA did not receive significant adverse comments on the DFR, so by this document the agency is confirming that the DFR will become effective on July 6, 2018.

**DATES:** The DFR published on May 7, 2018 (83 FR 19936), becomes effective on July 6, 2018. For purposes of judicial review, OSHA considers the date of publication of this document as the date of promulgation of the DFR.

**ADDRESSES:** For purposes of 28 U.S.C. 2112(a), OSHA designates the Associate Solicitor of Labor for Occupational Safety and Health as the recipient of petitions for review of the direct final rule. Contact the Associate Solicitor at the Office of the Solicitor, Room S-4004, U.S. Department of Labor, 200 Constitution Avenue NW, Washington, DC 20210; telephone: (202) 693-5445.

**FOR FURTHER INFORMATION CONTACT:**

*Press inquiries:* Mr. Frank Meilinger, OSHA Office of Communications, Room N-3647, 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).

*General information and technical inquiries:* Mr. William Perry or Ms. 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) 693-1950; fax: (202) 693-1678.

*Copies of this Federal Register document and news releases:* Electronic copies of these documents are available



at OSHA's web page at <http://www.osha.gov>.

**SUPPLEMENTARY INFORMATION:**

**I. Confirmation of Effective Date**

On May 7, 2018, OSHA published a DFR in the **Federal Register** (83 FR 19936) amending the text of the beryllium standard for general industry to clarify OSHA's intent with respect to certain terms in the standard, including the definition of Beryllium Work Area (BWA), the definition of emergency, and the meaning of the terms dermal contact and beryllium contamination. It also clarifies OSHA's intent with respect to provisions for disposal and recycling and with respect to provisions that the agency intends to apply only where skin can be exposed to materials containing at least 0.1% beryllium by weight. Interested parties had until June 6, 2018, to submit comments on the DFR.

The agency stated that it would publish another document confirming the effective date of the DFR if it received no significant adverse comments. OSHA received seven comments in the record from Materion Brush, Inc., Mead Metals Inc., National Association of Manufacturers, Airborn, Inc., Edison Electric Institute, and two private citizens (Document IDs OSHA-2018-0003-0004 thru OSHA-2018-0003-0010). The seven submissions contained comments that were either supportive of the DFR or were considered not to be significant adverse comments. (Document IDs OSHA-2018-0003-0004 thru OSHA-2018-0003-0010). Three of these submissions also contained comments that were outside the scope of the DFR and OSHA is not considering the portions of those submissions that are outside the scope (OSHA-2018-0003-0004 thru OSHA-2018-0003-0006).

OSHA has determined this DFR will maintain safety and health protections for workers while reducing employers' compliance burdens. As the agency did not receive any significant adverse comments, OSHA is hereby confirming that the DFR published on May 7, 2018, will become effective on July 6, 2018.

**CHANGE III**

Attachment A: March 2, 2018, Memorandum from Director Thomas Galassi of the Directorate of Enforcement Programs entitled, "Delay of Enforcement of the Beryllium Standards under 29 CFR 1910.1024, 29 CFR 1915.1024, and 29 CFR 1926.1124"

U.S. Department of Labor

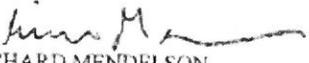
Occupational Safety and Health Administration  
Washington, DC 20210



MAR 02 2018

MEMORANDUM FOR REGIONAL ADMINISTRATORS

THROUGH:

  
RICHARD MENDELSON  
Acting Deputy Assistant Secretary

FROM:

  
THOMAS GALASSI, Director  
Directorate of Enforcement Programs

SUBJECT:

Delay of Enforcement of the Beryllium Standards under 29 CFR  
1910.1024, 29 CFR 1915.1024, and 29 CFR 1926.1124

The final rule on Occupational Exposure to Beryllium, published on January 9, 2017, established new Permissible Exposure Limits (PELs) and contained several other ancillary provisions that apply to general industry, construction, and shipyards. This rule was codified in three separate standards at 29 CFR §1910.1024, 29 CFR §1915.1024, and 29 CFR §1926.1124, and became effective on May 20, 2017. Under the general industry standard, all obligations were to commence on March 12, 2018, except for requirements for change rooms and showers in paragraphs (i)(2) and (i)(3), which commence on March 11, 2019, and requirements for engineering controls in paragraph (f), which commence on March 10, 2020.

On June 27, 2017, OSHA published a Notice of Proposed Rulemaking proposing to revoke the ancillary provisions of the construction and shipyard standards, 29 CFR §1915.1024 and 29 CFR §1926.1124, but retaining the new PEL and STEL. In that Notice, OSHA announced that it would not enforce the new construction and shipyard standards without further notice while that rulemaking was underway. 82 FR 29183. On August 24, 2017, OSHA noted on its website that it would not enforce the ancillary provisions of those standards without further notice, but did not state whether it would enforce the PEL or STEL.

OSHA has been in extensive settlement discussions with several parties who have filed legal actions challenging the general industry standard. In order to provide additional time to conclude those negotiations, we have decided to delay enforcement of the general industry standard by 60 days until May 11, 2018. Furthermore, to ensure employers have adequate notice before OSHA begins enforcing them, as well as in the interest of uniform enforcement and clarity for employers, we have decided to also delay enforcement of the PEL and STEL in the construction and shipyard standards until May 11, 2018. No other parts of the construction and shipyard beryllium standards will be enforced without additional notice. In the interim, if an employer fails to meet the new PEL or STEL, OSHA will inform the employer of the exposure levels and

offer assistance to assure understanding and compliance. No provisions of the beryllium final rule may be enforced until May 11, 2018. Please notify your staff of this delay.

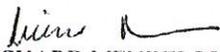
**CHANGE III**

ATTACHMENT B: May 9, 2018, Memorandum from Director Thomas Galassi of the Directorate of Enforcement Programs entitled, "Interim Enforcement Memorandum and Notice of Delay in Enforcement for Certain Provisions of the Beryllium Standards"



MAY 09 2018

MEMORANDUM FOR: REGIONAL ADMINISTRATORS  
STATE PLAN DESIGNEES

THROUGH:   
RICHARD MENDELSON  
Acting Deputy Assistant Secretary

FROM:   
THOMAS GALASSI, Director  
Directorate of Enforcement Programs

SUBJECT: Interim Enforcement Memorandum and Notice of Delay in  
Enforcement for Certain Provisions of the Beryllium Standards

This memorandum provides interim guidance for federal enforcement of the Beryllium Standards, 29 CFR 1910.1024, 29 CFR 1926.1124, and 29 CFR 1915.1024, beginning May 11, 2018. This memorandum will expire when superseded or when the compliance directive becomes effective and available to the field.

As you know, on January 9, 2017, OSHA published its final rule, *Occupational Exposure to Beryllium*, in the Federal Register (82 FR 2470-2757). The rule contained expanded standards for general industry, construction, and shipyards, and included a lower 8-hour time weighted average (TWA) and permissible exposure limit (PEL), a new short term exposure limit (STEL), and an action level at half of the 8-hour TWA PEL. Additionally, on June 27, 2017, OSHA issued a Notice of Proposed Rulemaking, *Occupational Exposure to Beryllium and Beryllium Compounds in Construction and Shipyard Sectors*, to revoke the ancillary provisions of the construction and shipyard standards, but retain the PELs (see 82 FR 29182). All obligations, besides the ancillary provisions of the construction and shipyard standards, were to begin on March 12, 2018; except for the general industry requirements for change rooms and showers in paragraphs (i)(2) and (i)(3) that will not start until March 11, 2019; and the requirements for engineering controls in paragraph (f) that will not begin until March 10, 2020.

Previously, in a memorandum dated March 2, 2018, OSHA delayed enforcing the general industry standard, and construction and shipyard PELs, until May 11, 2018. However, under the terms of settlement agreements reached with petitioners challenging the rule, the Agency will propose to extend the compliance dates of certain requirements until December 12, 2018. To allow time to complete that and other ongoing rulemaking proceedings, on May 11, 2018 OSHA will begin enforcing **only** the:

- PELs in the general industry, construction, and shipyard standards at §1910.1024(c), §1926.1124(c), and §1915.1024(c), respectively;
- General industry exposure assessment at §1910.1024(d);

- General industry respiratory protection §1910.1024(g);
- General industry medical surveillance §1910.1024(k); and
- General industry medical removal at §1910.1024(l).

Unless it provides notice, OSHA will not enforce any other provisions contained in §1910.1024 until June 25, 2018. And, unless it provides notice OSHA will not enforce any other provisions contained in §1926.1124 or §1915.1024.

Please see the attached procedures with specific interim enforcement guidance for the provisions listed above. Please take note that until May 11, 2018, if an employer fails to meet the new PEL, but meets the old PEL, then OSHA will inform the employer of the exposure levels and offer assistance to assure that the employer understands the findings and compliance requirements.

Thank you for your attention to this matter. If you have any questions, please contact Larry McGowan or Bill Matarazzo in the Office of Health Enforcement, (202) 693-2190.

Attachment

## Attachment: Interim Enforcement Guidance for the Beryllium Standards

### General Information:

§1910.1024; §1926.1124; §1915.1024. Applies to occupational exposure to beryllium (Be) in all forms, compounds, and mixtures in general industry, construction, and shipyards, respectively, except those articles and materials exempted by paragraphs (a)(2) and (a)(3) of their respective standard.

- §1910.1024(b) *Action level* means a concentration of airborne beryllium of 0.1 micrograms per cubic meter of air ( $\mu\text{g}/\text{m}^3$ ) calculated as an 8-hour time-weighted average (TWA).
- §1910.1024(c)(1); §1926.1124(c)(1); §1915.1024(c)(1) establishes an 8-hour TWA PEL of  $0.2 \mu\text{g}/\text{m}^3$ .
- §1910.1024(c)(2); §1926.1124(c)(2); §1915.1024(c)(2) establishes a STEL of  $2.0 \mu\text{g}/\text{m}^3$  over a 15-minute sampling period.
- §1910.1024:
  - Contains several other ancillary provisions;
  - The compliance date for change rooms and showers [§1910.1024(i)(2) and (i)(3)] is March 11, 2019; and
  - The compliance date for engineering control requirements [§1910.1024(f)] is March 10, 2020.
- §1926.1124; §1915.1024:
  - Current rulemaking (82 FR 29183) proposes to rescind the ancillary provisions but retain the PEL and STEL.

