Contents: Lead

Effective Date: **May 2002**

Point of Contact: Lead Subject Matter Expert

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6. Lead Machining and Fabrication	• Evaluate lead machining or fabrication operations. • Determine/characterize radiation contamination. • Determine worker-exposure monitoring requirements; approve work practices and worker-protection measures. • Determine waste stream. • Ensure training is complete. • Conduct operations. • Establish schedule for clean-up. • Conduct medical surveillance. • Dispose of waste.
7. Lead in Laboratory-scale Use	• Follow the Working with Chemicals Subject Area.
8. Lead in Drinking Water (Building Occupant Protocol)	• Arrange for sampling. • Run water for 5 minutes or until cold.
9. Melting Lead	• Evaluate lead-melting operations and areas. • Determine worker-exposure monitoring requirements; approve work practices and worker-protection

approve work practices and worker-protection measures.
- Ensure training is complete.
- Melt away from breathing zone.
- Establish schedule for clean-up.
- Collect waste and arrange for its removal.
- Conduct medical surveillance.
- Dispose of waste.

Definitions

Exhibits
Contaminated PPE Label

Disposal of Lead Solder Waste

Lead Warning Sign

Forms
Application for Use of BNL Firearms Range for Non-DOE Purposes

Outside Agency User Statement

Training Requirements and Reporting Obligations

This subject area contains training requirements. See the Training and Qualifications Web Site.

This subject area does not contain reporting obligations

References

BNL Water Quality Consumer Confidence Report

Discharge Monitoring & Water Treatment Plant Reports, Environmental Service's Division Web site

ES&H Standard 1.3.5, Planning and Control of Experiments

ES&H Standard 1.3.6, Work Planning and Control for Operations

Hazardous Waste Management Subject Area

Mixed Waste Management Subject Area

National Environmental Policy Act (NEPA) and Cultural Resources Evaluations Subject Area

OSHA 29 CFR 1910.1450, Laboratory Hygiene Plan

Site Environmental Reports, Environmental Service's Division Web Site

Training and Qualifications Web Site

Working With Chemicals Subject Area

Standards of Performance

All staff and guests shall comply with applicable Laboratory policies, standards, and procedures, unless a formal variance is obtained.

All staff and users shall identify, evaluate, and control hazards in order to ensure that work is conducted safely and in a manner that protects the environment and the public.

All staff and users shall ensure that they are trained and qualified to carry out their assigned responsibilities, and shall inform their supervisor if they are assigned to perform work for which they are not properly trained or qualified.

Management System

This subject area belongs to the **Worker Safety and Health** management system.

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Introduction: Lead

Effective Date: **May 2002**

Point of Contact: Lead Subject Matter Expert

Lead is an abundant element valued for its malleability, formability, and density. Its high radiation absorption characteristic has led to its use in experimental nuclear reactors and accelerators, primarily as a shielding material. Lead is used in construction and building trades in paint for its whitening and chalking properties, in solder for its low melting point and ease in bonding to copper, and in flashing for its malleability and ease of soldering. Lead is found in surface materials (lead in paint) in many buildings at BNL. There are some uses of lead-containing compounds in laboratory scale experiments.

Lead is a toxic substance that, if not handled properly, can create adverse health effects. The inhalation or ingestion of lead dust or particles can cause permanent health effects in children and adults. The OSHA, HUD, and EPA have established regulations to require a lead exposure prevention program for certain work conditions. The goal of these requirements is to reduce worker levels of exposure to lead, establish medical surveillance requirements to ensure early detection and treatment of disease, and minimize releases to the environment. This subject area describes BNL measures to enable compliance with these regulations.

This subject area also describes restrictions, defines permitted operations, and documents requirements on the Work Planning and Control for Experiments and Operations Subject Area.

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Subject Area: ***Lead***

1. Lead in Painted Surfaces (Construction and Building Maintenance)

Effective Date: **May 2002**

Point of Contact: Lead Subject Matter Expert

Applicability

This information applies to BNL staff and non-BNL staff who remove or disturb lead in painted surfaces.

Required Procedure

Contact your Supervisor, Facility Support Representative, Environmental Safety and Health Coordinator, Work Control Managers/Coordinator, or the Lead Subject Matter Expert for assistance in obtaining any service below.

