

SPECIAL TOXIC HAZARDS
Beryllium and Beryllium Alloys
Chronic Beryllium Disease Prevention Program

INTRODUCTION

Inhalation of beryllium has been associated with short and long term adverse health effects to individuals with a hypersensitivity to the metal. Acute effects include pneumonia-like symptoms such as inflammation of the respiratory system, substernal pain, moderate shortness of breath, and weight loss. Chronic beryllium disease is manifest primarily by similar respiratory symptoms, however, the disease progresses to severe lung impairment. Symptoms may not develop for years following the last beryllium exposure. There is no cure for this disease.

Recently, sophisticated medical tests have been developed that can detect individuals who are sensitized to beryllium well before overt symptoms develop. These tests have suggested that the sensitization of individuals occur at air exposure concentrations below current standards.

Fermilab uses beryllium, beryllium alloys and ceramic beryllia for targets and beamline components. These materials are primarily used as "articles" as defined by Department of Energy (DOE) 10 Code of Federal Regulations (CFR) Part 850, and as such, the majority of beryllium uses are exempt from the requirements of the DOE's Chronic Beryllium Disease Prevention Program. Handling of solid components does not normally result in measurable airborne beryllium particulate. Nevertheless, every effort must be made to limit employee exposure by controlling the way beryllium is used at the Laboratory.

Note: This document contains the detail, scope and content commensurate with the hazard of the Beryllium activities performed at Fermilab. As required by DOE 10 Code of Federal Regulations (CFR) Part 850.12, any new tasks that involve the potential for exposure to airborne beryllium outside the scope of this document will result in the modification of this program and a re-submittal for approval by the Head of DOE Field Element.

APPLICABLE CODES and STANDARDS

Department of Energy 10 CFR Part 850, "Chronic Beryllium Disease Prevention Program; Final Rule.

Implementation Guide for use with DOE 10 CFR Part 850, "Chronic Beryllium Disease Prevention Program".

Permissible Exposure Limits for Toxic and Hazardous Substances, Occupational Safety and Health Administration 29 Code of Federal Regulations 1910.1000 Air Contaminants (latest edition).

Fermilab Environmental, Safety and Health Manual (FESHM) Chapter 5101 – Personal Protective Equipment (PPE)

FESHM Chapter 5103 – Respiratory Protection

FESHM Chapter 8021 – Regulated Chemical Waste Disposal

FESHM Chapter 8022 – Waste Minimization and Pollution Prevention Awareness Program

FESHM Chapter 8023 – Solid Waste Management

SCOPE

This chapter applies to all present and past exposure, or the potential for exposure to beryllium at Fermilab.

DEFINITIONS

Action Level - Air (AL) - Employee exposure, without regard to the use of respirators, to an airborne concentration of beryllium of 0.0002 milligrams per cubic meter of air (mg/m^3) calculated as an 8-hour time-weighted average (TWA) as measured in the worker's breathing zone.

Action Level - Surface (ALS) - surface concentration levels in excess of 0.025 micrograms per squared centimeter ($0.025 \mu\text{g}/\text{cm}^2$ or $2.5 \mu\text{g}/100 \text{cm}^2$).

Beryllium - elemental beryllium and insoluble beryllium compound or alloy containing at least 0.1% beryllium that may release beryllium as an airborne particulate.

Beryllium Activity – means an activity that has the potential to expose workers to airborne beryllium above the limit of detection. Activities include, but are not limited to, cutting, grinding, sanding, and soldering.

Beryllium Article - manufactured item 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 above the limit of detection of beryllium under normal conditions of use.

Beryllium-associated worker - means a current worker who is or was exposed or potentially exposed to airborne concentrations of beryllium above detectable limits, including:

- (1) A beryllium worker;
- (2) A current worker whose work history shows that the worker may have been exposed to airborne concentrations of beryllium;
- (3) A current worker who exhibits signs or symptoms of beryllium exposure; and
- (4) A current worker who is receiving medical removal protection benefits.

Beryllium emergency - any occurrence such as, but not limited to, equipment failure, container rupture, or failure of control equipment or operations that results in an unexpected and significant release of beryllium.

Beryllium Worker - a current worker who is regularly employed in a beryllium activity.

Breathing Zone - defined as a hemisphere forward of the shoulders, centered on the mouth and nose, with a radius of 6 to 9 inches.

Competent Person - One who is capable of identifying beryllium hazards in the surroundings or working conditions and who has authorization to take prompt corrective measures to eliminate them.