Paragraph (a)(3). The standards do not apply to materials containing less than 0.1% beryllium by weight where employers have objective data demonstrating that employee exposures will remain below the action level (AL) as an 8-hour TWA under any foreseeable conditions.

NOTE: The exception does not apply where exposures below  $0.1 \mu\text{g}/\text{m}^3$  as an 8-hour TWA PEL are expected or achieved only because engineering or other controls are being used to limit exposures. When using the phrase “any foreseeable conditions,” OSHA is referring to situations that can reasonably be anticipated. For example, annual maintenance of equipment during which exposures could exceed the action level would be a situation that is generally foreseeable. [*See also* 82 FR 2643-2644].



## Inspection Guidance: Obligations for Compliance by May 11, 2018.

### Permissible Exposure Limits

Applies to §1910.1024(c), §1926.1124(c), and §1915.1024(c)

- General
  - Reduces the PEL for beryllium to  $0.2 \mu\text{g}/\text{m}^3$ , averaged over 8-hours.
  - Establishes a new STEL for beryllium of  $2.0 \mu\text{g}/\text{m}^3$ , over a 15-minute sampling period.
  - NOTE: Until May 11, 2018, if an employer fails to meet the new PEL, but meets the old PEL, then OSHA will inform the employer of the exposure levels and offer assistance to assure that the employer understands the findings and compliance requirements.

### INSPECTION GUIDANCE

- NOTE: A new analytical method for beryllium is under development. The personal breathing zone sampling media and procedures for the new method are identical to those for OSHA Method ID 125G, and the previous method can be consulted for guidance. However, wipe samples for beryllium should only be collected using smear tabs. If additional guidance is needed contact the Salt Lake Technical Center (SLTC), through the regional office (if required), and request guidance specific to beryllium.
- Be prepared to collect one or more personal breathing zone samples on the first day of the inspection, in accordance with the OSHA Technical Manual (OTM), Section II, [Chapter 1](#), and using required methods for beryllium sampling as found on the OSHA [Chemical Sampling Information](#) (CSI) Web page.
- When placing a sampling cassette for monitoring abrasive blasting exposures where an employee is wearing an abrasive blast respirator with hood/helmet, place the cassette outside of the helmet/hood, i.e., outside the abrasive blasting shroud, but as near as practicable to the employee's breathing zone.
- When collecting an air sample on a welder wearing a protective helmet, position the sampling cassette inside the helmet. If the free space inside the helmet precludes the use of a 37-mm diameter cassette and filter, 25-mm diameter sampling filters and cassettes can be used instead. In some cases, a welder's helmet may be integrated into a respirator, such as a hooded, powered air purifying respirator (PAPR). If this is the case, position the sampling cassette outside the helmet and respirator assembly.

### CITATION GUIDANCE

- Overexposures will be characterized as serious violations.
- Until the compliance date for engineering controls becomes effective in the general industry standard, if overexposure is measured, OSHA will consider employers to be in compliance with the PELs as long as employers are in compliance with §1910.134

- and employees are being provided with, and use, appropriate respiratory protection, without first attempting to use engineering controls.
- When employees are overexposed to both Be and any other air contaminant(s) generated from the same process or operation, cite each PEL violation as serious and propose separate penalties.

**Exposure Assessments under §1910.1024(d)**  
**(DOES NOT APPLY TO CONSTRUCTION OR SHIPYARDS)**

- General
  - General industry employers must assess the airborne exposure of each employee who is, or may reasonably be expected to be, exposed to airborne beryllium in accordance with either the performance option or the scheduled monitoring option.
  - All air monitoring samples must be evaluated by a laboratory that can measure beryllium to an accuracy of plus or minus 25% within a 95% statistical confidence level for airborne concentration levels at or above the AL.
  - The employer must reassess airborne exposure whenever a change in the production, process, control equipment, personnel, or work practices may reasonably be expected to result in new or additional airborne exposure at or above the AL or STEL, or when the employer has any reason to believe that new or additional airborne exposure at or above the AL or STEL has occurred.
  - Within 15 working days after completing an exposure assessment, the employer must notify each employee of the results in writing or post the results in an accessible location. Whenever the exposure is above the TWA PEL or STEL, the employer must describe in the written notification the corrective action being taken to reduce airborne exposure.
- Performance Option
  - Provides some flexibility; the burden is on the employer to demonstrate the data fully complies with the requirements.
  - Allows employers to assess the 8-hour TWA exposure for each employee on the basis of any combination of air monitoring data (i.e., historical data) or objective data sufficient to accurately characterize employee exposures to beryllium:
    - Data must reflect worker exposure on each shift, each job classification, and in each work area.
  - Objective data relied upon must be recorded and maintained by the employer, as well as made available in accordance with OSHA's Access to Employee Exposure and Medical Records Standard (§1910.1020), including the following information:
    - The data relied upon;
    - The beryllium-containing material in question;
    - The source of the objective data;
    - A description of the process, task, or activity on which the objective data were based;
    - Other data relevant to the process, task, activity, material, or airborne exposure on which the objective data were based.

- NOTE: Under the performance option, objective data meeting the PEL may rely solely on control by an effective ventilation system. Such data can be used to satisfy the employer's responsibility for an exposure assessment. However, this data is not appropriate as objective data for determining coverage under the scope provision, (a)(3). Coverage under the standard is determined without regard to the use of engineering controls. [See note, above, under General Information].

- Scheduled Monitoring Option

- Requires both initial and periodic monitoring:
  - Employers must perform initial monitoring as soon as work begins to determine exposure levels and where to implement control measures;
  - Employers must conduct periodic monitoring at specified intervals based on most recent monitoring results;
  - Employees must be notified (in writing or results may be posted) within 15 working days after completing an exposure assessment; and
  - For airborne concentration exposures above the TWA PEL or STEL, employers must describe (in the written notification) the corrective action being taken to reduce exposure to or below the exceeded exposure limits where feasible corrective actions exist but had not yet been implemented when the monitoring occurred.
- Monitoring must assess exposures for each employee on the basis of one or more personal breathing zone air samples that reflect the exposures on each shift, each job classification, and work area:
  - Where several employees perform the same tasks on the same shift and in the same work area, the employer may sample a representative group of employees to meet this requirement. Representative sampling must be of the employee(s) who are expected to have the highest exposure to beryllium.
- Employers must perform periodic monitoring in accordance with §1910.1024(d)(3)(iv)-(viii).
- Employers must reassess airborne 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 AL or STEL, or when employers have any reason to believe that new or additional airborne exposures at or above the AL or STEL has occurred in accordance with §1910.1024(d)(4).

- Observation of Monitoring

- Employers must provide an opportunity for each affected employee, and their employee representative, a chance to observe the monitoring if their airborne exposure is measured or represented by the monitoring.
- When observation requires entry into an area where the use of personal protective clothing or equipment (including respirators) is required, the employer must provide to each observer at no cost, and ensure that each observer uses such clothing or equipment.
- Employers will ensure all observers follow all other applicable safety and health procedures.

## INSPECTION GUIDANCE

- If the employer has conducted an exposure assessment, review the assessment to determine what levels might be expected before entering the work area.
- Determine whether employers have accurately characterized the exposure of each employee to Be.
- Review the employer's sampling data, and interview employees to determine whether the sample times were representative of the work hours, whether samples were collected in the employee's breathing zone, and whether employees were notified of the results.
- Whether an employer used the scheduled monitoring option or the performance option, verify that the employer has performed a new exposure assessment required by §1910.1024(d)(4) whenever a change in the production, process, control equipment, personnel, or work practices may have resulted in or a have a reasonable expectation of new or additional exposure at or above the AL or STEL.

## CITATION GUIDANCE

- If no monitoring records exist and the employer does not have objective data, and employees are exposed to Be, cite §1910.1024(d)(1).
- If it is determined that the employer's assessment of an employee's full shift exposure is inadequate because of insufficient sampling time and/or insufficient documentation, or inaccurate analysis, cite a violation of the corresponding exposure determination provision.
- If the employer is using the performance option and it is determined that significant differences exist between the objective data and current conditions which could cause the employee(s) exposure(s) to be underestimated, cite a violation of §1910.1024(d)(2).
- If there has been a change in the workplace that could result in new or additional Be exposures, and the employer has not performed additional exposure determinations, cite §1910.1024(d)(4).
- If employees have not seen their exposure determination results within 15 working days, and the employer does not have a dated copy of the letter or posting of the results, cite §1910.1024(d)(6)(i). If the employer's written notification of exposures exceeding a PEL did not explain corrective action being taken, cite §1910.1024(d)(6)(ii).

## **Respiratory Protection under §1910.1024(g) (DOES NOT APPLY TO CONSTRUCTION OR SHIPYARDS)**

- General
  - Employers must provide respiratory protection at no cost to the employee, and ensure that each employee uses respiratory protection in accordance with the written respiratory protection program:

- During periods necessary to install or implement feasible engineering and work practice controls where airborne exposure exceeds, or can reasonably be expected to exceed, the TWA PEL or STEL;
- During operations for which an employer has implemented all feasible engineering and work practice controls when such controls are not sufficient to reduce airborne exposure to or below the TWA PEL or STEL;

NOTE: Employer obligations for engineering controls in §1910.1024(f) do not become enforceable until March 10, 2020.

- During emergencies; and
  - When an employee who is eligible for medical removal under paragraph [§1910.1024(l)(1)] chooses to remain in a job with airborne exposure at or above the AL, as permitted by §1910.1024(l)(2)(ii).
- Respiratory Protection Program
    - When the use of respiratory protection is required under §1910.1024(g), then employer must ensure the selection and use of such respiratory protection is in accordance with the Respiratory Protection Standard (§1910.134).
    - Employers must provide (at no cost) a powered air-purifying respirator (PAPR) instead of a negative pressure respirator when all of the following conditions are met:
      - Respiratory protection is required by this standard;
      - An employee entitled to such respiratory protection requests a PAPR; and
      - The PAPR provides adequate protection to the employee in accordance with §1910.1024(g)(2).

