



**United Cleanup Oak Ridge LLC**

OWNER: Safety, Systems, & Services	PPD-IH-6000	REVISION: 1
SUBJECT MATTER AREA: Industrial Hygiene	PREPARER: Vern Holden, CIH, CSP, ARM	Page 1 of 50
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TITLE: CHRONIC BERYLLIUM DISEASE PREVENTION PROGRAM	APPROVED BY/DATE: Matt Clark 6/19/23 [Approval Signature on File]	
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REVISION LOG			
Revision	Effective Date	Description of Changes	Pages Affected
1	6/27/23	Intent change. Strengthened existing beryllium exposure reduction and minimization efforts through more detailed description of recognized and established work practices and protocols. These efforts result in greater worker protection while also allowing flexibility to address unique situations.	All
0	5/23/22	Initial issue. Replaces PPD-IH-5150, same title.	All

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**PURPOSE**

The purpose of the Chronic Beryllium Disease Prevention Program (CBDPP) is to describe responsibilities and actions required for protection of workers from exposure to beryllium.

**SCOPE**

The United Cleanup Oak Ridge LLC (UCOR) CBDPP applies to all UCOR self-performed work and all tiers of UCOR Subcontractors involved in handling, processing, and storage of beryllium and beryllium-contaminated equipment at UCOR facilities where beryllium is present, and handling of beryllium-contaminated wastes and structural materials during decommissioning and demolition of structures contaminated with beryllium. Contact the UCOR CBDPP Manager for specific information and clarification on requirements of the CBDPP.

Program requirements are based on 10 Code of Federal Regulations (CFR) Part 850, Chronic Beryllium Disease Prevention Program, Final Rule, and amended by 10 CFR Part 851, Worker Safety and Health Program.

Provisions of this CBDPP do not apply to work performed by other U.S. Department of Energy (DOE) Prime Contractors or their Subcontractors, Community Reuse Organization of East Tennessee lessees, or other site tenants that do not have a contractual relationship with UCOR.

Per 10 CFR Part 850, beryllium is defined as elemental beryllium and any insoluble beryllium compound or alloy containing 0.1 percent beryllium or greater that may be released as an airborne particulate. Program does not apply to beryllium articles or laboratory operations that meet definition of laboratory use of hazardous chemicals in 29 CFR 1910.1450, Occupational Exposure to Hazardous Chemical in Laboratories.

Per 10 CFR Part 850.10, update of this program must be approved by DOE prior to initiation of activities involving potential exposure to airborne beryllium outside current approved program scope.

Trace levels of beryllium are sometimes found as mixtures in waste streams including oils, solids, liquids, and other waste stream components. UCOR interprets the DOE definition of beryllium to mean that beryllium identified in mixtures (using approved analytical methods) in concentrations equal to or greater than 0.1% (1,000 ppm) is beryllium-containing material. This interpretation is consistent with the criteria that 29 CFR 1910.1200, Hazard Communication, uses for a carcinogenic mixture, i.e., one that contains a carcinogenic component at a concentration of 0.1 percent (or 1,000 ppm) or greater, by weight or volume. Beryllium in mixtures not meeting the 1910.1200 criteria is excluded from program scope.

Beryllium fluoride, which is a soluble salt, is not included in the definition of “beryllium” in 10 CFR Part 850. However, DOE recognizes the potential for development of contact dermatitis, chronic ulcerations, and conjunctivitis associated with soluble forms of beryllium compounds that are not included in the definition of “beryllium” in the rule. While this program does not apply to soluble beryllium compounds, they will be addressed in hazard assessments and work control documentation, as applicable, to ensure worker protection.

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This CBDPP, addressing the 10 CFR Part 850 requirements, is a mandatory flow down document in Exhibit L, List of Mandatory Contractor Procedures. Subcontractor requirements are established and flowed, as applicable, to lower-tier Subcontractors through the completed Applicability and Responsibility Matrix of Exhibit G, Environmental Compliance and Protection, Radiation Protection, and Worker Safety and Health. Depending on the size for a project that falls under this program, different scope requirements may be developed and incorporated into the subcontract as appropriate. Subcontractors should contact their Subcontract Coordinators/Subcontract Technical Representatives for assistance in understanding or complying with this program.

**OTHER DOCUMENTS NEEDED**

- 10 CFR Part 850, Chronic Beryllium Disease Prevention Program, Final Rule
- 10 CFR Part 851, Worker Safety and Health Program
- 29 CFR 1910.132, Personal Protective Equipment General Requirements
- 29 CFR 1910.134, Respiratory Protection
- 29 CFR 1910.141, Sanitation
- 29 CFR 1910.1024, OSHA General Industry Standard for Beryllium
- 29 CFR 1910.1200, Hazard Communication
- 29 CFR 1926.1124, OSHA Construction Industry Standard for Beryllium
- UCOR-5342, *Beryllium Counseling and Benefits Handbook, Oak Ridge, Tennessee*
- UCOR-5343, *UCOR Facilities Beryllium Baseline Inventory, Oak Ridge, Tennessee*
- UCOR-5624, *United Cleanup Oak Ridge Industrial Hygiene Beryllium Sampling Strategy, Oak Ridge, Tennessee*
- PPD-EH-1400, *Integrated Safety Management System*
- PPD-EH-1745, *Worker Safety and Health Program*
- PPD-IH-5151, *Respiratory Protection Program*
- PPD-IH-5418, *Industrial Hygiene Program*
- PROC-EH-1013, *Accident Prevention Signs, Barricades, and Other Postings*
- PROC-EH-2005, *Personal Protective Equipment*
- PROC-FS-1001, *Integrated Work Control Program*
- PROC-IH-5206, *Generation and Use of Industrial Hygiene Work Permits*
- PROC-IH-5560, *Workplace Industrial Hygiene Sampling*
- PROC-OS-1001, *Records Management, Including Document Control*
- Form-773, *Industrial Hygiene Report*
- Form-1227, *Chronic Beryllium Disease Prevention Program Informed Consent Form*
- Form-1232, *Beryllium Health History Questionnaire*
- Form-2235, *Beryllium Registry Technical Review*
- Form-3061, *Industrial Hygiene Work Permit*
- Form-3062, *Industrial Hygiene Hazard Worksheet*

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**REQUIREMENTS      A.    Program Administration**

**1.    Submission for Approval:**

UCOR will submit an updated CBDPP to the DOE Head of the Field Element for approval whenever a significant change or significant addition is made to this CBDPP.

**NOTE 1:**    UCOR will distinguish between those workers who are currently qualified to work in posted beryllium work areas (Beryllium Controlled Areas [BCAs] and Beryllium Regulated Areas [BRAs]), and those who are not by the following definitions.

**NOTE 2:**    Although UCOR distinguishes between Beryllium Workers and Beryllium Associated Workers for administrative purposes, both groups are “Beryllium Associated Workers” as defined by 10 CFR 850.

**2.    Worker Definitions:**

**Beryllium Worker** – current worker who has:

- Completed Local Education Administrative Requirements Network (LEARN) Module 32036, Beryllium Briefing;
- Received a Beryllium-induced Lymphocyte Proliferation Test (BeLPT) with normal results;
- Completed baseline and annual (as applicable) beryllium medical surveillance requirements;
- Completed LEARN Module 32028, Beryllium Worker Training, within the past 24 months.

**Beryllium Associated Worker** – current worker who does not currently perform beryllium work, but meets one of the following:

- Work history shows potential previous exposure to airborne concentrations of beryllium at a DOE facility;
- Exhibits signs or symptoms of beryllium exposure;
- Is receiving medical removal protection benefits.

**3.    Beryllium Training Courses:**

LEARN Module 21221, Parkworker:

- Potential health risks to beryllium worker family members and others who may come in contact with beryllium from personal clothing or other items as a result of a beryllium control failure;
- Overview of the contents of the CBDPP;
- Required initially then every 24 months.

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LEARN Module 32036, Beryllium Briefing:

- Satisfies requirement to provide one week notice to workers entering into the beryllium medical surveillance program for the first time;
- Retraining not required.

LEARN Module 32028, Beryllium Worker Training:

- Potential health risks to beryllium worker family members and others who may come in contact with beryllium from personal clothing or other items as a result of a beryllium control failure;
- Overview of the contents of the CBDPP;
- Describes routes of exposure, health effects, work controls, and medical surveillance program;
- Retraining at least every 24 months.

4. Training Attendance:

**Beryllium Associated Workers** complete LEARN Module 21221, Parkworker. This training has a beryllium awareness section and will be provided before or at the time of initial assignment, and at least every 2 years thereafter.

**Beryllium Associated Workers** who are former Beryllium Workers complete LEARN Module 32028, Beryllium Worker Training, at least every 2 years.

**Beryllium Workers** complete LEARN Module 32036, Beryllium Briefing, at least one week prior to initial BeLPT blood draw.

**Beryllium Workers** complete LEARN Module 32028, Beryllium Worker Training, prior to performing beryllium work and at least every 2 years thereafter.

**Beryllium Workers** will be retrained if there is reason to believe that they lack the proficiency, knowledge, or understanding needed to work safely with beryllium or in areas with beryllium contamination.

**Beryllium Workers** and **Beryllium Associated Workers** will be retrained if significant changes are made to 10 CFR 850, field conditions/required controls are significantly modified, or PPD-IH-6000, *Chronic Beryllium Disease Prevention Program*, undergoes significant revision, as determined necessary by CBDPP Manager, Industrial Hygiene (IH) Manager, and/or Training Manager.

5. Beryllium Worker Medical Surveillance is tracked as LEARN Module 32074, Beryllium Worker Medical Surveillance.

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6. As long as the LEARN system shows a Beryllium Worker as current on both LEARN Module 32074, Beryllium Worker Medical Surveillance, and LEARN Module 32028, Beryllium Worker Training, that worker meets the Beryllium Worker requirements of PPD-IH-6000 and may be authorized access to posted BCAs/BRAs and areas not yet characterized where process knowledge indicates beryllium contamination may be present. A UCOR Beryllium Badge Card is issued to all medically approved, qualified Beryllium workers. The Beryllium Badge Card provides verification that required medical surveillance and training have not expired. Refer to Job Supervisor responsibilities listed in WHAT TO DO Section C.7.

**B. Baseline Beryllium Inventory**

1. A baseline inventory of the locations of beryllium operations and other locations of potential beryllium contamination is available on the Beryllium page of the UCOR intranet.
2. The baseline inventory is maintained by and available from the UCOR CBDPP Manager.

**C. Hazard Evaluation**

1. Beryllium Hazard Evaluation is performed per PROC-IH-5206, *Generation and Use of Industrial Hygiene Work Permits*. Beryllium Characterization Assessments are performed as soon as possible after building acquisition to analyze the potential hazards to protect workers engaged in deactivation activities and others entering the building.

**D. Personnel Exposure Limits**

1. The DOE Action Level regulatory 8-hour Time Weighted Average (TWA) Occupational Exposure Limit (OEL) for beryllium is 0.2 micrograms per cubic meter of air ( $\mu\text{g}/\text{m}^3$ ).
2. UCOR has administratively established an Airborne Control Level (ACL) of 0.1  $\mu\text{g}/\text{m}^3$ .