Exposure Limits -

Permissible Exposure Limit Time Weighted Average (PEL-TWA) - the time-weighted average concentration for a conventional 8-hour workday and a 40-hour workweek. The Occupational Safety and Health Administration (OSHA) has established a PEL-TWA of 0.002 mg/ m³ for beryllium, without regard to the use of respirator averaged over an 8-hour period.

Acceptable Ceiling Concentration (ACC) - is a fifteen-minute TWA that shall not be exceeded at any time during an 8-hour shift. The acceptable ceiling concentration limit for beryllium is 0.005 mg/ m³, except for a time period of 30 minutes where the acceptable maximum peak above the acceptable ceiling concentration for an 8-hour shift may be 0.025 mg/ m³.

Limit of detection – the smallest concentration or amount of a substance that can be differentiated from background levels by a given measurement process.

Regulated Areas - area demarcated in which airborne concentration of beryllium exceeds, or can reasonably be expected to exceed the AL.

Removable beryllium contamination - means beryllium contamination that can be removed from surfaces by nondestructive means, such as casual contact, wiping, brushing or washing.

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

SPECIAL RESPONSIBILITIES

Division/ Section (D/ S) heads shall be aware of the materials, operations, and related hazards with which their personnel may be involved. They shall assure the policies, procedures, and requirements as set forth in this ES&H chapter are followed.

Supervisors, construction coordinators, and task managers shall conduct their operations in a safe manner. They shall assure competent personnel use adequate protective measures and that appropriate personal protective equipment (PPE) is available and used properly. They shall assure that their personnel are trained and understand procedures, hazards, protective measures and equipment, and emergency procedures to prevent adverse effects from their work.

Individuals working with or handling beryllium shall have sufficient knowledge and training to perform their work safely. Before performing work, which involves beryllium materials, they shall be familiar with the potential hazards, protective measures, proper use of all materials and equipment, and emergency procedures. They shall follow the precautions listed in this chapter and on the hazard analysis or beryllium work permit (if permit is required). Employees may consult with their ES&H Group or ES&H Section for additional information.

The Medical Department shall provide a medical surveillance program for beryllium workers as defined by this chapter (see Medical Surveillance).

INVENTORY

Divisions and sections will utilize their records, process knowledge, employee interviews, and hazard assessment of beryllium locations to determine if they have beryllium or beryllium contamination areas. Locations where beryllium was previously

used and residual contamination exist, must be included in the inventory. Conduct air, surface, and bulk sampling if necessary. An inventory of current beryllium locations and operations shall be maintained by the ES&H Section. The inventory shall also identify the workers exposed or potentially exposed to beryllium at these locations. The inventory shall be reviewed and updated annually. A list of those operations that involve beryllium that are currently being performed, or are planned can be found in Attachment A.

STORAGE AND LABELING

Label beryllium to identify it from other less toxic metals. Individual pieces need not be labeled if they are stored in a labeled container and/ or cabinet. Whenever possible, components used in experimental areas should be labeled. It is recognized that in some cases this is impossible due to the complex nature of the component.

Beryllium must be stored in designated storage areas. It must be stored in sealed containers, labeled, and secured in a dry location. Surplus beryllium must be stored in a locked storage facility maintained by the Division/ Section ES&H Group. Activated beryllium may be stored at the Railhead Facility.

HAZARD ASSESSMENT AND CONTROL OF BERYLLIUM ACTIVITIES

Every effort shall be made to minimize employee exposure to beryllium. All beryllium activities that are performed at Fermilab must be reviewed by the Division/ Section ES&H Group.

1. Exposure Assessment

Exposure assessment is conducted by an ES&H professional using the following guidelines:

Initial Monitoring

Eight-hour TWA personal breathing zone exposure sampling shall be conducted in all areas that may have airborne beryllium above the limit of detection, as indicated by the baseline inventory and hazard assessment.

Note: Only those samples collected after January 7, 1999 may be used to fulfill the initial monitoring requirements.

- a. Beryllium activities are assumed to be above the AL unless there is data for similar previous work, which documents exposures below the AL.

- b. Exposure above the AL is assumed when handling a significant number of beryllium pieces with surface oxidation in excess of $0.025 \mu\text{g}/\text{cm}^2$ unless there is data for similar previous work, which documents exposures below the AL.

Periodic Monitoring

- a. Eight-hour TWA personal breathing zone exposure sampling shall be performed at least every 3 months (quarterly) in areas where airborne concentrations of beryllium are at or above the action level.
- b. If operations, maintenance or procedures change additional exposure monitoring must be performed.

Reduce or Terminate Monitoring

Professional judgement shall be used to reduce or terminate monitoring. Whenever practical, a statistically-based monitoring strategy will be applied to ensure that a sufficient number of sample results were performed that adequately characterize exposures.