#### INSPECTION GUIDANCE

- If the employer has determined that respirator use is required, verify that the employer has established and implemented an appropriate respiratory protection program, in accordance with OSHA's Respiratory Protection Standard §1910.134, that contains all of the required elements. Verify compliance with the program through a review of the written program, visual observation(s) during a walk-around, and employee interviews.
- Evaluate the adequacy of respiratory protection when the employer requires respirator use and when the employer has made an exposure determination (or the compliance officer has measured an exposure) exceeding the PEL or STEL. The assigned protection factor of the respirator must be high enough to maintain the employee's exposure to beryllium at or below the maximum use concentration (i.e., the product of multiplying the APF of the respirator by the PEL for Be). [See §1910.134(d)(3)(i)(B)(1)].
- Review medical examination results that are authorized under the Respiratory Protection Standard, §1910.134, and conduct interviews to determine whether there are any employees wearing respirators who should not be. For guidance on inspection procedures for §1910.134, refer to the *Inspection Procedures for the Respiratory Protection Standard*, Enforcement and Compliance Directive ([CPL 02-00-158](#)).

- Although the Beryllium Standard does not address the voluntary use of respirators, if employees are voluntarily using respirators to protect themselves from Be exposures, cite the applicable provisions of §1910.134 after evaluating in accordance with CPL 02-00-158.

#### CITATION GUIDANCE

- If the employer does not provide appropriate respiratory protection for employees in the above situations, cite the applicable subparagraph of §1910.1024(g) for general industry and group with the appropriate PEL violation, §1910.1024(c), as applicable.
- If the employer does not provide an adequate respiratory protection at no cost, cite the applicable subparagraph of §1910.1024(g) for general industry.
- If employees are required to wear respirators, then the employer must have a respiratory protection program. If the employer has not implemented the program or elements of it are deficient or missing, cite §1910.1024(g)(2). Additionally, if elements are deficient or missing, violations should be grouped where appropriate and cite the applicable subparagraphs under §1910.134. For example, when the employer has provided a respirator with an APF that does not maintain an employee's exposure to Be at or below the maximum use concentration, cite §1910.1024(g)(2) and group with a violation of §1910.134(d)(3)(i)(B)(1).
- If there is a discrepancy between the written program and implemented work practices at the worksite, cite §1910.1024(g)(2) and group with a violation of the paragraph under §1910.134 that requires the work practice.
- If violations are found with employees voluntarily using respirators to protect themselves from Be exposures, cite the applicable voluntary use provisions of §1910.134.

### **Respiratory Protection under §1910.134 As related to §1926.1124(c) and §1915.1024(c) only**

- General
  - OSHA will continue to enforce the Respiratory Protection Standard (§1910.134) where the PEL is exceeded in the construction and shipyard industries.

#### INSPECTION GUIDANCE

- Verify that the employer has established and implemented an appropriate respiratory protection program, in accordance with OSHA's Respiratory Protection Standard §1910.134, that contains all of the required elements. Verify compliance with the program through a review of the written program, visual observation(s) during a walk-around, and employee interviews.

#### CITATION GUIDANCE

- If the employer does not provide appropriate respiratory protection, or has not established and implemented an appropriate respiratory protection program, cite the

applicable subparagraph of §1910.134, for overexposures, group with the appropriate PEL violation, §1926.1124(c) or §1915.1024(c), as applicable.

**Medical Surveillance under §1910.1024(k)  
(DOES NOT APPLY TO CONSTRUCTION OR SHIPYARDS)**

- General
  - Employers must make medical surveillance required by §1910.1024(k) available at no cost to the employee, and at a reasonable time and place for each employee:
    - Who is, or is reasonably expected to be, exposed at or above the AL for more than 30 days per year;
    - Who shows signs or symptoms of chronic beryllium disease (CBD) or other beryllium-related health effects;
    - Who is exposed to beryllium during an emergency; and
    - Whose most recent written medical opinion required by §1910.1024(k)(6)-(7) recommends periodic medical surveillance.
  - Employers must ensure that all medical examinations and procedures required by §1910.1024(k) are performed by, or under the direction of, a licensed physician.
  - NOTE: Employers may rely on the following definitions that OSHA plans to propose in an upcoming rulemaking:
    - CBD diagnostic center means a medical diagnostic center that has a pulmonologist or pulmonary specialist on staff and on-site facilities to perform a clinical evaluation for the presence of chronic beryllium disease (CBD). The CBD diagnostic center must have the capacity to perform pulmonary function testing (as outlined by the American Thoracic Society criteria), bronchoalveolar lavage (BAL), and transbronchial biopsy. The CBD diagnostic center must also have the capacity to transfer BAL samples to a laboratory for appropriate diagnostic testing within 24 hours. The pulmonologist or pulmonary specialist must be able to interpret the biopsy pathology and the BAL diagnostic test results;
    - Chronic beryllium disease (CBD) means a chronic granulomatous lung disease caused by inhalation of airborne beryllium by an individual who is beryllium-sensitized; and
    - Confirmed positive means the person tested has two abnormal [beryllium lymphocyte proliferation] BeLPT test results, an abnormal and a borderline test result, or three borderline test results obtained within the 30-day follow-up test period required after a first abnormal or borderline BeLPT test result. It also means the result of a more reliable and accurate test indicating a person has been identified as having beryllium sensitization.
- Frequency
  - Employers must provide medical exams:
    - Within 30 days if:
      - An employee meets the criteria of paragraph §1910.1024(k)(1)(i)(A), unless the employee has received a medical examination (in accordance §1910.1024) within the last two years, or
      - An employee meets the criteria of §1910.1024(k)(1)(i)(B) or (C).

- NOTE: OSHA plans to propose a change to this provision so that an employee who meets the criteria of §1910.1024(k)(1)(i)(C), i.e., exposed to beryllium in an emergency, must be provided a medical exam within at least one year but no more than two years. Employers complying with the expected revision should be considered to be making a good faith effort to comply with the current provision.
  - At least every two years thereafter for each employee who continues to meet the criteria of §1910.1024(k)(1)(i)(A), (B), or (D); and
  - At the termination of employment for each employee who meets any of the criteria of §1910.1024(k)(1)(i) at the time the employee's employment is terminated, unless an examination has been provided in accordance with this standard during the six months prior to the date of termination.
- Contents of Examination
  - Employers must ensure that the physician or other licensed health care professional (PLHCP) conducting the examination advises the employee of the risks and benefits of participating in the medical surveillance program and the employee's right to opt out of any or all parts of the medical examination.
  - Employers must ensure that the employee is offered a medical examination that includes the contents at §1910.1024(k)(3)(ii)(A)-(G).
- Information provided to the PLHCP
  - Employers must ensure that the examining PLHCP and the agreed-upon CBD diagnostic center, if an evaluation is required under §1910.1024(k)(7), has a copy of this standard and must provide information under §1910.1024(k)(4)(i)-(iv), if known.
- Licensed physician's written medical report for the employee
  - Employers must ensure that the employee receives a written medical report from the licensed physician within 45 days of the examination, including any follow-up BeLPT required under §1910.1024(k)(3)(ii)(E), and that the PLHCP explains the results of the examination to the employee. The written medical report must contain the requirements under §1910.1024(k)(5)(i)-(v).
  - The employer must ensure compliance with other provisions specified at §1910.1024(k)(5).
- Licensed physician's written medical opinion for the employer
  - Employers must obtain a written medical opinion from the licensed physician within 45 days of the medical examination, including any follow-up BeLPT required under §1910.1024(k)(3)(ii)(E). The written medical opinion must contain only the information specified at §1910.1024(k)(6)(i)(A)-(D), unless the employee provides written authorization to include information at §1910.1024(k)(6)(ii)-(v).
  - The employer must ensure compliance with other provisions specified at §1910.1024(k)(6).
- CBD diagnostic center
  - The employer must provide an evaluation at no cost to the employee at a CBD diagnostic center that is mutually agreed upon by the employer and the employee. The examination must be provided within 30 days of:
    - The employer's receipt of a physician's written medical opinion to the employer that recommends referral to a CBD diagnostic center; or



- The employee presenting to the employer a physician's written medical report indicating that the employee has been confirmed positive or diagnosed with CBD, or recommending referral to a CBD diagnostic center.
- The employer must ensure compliance with other provisions specified at §1910.1024(k)(7).
- NOTE: OSHA plans to propose a change to this provision so that the employer must provide a consultation with a CBD diagnostic center within 30 days but may provide the examination within a reasonable time thereafter. Employers complying with the expected revision should be considered to be making a good faith effort to comply with the provision.

#### INSPECTION GUIDANCE

- If the employer has determined that medical surveillance is needed for employees, verify compliance with the program through a review of the written program, visual observation(s) during a walk-around, and employee interviews to ensure that the employer has included the appropriate employees. For example, review the employer's exposure assessment and interview employees to determine whether the employer provided a medical exam and required tests (Note: this is also a good time to inquire about respirator use and selection):
  - Ask employees when their examinations took place and if it was prior to or within 30 days of beginning their Be work assignments;
  - Ask employees if examinations, including CBD diagnostic centers (if necessary) are offered at no cost, if employees are paid for time spent taking examinations, if the employer pays the cost of travel (if any), and if medical testing is offered at reasonable times and places; and
  - Ask employees if the PLHCP explained the results of their examination and if they were provided with a written medical report either from the employer or from the PLHCP within 45 days.
- Employers have to make and maintain records for each employee covered by medical surveillance - these records must include a copy of the licensed physician's written medical opinion as required by §1910.1024(k)(6). These records should include any exposure limitations and referrals for follow-up testing, including to a CBD diagnostic center, if necessary. If an employee was referred to a CBD diagnostic center, verify the employee exam was conducted within 30 days of the PLHCP's referral and that the CBD's diagnostic center written medical opinion was received by the employer within 30 days of the exam and is compliant with all provisions under §1910.1024(k)(7). Request copies of the medical surveillance records including the medical opinions.
- Whenever reviewing medical reports or opinions, follow OSHA Instruction [CPL 02-02-072](#), *Rules of Agency Practice and Procedure Concerning OSHA Access to Employee Medical Records*.
- For assistance with obtaining a medical access order (MAO), contact the Office of Occupational Medicine and Nursing in the National Office. Consider issuing a subpoena for those records, if necessary.