**E. Exposure Monitoring**

1. The Project Industrial Hygienist (PIH), with the assistance of supervision, evaluates operations and areas in which operations will be performed, and then identifies workers and areas to be monitored.
2. Airborne monitoring and analysis method selected for evaluation of potential employee exposure and area sampling shall have an accuracy of not less than plus or minus 25 percent, with a confidence level of 95 percent, for airborne concentrations of beryllium at the ACL.

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3. The PIH shall oversee and/or review and approve exposure monitoring.
4. Personal Breathing Zone (BZ) sampling is conducted for workers potentially exposed to airborne beryllium, or the PIH shall document the rationale for monitoring a limited subset of workers (e.g., maximum exposure potential).
  - a. Results of sampling are used to verify adequacy of engineering, administrative, and personal protective equipment (PPE) controls, including respirators.
  - b. Minimum sample air volume of 100 liters is required to meet analytical detection limits for UCOR's ACL.
5. Air monitoring samples shall be analyzed in a laboratory accredited for metals by the American Industrial Hygiene Association (AIHA) or by a laboratory that demonstrates quality assurance for metals analysis that is equivalent to AIHA accreditation as determined by the CBDPP Manager.
6. Area sampling is conducted at access points of beryllium-contaminated areas, including Entry/Exit Points, and/or at downwind locations, or at the discretion of PIH, to ensure that airborne beryllium is not migrating into support areas.

**NOTE 1:** Surface sampling is only a cleanliness measure and cannot be used as a correlation for airborne concentrations of beryllium. It is used as a defense-in-depth measure to reduce potential excessive beryllium surface contamination and/or airborne concentrations.

**NOTE 2:** When evaluating a facility to determine if beryllium characterization is warranted, the initial hazard assessment should consider beryllium as a potential contaminant even if available process knowledge, legacy information and results of visual inspection indicates the only beryllium historically or currently present is in the form of beryllium articles (exempt from 10 CFR Part 850). Degradation of beryllium articles can result in removable beryllium contamination and exposure to airborne concentrations of beryllium under normal use conditions. For example, deactivated thermal reactors with neutron reflectors, where beryllium was commonly used as a non-multiplying medium, should be targeted for early beryllium characterization.

7. Surface wipe and/or bulk sampling is performed to evaluate removable surface beryllium contamination in work areas/buildings. A surface is considered acceptable if beryllium surface levels are less than 1.5 µg/100 cm<sup>2</sup>.
8. Surface sampling is performed in support areas to verify that beryllium dust has not contaminated surfaces of lunchrooms, change rooms, and other support areas. A surface is considered acceptable in a support area if beryllium surface levels are less than 0.2 µg/100 cm<sup>2</sup>. Support areas include lunchrooms, locker rooms, respirator issuance stations, instrument storage rooms and rad count rooms.

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9. Required frequency of monitoring is determined following statistical analysis guidelines in UCOR-5624, *United Cleanup Oak Ridge Industrial Hygiene Beryllium Sampling Strategy*, by the PIH using a risk-based approach.

#### F. Beryllium Controlled Areas

**NOTE: Exclusion:** These limits do not apply to surfaces of interiors of closed systems, such as, but not limited to, tanks, system piping, enclosures, glove boxes, chambers, or ventilation systems that can be sealed and segregated to the extent that potential airborne exposures are negligible or of minimal risk of becoming airborne.

1. A **Beryllium Controlled Area (BCA)** shall be established where airborne beryllium levels meet or exceed  $0.1 \mu\text{g}/\text{m}^3$  but are less than  $0.2 \mu\text{g}/\text{m}^3$  or where surface concentrations of beryllium meet or exceed  $1.5 \mu\text{g}/100 \text{ cm}^2$  but are less than  $3.0 \mu\text{g}/100 \text{ cm}^2$ ; or where BCAs are established and posted solely as Entry/Exit points to a BRA.
2. BCAs are demarcated from the rest of the workplace in a manner that adequately alerts workers to the boundaries of such areas.
3. Access must be limited to Beryllium Workers.
4. Respiratory protection and PPE will be worn in BCAs unless a Negative Exposure Assessment (NEA) has been generated or are exempt based on meeting the conditions in REQUIREMENTS Section P.3.
5. The configuration of a BCA is 3 dimensional with a maximum vertical height based on a hazard evaluation by the PIH.
6. See Attachment C for example BCA posting.
7. During building demolition items identified as beryllium contaminated or beryllium containing material shall be segregated from non-beryllium debris and may not be posted due to demolition equipment movement.

#### G. Beryllium Regulated Areas

1. A **Beryllium Regulated Area (BRA)** shall be established where airborne beryllium concentrations are at or above  $0.2 \mu\text{g}/\text{m}^3$  or where surface levels of beryllium meet or exceed  $3.0 \mu\text{g}/100 \text{ cm}^2$ .
2. BRAs are demarcated and posted from the rest of the workplace in a manner that adequately alerts workers to the boundaries.
3. Access (including those working at the BRA Entry/Exit Points) is limited to Beryllium Workers.
4. An entry log must be kept on individuals who enter BRAs. These records must include the name, date, time-in/time-out, and work activity.

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5. The following must occur for work that takes place in BRAs:
  - Conduct daily exposure monitoring during beryllium work activities;
  - Establish exposure reduction and minimization controls and practices;
  - Provide change rooms and showers;
  - Implement hygienic controls and practices, including showers at the end of the workday and washing hands and face after exiting the BRA and before eating, drinking, smoking, or applying cosmetics;
  - Provide and require use of respiratory protection for Beryllium Workers;
  - Provide and require use of personal protective clothing and equipment.
6. The configuration of a BRA is 3 dimensional with a maximum vertical height based on a hazard evaluation by the PIH.
7. See Attachment D for an example BRA posting.
8. During building demolition items identified as beryllium contaminated or beryllium containing material shall be segregated from non-beryllium debris. These items, however, may not be posted due to demolition equipment movement.

**H. Area Control**

1. Maintain appropriate controls that prevent the inadvertent transfer of removable contamination to locations outside of beryllium areas under normal operating conditions.
2. Apply the following measures, as applicable, to prevent the spread of contamination across BRA and BCA boundaries.
  - Use barriers to enclose the area.
  - Secure items such as hoses and cords that cross the boundaries.
  - Control and direct airflow from areas of lesser to areas of greater removable contamination whenever practicable.
  - Use the hierarchy of controls. When utilizing engineering controls consider controls such as containment devices, glove bags, tents, wet methods, misting, fixatives and point source ventilation.
  - Place sticky tack mats at Step-off-pads.
3. Down posting of areas shall require surveys to demonstrate removable surface contamination areas are less than 1.5 µg/100 cm<sup>2</sup>.

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## **I. Entry and Exit Control**

**NOTE:** Wet areas may present a slipping or tripping hazard; therefore, the PIH may waive the requirement for a step-off pad with approval of the CBDPP Manager or the Safety & Health (S&H) Operations Manager.

1. Step-off pads shall be used for work indoors.
2. The following must occur for work that takes place in BCAs/BRAs:
  - a. Include the following at exit points from BCAs/BRAs:
    - A step-off pad placed immediately outside of area boundary.
    - Posted PPE doffing instructions.
    - Containers near the step-off pad for the collection of protective clothing and waste.
3. An IHT may be assigned to assist with personnel decontamination and doffing.
4. Removal of small tools, instruments, and other hand-held items shall be decontaminated by HEPA vacuum and/or wet wipe, double bagged and sealed.
5. Storage and release of items shall be determined by the PIH based on release criteria in REQUIREMENTS Section S.

## **J. Personnel Contamination Control**

1. Personal protective clothing and respiratory protection shall be determined by PIH and specified in the Industrial Hygiene Work Permits (IHWP)/Industrial Hygiene Hazard Worksheet (IHHW).
2. Individuals exiting BRAs shall vacuum and/or wet wipe outer PPE and respirators prior to removal.
3. Individuals exiting BCAs shall wet wipe and remove remaining PPE prior to exit.

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## K. Collection and Handling of Air and Surface Samples

1. IHTs collecting and handling beryllium air and surface samples shall be trained and qualified.

**NOTE:** On rare occasions other support personnel (i.e., Radiological Protection Technicians (RPTs) in high contamination areas, Qualified Electrical Workers (QEWs) near energized equipment or conductors) may collect surface samples for as low as reasonably achievable (ALARA) purposes, but only if they are trained and qualified in LEARN Module 31377, IH-8-02, Sampling for Surface Contamination, and collect samples with oversight provided by an IH Technician (IHT) and/or PIH.

2. IHTs shall follow documented established sampling methods and instructions according to PROC-IH-5560, *Workplace Industrial Hygiene Sampling*, for collection, handling and submission of air and surface samples.
3. Proper chain of custody protocols shall be followed.
4. Radiological release may be required for samples prior to packaging and shipment. Consult with Radiological Protection.
5. Air and surface samples shall be submitted for beryllium analysis to an AIHA accredited laboratory in a timely manner. The turnaround time goal of the sample analysis result for air samples should be three (3) working days for work activities with suspected exposure or unacceptable prior airborne exposures.
6. **IF** airborne results are not obtained within three working days, **THEN** the PIH and CBDPP Manager and/or the S&H Operations Manager will determine if a pause in the project is necessary.

## L. Sampling Strategy

1. *United Cleanup Oak Ridge Industrial Hygiene Beryllium Sampling Strategy* (UCOR-5624) shall be used to determine hazard assessment, initial characterization, investigate, routine housekeeping sampling and post-remediation/decontamination sampling parameters. The UCOR Beryllium Characterization Sampling Strategy is applicable to closure facilities targeted for deactivation and demolition.
2. Beryllium sampling strategies shall be specified in IHWPs/IHHWs (Form-3061/Form-3062), current revisions, UCOR Industrial Hygiene Sample Request (Form-3659, current revision), specific Beryllium Characterization Sampling and Analysis Plans and through occasional verbal requests.
3. IHWPs/IHHWs contain IHT Coverage and Monitoring/Sampling Requirements. The level of intrusive activities and exposure potential will determine job/task coverage requirements.

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### M. Exposure Reduction and Minimization

1. Controls implemented in this program, coupled with the hierarchy of IH hazard controls outlined in PPD-IH-5418, *Industrial Hygiene Program*, shall be utilized to meet 10 CFR 850.25, Exposure Reduction and Minimization, requirements.
2. For each project or site where a potential exists for personnel exposure to airborne beryllium at levels equal to or greater than the UCOR ACL of 0.1  $\mu\text{g}/\text{m}^3$  BCA, aggressive beryllium exposure reduction and minimization techniques will be developed and incorporated into project and/or task work control documents. These will include the following:
  - Reduce airborne levels of beryllium to ALARA.
  - Minimize the number of current workers exposed or potentially exposed to beryllium.
  - Minimize the number of opportunities where workers may potentially be exposed.
  - Minimize the size and configuration of BCAs/BRAs that are established based solely on surface contamination to as small as possible based upon the identified area(s) of contamination.
  - Clean frequently BCA/BRA entry and exit areas, work and/or travel routes through BCAs. Cleaning should be performed on a monthly basis at a minimum.
  - Minimize active handling and processing of beryllium-contaminated items and waste materials.
  - Apply fixatives to prevent or minimize airborne dispersion of beryllium particulates.
  - Use clear plastic waste bags when possible so that the contents can be observed without opening the bag.
  - Bag small items going from BRA to BCA and bag again from BCA to non-beryllium area, then seal and label.
  - Establish exposure reduction and minimization goals to reduce airborne beryllium levels and beryllium surface contamination.
3. In the event of an emergency/upset condition that occurs in a BCA or BRA, workers will stop work; warn nearby personnel; isolate the area as appropriate; and minimize exposures.
4. Consult UCOR Health Services for follow up actions regarding need for further evaluation of personnel involved in or impacted by an emergency event an/or upset condition.

