UNITED STATES COURT OF APPEALS
FOR THE EIGHTH CIRCUIT

EDISON ELECTRIC INSTITUTE, Petitioners, v. U.S. OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION and U.S. DEPARTMENT OF LABOR, Respondents, and UNITED STEELWORKERS, Intervenor.	)	Civ. No. 17-1639

SETTLEMENT AGREEMENT

The parties to this Settlement Agreement ("Agreement") are the Occupational Safety and Health Administration, United States Department of Labor ("OSHA") and Edison Electric Institute ("Petitioner").

WHEREAS, on January 9, 2017, OSHA promulgated and published in the Federal Register at 82 Fed. Reg. 2470–2757 a final rule entitled "Occupational Exposure to Beryllium," which is codified at 29 C.F.R. § 1910.1024 (hereinafter, "the Beryllium Standard"), 29 C.F.R. § 1915.1024, and 29 C.F.R. § 1926.1124.

WHEREAS, Petitioner filed a petition for review that was consolidated with other petitions for review of the final rule entitled "Occupational Exposure to Beryllium" in the United States Court of Appeals for the Eighth Circuit under Docket No. 17-1124.

WHEREAS, OSHA and Petitioner have diligently engaged in complex settlement discussions since filing the Petitions for Review;

NOW, THEREFORE, in light of the complexity of the issues raised by this matter and to avoid the expense and uncertainty of litigation, the parties have reached a mutually agreeable settlement of the litigation, and do hereby agree to the following terms:

1. **Holding Petition for Review in Abeyance.** OSHA and Petitioner agree to file a joint motion with the Court of Appeals to hold the Petition for Review in abeyance pending issuance of the Direct Final Rule, discussed in further detail in paragraph 2 below, within seven (7) days of the execution of this Agreement.

2. **Direct Final Rule.** (a) OSHA agrees to prepare and publish in the Federal Register, within a reasonable amount of time from the execution of this agreement, a Direct Final Rule to revise the Beryllium Standard (DFR) along with a concurrent Notice of Proposed Rulemaking (DFR NPRM). The revisions to the Beryllium Standard in the DFR and the DFR NPRM must be identical to those identified in Appendix A. OSHA will not include additional revisions to the Beryllium Standard in this DFR or DFR NPRM unless Petitioner reviews and agrees to the changes prior to their publication in the Federal Register.

   (b) OSHA agrees to include a statement in the DFR NPRM that it has preliminarily determined that the Beryllium Standard as modified by the DFR provides equal protection to the Beryllium Standard as promulgated, and that compliance with the Beryllium Standard as modified by the DFR would be a *de minimis* condition and would result in no citation or penalty while the DFR NPRM rulemaking is pending.

   (c) If OSHA receives no significant adverse comments during the comment period, OSHA will publish a notice withdrawing the DFR NPRM and the DFR will become final. Petitioner agrees to file a motion to dismiss its petition for review with prejudice within 70 days of the publication of the notice to withdraw the DFR NPRM in the Federal Register, if no person or entity files a petition to challenge to either the DFR or the notice to withdraw the DFR NPRM under section 6(f) of the OSH Act.

   (d) If OSHA receives a significant adverse comment during the comment period, it will withdraw the DFR and proceed with rulemaking based on the DFR NPRM. Petitioner agrees to file a motion to dismiss its petition for review with prejudice within 70 days of the publication in the Federal Register of a final rule resulting from the DFR NPRM if the final rule does not materially deviate from the DFR, and no person or entity files a petition to challenge to the final rule resulting from the DFR NPRM under Section 6(f) of the OSH Act.

   (e) If a petition for review of the DFR or the notice to withdraw the DFR NPRM is filed (DFR Litigation), Petitioner reserves the right to intervene in that litigation for the purpose of defending the DFR. Petitioner will move to dismiss its petition for review in the instant case (17-1639) upon the conclusion of the DFR Litigation, unless a material revision set forth in Appendix A is remanded or vacated in the DFR Litigation. In the event of such a remand or vacatur, Petitioner and OSHA will meet and confer in a good faith effort to complete the resolution of this matter.