General Monitoring Requirements

- a. The method of monitoring and analysis must 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 action level.
- b. The laboratory must be accredited for metals by the American Industrial Hygiene Association (AIHA).

Notification of Monitoring Results

- a. The Division/ Section ES&H Group shall personally notify, in writing, the affected worker within 10 working days after receipt of any monitoring results.
- b. If the monitoring results indicate that the worker's exposure is at or above the action level, the notice shall include a statement that the action level has been met or exceeded, a description of the corrective action(s) being taken to reduce the worker's exposure to below the action level, and be sent to both DOE and the SOMD within 10 working days after receipt of any monitoring results.

Release Criteria

Beryllium contaminated equipment being released to the general public or a DOE facility for non-beryllium use, or to another facility for work involving beryllium must be labeled in accordance with section 3 on "Signage and Labeling" and cleaned to the lowest level practicable, but not to exceed the following levels:

- a. Removable beryllium contamination on equipment or other items released to the general public or for use in non-beryllium area of a DOE facility must not exceed the higher of $0.002 \mu\text{g}/\text{cm}^2$ ($0.2 \mu\text{g}/100 \text{cm}^2$) or the concentration level of beryllium in soil at the point of release, whichever is greater. The release is conditioned on the recipient's written commitment to implement controls that will prevent foreseeable beryllium exposure, considering the nature of the equipment of item and its future use and the nature of the beryllium contamination.
- b. Removable beryllium contamination on equipment or other items released to another facility performing work with beryllium must not exceed $0.025 \mu\text{g}/\text{cm}^2$ or ($2.5 \mu\text{g}/100 \text{cm}^2$). The equipment or item must be enclosed or placed in sealed, impermeable bags or containers to prevent the release of beryllium dust during handling and transportation.

2. Exposure Reduction and Minimization

- a. Where exposure levels are at or above the action level, an exposure and minimization plan will be established which includes the following:

Toxic Material Handling Permit - The permit includes the start and expiration dates of the permit, the location of the work, the description of the work, the name(s) of the employees and an indication as to whether the employee has received both beryllium training and medical approval. Other information required by the permit includes; pre-job conditions, required controls, required personal protective equipment and required sampling, what hygiene facilities are needed, waste disposal instructions and special instructions. The permit also contains signature approval space for the Task Manager and the Division/ Section Environment, Safety and Health Group.

1. Beryllium Worker training and respiratory protection training, as a minimum, is required of all employees assigned to the job.

2. Medical must be notified prior to any job for which a permit is needed. Medical approval including respiratory protection approval is needed for each worker assigned to the job.
3. As part of the permit process, preparation for the job may include wipe samples to determine beryllium contamination of work area or beryllium components, safety concerns, ergonomic concerns, etc. Clean up surfaces contaminated as a result of work operations to below 0.025 $\mu\text{g}/\text{cm}^2$.
4. The required controls and subsequent required personal protective equipment are based upon the conventional hierarchy of industrial hygiene controls (i.e., engineering controls, administrative controls, and personal protective equipment). Examples of engineering and administrative controls include exhaust ventilation, hygiene practices, enclosing and restricting access to the work area, etc.
5. The permit should indicate the type of respirator selected by the ES&H professional for the job. Employees that use respirators must also receive medical surveillance, fit testing and training. Disposable coveralls or similar full-body work clothing, gloves, hoods, and disposable shoe coverlets shall be worn when exposure may exceed the AL. Contaminated protective clothing and equipment shall be collected in a labeled sealable container.
6. The number and frequency of personal and area air samples should be indicated on the permit. It should also indicate the number and location of wipe samples if surface contamination is of concern.
7. All working surfaces shall be maintained as free as practicable of accumulations of beryllium. Floors and other surfaces shall be routinely sampled and cleaned, as necessary, by vacuuming or other methods (i.e., sticky tack cloths) that minimize the likelihood of beryllium becoming airborne. Where vacuuming methods are used, the vacuums shall be equipped with High Efficiency Particulate Air (HEPA) filters and used and emptied in a manner, which minimizes the re-entry of beryllium into the workplace. HEPA filters shall be changed as often as needed to maintain their capture efficiency. All cleaning equipment that is used to clean beryllium-contaminated surfaces shall be labeled, controlled, and not used for non-hazardous materials. Compressed air or dry methods must not be used for such cleaning.

Food and/ or beverage shall not be stored or consumed and tobacco products shall not be present or used in areas where employees may be exposed to beryllium above the AL. Employees, who may be exposed above the AL, shall be required to wash their hands and face prior to eating, drinking, smoking, or applying cosmetics.