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## N. Hierarchy of Controls for Deactivation and Demolition

Due to the nature of UCOR's contracted work scope involving deactivation and demolition of buildings and facilities, hazardous work is often performed on facilities containing legacy residual beryllium; therefore, diligent facility assessment includes targeting early beryllium characterization when beryllium is a potential contaminant based on process knowledge, legacy information, empirical sampling results and/or visual inspection. If beryllium surface contamination is found, then the primary goal is to remediate, remove, decontaminate and down-post BCAs and BRAs.

1. **IF** airborne results are not obtained within three working days, **THEN** the PIH and CBDPP Manager and/or the S&H Operations Manager will determine if a pause in the project is necessary.
2. Post remediation verification sampling is performed to evaluate the effectiveness of decontamination efforts and fixative application in order to down-post a BCA/BRA. If airborne OELs for beryllium are exceeded or if excessive removable surface beryllium contamination remains in area(s) in a facility prior to demolition, then applicable beryllium controls will be implemented. Refer to Section N.8.
3. Beryllium Workplace Controls are similar to the hierarchy of controls used when working with other hazardous substances:
  - Elimination
  - Substitution
  - Engineering
  - Administrative
  - PPE
4. Hazards associated with beryllium result from legacy contamination and work activities being performed and cannot be substituted. Decontamination serves to eliminate the beryllium contamination when practical.
5. Utilize Engineering Controls:
  - Point source ventilation.
  - Enclosures/containments.
  - Glove bags.
  - Wet methods.
  - Fixatives, foam, or sealants applied to surfaces including interiors of closed systems, such as, but not limited to, tanks, system piping, enclosures, glove boxes, hoods, chambers, hot cells, or ventilation systems.

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- Local exhaust ventilation hoods.
  - Negative air machines.
  - HEPA vacuums.
  - Cover contaminated surfaces/materials.
  - Install plastic sheeting (i.e., Griffolyn® or Herculite®) on travel paths.
  - Perform regular housekeeping.
  - Use proper beryllium waste disposal using 6-mil polyethylene bags or containers and prompt disposal.
  - Double bag or wrap contaminated equipment/materials/items.
6. Implement Administrative Controls:
- Minimize number of exposed workers.
  - Ensure proper sequence of work.
  - Minimize number of entries.
  - Minimize handling and processing.
  - Avoid leaning on or brushing against dusty items, equipment, and/or walls.
  - Minimize number of tools, items, materials brought into BCAs/BRA.
  - Keep items stored in BCAs and BRAs whenever possible.
  - Minimize waste.
  - Document using IHWPs and work procedures.
  - Perform hazard assessments.
  - Complete Beryllium Worker Training.
  - Post signs and warning labels.
  - Restrict access.
  - Avoid areas of beryllium contamination unless part of work scope.
  - Wear proper PPE.
  - Follow rules for washing, showering, eating, drinking, using tobacco products, applying cosmetics, and covering open wounds.
  - Use Beryllium Workers for decontamination and handling beryllium waste.

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- Implement contamination control in support areas (regular cleaning, sticky tack mats, waste containers, wrapping, taping).
  - Follow waste stream worksheet.
7. Wear PPE specified in IHWP/IHHW. Follow posted donning instructions. Ask for assistance, if needed, and a peer check. A full set of PPE for work in a BCA/BRA will typically include:
- Company provided clothing (scrubs) worn under PPE.
  - Safety boots.
  - Plastic shoe covers over safety shoes.
  - Disposable coveralls with integrated booties and hood.
  - Rubber overshoes.
  - Two pairs of nitrile gloves.
  - Sleeve taped to inner nitrile gloves.
  - Respirator (Air-purifying respirator [APR] or Powered Air Purifying Respirator [PAPR] with P-100 filters).

**NOTE:** The PIH should review any applicable RWP requirements prior to development of IHWP/IHHWs for consistency in PPE and other controls.

8. Beryllium controls used for demolition should include:
- BCA/BRAs may be established to identify, pinpoint and isolate areas of beryllium contamination.
  - Beryllium Workers used for demolition and beryllium waste loading outside the BCA/BRA into the secondary containers and trucks.
  - Wet methods during demolition and size reducing using water cannons, misters and foggers.
  - Application of fixatives in beryllium-controlled areas and on contaminated equipment/components.
  - Removal, segregation and decontamination of contaminated building structures, process equipment/components.
  - Proper sequencing of demolition to remove less contaminated areas first, thereby allowing additional room on the demolition field footprint for staging of waste load out containers/boxes/bags.
  - Robust daily beryllium air sampling (perimeter area and personal) initially.

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## O. Hygiene Facilities and Practices

**NOTE:** If an NEA has been established for the work area, then PPE may be downgraded to minimize heat stress and to allow for hydration at BCA boundaries.

1. In areas where workers are exposed to beryllium at or above the UCOR ACL, the following practices must be followed:

- Food, beverage, and tobacco products shall not be used while in the BCA or BRA.
- Cosmetics cannot be applied while in the BCA or BRA.
- Open wounds must be covered while in the BCA or BRA.
- For entry into BCAs, disposable outer layer of protective clothing must be worn over company-provided clothing. The disposable outer layer will be removed at the BCA Exit Point.
- For entry into BRAs, a second layer of disposable protective clothing shall be worn. The extent and type of the second layer will be determined by the PIH in Form-3062, Industrial Hygiene Hazard Worksheet (IHHW), with a graded approach applied in consideration of the likelihood of contact with contaminated surfaces, and/or the likelihood that the activity to be conducted in the BRA will result in increased airborne beryllium contamination or personnel contamination. The second layer shall be doffed at the BRA Exit Point. The last layer of disposable garments shall be doffed at the BCA Exit Point.

**NOTE:** The respirator may be doffed at the BRA Exit Point if the BCA is established solely for the purpose of exiting the BRA to minimize heat stress.

- Removal of beryllium from protective clothing and equipment by blowing, shaking, or other means that may disperse beryllium into the air is prohibited.
2. Clean change rooms or areas must be provided for beryllium workers who work in BRAs. The change areas must be established prior to performing work in a BRA or BCA.
- A facility free of beryllium must be provided for beryllium workers to change into and out of clean protective clothing and equipment to prevent cross-contamination, and to store personal clothing.
  - Change rooms or areas used to remove beryllium-contaminated clothing and PPE must be maintained under negative pressure or located to minimize dispersion of beryllium into clean areas.
  - Hand washing and shower facilities for beryllium must be provided for individuals who work in BRAs.

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- Beryllium workers who work in BRAs must shower prior to the end of the work shift. Beryllium Workers who work in BCAs may choose to shower at end of work shift but are not required to do so.
3. A lunchroom facility must be readily accessible to beryllium workers, with tables for eating that are free of beryllium (less than 0.2  $\mu\text{g}/100\text{ cm}^2$ ) and in a facility that will not be exposed at any time to airborne beryllium at or above the UCOR ACL of 0.1  $\mu\text{g}/\text{m}^3$ .
  4. Surface levels of beryllium in lunchrooms, change rooms or areas, and shower rooms, and other support areas must be maintained less than 0.2  $\mu\text{g}/100\text{ cm}^2$ . These areas will be regularly cleaned to minimize beryllium contamination. These areas will also be wipe sampled periodically to ensure they are not contaminated with beryllium.
  5. The change rooms or areas, shower and hand washing facilities, and lunchroom facilities must comply with 29 CFR 1910.141, Sanitation.

**P. Respiratory Protection**

1. UCOR has established a respiratory protection program, PPD-IH-5151, *Respiratory Protection Program*, that complies with the requirements of 29 CFR 1910.134, Respiratory Protection.
2. Respirators must be supplied to and used by all workers who perform work in a BRA. Respirators must be supplied to and used by all workers who perform work in a BCA unless a NEA has been developed.
3. Employees performing visual inspections/walkdowns in BCAs may be exempt from wearing a respirator in a BCA if the following conditions are met:
  - Airborne concentrations of beryllium in the BCA are all less than the ACL of 0.1  $\mu\text{g}/\text{m}^3$  based on air sample(s) taken in the area within the past year.
  - Intrusive activities are not performed by the employees or by others in the BCA during the visual inspection. Refer to Intrusive Activity in Attachment A.
  - No contact is made with surfaces, substrates, equipment, items, or materials during the inspection/walkdown.
  - Employees must be active Beryllium Workers.
  - The employees minimize time spent in the BCA.
  - Disposable coveralls with attached hoods, gloves and shoe covers are worn.
  - PIH and CBDPP Manager approval.
  - IHTs support coverage during the inspection.

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4. Consistent with the Respiratory Protection Program policy, a respirator shall be provided to any Beryllium Associated Worker who requests to use a respirator for protection against airborne beryllium, regardless of measured exposure levels.

**Q. Protective Clothing and Equipment**

1. Protective clothing and equipment shall be provided to Beryllium Workers and properly used and maintained by the Beryllium Workers performing work in BCAs and in BRAs. The PIH may downgrade PPE requirements based on a hazard assessment, empirical sampling data and known conditions within a BCA.
2. Follow requirements in PROC-EH-2005, *Personal Protective Equipment*, and PPD-IH-5151, *Respiratory Protection Program*, when workers use personal protective clothing and equipment. Other requirements include the following:
  - Procedures or instructions for decontamination, donning, doffing, handling, and storing protective clothing and equipment must be in place. Don and doff instructions will be posted at the BCA/BRA Entry and Exit Points, respectively. Decontamination instructions are included in the doffing instructions.
  - Beryllium-contaminated protective clothing and equipment must not be moved from areas that contain beryllium, except by Beryllium Workers.
  - Beryllium-contaminated protective clothing and equipment, when removed for laundering, cleaning, maintenance, or disposal, must be placed in labeled containers that prevent the dispersion of beryllium dust in accordance with the requirements of 10 CFR 850.38, Warning signs and labels, and described in REQUIREMENTS, Section V, of this CBDPP.
  - Non-disposable protective clothing and equipment must be cleaned, laundered, repaired, or replaced as needed to maintain effectiveness.
  - Decontamination and/or other required controls will be performed on equipment prior to it being removed from a BCA or BRA to a clean support area.
  - Organizations/individuals that launder or clean DOE beryllium-contaminated protective clothing or equipment shall be informed that exposure to beryllium is potentially harmful, and that clothing and equipment should be laundered or cleaned in a manner to prevent the release of airborne beryllium.
3. Beryllium-contaminated disposable protective clothing and equipment must be bagged, labeled, and properly disposed as beryllium-contaminated waste.
4. Respiratory protective equipment shall be vacuumed and/or wet wiped. APRs shall be vacuumed and/or wet wiped, laundered as beryllium contaminated PPE or discarded. A specified number of respirators worn in BCAs/BRAs may be sampled for beryllium surface contamination as per direction from the PIH during doffing.