(f) For the purposes of the DFR, the term "significant adverse comment" means a comment that explains why the amendments being made to the beryllium standard would be inappropriate. In determining whether a comment necessitates withdrawal of the DFR, OSHA will consider whether the comment raises an issue serious enough to warrant a substantive response in a notice-and-comment process. OSHA will not consider a comment recommending an additional amendment to be a significant adverse comment unless the comment states why the DFR would be ineffective without the addition.

(g) OSHA agrees to include in the preamble to the DFR a statement incorporating the meaning of the term "significant adverse comment" set forth in paragraph 2(e).

(h) OSHA intends to publish the DFR and DFR NPRM prior to the compliance date of May 11, 2018. If OSHA is unable to publish the DFR before that date, it will announce that it has preliminarily determined that the Beryllium Standard as modified by the regulatory text in Appendix A provides equal protection to the Beryllium Standard as promulgated, and that until the DFR is published, compliance with the Beryllium Standard as modified by Appendix A would be a *de minimis* condition and would result in no citation or penalty.

3. **Existing Legal Obligations**. The parties acknowledge that OSHA must comply with all legal obligations under the Occupational Safety and Health Act, the Administrative Procedure Act, and all other applicable law in making its final decision in all rulemakings covered by this agreement.

4. **Guidance Documents.** (a) OSHA agrees to include the language specified in Appendix B ("Guidance Documents") in guidance documents issued by the Agency to explain the Beryllium rule.

   (b) After issuance of the Guidance Documents, OSHA shall not amend, modify, rescind, or change any language specified in Appendix B within five years of the execution of this agreement except through notice-and-comment rulemaking or pursuant to the following procedure:

   (1) OSHA shall notify Petitioner in writing at least thirty (30) days before OSHA adopts any contemplated change; and

   (2) OSHA shall meet with Petitioner upon request to discuss the contemplated changes before any changes are adopted.

5. **Effect of Agreement.** (a) Notwithstanding anything in this Agreement to the contrary, nothing in this Agreement constitutes an admission of law or fact by any of the parties hereto for purposes of this litigation or in any other legal proceeding. By entering into this Agreement, the parties do not concede the validity or invalidity of any claim or argument that any party could have raised in this litigation. Nothing in this Agreement constitutes an admission by Petitioner that a significant risk of material impairment of health or functional capacity exists in every industry due to exposures to beryllium at or below the 8-hour TWA permissible exposure limit published on January 9, 2017 or that any provision of the Beryllium Standard as published on January 9, 2017 is feasible in every industry.

(b) The dismissal with prejudice of the Petition for Review pursuant to this agreement does not operate as a waiver by Petitioner:

(1) With respect to any citation for violation of the Beryllium Standard; or

(2) Of any claim under Section 6(f) of the OSH Act, 29 U.S.C. § 655(f), with respect to the final rule resulting from the DFR NPRM, if OSHA receives significant adverse comment on the DFR.

(c) If the DFR described in Paragraph 2 goes into effect, Petitioner waives any claim under Section 6(f) of the OSH Act, 29 U.S.C. § 655(f), with respect to the DFR. However, Petitioner reserves the right to intervene in a petition for review of the DFR or any other lawsuit concerning the DFR filed by another party for the purpose of defending the DFR.

6. **Scope and Amendment of Agreement.** Appendices A and B are incorporated by reference in this Agreement, which contains the full and complete agreement between OSHA and Petitioner with respect to the matters covered herein. Any prior conversations, meetings, discussions, drafts, and writings of any kind with respect to the matters covered herein are specifically superseded by this Agreement. No modification of this Agreement shall be effective unless it is in writing and signed by OSHA and Petitioner.

7. **Attorney's Fees.** Each party agrees to bear its own attorneys' fees, costs, and other expenses that have been incurred in connection with the filing of the Petition for Review and the negotiation of this Agreement.

8. **Execution.** (a) This Agreement is effective upon completion of the signing of the Agreement by OSHA and Petitioner. Each person who signs this Agreement in a representative capacity warrants that he or she is duly authorized to do so.

(b) This Agreement may be executed in any number of counterparts, each of which when executed shall be deemed an original. All counterparts together shall constitute a single original agreement.