Step 1	The Work Planner or Staff contacts the Facility Support Representative to arrange for • A Lead Hazard Assessor to measure the lead content in the painted surface. Accepted methods are XRF measurement or collecting a representative bulk sample for certified laboratory analysis by the American Industrial Hygiene Association (AIHA). • A Facility Support Representative to determine/characterize radiation contamination for painted surfaces in radiological areas.
Step 2	The Lead Hazard Assessor provides guidance for the Work Planner on the lowest, practical dust-generating operation, activity, and procedures. The Lead Hazard Assessor determines worker-exposure monitoring requirements and approves work practices and worker-protection measures (respiratory protection and protective clothing). • Avoid high-dust-generating activities, including grinding, sanding, mechanical buffing, Zamboni buffing, abrasive blasting, sawing, welding, drilling, brazing, torch cutting, burning, rivet busting, or any other high speed tooling of the lead containing painted surface. Such activities may be done on a case-by-case basis, but only with the approval of a Lead Hazard Assessor. • Select low-dust-generating activities, such as manual hand scraping of paint by scraper knife or draw blade, whenever possible. • Hydroblasting may be used on a case by case basis, but only with the permission of a Lead Hazard Assessor. All components of the Work Planning and Control for Experiments and Operations Subject Area must be incorporated into the documentation of the project.
Step 3	The Work Planner contacts the Hazardous Waste Program Manager before lead removal to determine the appropriate waste stream from the type of lead waste generated.

	If the material may be hazardous waste, follow the Hazardous Waste Management Subject Area before generating the waste. If the material is also radioactive, follow the Mixed Waste Management Subject Area.
Step 4	Supervisors ensure that workers with the potential for lead exposure above the action level have completed training. See the Training and Qualifications Web Site. The BNL contracting organization ensures that contractors provide documentation that demonstrates OSHA-compliant training has been received by all workers contacting lead.
Step 5	Lead Workers protect the work area by spreading a barrier on adjacent surfaces at least 6-feet beyond each dimension of the painted surface to be disturbed. • Use 6-mil plastic, burlap or canvas when dry scraping. Wet the surface covering to hold down dust and trap chips. • Use six 6-mil plastic when hydroblasting. Collect pooled water for proper disposal.
Step 7	Lead Workers conduct lead-paint removal following the precautions and controls stated in departmental written procedures and this subject area. Use these work practices whenever possible: • Post the area with a warning sign to alert unauthorized personnel to stay away. See the exhibit Lead Warning Sign. • Remove lead-coated structures intact, when possible (such as door and window frames) intact. • Separate unpainted surfaces or nonlead containing painted surfaces from lead-based paint surfaces. • Separate radiologically contaminated and non-radiologically contaminated surfaces, whenever possible. • Wet painted surfaces with water to hold down dust. Keep the surface wet throughout paint removal operations. • Use chemical strippers when harmful solvent vapors or caustic mists can be controlled. • Use only HEPA vacuum cleaners when vacuuming surfaces.
Step 8	The Occupational Medicine Clinic (OMC) may need to perform medical surveillance of BNL lead workers depending on the level and duration of exposure. 1. If exposure monitoring has not been done, the Department/Division must • Offer blood-lead level screening to employees who conduct this operation for more than 30 minutes per day; • Notify the OMC of the employees who conduct this operation for more than 30 minutes on 30 or more days per year for mandatory medical surveillance and blood testing. 2. If the exposure was represented by exposure monitoring, the Department/Division must • Offer blood-lead level screening to employees whose exposure is at or above the action level on any day. • Notify the OMC of the employees who were exposed at or above the action level for 30 or more days per year for mandatory medical surveillance and blood testing. **Note:** Medical surveillance evaluations are provided at least annually thereafter on lead workers that remain at or above the action level for a combined total of 30 or more days per year. **Note**: Departments/Divisions may develop alternative OMC notification protocols for lead workers that meet the intent of the OSHA requirements and are approved by the Lead Subject Matter Expert.

	Waste Export.
Step 9	Lead Workers dispose of lead-containing construction debris, collected dust, pooled water, drop cloths, and disposable PPE through the Waste Management Division. • Dispose of lead waste in sealed, impermeable bags or containers, labeled with the contents of the bag. • Manage lead waste determined to be Resource Conservation and Recovery Act (RCRA) hazardous according to the Hazardous Waste Management or Mixed Waste Management Subject Areas. • Label lead-contaminated PPE with the Contaminated PPE Label attached to the exterior of the disposal or laundry shipment bag.

References

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Subject Area: ***Lead***

2. Lead Soldering: Electronic Components

Effective Date: **May 2002**

Point of Contact: Lead Subject Matter Expert

Applicability

This information applies to BNL staff and non-BNL staff who perform bench-scale soldering with lead-containing solder on electronic circuit boards and other components with hand-held electric soldering irons or guns.

Required Procedure

Contact your Supervisor, Facility Support Representative, Environmental Safety and Health Coordinator, Work Control Managers/Coordinator, or the Lead Subject Matter Expert for assistance in obtaining any service below.