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## R. Housekeeping

1. Beryllium-contaminated surfaces in facilities will be controlled whenever possible to prevent airborne beryllium levels in employee work areas from meeting or exceeding the ACL of 0.1  $\mu\text{g}/\text{m}^3$ . Actions will be taken to prevent the spread of beryllium contamination and airborne beryllium during intrusive activities. Refer to controls in REQUIREMENTS Sections N.5, N.6 and N.7. Surface levels of beryllium in support areas including lunchrooms, locker rooms, respirator issuance stations, instrument storage rooms and rad count rooms must be maintained less than 0.2  $\mu\text{g}/100 \text{ cm}^2$ . These areas will be regularly cleaned, at a minimum of once per month, to minimize beryllium contamination. Surface sampling will also be performed periodically to ensure they are not contaminated with beryllium.
2. When cleaning floors and surfaces in areas where beryllium is present, beryllium-contaminated floors and surfaces must be cleaned using a wet method, vacuum cleaner equipped with a HEPA filter or other cleaning methods that minimize the production of airborne dust. Cleaning beryllium-contaminated equipment or surfaces with compressed air/gases or other dry methods is prohibited.
3. Portable or mobile vacuum units that are used to clean beryllium-contaminated areas must be equipped with HEPA filters. The filters must be changed as often as needed to maintain their capture efficiency.
4. Ensure filter integrity tests (DOP) are performed on HEPA vacuums and portable local exhaust ventilation units.
5. Ensure use and movement of HEPA vacuums and portable local exhaust ventilation is controlled and documented in an IHWP/IHHW.
6. Ensure HEPA vacuums and portable local exhaust ventilation units are in date prior to use.

**NOTE 1:** Improper use of HEPA vacuums and portable local exhaust ventilation units could result in generation of airborne contaminants and the spread of loose surface contamination; therefore, their use should be controlled.

**NOTE 2:** Labels placed on HEPA vacuums and portable ventilation equipment utilized in beryllium-contaminated areas may include warnings regarding other hazardous agents, such as, but not limited to, lead, asbestos, and/or mercury.

7. Cleaning equipment, HEPA vacuums and local exhaust ventilation equipment that is used to clean beryllium-contaminated surfaces must be labeled: **Danger Contaminated with Beryllium** (or similar message), controlled, and not used for non-hazardous materials.

**S. Release Criteria**

**Table 1. Beryllium Surface and Air Contamination Limits.**

Posting	Surface Contamination Limit (ug/100 cm <sup>2</sup> )	Air Contamination Limit (ug/m <sup>3</sup> )
BCA (Restricted)	≥ 1.5 to < 3.0	≥ 0.1 to < 0.2
BRA (Restricted)	≥ 3.0	≥ 0.2
None (Unrestricted)	<0.2	<0.1

1. Before releasing beryllium-contaminated equipment or other items for unrestricted use where there is no NEA or surface beryllium contamination levels that exceed the levels in Table 1 ensure that:

- Removable surface contamination level of equipment or items does not exceed 0.2 µg/100 cm<sup>2</sup>.

**NOTE:** Fixatives can be used if decontamination does not remove beryllium to a sufficient degree.

2. Release of wood, concrete, synthetic materials and other porous or semi-porous materials shall be evaluated by the PIH on a case-by-case basis.
3. The PIH shall gain approval of the CBDPP Manager for release of these materials.
4. Perform contamination control methods and surface sampling in Table 2 on equipment and/or items prior to movement and release to other facilities/areas:

**Table 2. Movement and Release of Beryllium-Contaminated Equipment and/or Items.**

Area Posting	Location	Surface Contamination Limit	Surface Sampling	Contamination Control Methods
BRA to BRA	Same Facility / Footprint (Restricted)	< 3.0 µg/100 cm <sup>2</sup>	Required with exception of respirators and IH and Rad detection instruments	Decontaminate, double bag/seal/label/post area
BRA to BRA	Different Facility/ Footprint (Restricted)	< 3.0 µg/100 cm <sup>2</sup>	Required with exception of respirators and IH and Rad detection instruments	Decontaminate, double bag/seal/label/post area
BRA to BCA	Same Facility/ Footprint (Restricted)	< 3.0 µg/100 cm <sup>2</sup>	Required with exception of respirators and IH and Rad detection instruments	Decontaminate, double bag/seal/label/post area
BCA to BCA	Same or Different Facility Footprint (Restricted)	≥ 1.5 µg/100 cm <sup>2</sup> to < 3.0 µg/100 cm <sup>2</sup>	Determined by PIH, Beryllium SME, IH Manager and/or S&H Operations Manager	Decontaminate, double bag/seal/label/post area
BCA or BRA	Offsite (Unrestricted)	< 0.2 µg/100 cm <sup>2</sup>	Required with exception of PAPRs and IH and Rad detection instruments	Decontaminate

**NOTE:** Larger equipment and/or items are those that cannot be bagged. Examples are machinery, filtration systems, electrical load centers, material handling equipment, gantry cranes, long reach tools or large specialized equipment.

5. For movement of larger equipment/materials/items from one BCA/BRA to another BCA/BRA within the same facility, ensure that:
  - Equipment/materials/items are wet-wiped prior to movement to the BCA/BRA.

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- Plastic sheeting is placed on the floor within a facility to prevent contamination on the wheels from transferring to the floor. Remove the sheeting upon completion of the movement and discard as beryllium waste.

Equipment/materials/items are transferred directly to the receiving BCA/BRA within the facility footprint.

- If the movement is initiated but cannot be completed (cannot complete movement of equipment/materials/items into the receiving BCA/BRA prior to leaving them unattended), then post a BCA/BRA around the equipment/materials/items until the transfer can be completed OR return the equipment/materials/items to the BCA/BRA from which it was removed.
- Release surface sampling for beryllium is not required for a BCA/BRA to BCA/BRA movement within the same facility if the steps above are completed.

**NOTE 1:** Criteria in this subsection does not apply to free release of equipment/materials/items

**NOTE 2:** Demolition equipment is sprayed off with water to prevent cross contamination.

**6.** For movement of smaller hand-held equipment/materials/items from one BCA/BRA to another BCA/BRA within the same facility, ensure that:

- If the equipment/materials/items are tools or equipment for re-use, then HEPA vacuum and/or wet-wipe prior to movement.
- If the equipment/materials/items is waste being transported for staging or final packaging, no vacuuming or wet-wipe is necessary.
- Equipment/materials/items are double bagged prior to movement to the BCA/BRA.
- The packages to be moved are properly labeled with Beryllium labels (either as internal beryllium contaminated, potential internal beryllium contaminated or as beryllium waste per the Waste Stream Worksheet).
- The equipment/materials/items are transferred directly to the receiving BCA/BRA within the facility footprint.
- If the movement is initiated but cannot be completed (cannot complete movement of equipment/materials/items into the receiving BCA/BRA prior to leaving them unattended), then post a BCA/BRA around the equipment/materials/items until the transfer can be completed OR return the equipment/materials/items to the BCA/BRA from which it was removed.
- Release surface sampling for Beryllium is not required for a BCA/BRA to BCA/BRA within the same facility if the steps above are completed.

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7. For bulk packaging and shipment of beryllium contaminated waste, perform the following:
  - Within the BCA/BRA, place the bulk materials/items inside a container or box and then seal/close the container or box. For example, boxes are often used for light bulb waste. Non-boxed waste shall be double bagged.
  - HEPA vacuum and/or wet wipe the exterior of containers/boxes/bags.
  - Immediately transfer the container/boxes/bags over the BCA/BRA boundary and place directly into a Beryllium clean container located outside the BCA/BRA boundary. Demolition debris shall be loaded inside a bulk bag, such as a Super Sack®, that is inside of a dump truck, or soft-sided B-12, or load debris directly into a B-25 container. Beryllium Workers shall be used for beryllium waste loading outside the BCA/BRA. The outside of the container should have a sign attached, “This box is only to be opened by Beryllium Workers” (or similar).
  - Label the secondary container as Beryllium waste and ship as quickly as the secondary container is filled.

**T. Waste Disposal**

1. Beryllium-containing waste will be managed in accordance with 10 CFR 850.32. Waste materials will be classified prior to disposal. Plastic bags used to contain beryllium-contaminated waste will be a minimum of 6 mm thick.
2. Beryllium-containing waste, and beryllium-contaminated equipment and other items that are disposed as waste, must be disposed in sealed, impermeable bags, containers, or enclosures to prevent the release of beryllium dust during handling and transportation.
3. Double bag non-containerized waste and do not overload bags. Whenever possible, these bags will be clear plastic so that the contents can be observed without opening the bag.
4. Bags, containers, and enclosures that are used for disposal of beryllium waste must be properly labeled in accordance with the requirements of 10 CFR 850.38, Warning signs and labels.

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## U. Demolition Waste Packaging of Contaminated Waste and Building Debris

**NOTE:** It is important to understand that release criteria apply to beryllium contaminated equipment, materials and items and do not apply to beryllium contaminated waste/demolition debris.

1. Beryllium-containing waste, and beryllium-contaminated equipment and other items that are disposed as waste, must be disposed in sealed, impermeable bags, containers, or enclosures to prevent the release of beryllium dust during waste load-out, handling and transportation.
2. Implement the following controls for proper disposal of beryllium contaminated waste/demolition debris:
  - a. If beryllium contaminated building materials/surfaces/materials are decontaminated or fixed and post remediation-verification sampling results indicate removable surface contamination less than 1.5  $\mu\text{g}/100\text{ cm}^2$ , then the building materials/surfaces could be deemed to be acceptable and the respective areas could be down posted.
  - b. If removable surface contamination is  $\geq 1.5\ \mu\text{g}/100\text{ cm}^2$ , implement the following beryllium controls for demolition:
    - Use Beryllium Workers for demolition and beryllium waste loading outside the BCA/BRA into the secondary containers and trucks.
    - Employ wet methods during demolition and size reducing using water cannons, misters and foggers.
    - Apply fixatives in beryllium controlled areas and on contaminated equipment/components.
    - Remove, segregate and decontaminate of contaminated building structures, process equipment/components.
    - Employ proper sequencing of demolition to remove less contaminated areas first, thereby allowing additional room on the demolition field footprint for staging of waste load out containers/boxes/bags.
    - Perform robust daily beryllium air and surface sampling at the direction of the PIH or the CBDPP Manager.
  - c. Demolition debris load-out practices for beryllium contaminated waste:
    - Place the bulk waste materials, including building debris/rubble, inside waste containers/boxes/bags.
    - Double-bag or wrap non-boxed beryllium waste. The outer bags shall be IH approved.
    - Seal/close the containers/boxes/bags after filling with demo debris.