Whenever employee exposure to beryllium may exceed the AL, employees shall not leave the workplace wearing any protective clothing or equipment that is required to be worn during the workshift. Employees shall be provided with a clean change area with separate storage facilities for protective work clothing and street clothes to prevent cross contamination.

Showers shall be taken at the end of the workshift or job. Employees shall be provided with shower and hand washing facilities close to the work area, when feasible, when exposure to beryllium may be above the AL.

Lunchroom facilities must be readily accessible to beryllium workers and contain eating tables that are free of beryllium and at no time shall the worker be exposed to beryllium at or above the action level in a lunchroom facility.

The change rooms/ areas, shower and hand washing facilities and lunchroom facilities must comply with 29 CFR 1910.141, Sanitation.

Employees exposed to beryllium above the AL shall not leave the area with PPE or equipment unless surface dust has been removed by HEPA vacuuming or other cleaning method that limits dispersion of beryllium dust.

8. Every reasonable effort shall be made to limit the release of beryllium residues into air, ground, or water. To the extent practical, all beryllium-contaminated residues must be contained, collected and containerized for disposal. All generated waste shall be disposed of per Fermilab's regulated chemical waste disposal program. See Section 3, Signage and Postings, of this chapter for waste labeling requirements.
9. The permit shall be signed by the ES&H Group of the D/ Ssupervising the project and by the task manager, project supervisor or lead technician.

10. Every reasonable effort shall be made to minimize the number of workers exposed and potentially exposed to beryllium. A log (reverse side of the permit) must be maintained by the task manager, project supervisor, or lead technician for the job to track all individuals who enter regulated areas. These records must include the name, date, time in and time out, and work activity.

11. Upon the completion of the job, a copy of the permit must be sent to the ES&H Section.

b. Where exposure levels are above the limit of detection but below the action level, and when practicable, implement the following actions to reduce employee exposures; written hazard analysis (per FESHM Chapter 2060), engineering controls (i.e., ventilation), administrative controls (i.e., personal hygiene, warning signs and labels, work practices) and personal protective equipment (i.e., gloves, respirators).

3. Signage and Postings

a. Regulated areas shall be posted with a warning sign, which states:

<p>RESTRICTED AREA - NO ENTRY DANGER BERYLLIUM WORK AREA INHALATION OF DUST OR FUME MAY CAUSE SERIOUS LUNG DISEASE POTENTIAL CANCER HAZARD NO SMOKING OR EATING CONTACT _____ PRIOR TO ENTRY</p>
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b. Containers of beryllium, beryllium compounds, beryllium-contaminated clothing, equipment, waste, scrap, or debris shall be posted with a warning sign, which at a minimum contains the following information:

<p>DANGER CONTAMINATED WITH BERYLLIUM DO NOT REMOVE DUST BY BLOWING OR SHAKING CANCER AND LUNG DISEASE HAZARD</p>
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MEDICAL SURVEILLANCE

The Fermilab Medical Department shall implement a beryllium medical surveillance program for beryllium-associated workers who voluntarily participate in the program.

See Attachment B for further details of Fermilab's Beryllium Medical Surveillance Program.

To aid Fermilab's Medical Department in this endeavor, the ES&H Section shall provide, and when necessary assist, the SOMD with the information needed to operate and administer the medical surveillance program. This includes:

1. List of beryllium-associated workers;
2. Beryllium inventories;
3. Job Hazard Analysis;
4. Exposure monitoring data;
5. Copies of any Toxic Material Handling permits; and
6. A copy of the current 10 CFR Part 850 and its preamble.

The medical requirements in this CBDPP shall be performed by or under the supervision of a licensed physician familiar with the health effects of beryllium.

TRAINING

Several levels of training are offered for distinct worker classifications:

Hazard Communication Training is required for all new Fermilab employees and is given as part of New Employee Orientation. The basic hazards of exposure to beryllium are discussed.

Beryllium Handling Training is an awareness-level course required for all workers who may handle beryllium but are not exposed above the limit of detection. This training shall include information on the health effects of beryllium, safe work practices, proper handling, and control of beryllium.

Beryllium Worker Training is required for current Beryllium workers only. This training shall include Beryllium Handling Training, and additional information on use of personal protective equipment, required medical monitoring, waste management, and decontamination procedures. Beryllium Worker training shall take place before or at the time of initial assignment and every two years thereafter.