Step 1	The Work Planner or Staff contacts the Facility Support Representative to arrange for a Lead Hazard Assessor to evaluate lead-soldering operations or areas where large-scale operations are conducted or planned to last for 30 days per year. Operations previously evaluated in the Work Planning and Control for Experiments and Operations Subject Area that addressed the lead hazard elements of this subject area are exempted from this additional review.
Step 2	The Lead Hazard Assessor determines worker-exposure monitoring requirements and approves work practices and worker-protection measures (respiratory protection and protective clothing).
Step 3	The Lead Hazard Assessor provides guidance for the Work Planner on the lowest, practical dust-generating operation, activity, and procedures. The fumes from electronic soldering contain nonhazardous levels of lead, but do contain hazardous decomposition products from the flux, such as organic acid and aldehydes.
Step 4	Supervisors ensure that workers with the potential for lead exposure above the action level have completed training. See the Training and Qualifications Web Site. The BNL contracting organization ensures that contractors provide documentation that demonstrates OSHA-compliant training has been received by all workers contacting lead.
Step 5	Lead Workers solder lead in a manner so that smoke from the soldering is directed away from the breathing zone of all workers. Provide local capture ventilation (elephant trunk type system), when practical.
Step 6	Lead Workers contact the Environmental Safety and Health Coordinator or Environmental Compliance Representative to determine appropriate means to handle and/or collect lead splatter, tailings, and droplets.

	Note: Waste solder should be collected in containers labeled "Solder Scrap for Recycling." When the container is full, contact the Central Shops Division to arrange for removal. Follow the exhibit Dispoal of Lead Solder Waste.
Step 7	Lead Workers conduct proper housekeeping of surfaces where lead is used and stored. Wet wipe, maslinn wipe, or use a HEPA vacuum as needed to maintain lead-dust-free areas. Establish a regular schedule of clean-up of the splatters to maintain a lead-free area. **Note:** The Facility Support Representative, Lead Hazard Assessor, or their designee may conduct post-surface wipe sampling of areas with lead contamination, if appropriate.
Step 8	The Occupational Medicine Clinic (OMC) may need to perform medical surveillance of BNL lead workers depending on the level and duration of exposure. Based on past exposure monitoring of this operation, this operation typically does not create worker exposure levels that trigger medical surveillance requirements. However, if the Lead Hazard Assessor requires exposure monitoring, the Department/Division must notify the OMC of the employees who were exposed at or above the action level for 30 or more days per year for mandatory medical surveillance and blood testing. **Note:** Medical surveillance evaluations are provided at least annually thereafter on lead workers that remain at or above the action level for a combined total of 30 or more days per year. **Note**: Departments/Divisions may develop alternative OMC notification protocols for lead workers that meet the intent of the OSHA requirements and are approved by the Lead Subject Matter Expert.
Step 9	Lead Workers dispose of lead-containing debris through the Waste Management Division (WMD). Waste material will be hazardous waste, and lead waste must be disposed of according to guidance from WMD. Follow the Hazardous Waste Management Subject Area before generating the waste. Label lead-contaminated PPE with the Contaminated PPE Label attached to the exterior of the disposal or laundry shipment bag.

Guidelines

In areas with a high amount of soldering, the room air should not be recycled within the HVAC system. Contact the Lead Subject Matter Expert for an evaluation of the work area.

In determining if existing work planning document is adequate and in preparing work planning and control documentation, consider implications and risks related to

- Hazards and exposure limits;
- Storage requirements;
- Disposal requirements;
- Cost (of the chemical itself, implementing requirements, mitigating impacts, disposal);
- Use requirements;
- Controls on use, storage, and disposal;
- Environmental impacts and environmentally regulated chemicals;
- National Environmental Policy Act (NEPA) documentation requirements (See the National Environmental Policy Act (NEPA) and Cultural Resources Evaluations Subject Area).

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National Environmental Policy Act (NEPA) and Cultural Resources Evaluations Subject Area

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Subject Area: ***Lead***

3. Lead Soldering: Plumbing, Flashing, and High Voltage Lines (Construction and Building Maintenance)

Effective Date: **May 2002**

Point of Contact: Lead Subject Matter Expert

Applicability

This information applies to BNL staff and non-BNL staff who perform soldering with lead-containing solder on building components with hand-held electric soldering irons, guns, or torches.

Required Procedure

Lead-containing solder **must not** be used on potable water supply lines. Recommended alternatives are 50/50 Tin/Antimony solder or equivalent.

Lead solder may be used on wastewater return lines, sewage lines, and nonpotable piping.

Contact your Supervisor, Facility Support Representative, Environmental Safety and Health Coordinator, Work Control Managers/Coordinator, or the Lead Subject Matter Expert for assistance in obtaining any service below.