## CITATION GUIDANCE

- If medical surveillance was not made available at no cost to the employee(s) or at a reasonable time and place, cite appropriate subparagraph(s) under §1910.1024(k)(1). NOTE: Cite §1910.1024(k)(7) if an eligible employee is not provided an evaluation at a CBD diagnostic center at no cost to the employee(s) or at a reasonable time and place. Do not cite if the employer has made a reasonable attempt to provide a consultation with the CBD diagnostic center within 30 days of meeting the criteria in §1910.1024(k)(7)(i) and provided a medical examination within a reasonable time thereafter.
- Cite §1910.1024(k)(1)(i)(A) if no medical surveillance was provided when employees were exposed at or above the action level for 30 or more days a year beginning May 11, 2018 (unless the employee was provided an exam within the last two years).
- Cite the appropriate paragraph §1910.1024(k)(2) if initial medical examinations were not provided within 30 days after determining eligibility, unless the employer made a reasonable attempt to provide a medical examination by the 30th day of eligibility.
- Cite paragraph §1910.1024(k)(2)(ii) if the employer did not make periodic examinations available at least every two years, or more frequently if recommended by a PLHCP.
- Cite the appropriate paragraphs §1910.1024(k)(3) if the employer did not ensure the PLHCP provided the appropriate procedures and tests as part of the employee's periodic examination.
- Cite the appropriate paragraph under §1910.1024(k)(4) if the examining PLHCP was not provided the required information by the employer.
- Cite paragraph §1910.1024(k)(5) if employees were not given a written medical report from the PLHCP within 45 days of an examination or if the employer did not ensure the PLHCP explained the results to the employee with the required elements.
- Cite the employer under the appropriate paragraph of §1910.1024(k)(6) for failing to obtain a written medical opinion which contained only the specified information from the PLHCP or if the opinion was not received within 45 days of an examination.
- If any information is missing from the PLHCP reports or opinions, cite the appropriate paragraphs under §1910.1024(k)(5) for reports provided to the employee, or §1910.1024(k)(6) for reports provided to the employer.

## **Medical Removal under §1910.1024(l) (DOES NOT APPLY TO CONSTRUCTION OR SHIPYARDS)**

- General
  - An employee is eligible for medical removal if the employee works in a job with airborne exposure at or above the AL and either:
    - The employee provided the employer with:
      - A written medical report indicating a confirmed positive finding or CBD diagnosis, or
      - A written medical report recommending removal from airborne exposure to beryllium in accordance with §1910.1024(k)(5)(v) or (k)(7)(ii).

- The employer receives a written medical opinion recommending removal from airborne exposure to beryllium in accordance §1910.1024(k)(6)(v) or (k)(7)(iii).
- If an employee is eligible for medical removal, the employer must provide the employee with the employee's choice of:
  - Removal as described in §1910.1024(l)(3); and
  - Remaining in a job with airborne exposure at or above the AL, provided that the employer provides, and ensures that the employee uses, respiratory protection that complies with §1910.1024(g) of this standard whenever airborne exposures are at or above the AL.
- If the employee chooses removal:
  - If a comparable job is available where airborne exposures to beryllium are below the AL, and the employee is qualified for that job or can be trained within one month, the employer must remove the employee to that job. The employer must maintain for six months from the time of removal the employee's base earnings, seniority, and other rights and benefits that existed at the time of removal;
  - If comparable work is not available, the employer must maintain the employee's base earnings, seniority, and other rights and benefits that existed at the time of removal for six months or until such time that comparable work described in §1910.1024(l)(3)(i) becomes available, whichever comes first.
- The employer's obligation to provide medical removal protection benefits to a removed employee must be reduced to the extent that the employee receives compensation for earnings lost during the period of removal from a publicly or employer-funded compensation program, or receives income from another employer made possible by virtue of the employee's removal.

#### INSPECTION GUIDANCE

- If an employee is determined to be eligible for medical removal, document each instance where an employee should have been removed. Verify the employee was removed by reviewing the employer's medical records (document any PLHCP recommendations or confirmed positive or CBD diagnosis), employer's removal records (in accordance with §1910.1024(l)(1), air sampling data (at or above the action level) for the area(s) where the employee(s) were removed, and conduct employee interviews.
- If an employee was eligible for removal, verify that the employee was provided with a choice of his or her preference in accordance with §1910.1024(l)(2)(ii).
- If the employee chose to remain in the job with Be exposures at or above the AL, verify and document that the employer provided, and that the employee uses, respiratory protection.
- Ensure records and recordkeeping are compliant [CPL 02 00-135](#), OSHA *Recordkeeping Policies and Procedures Manual*.

### CITATION GUIDANCE

- If an employee was determined to be eligible for medical removal, but was not given a choice to be either removed, re-assigned/trained, or remain in existing job, cite the appropriate paragraph under cite §1910.1024(1)(2).
- If an employee was eligible for medical removal, but remained in the current job at or above the AL, and the appropriate respiratory protection was not provided to and used by the employee, cite the applicable subparagraph of §1910.1024(1)(2) and group with the appropriate Respiratory Protection violation, §1910.134, as applicable.
- If an employee chooses removal, cite the appropriate paragraph under §1910.1024(1)(3) if the employer failed to provide or maintain earning, seniority or other pay and benefits for a period of at least 6 months.

### **Medical Exams for OSHA Personnel**

Regional Administrators and Area Directors are responsible for implementing the OSHA medical examination programs in accordance with all OSHA Instructions and policies. These medical evaluations may be more stringent than what is required by the Beryllium or Respiratory Protection Standards. If you have a question regarding medical exams, please contact the Directorate of Technical Support and Emergency Management – Office of Occupational Medicine and Nursing.

### **CSHO Protection**

CSHOs who are required to wear any respiratory protection must be medically cleared via the medical eligibility examination procedures as described in CPL 02-02-054, *Respiratory Protection Program Guidelines*. They must also wear other appropriate personal protective equipment (PPE) for potential hazardous dermal exposures (e.g., gloves, disposable coveralls, booties) as required. CSHOs must not enter a beryllium regulated area, or other area where exposures are likely to exceed the PEL or STEL, unless it is absolutely necessary and then only if using appropriate PPE. For inspection and air sampling activities, use remote operations when practical. Be conservative about time spent in areas where high concentrations of beryllium exist or are suspected.

**CHANGE I**

**Occupational Exposure to Beryllium, §1910.1024**

As Adopted by the  
Safety and Health Codes Board

Date: 16 February 2017



VIRGINIA OCCUPATIONAL SAFETY AND HEALTH PROGRAM

VIRGINIA DEPARTMENT OF LABOR AND INDUSTRY

Effective Date: 15 May 2017

16VAC25-90-1910.1024, Beryllium, §1910.1024

When the regulations, as set forth in the Final Rule for the Occupational Exposure to Beryllium, §1910.1024, are applied to the Commissioner of the Department of Labor and Industry and/or to Virginia employers, the following federal terms shall be considered to read as below:

Federal Terms

VOSH Equivalent

29 CFR

VOSH Standard

Assistant Secretary

Commissioner of Labor and Industry

Agency

Department

10 March 2017

15 May 2017

\* \* \* \* \*

■ 3. Add § 1910.1024 to read as follows:

§ 1910.1024 **Beryllium.**

(a) *Scope and application.* (1) This standard applies to occupational exposure to beryllium in all forms, compounds, and mixtures in general industry, except those articles and materials exempted by paragraphs (a)(2) and (a)(3) of this standard.

(2) This standard does not apply to articles, as defined in the Hazard Communication standard (HCS) (§ 1910.1200(c)), that contain beryllium and that the employer does not process.

(3) This standard does not apply to materials containing less than 0.1% beryllium by weight where the employer has objective data demonstrating that employee exposure to beryllium will remain below the action level as an 8-hour TWA under any foreseeable conditions.

(b) *Definitions.* As used in this standard:

*Action level* means a concentration of airborne beryllium of 0.1 micrograms per cubic meter of air ( $\mu\text{g}/\text{m}^3$ ) calculated as an 8-hour time-weighted average (TWA).

*Airborne exposure and airborne exposure to beryllium* mean the exposure to airborne beryllium that would occur if the employee were not using a respirator.

*Assistant Secretary* means the Assistant Secretary of Labor for Occupational Safety and Health, United States Department of Labor, or designee.

*Beryllium lymphocyte proliferation test (BeLPT)* means the measurement of blood lymphocyte proliferation in a laboratory test when lymphocytes are challenged with a soluble beryllium salt.

*Beryllium work area* means any work area containing a process or operation that can release beryllium where employees are, or can reasonably be expected to be, exposed to airborne beryllium at any level or where there is the potential for dermal contact with beryllium.

*CBD diagnostic center* means a medical diagnostic center that has an

on-site pulmonary specialist and on-site facilities to perform a clinical evaluation for the presence of chronic beryllium disease (CBD). This evaluation must include pulmonary function testing (as outlined by the American Thoracic Society criteria), bronchoalveolar lavage (BAL), and transbronchial biopsy. The CBD diagnostic center must also have the capacity to transfer BAL samples to a laboratory for appropriate diagnostic testing within 24 hours. The on-site pulmonary specialist must be able to interpret the biopsy pathology and the BAL diagnostic test results.

*Chronic beryllium disease (CBD)* means a chronic lung disease associated with airborne exposure to beryllium.