Beryllium Associated Worker Training is required for any employee who self identifies by opting into the Beryllium Associated Worker Program or any employee who was previously considered to be a Beryllium Workers. The training includes, but is not limited to information on the chemical and physical properties of beryllium, the health effects of beryllium exposure, exposure standards, who and what is the Oak Ridge Institute for Science and Education (ORISE).

Retraining shall be provided if there is reason to believe that a trained individual lacks the proficiency, knowledge, or understanding needed to work safely with beryllium. Such situations include, but may not be limited to, a change in the operations, procedures, or beryllium controls about which the individual was not previously trained.

RECORDS

Documentation concerning this program shall be maintained per electronic format for 75 years. Records shall be maintained as follows:

Industrial Hygiene Sampling Results - database maintained by the ES&H Section. A paper copy of all employee exposure results is sent to the Medical Department for inclusion into the employee's medical file.

Inventories - database maintained by the ES&H Section.

Training - database is maintained by the ES&H Section.

Permits and Hazard Analysis - shall be maintained by the division and sections and the ES&H Section. These are not maintained electronically.

Medical - are maintained by the Medical Department. These are not maintained electronically.

Information from all these documents can be combined if a need arises to link hazard assessment, exposure monitoring, and medical surveillance activities. This information is being captured in the Department of Energy's, Office of Epidemiologic Studies, Beryllium-Associated Worker Registry.

EXPERIMENTERS AND OUTSIDE CONTRACTORS

Experimenters and subcontractors that may be exposed to beryllium while at Fermilab shall be subject to the requirements of this chapter.

When beryllium is sent off-site for machining or other activity that may release airborne dust or fume, Fermilab shall inform the recipient of the hazard with warning labels or other appropriate warning methods. The Purchase Requisition and contract exhibits shall be reviewed and approved by the D/ SES&H Group. The ES&H Section shall be consulted regarding contract exhibits and contractor selection.

Experimenters and subcontractors shall notify their respective D/ SES&H Group prior to bringing any beryllium on-site.

EMERGENCY PREPAREDNESS

The Fire Department shall be **immediately** informed of any beryllium emergency.

PERFORMANCE FEEDBACK

Divisions/ Sections must periodically assess their status with this program. Reviews must be submitted to the ES&H Section. The Tripartite Assessment Program (FESHM 1040) may be utilized to fulfill this requirement.

TOXIC MATERIAL HANDLING PERMIT

Date:	Expires:	Extended To:
Location of Work (Please be specific)		
Description of Work		
Employees (names)	Training Current	Medical Approval
1.		
2.		
3.		
4.		
5.		
6.		
Pre-Job Conditions (contamination, safety factors, etc.)		
Required Controls		
Required Sampling		
Required Personal Protective Equipment		
Hygiene Facilities Needed		
Waste Disposal Instructions		
Special Instructions		
Approvals Division/Section ES&H		
Task Manager, Project Supervisor or Lead Technician		

TOXIC MATERIAL PERMIT LOG

ATTACHMENT A
Beryllium Operations

This table lists operations that are currently being performed, or are planned.

Facility	Location	Job Description
Beams Division	A-0, C-0, Main Injector	Handling Vacuum Windows
Beams Division	AP-0, NuMI	Handling Beryllium Targets
Beams Division	A-0	Beryllium Beam Tube Pressure Testing
Computing Division	FCC3	Assembly of Portcards
Particle Physics Division	SiDet	Be HDI, Vacuum laminations and assembly
Particle Physics Division	ME-7 Worm	Storage
Particle Physics Division	CDF and DO	Beam pipe installation
Technical Division	MP 9	CM SMuon detector assembly

ATTACHMENT B
Beryllium Medical Surveillance

Baseline examination-done post offer—pre-placement

1. History including questionnaires.
2. Physical examination.
3. Spirometry
4. B-reader chest x-ray.
5. Beryllium Proliferation test (Be-LPT)

Current Beryllium Worker examination---done annually

1. History including questionnaires.
2. Physical examination.
3. Spirometry annually.
4. B-reader chest x-ray every 5 years.
5. Be-LPT

Beryllium Associated Worker examination---done biannually

1. History including questionnaires.
2. Physical examination.
3. Spirometry biannually.
4. B-Reader chest x-ray every 5 years.
5. Be-LPT

The following is the detailed description:

1. History and documentation of previous Beryllium exposure - medical will question employees on this topic in the medical office.
2. Baseline medical office evaluation for current Beryllium worker, or Beryllium associated workers: Site Occupational Medical Director (SOMD) will obtain history, emphasizing pulmonary and beryllium issues and utilizing the Fermilab Beryllium Medical Questionnaire and the OSHA Respirator Medical Evaluation Questionnaire. The SOMD will perform comprehensive physical exam, with attention to lungs, skin, and eyes. Investigations offered will include chest radiograph (posterior-anterior, 14x17 inches) 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). Spirometry consisting of forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV1), and Be-LPT.