Step 1	Work Planner or Staff contacts the Facility Support Representative to arrange for a Lead Hazard Assessor to • Evaluate lead-soldering operations/area. Operations previously evaluated in the Work Planning and Control for Experiments and Operations Subject Area that addressed the lead hazard are exempted from this additional review. • Determine worker-exposure monitoring requirements and to approve work practices and worker-protection measures respiratory protection and protective clothing). Lead Workers must wear exposure-monitoring equipment as required by the Lead Hazard Assessor assigned to the operation. **Note:** Operations that are conducted daily or routinely can have a pre-determined exposure assessment schedule established by a Lead Hazard Assessor.
Step 2	The Lead Hazard Assessor provides guidance for the Work Planner to use the lowest fume-generating technique possible. The fumes from soldering contain nonhazardous levels of lead, but do contain hazardous decomposition products from the flux, such as organic acids and aldehydes.
Step 3	Supervisors ensure that workers with the potential for lead exposure above the action level have completed training. See the Training and Qualifications Web Site. The BNL contracting organization ensures that contractors provide documentation that

	The BNL contracting organization ensures that contractors provide documentation that demonstrates OSHA-compliant training has been received by all workers contacting lead.
Step 4	Lead Workers solder lead in a manner so that smoke from the soldering operation is directed away from the breathing zone of all workers. Provide local capture ventilation (elephant trunk type system), when practical.
Step 5	Lead Workers use personal protective equipment (PPE), such as gloves, impervious suits, and respiratory protection as required by the Lead Hazard Assessor or by written procedures on lead use. When open flame or high-temperature sources, such as soldering irons are used, verify that the PPE is safe for high-temperature applications.
Step 6	Lead Workers conduct proper housekeeping of surfaces where lead is used and stored. Wet wipe, maslinn wipe, or use a HEPA vacuum as needed to maintain lead-dust-free areas. **Note:** The Lead Hazard Assessor may conduct post- surface wipe sampling of areas with lead contamination, if appropriate.
Step 7	Lead Workers collect waste solder in containers labeled "Solder Scrap for Recycling." When the container is full, contact the Central Shops Division to arrange for removal. Follow the exhibit Disposal of Lead Solder Waste.
Step 8	The Occupational Medicine Clinic (OMC) may need to perform medical surveillance of BNL lead workers depending on the level and duration of exposure. Based on past exposure monitoring of this operation, this operation typically does not create worker exposure levels that trigger medical surveillance requirements. However, if the Lead Hazard Assessor requires exposure monitoring, the Department/Division must • Offer blood-lead level screening to employees whose exposure is at or above the action level on any day. • Notify the OMC of the employees who were exposed at or above the action level for 30 or more days per year for mandatory medical surveillance and blood testing. **Note:** Medical surveillance evaluations are provided at least annually thereafter on lead workers that remain at or above the action level for a combined total of 30 or more days per year. **Note**: Departments/Divisions may develop alternative OMC notification protocols for lead workers that meet the intent of the OSHA requirements and are approved by the Lead Subject Matter Expert.
Step 9	Lead Workers dispose of lead-containing debris (including decontamination cleanup material, e.g., vacuum debris and wipe rags) through the Waste Management Division (WMD). Waste material will be hazardous waste and must be disposed of according to guidance from the WMD. Follow the Hazardous Waste Management Subject Area before generating the waste. If the material is also radioactive, follow the Mixed Waste Management Subject Area. Label lead-contaminated PPE with the Contaminated PPE Label attached to the exterior of the disposal or laundry shipment bag.

Guidelines

In areas with a high amount of soldering, the room air should not be recycled within the HVAC system. Contact the Lead Subject Matter Expert for an evaluation of the work operation.

In determining if existing work planning document is adequate and in preparing work planning and control documentation, consider implications and risks related to

- Hazards and exposure limits;

- Hazards and exposure limits;
- Storage requirements;
- Disposal requirements;
- Cost (of the chemical itself, implementing requirements, mitigating impacts, disposal);
- Use requirements;
- Controls on use, storage, and disposal;
- Environmental impacts and environmentally regulated chemicals;
- National Environmental Policy Act (NEPA) documentation requirements (See the National Environmental Policy Act (NEPA) and Cultural Resources Evaluations Subject Area).

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Subject Area: ***Lead***

4. Lead Shielding and Ballast

Effective Date: **May 2002**

Point of Contact: Lead Subject Matter Expert

Applicability

This information applies to BNL staff and non-BNL staff who handle lead bricks, sheets, wool or plates in radiation shielding or ballast weight. It does not apply to cutting, drilling, machining, or other alteration of the shape of lead shielding or ballast material (which is covered in the section Lead Machining and Fabricating), and handling of fully encapsulated lead (such as bricks wrapped in tape, dipped in PVC coating).

Required Procedure

Contact your Supervisor, Facility Support Representative, Environmental Safety and Health Coordinator, Work Control Managers/Coordinator, or the Lead Subject Matter Expert for assistance in obtaining any service below.