*Confirmed positive* means the person tested has beryllium sensitization, as indicated by two abnormal BeLPT test results, an abnormal and a borderline test result, or three borderline test results. It also means the result of a more reliable and accurate test indicating a person has been identified as having beryllium sensitization.

*Director* means the Director of the National Institute for Occupational Safety and Health (NIOSH), U.S. Department of Health and Human Services, or designee.

*Emergency* means any uncontrolled release of airborne beryllium.

*High-efficiency particulate air (HEPA) filter* means a filter that is at least 99.97 percent efficient in removing particles 0.3 micrometers in diameter.

*Objective data* means information, such as air monitoring data from industry-wide surveys or calculations based on the composition of a substance, demonstrating airborne exposure to beryllium associated with a particular product or material or a specific process, task, or activity. The data must reflect workplace conditions closely resembling or with a higher airborne exposure potential than the processes, types of material, control methods, work practices, and environmental conditions in the employer's current operations.

*Physician or other licensed health care professional (PLHCP)* means an

individual whose legally permitted scope of practice (*i.e.*, license, registration, or certification) allows the individual to independently provide or be delegated the responsibility to provide some or all of the health care services required by paragraph (k) of this standard.

*Regulated area* means an area, including temporary work areas where maintenance or non-routine tasks are performed, where 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).

*This standard* means this beryllium standard, 29 CFR 1910.1024.

(c) *Permissible Exposure Limits (PELs)*—(1) *Time-weighted average (TWA) PEL.* The employer must ensure that no employee is exposed to an airborne concentration of beryllium in excess of 0.2  $\mu\text{g}/\text{m}^3$  calculated as an 8-hour TWA.

(2) *Short-term exposure limit (STEL).* The employer must ensure that no employee is exposed to an airborne concentration of beryllium in excess of 2.0  $\mu\text{g}/\text{m}^3$  as determined over a sampling period of 15 minutes.

(d) *Exposure assessment*—(1) *General.* The employer must assess the airborne exposure of each employee who is or may reasonably be expected to be exposed to airborne beryllium in accordance with either the performance option in paragraph (d)(2) or the scheduled monitoring option in paragraph (d)(3) of this standard.

(2) *Performance option.* The employer must assess the 8-hour TWA exposure and the 15-minute short-term exposure for each employee on the basis of any combination of air monitoring data and objective data sufficient to accurately characterize airborne exposure to beryllium.

(3) *Scheduled monitoring option.* (i) The employer must perform initial monitoring to assess the 8-hour TWA exposure for each employee on the basis of one or more personal breathing zone air samples that reflect the airborne

exposure of employees on each shift, for each job classification, and in each work area.

(ii) The employer must perform initial monitoring to assess the short-term exposure from 15-minute personal breathing zone air samples measured in operations that are likely to produce airborne exposure above the STEL for each work shift, for each job classification, and in each work area.

(iii) Where several employees perform the same tasks on the same shift and in the same work area, the employer may sample a representative fraction of these employees in order to meet the requirements of this paragraph (d)(3). In representative sampling, the employer must sample the employee(s) expected to have the highest airborne exposure to beryllium.

(iv) If initial monitoring indicates that airborne exposure is below the action level and at or below the STEL, the employer may discontinue monitoring for those employees whose airborne exposure is represented by such monitoring.

(v) Where the most recent exposure monitoring indicates that airborne exposure is at or above the action level but at or below the TWA PEL, the employer must repeat such monitoring within six months of the most recent monitoring.

(vi) Where the most recent exposure monitoring indicates that airborne exposure is above the TWA PEL, the employer must repeat such monitoring within three months of the most recent 8-hour TWA exposure monitoring.

(vii) Where the most recent (non-initial) exposure monitoring indicates that airborne exposure is below the action level, the employer must repeat such monitoring within six months of the most recent monitoring until two consecutive measurements, taken 7 or more days apart, are below the action level, at which time the employer may discontinue 8-hour TWA exposure monitoring for those employees whose exposure is represented by such monitoring, except as otherwise provided in paragraph (d)(4) of this standard.

(viii) Where the most recent exposure monitoring indicates that airborne exposure is above the STEL, the employer must repeat such monitoring within three months of the most recent short-term exposure monitoring until two consecutive measurements, taken 7 or more days apart, are below the STEL, at which time the employer may discontinue short-term exposure monitoring for those employees whose exposure is represented by such monitoring, except as otherwise

provided in paragraph (d)(4) of this standard.

(4) *Reassessment of exposure.* The employer must reassess airborne exposure whenever a change in the production, process, control equipment, personnel, or work practices may reasonably be expected to result in new or additional airborne exposure at or above the action level or STEL, or when the employer has any reason to believe that new or additional airborne exposure at or above the action level or STEL has occurred.

(5) *Methods of sample analysis.* The employer must ensure that all air monitoring samples used to satisfy the monitoring requirements of paragraph (d) of this standard are evaluated by a laboratory that can measure beryllium to an accuracy of plus or minus 25 percent within a statistical confidence level of 95 percent for airborne concentrations at or above the action level.

(6) *Employee notification of assessment results.* (i) Within 15 working days after completing an exposure assessment in accordance with paragraph (d) of this standard, the employer must notify each employee whose airborne exposure is represented by the assessment of the results of that assessment individually in writing or post the results in an appropriate location that is accessible to each of these employees.

(ii) Whenever an exposure assessment indicates that airborne exposure is above the TWA PEL or STEL, the employer must describe in the written notification the corrective action being taken to reduce airborne exposure to or below the exposure limit(s) exceeded where feasible corrective action exists but had not been implemented when the monitoring was conducted.

(7) *Observation of monitoring.* (i) The employer must provide an opportunity to observe any exposure monitoring required by this standard to each employee whose airborne exposure is measured or represented by the monitoring and each employee's representative(s).

(ii) When observation of monitoring requires entry into an area where the use of personal protective clothing or equipment (which may include respirators) is required, the employer must provide each observer with appropriate personal protective clothing and equipment at no cost to the observer and must ensure that each observer uses such clothing and equipment.

(iii) The employer must ensure that each observer follows all other applicable safety and health procedures.

(e) *Beryllium work areas and regulated areas—(1) Establishment.* (i)

The employer must establish and maintain a beryllium work area wherever the criteria for a "beryllium work area" set forth in paragraph (b) of this standard are met.

(ii) The employer must establish and maintain a regulated area wherever employees are, or can reasonably be expected to be, exposed to airborne beryllium at levels above the TWA PEL or STEL.

(2) *Demarcation.* (i) The employer must identify each beryllium work area through signs or any other methods that adequately establish and inform each employee of the boundaries of each beryllium work area.

(ii) The employer must identify each regulated area in accordance with paragraph (m)(2) of this standard.

(3) *Access.* The employer must limit access to regulated areas to:

(i) Persons the employer authorizes or requires to be in a regulated area to perform work duties;

(ii) Persons entering a regulated area as designated representatives of employees for the purpose of exercising the right to observe exposure monitoring procedures under paragraph (d)(7) of this standard; and

(iii) Persons authorized by law to be in a regulated area.

(4) *Provision of personal protective clothing and equipment, including respirators.* The employer must provide and ensure that each employee entering a regulated area uses:

(i) Respiratory protection in accordance with paragraph (g) of this standard; and

(ii) Personal protective clothing and equipment in accordance with paragraph (h) of this standard.

(f) *Methods of compliance—(1)*

*Written exposure control plan.* (i) The employer must establish, implement, and maintain a written exposure control plan, which must contain:

(A) A list of operations and job titles reasonably expected to involve airborne exposure to or dermal contact with beryllium;

(B) A list of operations and job titles reasonably expected to involve airborne exposure at or above the action level;

(C) A list of operations and job titles reasonably expected to involve airborne exposure above the TWA PEL or STEL;

(D) Procedures for minimizing cross-contamination, including preventing the transfer of beryllium between surfaces, equipment, clothing, materials, and articles within beryllium work areas;

(E) Procedures for keeping surfaces as free as practicable of beryllium;

(F) Procedures for minimizing the migration of beryllium from beryllium work areas to other locations within or outside the workplace;



(G) A list of engineering controls, work practices, and respiratory protection required by paragraph (f)(2) of this standard;

(H) A list of personal protective clothing and equipment required by paragraph (h) of this standard; and

(I) Procedures for removing, laundering, storing, cleaning, repairing, and disposing of beryllium-contaminated personal protective clothing and equipment, including respirators.

(ii) The employer must review and evaluate the effectiveness of each written exposure control plan at least annually and update it, as necessary, 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 exposure to beryllium;

(B) The employer is notified that an employee is eligible for medical removal in accordance with paragraph (l)(1) of this standard, referred for evaluation at a CBD diagnostic center, or shows signs or symptoms associated with airborne exposure to or dermal contact with beryllium; or

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

(iii) 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 in accordance with OSHA's Access to Employee Exposure and Medical Records (Records Access) standard (§ 1910.1020(e)).

(2) *Engineering and work practice controls.* (i) For each operation in a beryllium work area that releases airborne beryllium, the employer must ensure that at least one of the following is in place to reduce airborne exposure:

(A) Material and/or process substitution;

(B) Isolation, such as ventilated partial or full enclosures;

(C) Local exhaust ventilation, such as at the points of operation, material handling, and transfer; or

(D) Process control, such as wet methods and automation.

(ii) An employer is exempt from using the controls listed in paragraph (f)(2)(i) of this standard to the extent that:

(A) The employer can establish that such controls are not feasible; or

(B) The employer can demonstrate that airborne exposure is below the action level, using no fewer than two representative personal breathing zone

samples taken at least 7 days apart, for each affected operation.

(iii) If airborne exposure exceeds the TWA PEL or STEL after implementing the control(s) required by paragraph (f)(2)(i) of this standard, the employer must implement additional or enhanced engineering and work practice controls to reduce airborne exposure to or below the exposure limit(s) exceeded.

(iv) Wherever the employer demonstrates that it is not feasible to reduce airborne exposure to or below the PELs by the engineering and work practice controls required by paragraphs (f)(2)(i) and (f)(2)(iii) of this standard, the employer must implement and maintain engineering and work practice controls to reduce airborne exposure to the lowest levels feasible and supplement these controls by using respiratory protection in accordance with paragraph (g) of this standard.