IN WITNESS WHEREOF, OSHA and Petitioner have executed the foregoing Settlement Agreement or counterparts thereof, intending to be legally bound.

Agreed to this 26th day of April 2018.

Petitioner

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Respondents

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Appendix A

§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) (29 CFR 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 (µg/m3) 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: (1) containing a process or operation that can release beryllium and that involves materials that contain at least 0.1 percent beryllium by weight; and (2) 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.

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: (1) soluble beryllium compounds containing beryllium in concentrations greater than or equal to 0.1 percent by weight; (2) solutions containing beryllium in concentrations greater than or equal to 0.1 percent by weight; or (3) dust, fumes, or mists containing beryllium in concentrations greater than or equal to 0.1 percent by weight.

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 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.

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 $\mu g/m^3$ 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 $\mu g/m^3$ 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) 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 by 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.

~~(iii) If airborne exposure exceeds the TWA PEL or STEL after implementing the control(s) required by (f)(2)(i), 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), 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 beryllium-contaminated 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 e~~Employees' hair or body parts other than hands, face, and neck can reasonably be expected to become contaminated with beryllium.

(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 t~~The employee's hair or body parts other than hands, face, and neck could reasonably have become contaminated with beryllium.

(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) Beryllium-contaminated ~~S~~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

(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.

(j) Housekeeping—(1) General. (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

(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 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.

(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 and recycling. For materials that contain beryllium in concentrations of 0.1 percent by weight or more or are contaminated with beryllium, t~~T~~he 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 (FEV1);

(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).

(iii) 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 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: (1) Install local exhaust ventilation (LEV) on oxide press tables, oxide feed drum breaks, press tumblers, powder rollers, and die set disassembly stations; (2) Enclose the oxide presses; and (3) Install mechanical ventilation (make-up air) in processing areas. For extruding operations: (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; (2) Enclose the centerless grinders; and (3) Install mechanical ventilation (make-up air) in processing areas.	Primary Beryllium Production; Beryllium Oxide Ceramics and Composites

Chemical Processing Operations (e.g., leaching, pickling, degreasing, etching, plating)	For medium and high gassing operations (1)Perform operation with a hood having a maximum of one open side; and (2) Design process so as to minimize spills; if accidental spills occur, perform immediate cleanup.	Primary Beryllium Production; Beryllium Oxide Ceramics and Composites; Copper Rolling, Drawing and Extruding
Finishing (e.g., grinding, sanding, polishing, deburring)	(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. (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.	Secondary Smelting; Fabrication of Beryllium Alloy Products; Dental Labs
Furnace Operations (e.g., Melting and Casting)	(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. (2) Use mechanical ventilation (make-up air) in furnace building.	Primary Beryllium Production; Beryllium Oxide Ceramics and Composites; Nonferrous Foundries; Secondary Smelting
Machining	Use (1) LEV consistent with ACGIH® ventilation guidelines on deburring hoods, wet surface grinder enclosures, belt sanding hoods, and electrical discharge machines (for operations such as polishing, lapping, and buffing); (2) high velocity low volume hoods or ventilated enclosures on lathes, vertical mills, CNC mills, and tool grinding operations; (3) for beryllium oxide ceramics, LEV on lapping, dicing, and laser cutting; and	Primary Beryllium Production; Beryllium Oxide Ceramics and Composites; Copper Rolling, Drawing, and Extruding; Precision Turned Products

	(4) wet methods (e.g., coolants).	
Mechanical Processing (e.g., material handling (including scrap), sorting, crushing, screening, pulverizing, shredding, pouring, mixing, blending)	(1) Enclose and ventilate sources of emission; (2) Prohibit open handling of materials; and (3) Use mechanical ventilation (make-up air) in processing areas.	Primary Beryllium Production; Beryllium Oxide Ceramics and Composites; Aluminum and Copper Foundries; Secondary Smelting
Metal Forming (e.g., rolling, drawing, straightening, annealing, extruding)	(1) For rolling operations, install LEV on mill stands and reels such that a hood extends the length of the mill; (2) For point and chamfer operations, install LEV hoods at both ends of the rod; (3) For annealing operations, provide an inert atmosphere for annealing furnaces, and LEV hoods at entry and exit points; (4) For swaging operations, install LEV on the cutting head; (5) For drawing, straightening, and extruding operations, install LEV at entry and exit points; and (6) For all metal forming operations, install mechanical ventilation (make-up air) for processing areas.	Primary Beryllium Production; Copper Rolling, Drawing, and Extruding; Fabrication of Beryllium Alloy Products