Step 1	Line Management or the Work Planner contacts the Facility Support Representative to arrange for a Lead Hazard Assessor to evaluate lead shielding or ballast handling involving more than 30 minutes of contact time per person per day with the lead material. Operations previously evaluated in the Work Planning and Control for Experiments and Operations Subject Area that addressed the lead hazard are exempted from this additional review.
Step 2	The Lead Hazard Assessor • Evaluates the oxidation level of the lead material and determines if preliminary oxidation removal will significantly reduce worker exposure to airborne lead during handling; • Plans the work to use the lowest dust-generating operation, activity, and procedures possible; • Determines worker-exposure monitoring requirements and approves work practices and worker-protection measures (respiratory protection and protective clothing).
Step 3	Line Management or the Work Planner contacts the Facility Support Representative to arrange for determining/characterizing radiation contamination of lead material in radiological areas before disturbing the shielding or ballast material.
Step 4	Lead Workers contact the Hazardous Waste Program Manager before waste generation to determine the appropriate waste stream from the type of lead waste generated. Lead should be recycled by the Central Shops Division whenever possible, if it is clean of radioactivity. Waste material will be hazardous waste, and must be disposed of according to guidance from the Waste Management Division. Follow the Hazardous Waste Management Subject

	from the Waste Management Division. Follow the Hazardous Waste Management Subject Area before generating the waste. If the material is also radioactive, follow the Mixed Waste Management Subject Area. Label lead-contaminated Personal Protective Equipment (PPE) with the Contaminated PPE Label attached to the exterior of the disposal or laundry shipment bag. **Note:** Paint chips from lead bricks should be tested by XRF or treated as lead waste.
Step 5	Supervisors ensure that workers with the potential for lead exposure above the action level have completed training. See the Training and Qualifications Web Site. The BNL contracting organization ensures that contractors provide documentation that demonstrates OSHA-compliant training has been received by all workers contacting lead.
Step 6	Lead Workers wear exposure-monitoring equipment as required by the Lead Hazard Assessor. Use PPE, such as gloves, body covering, and respiratory protection, as required by the Lead Hazard Assessor and departmental written procedures on lead use, if applicable.
Step 7	Lead Workers conduct handling operations following the precautions and controls stated in departmental written procedures and this subject area. Use these work practices, whenever possible: • Separate radiologically contaminated and non-radiologically contaminated surfaces, whenever possible. • Use only HEPA vacuum cleaners.
Step 8	Lead Workers conduct proper housekeeping of surfaces where lead is used and stored. Wet wipe, masslinn wipe or use a HEPA vacuum as needed to maintain lead-dust- free areas. **Note:** The Lead Hazard Assessor may conduct post- surface wipe sampling of areas with lead contamination, if appropriate.
Step 9	The Occupational Medicine Clinic (OMC) may need to perform medical surveillance of BNL lead workers depending on the level and duration of exposure. 1. If exposure monitoring has not been done, the Department/Division must • Offer blood-lead level screening to employees who conduct this operation for more than 30 minutes per day; • Notify the OMC of the employees who conduct this operation for more than 30 minutes on 30 or more days per year for mandatory medical surveillance and blood testing. 2. If the exposure was represented by exposure monitoring, the Department/Division must • Offer blood-lead level screening to employees whose exposure is at or above the action level on any day. • Notify the OMC of the employees who were exposed at or above the action level for 30 or more days per year for mandatory medical surveillance and blood testing. **Note:** Medical surveillance evaluations are provided at least annually thereafter on lead workers that remain at or above the action level for a combined total of 30 or more days per year. **Note**: Departments/Divisions may develop alternative OMC notification protocols for lead workers that meet the intent of the OSHA requirements and are approved by the Lead

	workers that meet the intent of the OSHA requirements and are approved by the Lead Subject Matter Expert.

Guidelines

- Enclosing lead structures or encapsulating lead bricks in PVC coating or electrical or duct tape prevents potential worker exposure to surface lead and should be used whenever practical. (Evaluate the potential for activation of the coating in radiological shielding use and avoid coating if activation is possible). Cover piles of lead bricks with a plastic sheet whenever possible.
- Washing the surfaces of oxidized lead material with 10% acetic acid (vinegar) can eliminate loose dust and reduce exposure potential. Treat the rinse as hazardous waste.
- Paint bricks with latex or enamel paint to protect surfaces that will not be handled frequently or receive damage from abrasion or striking by moving equipment.
- Consider replacing lead in shielding material with other material with high density. Substitute materials include cast iron, steel, "Kirksite" and "HeavyMetal".
- Use "sticky step off" pads at entrances to lead-dust-contaminated areas.
- Cover surfaces with blotter paper, aluminum foil, or plastic to minimize surface contamination.
- Use a HEPA vacuum on shielding surfaces before handling to reduce loose lead oxide.
- Use dedicated lead HEPA vacuums that are not used with radioactive contamination to avoid creating mixed waste, whenever possible.
- Use a HEPA vacuum on nondisposable PPE clothing to reduce contamination and send clothing to BNL laundry service for cleaning as necessary.
- As a pollution prevention measure, contact other organizations to determine if extra lead bricks are available before purchasing new ones.
- Wear gloves (leather, cotton, or heavy elastomer) for handling bricks.