3. Beryllium worker follow up medical surveillance: SOMD history, Fermilab Beryllium Medical Questionnaire and the OSHA Respirator Medical Evaluation Questionnaire, SOMD physical exam, and Spirometry will be offered annually. B-reader chest X-ray will be offered every 5 years. Be-LPT will be offered annually.
4. Beryllium associated worker follow up medical surveillance: SOMD history, Fermilab Beryllium Medical Questionnaire and the OSHA Respirator Medical Evaluation Questionnaire, and Spirometry will be offered every two years. B-reader chest X-ray will be offered every 5 years. Be-LPT will be offered at a minimum of every 3 years.
5. Emergency treatment...Any occurrence such as, but not limited to, equipment failure, container rupture, or failure of control equipment or operations that results in an unexpected and significant release of beryllium. The medical evaluation will include the requirements of paragraph (b)(2) of 10 CFR PART 850.
 - a. Detailed medical and work history with emphasis on past, present, and anticipated future exposure to beryllium;
 - b. Respiratory symptoms questionnaire;
 - c. Physical examination with emphasis on the respiratory system;
 - d. Be-LPT;
 - e. Any other medical evaluations deemed appropriate by the examining physician for evaluating beryllium-related health effects.
6. If a beryllium associated worker is diagnosed by the Site Occupational Medical Director (SOMD) to be sensitized to beryllium or to have Chronic Beryllium Disease, a counseling program will be initiated which includes communications on:
 - a. Medical surveillance program provisions and procedures (i.e., Written Medical Reporting (opinion and recommendation), Data Analysis, Medical Removal Protection, etc.;
 - b. Medical treatment options;
 - c. Medical, psychological, and career counseling;
 - d. Medical benefits;
 - e. Administrative procedures and workers rights under applicable Workers' Compensation laws and regulations;
 - f. Work practice procedures limiting beryllium associated worker exposure to beryllium;
 - g. The risk of continued beryllium exposure after sensitization.
7. Multiple Physician Review. Fermilab shall have a multiple physician review process in place that meets the requirements of 10CFR850.34(c) and (d). A copy

of this rule and preamble shall be provided to any physician performing an evaluation.

8. Questionnaires utilized in all above exams will consist of the attached Fermilab Beryllium Medical Questionnaire and the OSHA Respirator Medical Evaluation Questionnaire.
9. At least one week prior to the first medical evaluation, the employee is to be given a summary of the medical surveillance program which includes:
 - a. Type of data to be collected
 - b. How data will be collected and maintained
 - c. Purpose for data use
 - d. Description of how confidential data will be protected
 - e. A statement as to the benefits and risks of the tests
 - f. A notice to the employee that they are free to ask questions about this process at the time of their visit

A copy of the consent form...Appendix A to Part 850--Chronic Beryllium Disease Prevention Program will be included with the summary of the medical surveillance program. The SOMD will meet with the employee and obtain the employee's signature on the informed consent form prior to performing medical evaluations and tests.

FERMILAB BERYLLIUM MEDICAL QUESTIONNAIRE

Name: _____ Gender: Male ___ Female ___

Contractor _____ Date of Birth _____

Today's Date _____ Fermilab ID# _____

POTENTIAL BERYLLIUM EXPOSURE SYMPTOMS

Please check any of the following potential symptoms of beryllium exposure that you are experiencing:

Symptoms:	Yes	No	Comment:
Cough	___	___	_____
Chest pain	___	___	_____
Shortness of Breath especially With exertion	___	___	_____
Weight loss	___	___	_____
Fatigue	___	___	_____
Weakness	___	___	_____

Have you been told you have Sarcoid or Sarcoidosis/ Granulomatous Disease or Scarring?

Yes ___ No ___

If yes, explain: _____

Have you been told you have an ongoing lung disease?

Yes ___ No ___

If yes, what is the diagnosis: _____

Have you been told you have an abnormal chest X-ray(Tumor, Mass or other pulmonary lesions)?

Yes ___ No ___

If yes, explain: _____

Have you been told you have an abnormal pulmonary function test (breathing test)?

Yes ___ No ___

If yes, explain: _____

Comments: _____



..1910.134 Appendix C

Appendix C to Sec. 1910.134: OSHA Respirator Medical Evaluation Questionnaire (Mandatory)

To the employer: Answers to questions in Section 1, and to question 9 in Section 2 of Part A, do not require a medical examination.