Welding	For fixed welding operations: (1) Enclose work locations around the source of fume generation and use local exhaust ventilation; and (2) Install close capture hood enclosure designed so as to minimize fume emission from the enclosure welding operation. For manual operations: (1) Use portable local exhaust and general ventilation.	Primary Beryllium Production; Fabrication of Beryllium Alloy Products; Welding

* All LEV specifications should be in accordance with the ACGIH® Publication No. 2094, "Industrial Ventilation – A Manual of Recommended Practice" wherever applicable.

Appendix B – Modifications to "Frequently Asked Questions: Beryllium and Beryllium Compounds," located at https://www.osha.gov/berylliumrule/faq.html

1. In the answer to the question "What is beryllium?" – OSHA will change "<0.1% by weight" to "considerably <0.1% by weight."

2. In the answer to the question "Who is at risk from exposure to beryllium?" – OSHA will modify the third sentence in the first paragraph to read: "Worker exposures to beryllium can occur in settings such as foundry and smelting operations; fabricating, machining, and grinding beryllium metal and alloys; beryllium oxide ceramics manufacturing; and dental lab work." OSHA will add the following sentence to the beginning of the second paragraph: "In addition to the operations described above, the final rule covers operations involving trace amounts of beryllium (<0.1% by weight) where workers may nevertheless be exposed to beryllium above the action level." OSHA will modify the second sentence of the second paragraph to read: "Workers at fossil fuel-fired power plants may encounter beryllium in certain plant processes." And OSHA will modify the final sentence of the second paragraph to read: "In these operations, beryllium exposure may occur as a result of high dust levels generated in the process despite the low beryllium content of the material."

3. In the answer to the question "What industries will be affected by the rule?" – OSHA will change "Coal-fired power utilities" to "Fossil Fuel-fired Electric Power Generation."

4. In the answer to the question "How can beryllium exposures be controlled to keep exposures at or below the new PEL?" – OSHA will add the following sentence to the second bullet point: "See the "How does OSHA define 'as free as practicable'" section for further information."

5. In the answer to the question "Can the employer use existing labels that contain the requisite information and comply with OSHA's Globally Harmonized System-Hazard Communication Standard?" – OSHA will add the following sentence to the end of the answer, and will hyperlink the text to the guidance referenced: "For transportation guidance, see the joint OSHA/DOT guidance."

6. OSHA will issue the following five FAQs within a reasonable time:

1. How will the beryllium rule protect workers' health?

The new rule lowers the Permissible Exposure Limits (PELs) and requires that employers use feasible engineering controls – such as ventilation along with work practice controls – to reduce workers' inhalation exposure to beryllium. Research indicates that inhalation exposure to airborne beryllium particulate is necessary for CBD to develop in workers. Once the full effects of the rule are realized, OSHA expects it to prevent 90 deaths from beryllium-related diseases and prevent 46 new cases of CBD each year.

NIOSH studies have shown that worker protection models such as Materion's beryllium worker protection model (BWPM) have reduced risks of beryllium-related diseases for Materion's facilities. For more information on Materion's BWPM, see http://beryllium.eu/product-stewardship/beryllium-safety-model-2/.

2. Are there exemptions to this rule?

The rule does not apply to articles that contain beryllium and that the employer does not process. OSHA defines an article, under its Hazard Communication standard, as "a manufactured item other than a fluid or particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, *e.g.*, minute or trace amounts of a hazardous chemical, and does not pose a physical hazard or health risk to employees."