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Subject Area: ***Lead***

5. Lead in Firearms Use

Effective Date: **May 2002**
Point of Contact: Lead Subject Matter Expert

Applicability

This information applies to BNL staff who use firearms in qualification and practice during their employment at BNL. It also applies to BNL staff and non-BNL staff who sift the berm at the firing range to remove lead shot from the soil, and to BNL staff involved in BERA use of BNL facilities.

Required Procedure

Lead in Firearms Use contains two subsections:

5.1 Firing of Weapons in Qualification or Practice
5.2 Berm Sifting at the Firing Range

5.1 Firing of Weapons in Qualification or Practice

Step 1	Supervisors ensure that staff involved in firing weapons with the potential for lead exposure above the action level during their BNL employment have completed training. See the Training and Qualifications Web Site.
Step 2	The Safeguards and Security Division (SSD) informs the Facility Support Representative that occupational exposure monitoring is required for the firing session.
Step 3	The Facility Support Representative assigns a Lead Hazard Assessor to conduct occupational exposure monitoring for the firing session
Step 4	Staff minimize exposure to firing weapon to the shortest time possible and move from the firing line as quickly as is safely possible, following the instructions of the Range Officer. (Exposure to lead in firing a weapon is above background levels. Firing a weapon for over 2 hours may result in exposure to lead fumes above the Occupational Exposure Limit.) **Note:** Based on BNL historic exposure monitoring data, compliance with the action level and employee exposure limit may be administratively controlled by the following: • BERA: Limit firearm practice to less than 60 minutes per day. • Safeguards and Security Division: Limit weapon firing to less than 60 minutes per day. If circumstances require practice or qualification to exceed 60 minutes, contact the Facility Support Representative to arrange for a Lead Hazard Assessor to evaluate engineering and

	Support Representative to arrange for a Lead Hazard Assessor to evaluate engineering and administrative controls that will ensure compliance with the OSHA Action Level for the shooters and range instructors. SSD is responsible for controlling exposure of their workers to lead via appropriate engineering and administrative controls and personal protective equipment.
Step 5	Non-BNL users of BNL range facilities must sign and return to the Safeguards and Security Division an Outside Agency User Statement and an Application for Use of BNL Firearms Range for Non-DOE Purposes. Non-BNL user organizations are responsible for • Controlling exposure of their workers to lead via appropriate engineering and administrative controls and personal protective equipment; • Establishing appropriate range safety controls for their sessions.
Step 6	Firing weapons may result in occupational exposure that triggers Occupational Medicine Clinic (OMC) medical surveillance. Unless objective exposure monitoring data indicate acceptable exposure levels, the Department/Division must notify the OMC of the need for medical surveillance if the employee fires the weapon for more than 60 minutes/day for 30 or more days per year. **Note:** Medical surveillance evaluations are provided at least annually thereafter on lead workers that remain in these conditions. **Note**: Departments/Divisions may develop alternative OMC notification protocols for lead workers that meet the intent of the OSHA requirements and are approved by the Lead Subject Matter Expert.

5.2 Berm Sifting at the Firing Range

Contact your Supervisor, Facility Support Representative, Environmental Safety and Health Coordinator, Work Control Managers/Coordinator, or the Lead Subject Matter Expert for assistance in obtaining any service below.

Step 1	Line Management or Work Planner contacts the Facility Support Representative to arrange for an evaluation of the operation by a Lead Hazard Assessor.
Step 2	The Lead Hazard Assessor determines acceptable practices for handling the lead material, worker-exposure monitoring requirements and work practices, and worker protection measures respiratory protection and protective clothing).
Step 3	The Lead Hazard Assessor or Facility Support Representative conducts occupational exposure monitoring, if required, for the sifting operation.
Step 4	The Lead Hazard Assessor provides guidance for the Work Planner on the lowest, practical dust-generating operation, activity, and procedures. The dust from the berm contains lead particulate.
Step 5	Supervisors ensure that workers sifting the berm with the potential for lead exposure above the action level have completed training. See the Training and Qualifications Web Site.
Step 6	Workers use controls to minimize exposure: • Spread plastic beneath the wheel barrow and screen to minimize spreading lead debris; • Wear disposable body covering suit to prevent lead contamination; • Wear respiratory protection if it is determined to be required by the Lead Hazard Assessor.
Step 7	Workers process the lead debris via the Central Shops Division for off-site recycling.