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- Immediately transfer the containers/boxes/bags over the BCA/BRA boundary and place directly into a beryllium-free container (including dump trucks) located outside the BCA/BRA boundary.
- Label the secondary container as Beryllium Waste, and ship to the appropriate landfill as quickly as the secondary container is filled.

**V. Posting of Signs and Labeling Requirements**

1. Signs will be posted at each access point to a designated BCA with the following information:

**WARNING  
BERYLLIUM CONTROLLED AREA  
ACCESS RESTRICTED TO AUTHORIZED BERYLLIUM WORKERS ONLY  
APPROVED IHHW FOR BERYLLIUM REQUIRED FOR ENTRY**

2. Signs will be posted at each access point to a designated BRA with the following information:

**DANGER  
BERYLLIUM REGULATED AREA  
CANCER HAZARD  
BERYLLIUM CAN CAUSE LUNG DAMAGE  
AUTHORIZED PERSONNEL ONLY BEYOND THIS POINT**

3. Label containers of beryllium, beryllium compounds, or beryllium-contaminated clothing, equipment, waste, scrap, or debris that meet the scope of this CBDPP. Labels must contain the following information:

**DANGER  
CONTAMINATED WITH BERYLLIUM  
CANCER AND LUNG DISEASE HAZARD  
DO NOT REMOVE DUST BY BLOWING OR SHAKING**

4. Signs and labels must be in accordance with 29 CFR 1910.1200, Hazard Communication; 10 CFR 850.38, Warning Signs and Labels; and PROC-EH-1013, *Accident Prevention Signs, Barricades, and Other Postings*. Example signs and labels are presented as Attachments C, D, E, and F.
5. Consult with the CBDPP Manager if there is a situation that requires an additional or different type of posting or label.

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6. **IF** equipment or an item has internal beryllium contamination, or potential internal beryllium contamination, **THEN**  
affix a label with the following information, or similar information, onto the equipment or item:

**DANGER**  
**INTERNALLY CONTAMINATED WITH BERYLLIUM**  
**CANCER AND LUNG DISEASE HAZARD**

**WORK PACKAGE AND IHHW FOR BERYLLIUM REQUIRED**  
**TO OPEN THIS ITEM**

**W. Medical Surveillance**

1. A Medical Surveillance Program is established and implemented for identified Beryllium Associated Workers who voluntarily participate in the Beryllium Medical Surveillance Program and for Beryllium Workers who are required to participate in the Beryllium Medical Surveillance Program to be qualified as Beryllium Workers.
2. A list of Beryllium Associated Workers and Beryllium Workers based on records or other information shall be maintained by UCOR Health Services with input from Project Management and/or the CBDPP Manager.
3. Identified Beryllium Associated Workers, who voluntarily participate in the Beryllium Medical Surveillance Program, and Beryllium Workers, shall be provided medical evaluations at no cost and at a time and place that is reasonable and convenient to the worker.
4. A baseline medical evaluation is provided to identified Beryllium Associated Workers who voluntarily participate in the Beryllium Medical Surveillance Program and to Beryllium Workers who must participate in the Medical Surveillance Program to be considered a Beryllium Worker. The baseline evaluation includes the following diagnostic protocols at a minimum:
  - A detailed medical and work history with emphasis on past, present, and anticipated future exposure to beryllium, including questions relating to any respiratory symptoms experienced;
  - A physical examination with special emphasis on the respiratory system, skin, and eyes;
  - A chest radiograph (posterior-anterior, 14 x 17 in) interpreted by a National Institute for Occupational Safety and Health (NIOSH) B-reader of pneumoconiosis or a board-certified radiologist (unless a baseline chest radiograph is already on file and was taken less than 5 years prior);
  - Spirometry consisting of forced vital capacity (FVC) and forced expiratory volume at one (1) second (FEV1);

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- A BeLPT; and
  - Any other tests deemed appropriate by the examining physician for evaluating beryllium-related health effects.
5. Medical evaluations are required for Beryllium Workers annually and offered every three years for beryllium associated workers. The periodic medical evaluation includes the following diagnostic protocols:
- A detailed medical and work history with emphasis on past, present, and anticipated future exposure to beryllium, including questions relating to any respiratory symptoms experienced;
  - A physical examination with emphasis on the respiratory system, skin, and eyes;
  - Chest X-Ray every 5 years;
  - A BeLPT; and
  - Any other medical evaluations deemed appropriate by the examining physician for evaluating beryllium-related health effects.
6. A medical evaluation must be provided as soon as possible to any worker who may have been exposed to beryllium because of a beryllium emergency. A beryllium emergency could be equipment failure, container rupture, or other upset condition.

**NOTE:** The Beryllium Associated Worker or the Beryllium Worker's designated representative may agree upon the use of an alternate form of physician determination in lieu of the multiple physician review process, so long as the alternative is expeditious and at least as protective.

7. A multiple physician review and alternate physician review process has been established for Beryllium Associated Workers and Beryllium Workers that allows for the review of initial medical findings, determinations, or recommendations from medical evaluation(s) conducted. This process is described in detail in UCOR-5342, *Beryllium Counseling and Benefits Handbook*.
8. The Site Occupational Medical Director (SOMD) must provide each Beryllium Associated Worker and Beryllium Worker with a written medical opinion containing the results of all medical tests or procedures; an explanation of any abnormal findings, and any recommendation that the worker be referred for additional testing for evidence of CBD within 10 working days after the SOMD's receipt of results of medical tests or procedures. Any limitations are provided on the UCOR Health Services Duty Disposition Report (DDR) and include the worker's acknowledgement signature.

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9. Within two weeks of receipt of results, the SOMD must provide to the Employer a written, signed medical opinion for each medical evaluation performed on each beryllium associated worker. The written opinion must take into account the findings, determinations, and recommendations of the other examining physicians who may have examined the beryllium associated worker. This written medical opinion is provided on the DDR and ONLY sent if a limitation is placed.

**NOTE:** Personnel participation in medical surveillance is voluntary. However, to be considered an active Beryllium Worker and to be qualified to perform work in BCAs and BRAs, the worker must participate in the Beryllium Medical Surveillance Program.

10. Airborne and surface sampling data shall be evaluated to determine the need to consult with IH for additional exposure controls.

#### **X. Medical Removal**

1. A Beryllium Worker must be offered medical removal from exposure to beryllium if the SOMD determines in a written medical opinion that it is medically appropriate to remove the worker from such exposure. The SOMD's determination must be based on two or more abnormal BeLPT results; CBD diagnosis; an examining physician's recommendation; or any other signs or symptoms that the SOMD deems medically sufficient to remove a worker.

**NOTE:** Temporary limitations may include waiting for medical test results. Permanent limitations may include a personal health condition that could place a worker at increased risk of adverse health effects from exposure to beryllium.

2. If an active Beryllium Worker or a Beryllium Associated Worker must be restricted from work involving a potential for beryllium exposure for any reason, including abnormal or uninterpretable BeLPT results, temporary limitations, temporary removal, permanent limitations, or permanent removal, then the S&H Operations Manager shall perform the following:
  - Notify the Beryllium Worker and their Supervisor.
  - Retrieve the Beryllium Worker badge card from the employee.
  - Suspend the employee's Beryllium Worker training status in LEARN by suspending Module 32028.

- Notify the Beryllium Worker and their Supervisor.
- Retrieve the Beryllium Worker badge card from the employee.
- Suspend the employee's Beryllium Worker training status in LEARN by suspending Module 32028.

3. **IF** a BeLPT test is uninterpretable, **THEN** a repeat test shall be performed.

4. **IF** a test is abnormal or borderline, **THEN** two repeat BeLPT tests will be performed utilizing two blood serum samples.

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**NOTE 1:** Temporary Medical Removal benefits are offered when the SOMD determines and provides a written medical opinion that a worker shall be temporarily removed from beryllium exposure pending a final medical determination. Temporary removal benefits may also be offered for the period pending receipt of medical testing results. Temporary removal benefits are provided for up to one year (which may be extended if necessary) during the time that a final determination is being made. Permanent removal benefits are provided for up to two (2) years.

**NOTE 2:** The fact that UCOR provides medical removal protection benefit per this CBDPP is not intended to expand upon, restrict, or change any rights to a specific job classification or position under the terms of an applicable collective bargaining agreement.

5. **IF** a Beryllium Worker has been temporarily or permanently removed from beryllium exposure, **THEN** the Beryllium Worker must be provided the following:

- The opportunity to transfer to another position which is available, or later becomes available, for which the worker is qualified (or for which the worker can be trained in a short period) and where beryllium exposures are as low as possible, but in no event at or above the ACL of 0.1  $\mu\text{g}/\text{m}^3$ ; and
- Job assignments that do not require entry into BCAs, BRAs, or into buildings and areas that have not been characterized for beryllium contamination, if there is a potential for beryllium contamination in that building or area.
- If the Beryllium Associated Worker cannot be transferred to a comparable job where beryllium exposures are below the ACL of 0.1  $\mu\text{g}/\text{m}^3$ , a maximum of 2 years of permanent medical removal protection benefits will be provided in addition to any temporary medical removal protection benefits that had been provided while the diagnosis was being confirmed with repeat and/or additional tests.

#### **Y. Medical Consent**

1. Each Beryllium Associated Worker and Beryllium Worker must be provided with a summary of the Beryllium Medical Surveillance Program at least one week before the first medical evaluation or procedure or at any time requested by the worker. This summary must include:

- The type of data that will be collected in the Beryllium Medical Surveillance program;
- How the data will be collected and maintained;
- The purpose for which the data will be used;
- A description of how confidential data will be protected.

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2. Each beryllium associated worker must be provided with information on the benefits and risks of the beryllium medical tests and examinations available to the worker via completion of LEARN Module 32036, Beryllium Briefing, which must be completed at least one week prior to any such examination or test, along with an opportunity to have the worker's questions answered.
3. The SOMD must obtain a Beryllium Associated Worker's or Beryllium Worker's signature on the completed Form-1227, Chronic Beryllium Disease Prevention Program Informed Consent Form, before performing medical evaluations or any tests.

#### **Z. Counseling**

A counseling program has been developed to assist Beryllium Associated Workers who are diagnosed by the SOMD as being sensitized to beryllium or as having CBD. The counseling elements are detailed in the UCOR-5342, *Beryllium Counseling and Benefits Handbook*, which also includes a copy of 10 CFR 850 and its preamble. The CBDPP Manager, with cooperation from the worker's supervisor and UCOR Health Services, shall ensure that the worker attends the contractor counseling as soon as possible after a diagnosis has been made. UCOR is responsible to ensure that counseling is conducted for workers who work for its subcontractors.

1. This counseling program for a newly diagnosed beryllium sensitized worker or a worker diagnosed as having CBD includes the following elements to review with the worker:
  - Beryllium Medical Surveillance Program provisions and procedures;
  - Medical treatment options;
  - Medical, psychological, and career counseling;
  - Medical benefits;
  - Administrative procedures and workers' rights under applicable Workers' Compensation laws and regulations;
  - Work practice procedures limiting Beryllium Associated Worker and Beryllium Worker exposures to beryllium;
  - Risk of continued beryllium exposure after sensitization.