The rule also exempts materials containing less than 0.1 percent beryllium by weight where the employer has objective data demonstrating that employee exposure to beryllium will remain below the action level of 0.1 $\mu g/m^3$, as an 8-hour time weighted average, under any foreseeable conditions. For example, if the only beryllium-containing material in an employer's facility contains less than 0.1 percent beryllium by weight, and that facility has only one process that can release beryllium in excess of the action level, the standard applies only in locations where that process can release beryllium in excess of the action level. If the employer has objective data indicating that exposures will not reach the action level in a particular location within the facility then the standard, including the dermal contact provisions, does not apply in that part of the facility.

3. How can objective data be used to determine where the beryllium standard applies to employers who handle or use materials containing less than 0.1% beryllium by weight?

In the beryllium standard, OSHA defines objective data as 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.

Employers may rely on material, use, process, and air concentration information that indicates that the use or handling of a beryllium-containing material cannot, under any foreseeable conditions, release concentrations of beryllium at or above the action level (AL) of 0.1 $\mu g/m^3$ as an 8-hour TWA. OSHA interprets the phrase "any foreseeable conditions" as meaning situations that can be reasonably anticipated. For example, annual maintenance of equipment during which exposures could exceed the action level would be a situation that is generally foreseeable. Similarly, the failure of ventilation systems is foreseeable, so this exemption does not apply where exposures below the action level are only expected or achieved because of the use of ventilation.

Employers can develop objective data from the air monitoring results of industry-wide surveys (e.g., conducted by trade associations for use by their members, from stewardship programs operated by manufacturers for their customers, from workers' compensation insurance carriers, etc.) to show that similar operations and conditions in their workplaces do not expose employees to beryllium at or above the action level. Employers can also develop objective data using historical air monitoring data from a variety of sources, such as similar operations on different shifts, similar

operations in other facilities within the same industry, and similar operations in comparable industries. For example, the beryllium content of fly ash in coal-fired power plants is low enough that if an employer ensures exposures from fly ash cannot exceed the PEL for total dust (particles not otherwise regulated), then that data, along with information about the beryllium content of the fly ash, will be sufficient to show beryllium exposures will not exceed the action level.

4. Are materials with trace amounts of beryllium included in the rule?

OSHA's general industry beryllium standard includes an exemption for materials containing less than 0.1 % beryllium by weight but with the qualifier that an employer claiming this exemption must have objective data demonstrating that employee exposure to beryllium will remain below the action level of 0.1 micrograms of beryllium per cubic meter of air ($\mu g/m^3$) as an 8-hour time-weighted average (TWA) under any foreseeable conditions. See "Are there exemptions to this rule?" and "How can objective data be used to determine where the beryllium standard applies to employers who handle or use materials containing less than 0.1% beryllium by weight?" above for a discussion of OSHA's interpretation of "any foreseeable conditions" and a discussion of how employers can determine if they are covered under the standard.

For example, for coal combustion residuals that contain 2 ppm (0.0002 %) beryllium by weight, the final action level of beryllium of 0.1 $\mu g/m^3$ would be exceeded only when total dust concentrations exceed 50 mg/m^3, a level that is over 3 times higher than the current PEL of 15 mg/m^3 for PNOCs (particles not otherwise classified) as listed in 29 CFR 1910.1000 (Table Z-1-Limits for Air Contaminants). In this particular situation, if the employer has objective data that shows that exposures during an operation are consistently below the PEL for PNOCs of 15 mg/m^3, or even up to 3 times the PEL for PNOCs, then beryllium exposures would not exceed the action level under any foreseeable conditions and this operation would be exempt from the beryllium standards.