Step 8	The Occupational Medicine Clinic (OMC) may need to perform medical surveillance of BNL lead workers depending on the level and duration of exposure. Based on past exposure monitoring of this operation, this operation typically does not create worker exposure levels that trigger medical surveillance requirements. However, if the Lead Hazard Assessor requires exposure monitoring, the Department/Division must • Offer blood-lead level screening to employees whose exposure is at or above the action level on any day; • Notify the OMC of the employees who were exposed at or above the action level for 30 or more days per year for mandatory medical surveillance and blood testing. **Note:** Medical surveillance evaluations are provided at least annually thereafter on lead workers that remain at or above the action level for 30 or more days per year. **Note**: Departments/Divisions may develop alternative OMC notification protocols for lead workers that meet the intent of the OSHA requirements and are approved by the Lead Subject Matter Expert.
Step 9	Workers dispose of decontamination clean-up material (HEPA vacuum debris and wipe rags) through the Waste Management Division (WMD). Follow the Hazardous Waste Management Subject Area before generating the waste. Label lead-contaminated PPE with the Contaminated PPE Label attached to the exterior of the disposal or laundry shipment bag.

References

Hazardous Waste Management Subject Area

Training and Qualifications Web Site

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Subject Area: ***Lead***

6. Lead Machining and Fabricating

Effective Date: **May 2002**

Point of Contact: Lead Subject Matter Expert

Applicability

This information applies to BNL staff and non-BNL staff who alter the shape of lead bricks, sheets, or plates in radiation shielding or ballast weight material using powered or hand tools. It applies to those working in machine shop areas or on-site work fabrication.

Required Procedure

Contact your Supervisor, Facility Support Representative, Environmental Safety and Health Coordinator, Work Control Managers/Coordinator, or the Lead Subject Matter Expert for assistance in obtaining any service below.

Step 1	Line Management or the Work Planner contacts the Facility Support Representative to arrange for a Lead Hazard Assessor to evaluate the lead machining or fabrication operations. Exemptions to formal evaluation are the following: • Operations that are conducted in established lead-machining areas that have received previous approval of a Lead Hazard Assessor and are of the same size, duration, and work practices as previous work; • Operations in lead-handling areas that involve shearing lead sheets, cutting lead sheets or bricks with nonpowered hand tools, band saw or power hacksaw cutting of lead sheets or bricks with oil or coolant flood that is captured; • Operations previously evaluated in Work Planning and Control for Experiments and Operations Subject Area (that addressed the lead hazard), or National Synchrotron Light Source (NSLS) Shielding Configuration Control permits. **Note:** Operations that are conducted daily or routinely can have a pre-determined exposure assessment schedule established by a Lead Hazard Assessor.
Step 2	Line Management or the Work Planner contacts the Facility Support Representative to arrange for • A Facility Support Representative to determine/characterize radiation contamination of lead material in radiological areas before machining or fabricating lead material from radiological areas; • A Lead Hazard Assessor to evaluate the oxidation level of the lead material and determine if preliminary decontamination is appropriate.
Step 3	The Lead Hazard Assessor

	• Provides guidance for the Work Planner on the lowest, practical dust-generating operation, activity, and procedures; • Determines worker-exposure monitoring requirements, and approves work practices and worker-protection measures (respiratory protection and protective clothing).
Step 4	Contact the Hazardous Waste Program Manager before lead machining to determine the appropriate waste stream from the type of lead waste generated. If it is determined that the material may be hazardous waste, follow the Hazardous Waste Management Subject Area before generating the waste. If the material is also radioactive, follow the Mixed Waste Management Subject Area. Label lead-contaminated PPE with the Contaminated PPE Label attached to the exterior of the disposal or laundry shipment bag.
Step 5	Supervisors ensure that workers with the potential for lead exposure above the action level have completed training. See the Training and Qualifications Web Site.
Step 6	Lead Workers wear exposure-monitoring equipment as required by the Lead Hazard Assessor. Use personal protective equipment (PPE), such as gloves, impervious suits, and respiratory protection as required by the Lead Hazard Assessor and departmental written procedures on lead use, if applicable.
Step 7	Lead Workers conduct operations following the precautions and controls stated in departmental written procedures and this subject area. Use these work practices whenever possible: • Separate radiologically contaminated and non-radiologically contaminated surfaces, whenever possible. • Use only HEPA vacuum cleaners to vacuum surfaces.
Step 8	Lead Workers conduct proper housekeeping of surfaces where lead is used and stored. Wet wipe, masslinn wipe, or use a HEPA vacuum on surfaces as needed to maintain lead- dust-free areas. Establish a regular schedule of clean-up of the debris to maintain a lead-free area. **Note:** The Lead Hazard Assessor may conduct post- surface wipe sampling of areas with lead contamination, if appropriate.
Step 9	The Occupational Medicine Clinic (OMC) may need to perform medical surveillance of BNL lead workers depending on the level and duration of exposure. Based on past exposure monitoring of this operation, this operation typically does not create worker-exposure levels that trigger medical surveillance requirements. However, if the Lead Hazard Assessor requires exposure monitoring, the Department/Division must notify the OMC of the employees who were exposed at or above the action level for 30 or more days per year for mandatory medical surveillance and blood testing. **Note:** Medical surveillance evaluations are provided at least annually thereafter on lead workers that remain at or above the action level for 30 or more days per year. **Note**: Departments/Divisions may develop alternative OMC notification protocols for lead workers that meet the intent of the OSHA requirements and are approved by the Lead Subject Matter Expert.
Step 10	Lead Workers dispose of lead-containing debris, collected dust, pooled water, drop cloths, and disposable PPE through the Waste Management Division (WMD). Lead waste must be disposed of according to guidance from the WMD. Recycle lead through Central Shops Division whenever possible. Manage lead waste determined to be Resource Conservation and Recovery Act (RCRA) hazardous according to the Hazardous Waste Management Subject Area or the Mixed Waste Management Subject Area, if radioactive. Label lead-contaminated PPE with the Contaminated PPE Label attached to the exterior of the