(3) *Prohibition of rotation.* The employer must not rotate employees to different jobs to achieve compliance with the PELs.

(g) *Respiratory protection—(1) General.* The employer must provide respiratory protection at no cost to the employee and ensure that each employee uses respiratory protection:

(i) During periods necessary to install or implement feasible engineering and work practice controls where airborne exposure exceeds, or can reasonably be expected to exceed, the TWA PEL or STEL;

(ii) During operations, including maintenance and repair activities and non-routine tasks, when engineering and work practice controls are not feasible and airborne exposure exceeds, or can reasonably be expected to exceed, the TWA PEL or STEL;

(iii) During operations for which an employer has implemented all feasible engineering and work practice controls when such controls are not sufficient to reduce airborne exposure to or below the TWA PEL or STEL;

(iv) During emergencies; and

(v) When an employee who is eligible for medical removal under paragraph (l)(1) chooses to remain in a job with airborne exposure at or above the action level, as permitted by paragraph (l)(2)(ii) of this standard.

(2) *Respiratory protection program.* Where this standard requires an employer to provide respiratory protection, the selection and use of such respiratory protection must be in accordance with the Respiratory Protection standard (§ 1910.134).

(3) The employer must provide at no cost to the employee a powered air-purifying respirator (PAPR) instead of a negative pressure respirator when

(i) Respiratory protection is required by this standard;

(ii) An employee entitled to such respiratory protection requests a PAPR; and

(iii) The PAPR provides adequate protection to the employee in accordance with paragraph (g)(2) of this standard.

(h) *Personal protective clothing and equipment—(1) Provision and use.* The employer must provide at no cost, and ensure that each employee uses, appropriate personal protective clothing and equipment in accordance with the written exposure control plan required under paragraph (f)(1) of this standard and OSHA's Personal Protective Equipment standards (subpart I of this part):

(i) Where airborne exposure exceeds, or can reasonably be expected to exceed, the TWA PEL or STEL; or

(ii) Where there is a reasonable expectation of dermal contact with beryllium.

(2) *Removal and storage.* (i) The employer must ensure that each employee removes all beryllium-contaminated personal protective clothing and equipment at the end of the work shift, at the completion of tasks involving beryllium, or when personal protective clothing or equipment becomes visibly contaminated with beryllium, whichever comes first.

(ii) The employer must ensure that each employee removes beryllium-contaminated personal protective clothing and equipment as specified in the written exposure control plan required by paragraph (f)(1) of this standard.

(iii) The employer must ensure that each employee stores and keeps beryllium-contaminated personal protective clothing and equipment separate from street clothing and that storage facilities prevent cross-contamination as specified in the written exposure control plan required by paragraph (f)(1) of this standard.

(iv) The employer must ensure that no employee removes beryllium-contaminated personal protective clothing or equipment from the workplace, except for employees authorized to do so for the purposes of laundering, cleaning, maintaining or disposing of beryllium-contaminated personal protective clothing and equipment at an appropriate location or facility away from the workplace.

(v) When personal protective clothing or equipment required by this standard is removed from the workplace for laundering, cleaning, maintenance or disposal, the employer must ensure that

personal protective clothing and equipment are stored and transported in sealed bags or other closed containers that are impermeable and are labeled in accordance with paragraph (m)(3) of this standard and the HCS (§ 1910.1200).

(3) *Cleaning and replacement.* (i) The employer must ensure that all reusable personal protective clothing and equipment required by this standard is cleaned, laundered, repaired, and replaced as needed to maintain its effectiveness.

(ii) The employer must ensure that beryllium is not removed from personal protective clothing and equipment by blowing, shaking or any other means that disperses beryllium into the air.

(iii) The employer must inform in writing the persons or the business entities who launder, clean or repair the personal protective clothing or equipment required by this standard of the potentially harmful effects of airborne exposure to and dermal contact with beryllium and that the personal protective clothing and equipment must be handled in accordance with this standard.

(i) *Hygiene areas and practices—(1) General.* For each employee working in a beryllium work area, the employer must:

(i) Provide readily accessible washing facilities in accordance with this standard and the Sanitation standard (§ 1910.141) to remove beryllium from the hands, face, and neck; and

(ii) Ensure that employees who have dermal contact with beryllium wash any exposed skin at the end of the activity, process, or work shift and prior to eating, drinking, smoking, chewing tobacco or gum, applying cosmetics, or using the toilet.

(2) *Change rooms.* In addition to the requirements of paragraph (i)(1)(i) of this standard, the employer must provide employees who work in a beryllium work area with a designated change room in accordance with this standard and the Sanitation standard (§ 1910.141) where employees are required to remove their personal clothing.

(3) *Showers.* (i) The employer must provide showers in accordance with the Sanitation standard (§ 1910.141) where:

(A) Airborne exposure exceeds, or can reasonably be expected to exceed, the TWA PEL or STEL; and

(B) Beryllium can reasonably be expected to contaminate employees' hair or body parts other than hands, face, and neck.

(ii) Employers required to provide showers under paragraph (i)(3)(i) of this standard must ensure that each

employee showers at the end of the work shift or work activity if:

(A) The employee reasonably could have had airborne exposure above the TWA PEL or STEL; and

(B) Beryllium could reasonably have contaminated the employee's hair or body parts other than hands, face, and neck.

(4) *Eating and drinking areas.*

Wherever the employer allows employees to consume food or beverages at a worksite where beryllium is present, the employer must ensure that:

(i) Surfaces in eating and drinking areas are as free as practicable of beryllium;

(ii) No employees enter any eating or drinking area with personal protective clothing or equipment unless, prior to entry, surface beryllium has been removed from the clothing or equipment by methods that do not disperse beryllium into the air or onto an employee's body; and

(iii) Eating and drinking facilities provided by the employer are in accordance with the Sanitation standard (§ 1910.141).

(5) *Prohibited activities.* The employer must ensure that no employees eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas.

(i) *Housekeeping—(1) General.* (i) The employer must maintain all surfaces in beryllium work areas as free as practicable of beryllium and in accordance with the written exposure control plan required under paragraph (f)(1) and the cleaning methods required under paragraph (j)(2) of this standard; and

(ii) The employer must ensure that all spills and emergency releases of beryllium are cleaned up promptly and in accordance with the written exposure control plan required under paragraph (f)(1) and the cleaning methods required under paragraph (j)(2) of this standard.

(2) *Cleaning methods.* (i) The employer must ensure that surfaces in beryllium work areas are cleaned by HEPA-filtered vacuuming or other methods that minimize the likelihood and level of airborne exposure.

(ii) The employer must not allow dry sweeping or brushing for cleaning surfaces in beryllium work areas unless HEPA-filtered vacuuming or other methods that minimize the likelihood and level of airborne exposure are not safe or effective.

(iii) The employer must not allow the use of compressed air for cleaning beryllium-contaminated surfaces unless the compressed air is used in conjunction with a ventilation system designed to capture the particulates

made airborne by the use of compressed air.

(iv) Where employees use dry sweeping, brushing, or compressed air to clean beryllium-contaminated surfaces, the employer must provide, and ensure that each employee uses, respiratory protection and personal protective clothing and equipment in accordance with paragraphs (g) and (h) of this standard.

(v) The employer must ensure that cleaning equipment is handled and maintained in a manner that minimizes the likelihood and level of airborne exposure and the re-entrainment of airborne beryllium in the workplace.

(3) *Disposal.* The employer must ensure that:

(i) Materials designated for disposal that contain or are contaminated with beryllium are disposed of in sealed, impermeable enclosures, such as bags or containers, that are labeled in accordance with paragraph (m)(3) of this standard; and

(ii) Materials designated for recycling that contain or are contaminated with beryllium are cleaned to be as free as practicable of surface beryllium contamination and labeled in accordance with paragraph (m)(3) of this standard, or placed in sealed, impermeable enclosures, such as bags or containers, that are labeled in accordance with paragraph (m)(3) of this standard.

(k) *Medical surveillance—(1) General.*

(i) The employer must make medical surveillance required by this paragraph available at no cost to the employee, and at a reasonable time and place, to each employee:

(A) Who is or is reasonably expected to be exposed at or above the action level for more than 30 days per year;

(B) Who shows signs or symptoms of CBD or other beryllium-related health effects;

(C) Who is exposed to beryllium during an emergency; or

(D) Whose most recent written medical opinion required by paragraph (k)(6) or (k)(7) of this standard recommends periodic medical surveillance.

(ii) The employer must ensure that all medical examinations and procedures required by this standard are performed by, or under the direction of, a licensed physician.

(2) *Frequency.* The employer must provide a medical examination:

(i) Within 30 days after determining that:

(A) An employee meets the criteria of paragraph (k)(1)(i)(A), unless the employee has received a medical examination, provided in accordance

with this standard, within the last two years; or

(B) An employee meets the criteria of paragraph (k)(1)(i)(B) or (C).

(ii) At least every two years thereafter for each employee who continues to meet the criteria of paragraph (k)(1)(i)(A), (B), or (D) of this standard.

(iii) At the termination of employment for each employee who meets any of the criteria of paragraph (k)(1)(i) of this standard at the time the employee's employment terminates, unless an examination has been provided in accordance with this standard during the six months prior to the date of termination.

(3) *Contents of examination.* (i) The employer must ensure that the PLHCP conducting the examination advises the employee of the risks and benefits of participating in the medical surveillance program and the employee's right to opt out of any or all parts of the medical examination.