#### **AA. Performance Feedback**

1. Periodic assessments and/or surveillances must be conducted of monitoring activities, hazards, medical surveillance, exposure reduction and minimization, and any occurrence reporting data related to beryllium program compliance and/or exposures.
2. Feedback from assessments must be provided to the supervisor, UCOR Health Services, the worker, the DOE, and others as appropriate.

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**WHAT TO DO**

**A. Roles and Responsibilities**

- |                             |   |
|-----------------------------|---|
| UCOR S&H Manager            | 1. Oversee the preparation, modification, and maintenance of this CBDPP.  |
|                             | 2. Assign a qualified individual to serve as the UCOR CBDPP Manager.  |
| UCOR CBDPP Manager          | 3. Submit to DOE for approval an updated CBDPP whenever a significant change or addition is made [refer to 10 CFR Part 850.10(c), Development and approval of the CBDPP].   |
|                             | 4. Perform periodic assessments, self-assessments, and/or S&H surveillances to evaluate performance and compliance with this program.   |
|                             | 5. Review and provide concurrence with any new project and/or subproject level plans, as required, that contain beryllium exposure control and minimization work practices if the potential exists for personnel exposures to exceed the ACL.   |
|                             | 6. Verify in consultation with Subcontract Administrator and Subcontract Coordinator that project plans explicitly define the division of responsibilities where any portions of beryllium scope are subcontracted by UCOR.   |
|                             | 7. Where exposure levels meet or exceed the ACL of 0.1 µg/m <sup>3</sup> , establish exposure reduction and minimization goals as required by 10 CFR Part 850.25, WHAT TO DO, Section I, Exposure Reduction and Minimization.   |
|                             | 8. Update and maintain the inventory for locations where suspect and/or known beryllium or beryllium-containing materials may be encountered. The inventory is posted on the Beryllium page of the UCOR intranet.   |
| PIH                         | 9. Provide oversight of UCOR and Subcontractor CBDPP implementation.  |
| Subcontractors at all tiers | 10. For beryllium work activities within the scope of this CBDPP, comply with the established work control documentation in accordance with 10 CFR Part 850.11(a) and (b), General CBDPP requirements. Specify the current and planned operational tasks within the scope of this CBDPP; and comply with the requirements in REQUIREMENTS, Section M, and WHAT TO DO, Section I, Exposure Reduction and Minimization. |

**B. Project Management and Support**

- |                   |  |
|-------------------|--|
| PIH               | 1. Generate Form-3062, Industrial Hygiene Hazard Worksheet, and participate in the Job Hazard Analysis (JHA) of each work activity involving beryllium.  |
| JHA Planning Team | 2. Conduct a hazard review of each work activity involving beryllium or beryllium-containing materials using the hazard assessment processes described in PROC-FS-1001, <i>Integrated Work Control Program</i> . |
| Beryllium Worker  | 3. Assist in the identification of any potential beryllium hazards for assigned work activities.   |

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**C. Management of Beryllium Controlled Areas and Beryllium Regulated Work Areas**

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|-----------------|---|
| PIH             | 1. Identify the presence or potential presence of beryllium and beryllium-containing materials in their facilities.   |
| Job Supervisor  | 2. Consult with the PIH for recommendations when activities will involve potential exposure of individuals to airborne or surface beryllium.  |
| PIH             | 3. Delineate BCAs by posting each access point and the BCA perimeter. See Attachment C for an example BCA posting.  |
|                 | 4. Delineate BRAs by posting each access point and the BRA perimeter with signs that meet the requirements of this CBDPP. See Attachment D for an example BRA posting.  |
| Job Supervisor  | 5. Isolate BCAs and BRAs along the perimeter by using structural barriers such as walls or using barricades and/or placards per PROC-EH-1013, <i>Accident Prevention Signs, Barricades, and Other Postings</i> .  |
|                 | 6. Ensure that the individuals assigned to work in BCAs and BRAs are trained in the use of PPE, including decontamination; don/doff procedures; respiratory protection; LEARN Module 32028, Beryllium Worker Training; and any other training that may be required.   |
|                 | 7. Allow only those individuals that are authorized and trained as Beryllium Workers to enter and work in BCAs and BRAs. Verify training by checking the LEARN database for completion of Modules 32036, 32074 and 32028 and/or UCOR Beryllium Worker badge cards to ensure expiration dates have not passed.   |
|                 | 8. Minimize the number of workers at risk; the number of potential exposure opportunities; and the time personnel spend in BCAs and BRAs.   |
|                 | 9. Provide necessary PPE, including respiratory protection, per Form-3061, Industrial Hygiene Work Permit (IHWP), and Form-3062, Industrial Hygiene Hazard Worksheet (IHHW) requirements and/or PIH instructions. Respiratory protection and PPE shall meet the requirements of PPD-IH-5151, <i>Respiratory Protection Program</i> , and PROC-EH-2005, <i>Personal Protective Equipment</i> . |
| Project Manager | 10. Provide change rooms for workers who enter BCAs and change rooms and shower facilities for workers who enter BRAs. Workers who enter BCAs and those who enter BRAs may utilize the same change rooms and showers. The change rooms and showers may also be used by personnel who are not Beryllium Workers.   |
|                 | 11. Provide and maintain new or beryllium-clean decontamination equipment and characterization sampling supplies in a dedicated area for mobilization.  |
| Job Supervisor  | 12. Ensure waste containers that have beryllium-contaminated contents are labeled with the waste label as described in REQUIREMENTS Section V. See Attachment E for an example of appropriate labeling to be used.  |

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Job Supervisor

13. Ensure that surface wipe sampling is conducted by IH Technicians as determined by the PIH to evaluate beryllium background levels and the effectiveness of housekeeping. This sampling is not required to include the interior of installed closed systems such as, but not limited to, enclosures, glove boxes, chambers, drums, or ventilation systems, unless the Sampling and Analysis Plan (SAP) or PIH specifies that those surfaces need to be sampled.
  14. Operate in accordance with established waste minimization practices.
  15. Ensure only Beryllium Workers are assigned to tasks in areas contaminated or potentially contaminated with beryllium including beryllium waste load-out outside of a BCA/BRA.
  16. Allow only a minimum number of individuals that are authorized and trained as Beryllium Workers into active support zones for work in BCAs/BRAS. (For example, during egress and decontamination at a BCA boundary.)
  17. Reduce exposure potential by using ALARA principles.
  18. Where feasible, use nonporous and/or easily decontaminated work surfaces (e.g., bench tops, hood floors) on which beryllium-contaminated items are to be used or stored, unless they are of a disposable nature.
  19. Ensure that surfaces are decontaminated using appropriate methods (i.e., wet methods, vacuuming, or other cleaning methods, such as sticky tack cloths that avoid the production of airborne dust).
  20. Ensure that ventilation systems from primary containment equipment, such as, but not limited to, glove boxes or hoods, are HEPA filtered and discharged to the outdoors.
- NOTE 1:** If contamination meets or exceeds 1.5 µg/100 cm<sup>2</sup> and the equipment or item is being transported through a clean area, then it must be double wrapped or otherwise contained/sprayed with fixative to prevent spread of beryllium contamination. The equipment or item, including potentially contaminated internal surfaces, **MUST** be decontaminated to less than 0.2 µg/100 cm<sup>2</sup> if the equipment or item will be moved to a non-beryllium work area or released to the general public.
- NOTE 2:** If the equipment or item has internal or potential internal beryllium contamination, label the equipment or item with the label as shown in Attachment F; a label with a similar message may be used instead with approval from the CBDPP Manager.

Worker

21. Follow Housekeeping and Waste Disposal requirements as outlined above and as required by Work Control documents.
22. Dry sweeping or dry mopping methods or other methods likely to result in airborne beryllium are prohibited.

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**D. Safety and Health Responsibilities**

- |   |   |
|---|---|
| UCOR CBDPP<br>Manager                                       | 1. Conduct periodic Assessments and/or Surveillances to analyze monitoring activities, hazards, medical surveillance, exposure reduction and minimization, and occurrence reporting data as needed.   |
| UCOR CBDPP<br>Manager and UCOR<br>S&H Operations<br>Manager | 2. Perform a technical review of each Beryllium Registry data submittal (January and July) using Form-2235, Beryllium Registry Technical Review. These submittals are tracked using the Management Condition Reports in the Quality Assurance System.                         |
| PIH and S&H<br>Representative                               | 3. Assist supervisor and work control planners in identifying operations and areas in which workers must be monitored for potential beryllium exposure.   |
|   | 4. Participate in the hazard review process with the JHA Planning Team.   |
| PIH   | 5. Conduct exposure monitoring in accordance with REQUIREMENTS, Section E, Exposure Monitoring.   |
|   | 6. <b>IF</b> personal sampling results meet or exceed 0.2 µg/m <sup>3</sup> , <b>THEN</b> within 10 working days of receipt of those sample results, provide the elevated personal sampling result reports to the individual sampled and the sampled individual's supervisor. |

**OTHERWISE**

(results less than 0.2 µg/m<sup>3</sup>), post the results within 10 working days of receipt of results in a location easily accessible to monitored workers.

- |     |  |
|-----|--|
| PIH | 7. Provide personal sampling reports to the UCOR SOMD and to the DOE within 10 days of receipt of results if the results meet or exceed 0.2 µg/m <sup>3</sup> .  |
|     | 8. Conduct follow-up investigations of potential occupational illnesses as a result of any reported workplace exposure to beryllium as requested by UCOR Health Services, and document on Form-773, Industrial Hygiene Report. |

**E. Medical Surveillance**

**NOTE:** A listing of identified Beryllium Workers and Beryllium Associated Workers in the Beryllium Medical Surveillance Program is maintained by UCOR Health Services in the medical data base. This listing is provided to the S&H Operations Manager and/or other managers/supervisors who require this listing.

- |                       |   |
|-----------------------|---|
| UCOR CBDPP<br>Manager | 1. Assist UCOR Health Services in the compilation of a list of Beryllium Associated Workers and Beryllium Workers that participate in the Beryllium Medical Surveillance Program. |
|-----------------------|---|

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- |   |   |
|---|---|
| Subcontractors at all tiers   | 2. Identify Beryllium Workers and Beryllium Associated Workers participating in beryllium medical surveillance, as stipulated in 10 CFR Part 850, and ensure a listing is maintained and medical services are provided as required.   |
| SOMD  | 3. Administer the Beryllium Medical Surveillance Program in accordance with the requirements in REQUIREMENTS, Section W, Medical Surveillance.  |
| CBDPP Manager, SOMD and Beryllium Associated Worker or Beryllium Worker | <p>4. <b>IF</b> an employee seeks a second opinion, <b>THEN</b> make efforts to encourage and assist the two physicians to resolve any disagreement if the findings, determinations, or recommendations of the second physician differ from those of the initial physician.</p> <p>5. Through respective physicians, designate a third physician (if despite the efforts of the CBDPP Manager and the Beryllium Associated Worker or Beryllium Worker, the two physicians are unable to resolve their disagreement) to:</p> <ul style="list-style-type: none"> <li>• Review any findings, determinations, or recommendations of the other two physicians.</li> <li>• Conduct such examinations, consultations, laboratory tests, and consultations with the other two physicians, as the third physician deems necessary to resolve the disagreement among them.</li> </ul> |
| SOMD  | <p>6. Act consistently with the findings, determinations, and recommendations of the third physician, unless the SOMD and the Beryllium Associated Worker or Beryllium Worker reach an agreement that is consistent with the recommendations of at least one of the other two physicians.</p> <p><b>NOTE 1:</b> UCOR/Subcontractor and the Beryllium Associated Worker or Beryllium Worker or the worker's designated representative may agree upon the use of any alternate form of physician determination in lieu of the multiple physician review process so long as the alternative is expeditious and at least as protective of the worker.</p> <p><b>NOTE 2:</b> The SOMD's written medical opinion must not reveal specific records, findings, and diagnoses that are not related to medical conditions that may be affected by beryllium exposure.</p>             |
| Employer  | 7. Provide the Beryllium Associated Worker and Beryllium Worker, within 30 days following a written request, the information UCOR is required to provide the examining physician as described in 10 CFR 850.34(a)(6), Medical Surveillance.   |

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## F. Medical Removal

SOMD

1. Offer a Beryllium Worker removal from exposure to beryllium in accordance with REQUIREMENTS, Section X, Medical Removal, if determined in a written medical opinion that it is medically appropriate to remove the worker from such exposure. The determination must be based on two or more abnormal BeLPT results; CBD diagnosis; an examining physician's recommendation; or any other signs or symptoms deemed medically sufficient to remove a worker.