To the employee:

Can you read (circle one): Yes/No

Your employer must allow you to answer this questionnaire during normal working hours, or at a time and place that is convenient to you. To maintain your confidentiality, your employer or supervisor must not look at or review your answers, and your employer must tell you how to deliver or send this questionnaire to the health care professional who will review it.

Part A. Section 1. (Mandatory) The following information must be provided by every employee who has been selected to use any type of respirator (please print).

1. Today's date: _____
2. Your name: _____
3. Your age (to nearest year): _____
4. Sex (circle one): Male/Female
5. Your height: _____ ft. _____ in.
6. Your weight: _____ lbs.
7. Your job title: _____
8. A phone number where you can be reached by the health care professional who reviews this questionnaire (include the Area Code): _____
9. The best time to phone you at this number: _____
10. Has your employer told you how to contact the health care professional who will review this questionnaire (circle one): Yes/No
11. Check the type of respirator you will use (you can check more than one category):
 - a. _____ N, R, or P disposable respirator (filter-mask, non- cartridge type only).
 - b. _____ Other type (for example, half- or full-facepiece type, powered-air purifying, supplied-air, self-contained breathing apparatus).
12. Have you worn a respirator (circle one): Yes/No
If "yes," what type(s): _____

Part A. Section 2. (Mandatory) Questions 1 through 9 below must be answered by every employee who has been selected to use any type of respirator (please circle "yes" or "no").

1. Do you *currently* smoke tobacco, or have you smoked tobacco in the last month: Yes/No
2. Have you *ever had* any of the following conditions?
 - a. Seizures (fits): Yes/No
 - b. Diabetes (sugar disease): Yes/No
 - c. Allergic reactions that interfere with your breathing: Yes/No
 - d. Claustrophobia (fear of closed-in places): Yes/No
 - e. Trouble smelling odors: Yes/No

3. Have you *ever had* any of the following pulmonary or lung problems?
- a. Asbestosis: Yes/No
 - b. Asthma: Yes/No
 - c. Chronic bronchitis: Yes/No
 - d. Emphysema: Yes/No
 - e. Pneumonia: Yes/No
 - f. Tuberculosis: Yes/No
 - g. Silicosis: Yes/No
 - h. Pneumothorax (collapsed lung): Yes/No
 - i. Lung cancer: Yes/No
 - j. Broken ribs: Yes/No
 - k. Any chest injuries or surgeries: Yes/No
 - l. Any other lung problem that you've been told about: Yes/No
4. Do you *currently* have any of the following symptoms of pulmonary or lung illness?
- a. Shortness of breath: Yes/No
 - b. Shortness of breath when walking fast on level ground or walking up a slight hill or incline: Yes/No
 - c. Shortness of breath when walking with other people at an ordinary pace on level ground: Yes/No
 - d. Have to stop for breath when walking at your own pace on level ground: Yes/No
 - e. Shortness of breath when washing or dressing yourself: Yes/No
 - f. Shortness of breath that interferes with your job: Yes/No
 - g. Coughing that produces phlegm (thick sputum): Yes/No
 - h. Coughing that wakes you early in the morning: Yes/No
 - i. Coughing that occurs mostly when you are lying down: Yes/No
 - j. Coughing up blood in the last month: Yes/No
 - k. Wheezing: Yes/No
 - l. Wheezing that interferes with your job: Yes/No
 - m. Chest pain when you breathe deeply: Yes/No
 - n. Any other symptoms that you think may be related to lung problems: Yes/No
5. Have you *ever had* any of the following cardiovascular or heart problems?
- a. Heart attack: Yes/No
 - b. Stroke: Yes/No
 - c. Angina: Yes/No
 - d. Heart failure: Yes/No
 - e. Swelling in your legs or feet (not caused by walking): Yes/No
 - f. Heart arrhythmia (heart beating irregularly): Yes/No
 - g. High blood pressure: Yes/No
 - h. Any other heart problem that you've been told about: Yes/No
6. Have you *ever had* any of the following cardiovascular or heart symptoms?
- a. Frequent pain or tightness in your chest: Yes/No
 - b. Pain or tightness in your chest during physical activity: Yes/No
 - c. Pain or tightness in your chest that interferes with your job: Yes/No
 - d. In the past two years, have you noticed your heart skipping or missing a beat: Yes/No
 - e. Heartburn or indigestion that is not related to eating: Yes/ No
 - f. Any other symptoms that you think may be related to heart or circulation problems: Yes/No
7. Do you *currently* take medication for any of the following problems?
- a. Breathing or lung problems: Yes/No
 - b. Heart trouble: Yes/No
 - c. Blood pressure: Yes/No
 - d. Seizures (fits): Yes/No