(ii) The employer must ensure that the employee is offered a medical examination that includes:

(A) A medical and work history, with emphasis on past and present airborne exposure to or dermal contact with beryllium, smoking history, and any history of respiratory system dysfunction;

(B) A physical examination with emphasis on the respiratory system;

(C) A physical examination for skin rashes;

(D) Pulmonary function tests, performed in accordance with the guidelines established by the American Thoracic Society including forced vital capacity (FVC) and forced expiratory volume in one second (FEV<sub>1</sub>);

(E) A standardized BeLPT or equivalent test, upon the first examination and at least every two years thereafter, unless the employee is confirmed positive. If the results of the BeLPT are other than normal, a follow-up BeLPT must be offered within 30 days, unless the employee has been confirmed positive. Samples must be analyzed in a laboratory certified under the College of American Pathologists/Clinical Laboratory Improvement Amendments (CLIA) guidelines to perform the BeLPT.

(F) A low dose computed tomography (LDCT) scan, when recommended by the PLHCP after considering the employee's history of exposure to beryllium along with other risk factors, such as smoking history, family medical history, sex, age, and presence of existing lung disease; and

(G) Any other test deemed appropriate by the PLHCP.

(4) *Information provided to the PLHCP.* The employer must ensure that the examining PLHCP (and the agreed-upon CBD diagnostic center, if an evaluation is required under paragraph (k)(7) of this standard) has a copy of this standard and must provide the following information, if known:

(i) A description of the employee's former and current duties that relate to the employee's airborne exposure to and dermal contact with beryllium;

(ii) The employee's former and current levels of airborne exposure;

(iii) A description of any personal protective clothing and equipment, including respirators, used by the employee, including when and for how long the employee has used that personal protective clothing and equipment; and

(iv) Information from records of employment-related medical examinations previously provided to the employee, currently within the control of the employer, after obtaining written consent from the employee.

(5) *Licensed physician's written medical report for the employee.* The employer must ensure that the employee receives a written medical report from the licensed physician within 45 days of the examination (including any follow-up BeLPT required under paragraph (k)(3)(ii)(E) of this standard) and that the PLHCP explains the results of the examination to the employee. The written medical report must contain:

(i) A statement indicating the results of the medical examination, including the licensed physician's opinion as to whether the employee has

(A) Any detected medical condition, such as CBD or beryllium sensitization (i.e., the employee is confirmed positive, as defined in paragraph (b) of this standard), that may place the employee at increased risk from further airborne exposure; and

(B) Any medical conditions related to airborne exposure that require further evaluation or treatment.

(ii) Any recommendations on:

(A) The employee's use of respirators, protective clothing, or equipment; or

(B) Limitations on the employee's airborne exposure to beryllium.

(iii) If the employee is confirmed positive or diagnosed with CBD or if the licensed physician otherwise deems it appropriate, the written report must also contain a referral for an evaluation at a CBD diagnostic center.

(iv) If the employee is confirmed positive or diagnosed with CBD the written report must also contain a recommendation for continued periodic medical surveillance.

(v) If the employee is confirmed positive or diagnosed with CBD the written report must also contain a recommendation for medical removal from airborne exposure to beryllium, as described in paragraph (l) of this standard.

(6) *Licensed physician's written medical opinion for the employer.* (i)

The employer must obtain a written medical opinion from the licensed physician within 45 days of the medical examination (including any follow-up BeLPT required under paragraph (k)(3)(ii)(E) of this standard). The written medical opinion must contain only the following:

(A) The date of the examination;

(B) A statement that the examination has met the requirements of this standard;

(C) Any recommended limitations on the employee's use of respirators, protective clothing, or equipment; and

(D) A statement that the PLHCP has explained the results of the medical examination to the employee, including any tests conducted, any medical conditions related to airborne exposure that require further evaluation or treatment, and any special provisions for use of personal protective clothing or equipment;

(ii) If the employee provides written authorization, the written opinion must also contain any recommended limitations on the employee's airborne exposure to beryllium.

(iii) If the employee is confirmed positive or diagnosed with CBD or if the licensed physician otherwise deems it appropriate, and the employee provides written authorization, the written opinion must also contain a referral for an evaluation at a CBD diagnostic center.

(iv) If the employee is confirmed positive or diagnosed with CBD and the employee provides written authorization, the written opinion must also contain a recommendation for continued periodic medical surveillance.

(v) If the employee is confirmed positive or diagnosed with CBD and the employee provides written authorization, the written opinion must also contain a recommendation for medical removal from airborne exposure to beryllium, as described in paragraph (l) of this standard.

(vi) The employer must ensure that each employee receives a copy of the written medical opinion described in paragraph (k)(6) of this standard within 45 days of any medical examination (including any follow-up BeLPT required under paragraph (k)(3)(ii)(E) of

this standard) performed for that employee.

(7) *CBD diagnostic center.* (i) The employer must provide an evaluation at no cost to the employee at a CBD diagnostic center that is mutually agreed upon by the employer and the employee. The examination must be provided within 30 days of:

(A) The employer's receipt of a physician's written medical opinion to the employer that recommends referral to a CBD diagnostic center; or

(B) The employee presenting to the employer a physician's written medical report indicating that the employee has been confirmed positive or diagnosed with CBD, or recommending referral to a CBD diagnostic center.

(ii) The employer must ensure that the employee receives a written medical report from the CBD diagnostic center that contains all the information required in paragraph (k)(5)(i), (ii), (iv), and (v) of this standard and that the PLHCP explains the results of the examination to the employee within 30 days of the examination.

(iii) The employer must obtain a written medical opinion from the CBD diagnostic center within 30 days of the medical examination. The written medical opinion must contain only the information in paragraph (k)(6)(i), as applicable, unless the employee provides written authorization to release additional information. If the employee provides written authorization, the written opinion must also contain the information from paragraphs (k)(6)(ii), (iv), and (v), if applicable.

(iv) The employer must ensure that each employee receives a copy of the written medical opinion from the CBD diagnostic center described in paragraph (k)(7) of this standard within 30 days of any medical examination performed for that employee.

(v) After an employee has received the initial clinical evaluation at a CBD diagnostic center described in paragraph (k)(7)(i) of this standard, the employee may choose to have any subsequent medical examinations for which the employee is eligible under paragraph (k) of this standard performed at a CBD diagnostic center mutually agreed upon by the employer and the employee, and the employer must provide such examinations at no cost to the employee.

(l) *Medical removal.* (1) An employee is eligible for medical removal, if the employee works in a job with airborne exposure at or above the action level and either:

(i) The employee provides the employer with:

(A) A written medical report indicating a confirmed positive finding or CBD diagnosis; or

(B) A written medical report recommending removal from airborne exposure to beryllium in accordance with paragraph (k)(5)(v) or (k)(7)(ii) of this standard; or

(ii) The employer receives a written medical opinion recommending removal from airborne exposure to beryllium in accordance with paragraph (k)(6)(v) or (k)(7)(iii) of this standard.

(2) If an employee is eligible for medical removal, the employer must provide the employee with the employee's choice of:

(i) Removal as described in paragraph (l)(3) of this standard; or

(ii) Remaining in a job with airborne exposure at or above the action level, provided that the employer provides, and ensures that the employee uses, respiratory protection that complies with paragraph (g) of this standard whenever airborne exposures are at or above the action level.

(3) If the employee chooses removal:

(i) If a comparable job is available where airborne exposures to beryllium are below the action level, and the employee is qualified for that job or can be trained within one month, the employer must remove the employee to that job. The employer must maintain for six months from the time of removal the employee's base earnings, seniority, and other rights and benefits that existed at the time of removal.

(ii) If comparable work is not available, the employer must maintain the employee's base earnings, seniority, and other rights and benefits that existed at the time of removal for six months or until such time that comparable work described in paragraph (l)(3)(i) becomes available, whichever comes first.

(4) The employer's obligation to provide medical removal protection benefits to a removed employee shall be reduced to the extent that the employee receives compensation for earnings lost during the period of removal from a publicly or employer-funded compensation program, or receives income from another employer made possible by virtue of the employee's removal.

(m) *Communication of hazards*—(1)

*General.* (i) Chemical manufacturers, importers, distributors, and employers must comply with all requirements of the HCS (§ 1910.1200) for beryllium.

(ii) In classifying the hazards of beryllium, at least the following hazards must be addressed: Cancer; lung effects (CBD and acute beryllium disease); beryllium sensitization; skin

sensitization; and skin, eye, and respiratory tract irritation.

(iii) Employers must include beryllium in the hazard communication program established to comply with the HCS. Employers must ensure that each employee has access to labels on containers of beryllium and to safety data sheets, and is trained in accordance with the requirements of the HCS (§ 1910.1200) and paragraph (m)(4) of this standard.

(2) *Warning signs.* (i) *Posting.* The employer must provide and display warning signs at each approach to a regulated area so that each employee is able to read and understand the signs and take necessary protective steps before entering the area.

(ii) *Sign specification.* (A) The employer must ensure that the warning signs required by paragraph (m)(2)(i) of this standard are legible and readily visible.

(B) The employer must ensure each warning sign required by paragraph (m)(2)(i) of this standard bears the following legend:

DANGER  
REGULATED AREA  
BERYLLIUM  
MAY CAUSE CANCER  
CAUSES DAMAGE TO LUNGS  
AUTHORIZED PERSONNEL ONLY  
WEAR RESPIRATORY PROTECTION AND  
PERSONAL PROTECTIVE CLOTHING  
AND EQUIPMENT IN THIS AREA

(3) *Warning labels.* Consistent with the HCS (§ 1910.1200), the employer must label each bag and container of clothing, equipment, and materials contaminated with beryllium, and must, at a minimum, include the following on the label:

DANGER  
CONTAINS BERYLLIUM  
MAY CAUSE CANCER  
CAUSES DAMAGE TO LUNGS  
AVOID CREATING DUST  
DO NOT GET ON SKIN

(4) *Employee information and training.* (i) For each employee who has, or can reasonably be expected to have, airborne exposure to or dermal contact with beryllium:

(A) The employer must provide information and training in accordance with the HCS (§ 1910.1200(h));

(B) The employer must provide initial training to each employee by the time of initial assignment; and

(C) The employer must repeat the training required under this standard annually for each employee.