UCOR and  
Subcontractor

2. **IF** a Beryllium Worker has been temporarily or permanently removed from beryllium exposure, **THEN** ensure the Beryllium Worker is provided:
  - The opportunity to transfer to another position which is available, or later becomes available, for which the Beryllium Worker is qualified (or for which the worker can be trained in a short period) and where beryllium exposures are as low as possible, but in no event at or above the ACL; and
  - Ensure that the Beryllium Associated Worker who is under either Temporary or Permanent Removed Status does not enter BCAs, BRAs, or buildings/areas that have not yet been characterized for beryllium (if there is a potential that beryllium contamination may be present in that building or area) and is not assigned to jobs in which entry to those areas is required.
3. **IF** medical removal protection benefits are provided, **THEN** ensure that the removed worker's total normal earnings; continuity of service and/or seniority (when applicable); and other worker rights and benefits are maintained as though the worker had not been removed.

**NOTE 1:** The employer's obligation to provide medical removal protection benefits to a removed worker is reduced to the extent that the worker receives compensation for earnings lost during the period of removal either from a publicly- or employer-funded compensation program, or from employment with another employer made possible by virtue of the worker's removal.

**NOTE 2:** The employer may condition the provision of medical removal protection benefits upon the Beryllium Associated Worker's participation in medical surveillance provided in accordance with Title 10 CFR 850.34.

UCOR and  
Subcontractor

4. **IF** a removed worker files a claim for workers' compensation payments for a beryllium-related disability, **THEN** ensure that medical removal protection benefits continue to be provided pending disposition of the claim.

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**G. Medical Consent**

- SOMD and UCOR 1. Provide each Beryllium Associated Worker and Beryllium Worker with a summary of the medical surveillance program and associated risks and benefits at least one week before the first medical evaluation or procedure or at any time requested by the worker.

**NOTE:** LEARN Module 32036, Beryllium Briefing, will be used to provide the above information to the worker.

- SOMD 2. Obtain a Beryllium Associated Worker’s and Beryllium Worker’s signature on the completed Form-1227, Chronic Beryllium Disease Prevention Program Informed Consent Form, before performing medical evaluations or any tests.

**H. Medical Counseling**

- UCOR and Subcontractor 1. A counseling program has been developed to assist Beryllium Associated Workers and Beryllium Workers who are diagnosed by the SOMD as beryllium sensitized or to have CBD. This counseling program contains and will communicate the elements described in REQUIREMENTS, Section Z, Counseling, to the Beryllium Associated or Beryllium Worker that has just been diagnosed.

- Supervisor or Manager 2. The CBDPP Program Manager, with cooperation from the worker’s supervisor and UCOR Health Services, will ensure that the beryllium sensitized worker attends the contractor beryllium counseling as soon as possible after a diagnosis has been made. UCOR is responsible to ensure counseling is conducted for workers who work for their subcontractors.

**I. Exposure Reduction and Minimization**

- CBDPP Manager 1. Manage and control beryllium exposures in accordance with REQUIREMENTS, Section M, Exposure Reduction and Minimization.

**J. Worker Training**

- Training Resource 1. Develop and provide training for Beryllium Associated Workers and Beryllium Workers as requested by project or subcontractor management.

- CBDPP Manager 2. Ensure that training meets the requirements of 29 CFR 1910.1200, Hazard Communication, and 10 CFR Part 850, and is presented by technically qualified individuals.

- Job Supervisor and/or S&H Operations Manager 3. Identify work force who require beryllium worker training and ensure that Beryllium Associated Workers and Beryllium Workers attend training as required in REQUIREMENTS, Section A, Program Administration, Items 4 and 6.

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## K. Performance Feedback

UCOR and  
Subcontractor

1. Incorporate feedback using the principles detailed in PPD-EH-1400, *Integrated Safety Management System*, into performance measurements through project meetings, team meetings, lessons learned, corrective actions, debriefings, and other suitable means.
2. In consultation with the PIH, assess results of beryllium monitoring activities. Examples of items to assess for beryllium may include the following:
  - Number of workers potentially exposed;
  - Exposure level measures for groups and individuals such as percent exceeding the DOE's Action Level (AL) or UCOR's ACL;
  - Incidence of CBD and beryllium sensitization within the Beryllium Associated Worker and Beryllium Worker population;
  - Areas and/or waste containers outside BCAs and/or BRAs with removable surface contamination meeting or exceeding 1.5 µg/100 cm<sup>2</sup>;
  - Efforts to minimize the amount of Beryllium-contaminated waste that is generated where feasible (e.g., cubic feet).

## RECORDS

1. Records generated by this procedure and listed below shall be dispositioned in accordance with PROC-OS-1001, *Records Management, Including Document Control*. Records of all beryllium inventory information, hazard assessments, exposure measurements, exposure controls, and medical surveillance must be established and maintained for a minimum of 75 years and includes the following forms:
  - Form-1227, Chronic Beryllium Disease Prevention Program Informed Consent Form
  - Form-1232, Beryllium Health History Questionnaire
  - Form-2235, Beryllium Registry Technical Review
  - Work packages and Type 3 Work Determinations utilized for conduct of work in BCAs/BRAs, including the associated IHWP's and IHHW's
  - Beryllium Regulated Area (BRA) Entry/Exit Logs (when completed)
  - Industrial Hygiene Database records of sampling of surface and airborne beryllium contamination
  - Assessments and Surveillances generated as directed under this CBDPP, along with any resultant CAMS Issues
  - LEARN records associated with LEARN Module 21221, Parkworker, and CBDPP LEARN Module 32036, Beryllium Briefing, and LEARN Module 32028, Beryllium Worker training
  - Beryllium Medical Surveillance Program records and LEARN records of completion of LEARN Module 32074, Beryllium Medical Surveillance

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- Duty Determination Reports (DDRs) associated with Beryllium Worker temporary or permanent medical removal from Beryllium Worker status and Beryllium Worker/Beryllium Associated Worker counseling conducted per PPD-IH-6000, REQUIREMENTS, Sections Z, Counseling, and WHAT TO DO, Section H, Medical Counseling.
2. Within 10 business days of a written request, the Subcontractor shall provide UCOR with any data, including records and documentation associated with Subcontractor's compliance with this CBDPP.
  3. Transfer all records associated with this CBDPP to the DOE or its designee if the employer ceases to be involved in the CBDPP.
  4. Beryllium records must be maintained in a current and readily accessible electronic system, which includes the ability to readily retrieve data in a format that maintains confidentiality
  5. Reports generated from the data must be in a format that protects the confidentiality of individuals. Records transmitted to other parties must not contain names, social security numbers, or any other variables that could be used to identify particular individuals.
  6. Semi-annually, provide an electronic submittal for the Registry of Beryllium Associated Workers and Beryllium Workers that protects confidentiality. The registry submittal must include, but is not limited to, a unique identifier, date of birth, gender, site, job history, medical screening test results, exposure measurements, and results of referrals for specialized medical evaluations. The submittal must be transmitted to the DOE Office of Epidemiologic Studies within the Office of Environment, Safety and Health. Registry data will be reviewed by the UCOR CBDPP Manager and the UCOR S&H Manager (see Form-2235, Beryllium Registry Technical Review) prior to electronic submission of the data.

**SOURCE DOCUMENTS**

- 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response
- 29 CFR 1910.1000, Air Contaminants
- Federal Register, Vol 81, No. 109, Department of Energy Chronic Beryllium Disease Prevention Program Proposed Rules, 10 CFR 850 (6/7/2016)
- DOE G 440.1-7A, *Implementation Guide for Use With 10 CFR Part 850, Chronic Beryllium Disease Prevention Program*
- Exhibit L-1, List of Mandatory Contractor Procedures
- UCOR-5616, *United Cleanup Oak Ridge Industrial Hygiene Criteria for Open-Air Demolition of Beryllium Contaminated Facilities, Oak Ridge, Tennessee*
- PPD-WM-2400, *UCOR Waste Management Program Plan*
- PROC-WM-2010, *Waste Container Management*
- PROC-WM-2013, *Certification of Waste for Disposal at Nevada National Security Site*

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**Attachment A**  
**Definitions/Acronyms**  
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**ABIH** – American Board of Industrial Hygiene

**Abnormal BeLPT** – A BeLPT test result in which two or more Beryllium concentrations are greater than the stimulation index, indicating beryllium sensitization.

**Action Level (AL)** – The level of airborne concentration of beryllium that, if met or exceeded, requires the implementation of worker protection measures. The DOE Action Level for airborne beryllium is a concentration of 0.2 µg/m<sup>3</sup> 8-hour TWA as measured in the worker’s Breathing Zone by integrated personal sampling.

**Airborne Control Level (ACL)** – The Airborne Control Level is UCOR’s equivalent to an Action Level. This program uses the term Airborne Control Level to avoid confusion with DOE’s Action Level. UCOR’s Airborne Control Level is 0.1 µg/m<sup>3</sup> as measured in the worker’s Breathing Zone by integrated personal sampling.

**AIHA** – American Industrial Hygiene Association

**ALARA** – As Low As Reasonably Achievable

**APR** – air-purifying respirator

**Beryllium** – Elemental beryllium and any insoluble beryllium compound or alloy containing 0.1 percent (1,000 ppm) beryllium or greater that may be released as an airborne particulate. It is important to note that this definition is consistent with the criterion that 29 CFR 1910.1200, Hazard Communication, uses for a carcinogenic mixture, i.e., one that contains a carcinogenic component at a concentration of 0.1 percent (or 1,000 ppm) or greater, by weight or volume.

**Beryllium Activity** – An activity taken for, or by, DOE at a DOE facility that can expose workers to airborne beryllium, including but not limited to design, construction, operation, maintenance, or decommissioning, and which may involve one DOE facility or operation or a combination of facilities and operations.