8. If you've used a respirator, have you *ever had* any of the following problems? (If you've never used a respirator, check the following space and go to question 9:) _____

- a. Eye irritation: Yes/No
- b. Skin allergies or rashes: Yes/No
- c. Anxiety: Yes/No
- d. General weakness or fatigue: Yes/No
- e. Any other problem that interferes with your use of a respirator: Yes/No

9. Would you like to talk to the health care professional who will review this questionnaire about your answers to this questionnaire: Yes/No

Questions 10 to 15 below must be answered by every employee who has been selected to use either a full-facepiece respirator or a self-contained breathing apparatus (SCBA). For employees who have been selected to use other types of respirators, answering these questions is voluntary.

10. Have you *ever lost* vision in either eye (temporarily or permanently): Yes/No

11. Do you *currently* have any of the following vision problems?

- a. Wear contact lenses: Yes/No
- b. Wear glasses: Yes/No
- c. Color blind: Yes/No
- d. Any other eye or vision problem: Yes/No

12. Have you *ever had* an injury to your ears, including a broken ear drum: Yes/No

13. Do you *currently* have any of the following hearing problems?

- a. Difficulty hearing: Yes/No
- b. Wear a hearing aid: Yes/No
- c. Any other hearing or ear problem: Yes/No

14. Have you *ever had* a back injury: Yes/No

15. Do you *currently* have any of the following musculoskeletal problems?

- a. Weakness in any of your arms, hands, legs, or feet: Yes/No
- b. Back pain: Yes/No
- c. Difficulty fully moving your arms and legs: Yes/No
- d. Pain or stiffness when you lean forward or backward at the waist: Yes/No
- e. Difficulty fully moving your head up or down: Yes/No
- f. Difficulty fully moving your head side to side: Yes/No
- g. Difficulty bending at your knees: Yes/No
- h. Difficulty squatting to the ground: Yes/No
- i. Climbing a flight of stairs or a ladder carrying more than 25 lbs: Yes/No
- j. Any other muscle or skeletal problem that interferes with using a respirator: Yes/No

Appendix A to Part 850 --Chronic Beryllium Disease Prevention Program

Informed Consent Form:

I, _____ have carefully read and understand the attached information about the Be-LPT and other medical tests. I have had the opportunity to ask any questions that I may have had concerning these tests.

I understand that this program is voluntary and I am free to withdraw at any time from all or any part of the medical surveillance program. I understand that the tests are confidential, but not anonymous. I understand that if the results of any test suggests a health problem, the examining physician will discuss the matter with me, whether or not the result is related to my work with beryllium. I understand that my employer will be notified of my diagnosis only if I have a beryllium sensitization or chronic beryllium disease. My employer will not receive the results or diagnoses of any health conditions not related to beryllium exposure.

I understand that, if the results of one or more of these tests indicate that I have a health problem that is related to beryllium, additional examinations will be recommended. If additional tests indicate I do have a beryllium sensitization or CBD, the Site occupational Medical Director may recommend that I be removed from working with beryllium. If I agree to be removed, I understand that I may be transferred to another job for which I am qualified (or can be trained for in a short period) and where my beryllium exposures will be as low as possible, but in no case above the action level. I will maintain my total normal earnings, seniority, and other benefits for up to two years if I agree to be permanently removed.

I understand that if I apply for another job, or for insurance, I may be requested to release my medical records to a future employer or an insurance company.

I understand that my employer will maintain all medical information relative to the tests performed on me in segregated medical files separate from my personnel files, treated as confidential medical records, and used or disclosed only as provided by the Americans with Disability Act, the Privacy Act of 1974, or as required by a court order under other law.

I understand that the results of my medical tests for beryllium will be included in the Beryllium Registry maintained by DOE, and that a unique identifier will be used to maintain the confidentiality of my medical information. Personal identifiers will not be included in any reports generated from the DOE Beryllium Registry. I understand that the results of my tests and examinations may be published in reports or presented at meetings, but that I will not be identified.

I consent to having the following medical evaluations:

- ___ Physical examination concentrating on my lungs and breathing
- ___ Chest X-Ray
- ___ Spirometry (a breathing test)
- ___ Blood test called the beryllium-induced lymphocyte proliferation test or Be-LPT
- ___ Other test(s) Specify: _____

Signature of Participant: _____
Date: _____

I have explained and discussed any questions that the employee expressed concerning the Be_LPT, physical examination, and other medical testing as well as the implications of those tests.

Name of Examining Physician: _____
Signature of Examining Physician: _____
Date: _____

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