5. How does OSHA define "as free as practicable"?

Under the beryllium standards, the employer is required to keep surfaces in beryllium work areas, materials designated for recycling (unless they are placed in sealed impermeable containers) in general industry, and eating and drinking areas as free as practicable of beryllium. The requirement to maintain surfaces as free as practicable of a regulated substance is included in other OSHA health standards, such as those for lead (29 CFR 1910.1025, 29 CFR 1926.62), chromium (VI) (29 CFR 1910.1026), and asbestos (29 CFR 1910.1001). As OSHA explained in a 2014 letter of interpretation concerning the meaning of "as free as practicable" in the hexavalent chromium standard, OSHA evaluates whether a surface is "as free as practicable" of a contaminant by the efficacy of the employer's program to keep surfaces clean. A sufficient housekeeping program for beryllium may include a routine cleaning schedule and the use of effective cleaning methods to minimize exposure from accumulation of beryllium on surfaces. The intent of the "as-free-as-practicable" requirement is to ensure that accumulations of beryllium dust do not become sources of employee beryllium exposures. Therefore, any method that achieves this end is acceptable. OSHA further intends for this term to be broad and performance-oriented, so as to allow employers in a variety of industries flexibility to decide what type of control methods and procedures are best suited to their beryllium operations, and OSHA's beryllium standard does not specify quantitative limits for the amount of beryllium on surfaces. OSHA intends to evaluate compliance based on employer efforts under the circumstances present at each facility. For example, eating and drinking areas may need more frequent cleaning than regulated areas where workers wear PPE. Or

work areas may need more frequent cleaning during periods of higher production volume. Where appropriate, based on the beryllium content of the material, employees and employers may be able to assess whether surfaces are visibly clean as a practical guide to determine the effectiveness of a housekeeping program. For example, in industries working with materials that contain more than 0.1% beryllium by weight, visible cleanliness may be a helpful indicator of whether a surface is as free as practicable. However, depending on the operations involved, visible cleanliness may not be necessary or appropriate as a barometer of compliance in industries that work with materials that contain less than 0.1% beryllium by weight. If an employer maintains a reasonable, comprehensive written exposure control plan and follows the plan, the employer would likely be considered to be in compliance with the "as-free-as-practicable" requirement.

7. OSHA will issue the following FAQ within a reasonable time after issuance of any final rule adopting amendments to 29 C.F.R. § 1910.1024 relating to disposal and recycling and personal protective clothing and equipment in eating and drinking areas that necessitate these revisions:

How does OSHA define "as free as practicable"?

Under the beryllium standards, the employer is required to keep surfaces in beryllium work areas, materials designated for disposal or recycling in general industry (unless they are placed in enclosures that prevent the release of beryllium-containing particulate or solutions under normal conditions of use, storage, or transport), personal protective equipment (PPE), and eating and drinking areas as free as practicable of beryllium. The requirement to maintain surfaces as free as practicable of a regulated substance is included in other OSHA health standards, such as those for lead (29 CFR 1910.1025, 29 CFR 1926.62), chromium (VI) (29 CFR 1910.1026), and asbestos (29 CFR 1910.1001). As OSHA explained in a 2014 letter of interpretation concerning the meaning of "as free as practicable" in the hexavalent chromium standard, OSHA evaluates whether a surface is "as free as practicable" of a contaminant by the efficacy of the employer's program to keep surfaces clean. A sufficient housekeeping program for beryllium may include a routine cleaning schedule and the use of effective cleaning methods to minimize exposure from accumulation of beryllium on surfaces. The intent of the "as free as practicable" requirement is to ensure that accumulations of beryllium dust do not become sources of employee beryllium exposures. Therefore, any method that achieves this end is acceptable. OSHA further intends for this term to be broad and performance-oriented, so as to allow employers in a variety of industries flexibility to decide what type of control methods and procedures are best suited to their beryllium operations, and OSHA's beryllium standard does not specify quantitative limits for the amount of beryllium on surfaces or PPE. OSHA intends to evaluate compliance based on employer efforts under the circumstances present at each facility. For example, eating and drinking areas may need more frequent cleaning than regulated areas where workers wear PPE. Or work areas may need more frequent cleaning during periods of higher production volume. Where appropriate, based on the beryllium content of the material, employees and employers may be able to assess whether surfaces are visibly clean as a practical guide to determine the effectiveness of a housekeeping program. For example, in industries working with materials that contain more than 0.1% beryllium by weight, visible cleanliness may be a helpful indicator of whether a surface or PPE is as free as practicable. However, depending on the operations involved, visible cleanliness may not be necessary or

appropriate as a barometer of compliance in industries that work with materials that contain less than 0.1% beryllium by weight. If an employer maintains a reasonable, comprehensive written exposure control plan and follows the plan, the employer would likely be considered to be in compliance with the "as-free-as-practicable" requirement.