**Beryllium Article** – A manufactured item that is formed to a specific shape or design during manufacture, that has end-use functions that depend in whole or in part on its shape or design during end use, and that does not release beryllium or otherwise result in exposure to airborne concentrations of beryllium under normal conditions of use.

**Beryllium Associated Worker** – A current worker who is or was exposed or was potentially exposed to airborne concentrations of beryllium at a DOE facility, including:

- A current worker whose work history shows that the worker may have been exposed to airborne concentrations of beryllium at a DOE facility.
- A current worker who exhibits signs or symptoms of beryllium exposure.
- A current worker who is receiving medical removal protection benefits.
- A Beryllium Worker is included in the DOE definition of Beryllium Associated Worker. However, at UCOR, although Beryllium Associated Workers includes Beryllium Workers, only current Beryllium Workers who are trained and qualified to work in beryllium work areas are authorized to enter and work in Beryllium Controlled Areas (BCAs) and Beryllium Regulated Areas (BRAs); i.e., Beryllium Associated Workers are not authorized to enter BCAs and BRAs.

**Beryllium Contaminated Materials or Items** – Any material or item with removable contamination  $\geq 1.5$  µg/ 100 cm<sup>2</sup> on exterior or interior surfaces.

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**Beryllium Controlled Area (BCA)** – An area in which surface levels of beryllium meet or exceed  $1.5 \mu\text{g}/100 \text{ cm}^2$  but are less than  $3.0 \mu\text{g}/100 \text{ cm}^2$  or where airborne beryllium levels meet or exceed  $0.1 \mu\text{g}/\text{m}^3$  but are less than  $0.2 \mu\text{g}/\text{m}^3$ . A BCA could also be established and posted solely as an Entry/Exit point to a BRA even if surface levels of beryllium are less than  $1.5 \mu\text{g}/100 \text{ cm}^2$  and airborne levels are less than  $0.1 \mu\text{g}/\text{m}^3$ .

**Beryllium Emergency** – An upset condition such as, but not limited to, equipment failure, container rupture, or failure of control equipment or operations that results in an unexpected and/or significant release of beryllium or beryllium contamination at a DOE facility.

**Beryllium-induced Lymphocyte Proliferation Test (BeLPT)** – An in vitro measure of the beryllium antigen-specific, cell-mediated immune response.

**Beryllium Regulated Area (BRA)** – An area in which the airborne concentration of beryllium exceeds or can reasonably be expected to meet or exceed  $0.2 \mu\text{g}/\text{m}^3$  and/or in which surface levels meet or exceed  $3.0 \mu\text{g}/100 \text{ cm}^2$ .

**Beryllium Sensitization** – A response in the immune system of a specific individual who has been exposed to beryllium. There are no associated physical or clinical symptoms and no illness or disability with beryllium sensitization alone, but the response that occurs through beryllium sensitization can enable the immune system to recognize and react to beryllium. While not every beryllium-sensitized person will develop chronic beryllium disease (CBD), beryllium sensitization is essential for development of CBD.

**Beryllium Waste Material** – A material containing beryllium if beryllium is present in the mixture in concentrations greater than 0.1 percent (1,000 parts per million).

**Beryllium Worker** – A **Beryllium Worker** is a worker who has:

- attended LEARN Module 32036, Beryllium Briefing;
- received a Beryllium-induced Lymphocyte Proliferation Test (BeLPT) with normal results;
- completed baseline and annual (as applicable) beryllium medical surveillance requirements; and
- attended LEARN Module 32028, Beryllium Worker Training.

Only a Beryllium Worker is qualified to perform work in Beryllium Controlled Areas or in Beryllium Areas.

**Borderline BeLPT** – One out of three blood serum samples has a beryllium concentration that is greater than the stimulation index (two or more blood serum samples greater than the stimulation index indicates beryllium sensitization).

**CBDPP** – Chronic Beryllium Disease Prevention Program

**CFR** – Code of Federal Regulations

**Chronic Beryllium Disease (CBD)** – A chronic lung disease caused by immunologic hypersensitivity to beryllium particles less than 10 microns in diameter.

**cm<sup>2</sup>** – square centimeter

**DOE** – U.S. Department of Energy

**DOP Testing** – Dispersed Oil Particulate testing, also known as filter integrity testing, is the process in which the integrity of HEPA or Ultra Low Penetration Air (ULPA) filters are challenged through introducing particulates and measuring output. Oil is dispersed as an aerosol into the upstream flow of the filter media while the number of particles in the downstream flow is measured using a calibrated photometer.

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**DDR** – Duty Disposition Report

**Employer** – The company (e.g., prime contractor, subcontractor) that is directly responsible for the health and safety of employees while performing a beryllium activity or other activity at a DOE facility. For subcontracted employees, the subcontractor is the employer

**Entry/Exit Point** – An area that is designed to support personnel entering/exiting a contaminated work area and is the location of the final Personal Protective Equipment doffing step when exiting a contaminated work zone.

**Facility Manager** – An individual who has specific responsibilities for the infrastructure of a facility or building. The definition of a Facility Manager is detailed in PROC-FO-515, *Facility Management*, Attachment A.

**FEV1** – Forced Expiratory Volume at one (1) second.

**Fixed Contamination** – Beryllium particulates that cannot be spread due to chemical or mechanical binding to surfaces or structures. During destructive methods resuspension of particulates is greatly reduced. Fixatives are used to prevent airborne dispersion of particulates from surface contamination.

**HEPA** – High-efficiency particulate air

**IH** – Industrial Hygiene or Industrial Hygienist

**IHHW** – Industrial Hygiene Hazard Worksheet

**IHT** – IH Technician

**IHWP** – Industrial Hygiene Work Permit

**Intrusive Activity** – An intrusive activity consists of any of the following processes:

- Cutting, machining, drilling, casting, grinding, sanding and other dust disturbing activities.
- Altering or modifying an area, room, work area or building structure including the complete or partial removal of items/equipment/materials where an inaccessible area or surface is being exposed.
- Breaching/opening an item/equipment/system for the purpose of performing hands-on work. Examples include piping, ducts, ventilation systems, monitoring equipment, instrumentation, tool boxes, etc. where suspect or confirmed beryllium contamination has been identified.
- Opening/breaching electrical distribution equipment for repair/maintenance activities when controlled for potential of confirmed internal beryllium contamination. Activities include removal or replacement of units/components, air gapping, hands-on troubleshooting, and cleaning. Visual inspections and/or safe to work/condition checks are not considered to be an intrusive activity.
- Opening/breaching machinery such as panels or components not normally accessed for operation and/or motors, engines or compressors considered to be potentially or internally contaminated. If there is a potential for contamination within one of these systems, such as, but not limited to, an air intake, hands-on work performed on the outside of the components/systems or the closed system, is not considered to be intrusive.

Intrusive activities in beryllium areas and on labeled equipment or systems normally require controls specified in an IHWP. However, an IHWP is not required when sampling results support not requiring beryllium controls.

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**Job Hazard Analysis (JHA) Planning Team** – A panel of technical and craft discipline personnel selected by the planner, with concurrence by the Facility Manager, to research the work, conduct the JHA, and prepare the work package or Technical Procedure.

**LEARN** – Local Education Administrative Requirements Network

**Medical Removal Protection Benefits** – The employment rights established by 10 CFR 850.35 for Beryllium Associated Workers who have accepted temporary or permanent medical removal from beryllium work activities following a recommendation by the Site Occupational Medicine Director

**NEA** – Negative Exposure Assessment

**OEL** – Occupational Exposure Limit

**Permissible Exposure Limit (PEL)** – Airborne concentration of beryllium which is equal to or greater than the 8-hour TWA of 0.2 µg/m<sup>3</sup>. This airborne limit is published in 29 CFR 1910.1024 and 29 CFR 1926.1124, and is measured in the worker’s breathing zone by personal monitoring.

**PPE** – Personal Protective Equipment

**ppm** – parts per million

**Project Industrial Hygienist (PIH)** – A professional qualified by education, training, and experience to anticipate, recognize, evaluate, and develop controls for occupational health hazards. This individual either is certified in the practice of industrial hygiene by the American Board of Industrial Hygiene (ABIH) or is current in all requirements of the UCOR Training Position Description entitled Project Industrial Hygienist (PIH)/PIH Lead.

**Release Criteria** – A set of conditions to be met for movement of equipment/materials/items from a BCA/BRA for unrestricted public release; from a BCA/BRA for restricted release on site; from a BCA/BRA to another facility performing work with beryllium; and from one BCA/BRA to another BCA/BRA within the same facility.

**Removable Contamination** – Beryllium contamination that can be removed from surfaces by nondestructive means, such as casual contact, wiping, brushing, or washing.

**Safety and Health (S&H) Representative** – For UCOR, an individual with roles and responsibilities that are detailed in PPD-EH-1745, *Worker Safety and Health Program*. For Subcontractors, this individual is the Subcontractor ESH representative or qualified individual (e.g., industrial hygienist).

**Site Occupational Medical Director (SOMD)** – The physician responsible for the overall direction and operation of the site occupational medicine program.

**Subcontract Coordinator** – For subcontracted work, ensures that roles assigned to the subcontractor are clearly defined. Coordinate between UCOR and subcontractor project team members. Primary point of communication between subcontractor and UCOR team members.

**TWA** – Time weighted average

**UCOR** – United Cleanup Oak Ridge LLC

**Uninterpretable BeLPT** – BeLPT results that cannot be interpreted due to assay variations.

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**µg/m<sup>3</sup>** – Micrograms per cubic meter

**Worker** – A person who performs work for or on behalf of DOE, including a DOE employee, an independent contractor, a DOE contractor or subcontractor employee, or any other person who performs work at a DOE facility.

**Worker Exposure** – Means the exposure of a worker to airborne beryllium that would occur if the worker were not using respiratory protective equipment.

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**Attachment B**  
**UCOR Facilities Beryllium Baseline Inventory**  
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UCOR-5343, *UCOR Facilities Beryllium Baseline Inventory, Oak Ridge, Tennessee*, provides a summary of UCOR facilities/areas at the East Tennessee Technology Park (ETTP) (formerly K-25 Site), the Oak Ridge National Laboratory (ORNL), and the Y-12 National Security Complex (Y-12) in which suspect and/or known beryllium or beryllium-containing materials may be encountered. The inventory is intended to comply with Title 10 CFR 850.20, and information has been extracted from several sources, including: K/ER-47/R1, *Site Descriptions of Environmental Restoration Units at the Oak Ridge K-25 Site, Oak Ridge, Tennessee*; archived files; documents; interviews; and anecdotal information obtained from site personnel and former employees; and air, surface, and bulk sampling as maintained in the accumulated UCOR Industrial Hygiene survey records. The inventory is regularly updated to include results of beryllium characterization assessments performed to support UCOR Decommissioning and Demolition Operations. The Beryllium Inventory can be found on the Beryllium page of the UCOR Intranet.

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Attachment C  
Example of Sign for Beryllium Controlled Area  
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Attachment D  
Example of Sign for Beryllium Regulated Area  
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Attachment E  
Example of Beryllium-Contaminated Waste Container Label  
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**Attachment F**  
**Example of Internal Beryllium Contamination Label**  
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