(ii) The employer must ensure that each employee who is, or can reasonably be expected to be, exposed to airborne beryllium can demonstrate

knowledge and understanding of the following:

(A) The health hazards associated with airborne exposure to and contact with beryllium, including the signs and symptoms of CBD;

(B) The written exposure control plan, with emphasis on the location(s) of beryllium work areas, including any regulated areas, and the specific nature of operations that could result in airborne exposure, especially airborne exposure above the TWA PEL or STEL;

(C) The purpose, proper selection, fitting, proper use, and limitations of personal protective clothing and equipment, including respirators;

(D) Applicable emergency procedures;

(E) Measures employees can take to protect themselves from airborne exposure to and contact with beryllium, including personal hygiene practices;

(F) The purpose and a description of the medical surveillance program required by paragraph (k) of this standard including risks and benefits of each test to be offered;

(G) The purpose and a description of the medical removal protection provided under paragraph (l) of this standard;

(H) The contents of the standard; and

(I) The employee's right of access to records under the Records Access standard (§ 1910.1020).

(ii) When a workplace change (such as modification of equipment, tasks, or procedures) results in new or increased airborne exposure that exceeds, or can reasonably be expected to exceed, either the TWA PEL or the STEL, the employer must provide additional training to those employees affected by the change in airborne exposure.

(iv) *Employee information.* The employer must make a copy of this standard and its appendices readily available at no cost to each employee and designated employee representative(s).

(n) *Recordkeeping—(1) Air monitoring data.* (i) The employer must make and maintain a record of all exposure measurements taken to assess airborne exposure as prescribed in paragraph (d) of this standard.

(ii) This record must include at least the following information:

(A) The date of measurement for each sample taken;

(B) The task that is being monitored;

(C) The sampling and analytical methods used and evidence of their accuracy;

(D) The number, duration, and results of samples taken;

(E) The type of personal protective clothing and equipment, including respirators, worn by monitored employees at the time of monitoring; and

(F) The name, social security number, and job classification of each employee represented by the monitoring, indicating which employees were actually monitored.

(iii) The employer must ensure that exposure records are maintained and made available in accordance with the Records Access standard (§ 1910.1020).

(2) *Objective data.* (i) Where an employer uses objective data to satisfy the exposure assessment requirements under paragraph (d)(2) of this standard, the employer must make and maintain a record of the objective data relied upon.

(ii) This record must include at least the following information:

(A) The data relied upon;

(B) The beryllium-containing material in question;

(C) The source of the objective data;

(D) A description of the process, task, or activity on which the objective data were based; and

(E) Other data relevant to the process, task, activity, material, or airborne exposure on which the objective data were based.

(iii) The employer must ensure that objective data are maintained and made available in accordance with the Records Access standard (§ 1910.1020).

(3) *Medical surveillance.* (i) The employer must make and maintain a record for each employee covered by medical surveillance under paragraph (k) of this standard.

(ii) The record must include the following information about each employee:

(A) Name, social security number, and job classification;

(B) A copy of all licensed physicians' written medical opinions for each employee; and

(C) A copy of the information provided to the PLHCP as required by paragraph (k)(4) of this standard.

(iii) The employer must ensure that medical records are maintained and made available in accordance with the Records Access standard (§ 1910.1020).

(4) *Training.* (i) At the completion of any training required by this standard, the employer must prepare a record that indicates the name, social security number, and job classification of each employee trained, the date the training was completed, and the topic of the training.

(ii) This record must be maintained for three years after the completion of training.

(5) *Access to records.* Upon request, the employer must make all records maintained as a requirement of this standard available for examination and copying to the Assistant Secretary, the Director, each employee, and each employee's designated representative(s) in accordance with the Records Access standard (§ 1910.1020).

(6) *Transfer of records.* The employer must comply with the requirements involving transfer of records set forth in the Records Access standard (§ 1910.1020).

(o) *Dates—(1) Effective date.* This standard shall become effective March 10, 2017.

(2) *Compliance dates.* All obligations of this standard commence and become enforceable on March 12, 2018, except:

(i) Change rooms and showers required by paragraph (i) of this standard must be provided by March 11, 2019; and

(ii) Engineering controls required by paragraph (f) of this standard must be implemented by March 10, 2020.

(p) *Appendix.* Appendix A—Control Strategies to Minimize Beryllium Exposure of this standard is non-mandatory.

#### **Appendix A to § 1910.1024—Control Strategies To Minimize Beryllium Exposure (Non-Mandatory)**

Paragraph (f)(2)(i) of this standard requires employers to use one or more of the control methods listed in paragraph (f)(2)(i) to minimize worker exposure in each operation in a beryllium work area, unless the operation is exempt under paragraph (f)(2)(ii). This appendix sets forth a non-exhaustive list of control options that employers could use to comply with paragraph (f)(2)(i) for a number of specific beryllium operations.

TABLE A.1—EXPOSURE CONTROL RECOMMENDATIONS

Operation	Minimal control strategy*	Application group
Beryllium Oxide Forming (e.g., pressing, extruding).	For pressing operations: <ul style="list-style-type: none"> <li>(1) Install local exhaust ventilation (LEV) on oxide press tables, oxide feed drum breaks, press tumblers, powder rollers, and die set disassembly stations;</li> <li>(2) Enclose the oxide presses; and</li> <li>(3) Install mechanical ventilation (make-up air) in processing areas.</li> </ul> For extruding operations: <ul style="list-style-type: none"> <li>(1) Install LEV on extruder powder loading hoods, oxide supply bottles, rod breaking operations, centerless grinders, rod laydown tables, dicing operations, surface grinders, discharge end of extrusion presses;</li> <li>(2) Enclose the centerless grinders; and</li> <li>(3) Install mechanical ventilation (make-up air) in processing areas.</li> </ul>	Primary Beryllium Production; Beryllium Oxide Ceramics and Composites.
Chemical Processing Operations (e.g., leaching, pickling, degreasing, etching, plating).	For medium and high gassing operations: <ul style="list-style-type: none"> <li>(1) Perform operation with a hood having a maximum of one open side; and</li> <li>(2) Design process so as to minimize spills; if accidental spills occur, perform immediate cleanup.</li> </ul>	Primary Beryllium Production; Beryllium Oxide Ceramics and Composites; Copper Rolling, Drawing and Extruding.
Finishing (e.g., grinding, sanding, polishing, deburring).	<ul style="list-style-type: none"> <li>(1) Perform portable finishing operations in a ventilated hood. The hood should include both downdraft and backdraft ventilation, and have at least two sides and a top.</li> <li>(2) Perform stationary finishing operations using a ventilated and enclosed hood at the point of operation. The grinding wheel of the stationary unit should be enclosed and ventilated.</li> </ul>	Secondary Smelting; Fabrication of Beryllium Alloy Products; Dental Labs.
Furnace Operations (e.g., Melting and Casting).	<ul style="list-style-type: none"> <li>(1) Use LEV on furnaces, pelletizer; arc furnace ingot machine discharge; pellet sampling; arc furnace bins and conveyors; beryllium hydroxide drum dumper and dryer; furnace rebuilding; furnace tool holders; arc furnace tundish and tundish skimming; tundish preheat hood, and tundish cleaning hoods; dross handling equipment and drums; dross recycling; and tool repair station, charge make-up station, oxide screener, product sampling locations, drum changing stations, and drum cleaning stations</li> <li>(2) Use mechanical ventilation (make-up air) in furnace building</li> </ul>	Primary Beryllium Production; Beryllium Oxide Ceramics and Composites; Nonferrous Foundries; Secondary Smelting.
Machining	Use (1) LEV consistent with ACGIH <sup>®</sup> ventilation guidelines on deburring hoods, wet surface grinder enclosures, belt sanding hoods, and electrical discharge machines (for operations such as polishing, lapping, and buffing); <ul style="list-style-type: none"> <li>(2) high velocity low volume hoods or ventilated enclosures on lathes, vertical mills, CNC mills, and tool grinding operations;</li> <li>(3) for beryllium oxide ceramics, LEV on lapping, dicing, and laser cutting; and</li> <li>(4) wet methods (e.g., coolants).</li> </ul>	Primary Beryllium Production; Beryllium Oxide Ceramics and Composites; Copper Rolling, Drawing, and Extruding; Precision Turned Products.
Mechanical Processing (e.g., material handling (including scrap), sorting, crushing, screening, pulverizing, shredding, pouring, mixing, blending).	<ul style="list-style-type: none"> <li>(1) Enclose and ventilate sources of emission;</li> <li>(2) Prohibit open handling of materials; and</li> <li>(3) Use mechanical ventilation (make-up air) in processing areas</li> </ul>	Primary Beryllium Production; Beryllium Oxide Ceramics and Composites; Aluminum and Copper Foundries; Secondary Smelting.
Metal Forming (e.g., rolling, drawing, straightening, annealing, extruding).	<ul style="list-style-type: none"> <li>(1) For rolling operations, install LEV on mill stands and reels such that a hood extends the length of the mill;</li> <li>(2) For point and chamfer operations, install LEV hoods at both ends of the rod;</li> <li>(3) For annealing operations, provide an inert atmosphere for annealing furnaces, and LEV hoods at entry and exit points;</li> <li>(4) For swaging operations, install LEV on the cutting head;</li> <li>(5) For drawing, straightening, and extruding operations, install LEV at entry and exit points; and</li> <li>(6) For all metal forming operations, install mechanical ventilation (make-up air) for processing areas.</li> </ul>	Primary Beryllium Production; Copper Rolling, Drawing, and Extruding; Fabrication of Beryllium Alloy Products.
Welding	For fixed welding operations: <ul style="list-style-type: none"> <li>(1) Enclose work locations around the source of fume generation and use local exhaust ventilation; and</li> <li>(2) install close capture hood enclosure designed so as to minimize fume emission from the enclosure welding operation.</li> </ul> For manual operations: <ul style="list-style-type: none"> <li>(1) Use portable local exhaust and general ventilation</li> </ul>	Primary Beryllium Production; Fabrication of Beryllium Alloy Products; Welding.

\* All LEV specifications should be in accordance with the ACGIH<sup>®</sup> Publication No. 2094, "Industrial Ventilation—A Manual of Recommended Practice" wherever applicable.