	Label lead contaminated PPE with the Contaminated PPE Label attached to the exterior of the disposal or laundry shipment bag.

References

Hazardous Waste Management Subject Area

Mixed Waste Management Subject Area

Training and Qualifications Web Site

Work Planning and Control for Experiments and Operations Subject Area

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Subject Area: ***Lead***

7. Lead in Laboratory-scale Use

Effective Date: **May 2002**

Point of Contact: Lead Subject Matter Expert

Applicability

This information applies to BNL staff and non-BNL staff who use lead and lead-containing compounds in bench-scale laboratory work, including synthesis, analysis, testing, reactions, and other experimental use that is covered by OSHA 29 CFR 1910.1450, Laboratory Hygiene Plan.

Required Procedure

Step 1	Follow the Working with Chemicals Subject Area for procedures on laboratory scale use of chemicals, including lead. **Note:** Consider also following the Guidelines below for laboratory-scale use of lead.

Guidelines

Consider doing the following when working with lead:

- Use lead in a laboratory hood or with other engineering controls that eliminate employee exposure.
- Substitute less hazardous metals or compounds, whenever possible.
- Encapsulate lead bricks used for ballast (weighting down) laboratory equipment, such as ring stands.
- Substitute other less hazardous ballast material, such as steel, Kirksite, or concrete blocks.
- Wear gloves (leather, cotton, or heavy elastomer) for handling bricks.
- Wear disposable PVC, Latex, or nitrile for laboratory-scale handling of powder and solutions.

References

OSHA 29 CFR 1910.1450, Laboratory Hygiene Plan

Working with Chemicals Subject Area

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Subject Area: ***Lead***

8. Lead in Drinking Water (Building Occupant Protocol)

Effective Date: **May 2002**

Point of Contact: Lead Subject Matter Expert

Applicability

This information applies to occupants of all BNL buildings where potable water is supplied.

Required Procedure

Step 1	If there is a concern of possible lead contamination in the drinking water, contact your Environmental Compliance Representative to arrange for a sample of potable water from drinking fountains or kitchen faucets. **Note:** For more information on the quality of BNL's potable water, see the • Most recent BNL Water Quality Consumer Confidence Report; • Monthly Potable Water reports to the Suffolk County Department of Health Services on the Environmental Service's Division Web site, Discharge Monitoring & Water Treatment Plant Reports; • Annual Site Environmental Report.
Step 2	To ensure adequate flushing of infrequently used potable water supplies, run tap water for 5 minutes or until cold before use.

References

BNL Water Quality Consumer Confidence Report

Discharge Monitoring & Water Treatment Plant Reports, Environmental Service's Division Web site

Site Environmental Reports, Environmental Service's Division Web site

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Subject Area: ***Lead***

9. Melting Lead

Effective Date: **May 2002**

Point of Contact: Lead Subject Matter Expert

Applicability

This information applies to BNL staff who work with apparatus and are involved in operations at a BNL facility in which lead or lead alloys are melted and poured into molds for creating objects of unique shape. It also applies to BNL staff who work with apparatus and are involved in operations at a BNL facility in which lead or lead alloys are melted and poured into vessels to reduce the volume of the lead for disposal purposes.

Required Procedure

Contact your Supervisor, Facility Support Representative, Environmental Safety and Health Coordinator, Work Control Managers/Coordinator, or the Lead Subject Matter Expert for assistance in obtaining any service below.

Step 1	Line Management or the Work Planner contacts the Facility Support Representative to arrange for a Lead Hazard Assessor to evaluate lead-melting operations and areas.
Step 2	The Lead Hazard Assessor determines worker-exposure monitoring requirements and approves work practices and worker-protection measures (respiratory protection and protective clothing). Operations previously evaluated in Work Planning and Control for Experiments and Operations Subject Area, that addressed the lead hazard, are exempted from this additional review.
Step 3	Line Management or the Work Planner contacts the Environmental Compliance Representative to determine the need for an EPA Air Emission Permit for the operation.
Step 4	The Lead Hazard Assessor provides guidance for the Work Planner on the lowest, practical dust-generating operation, activity, and procedures. The atmosphere above lead-melting apparatus is free of hazardous levels of lead fumes, but exposure to airborne lead can occur from • Improper handling of lead-dust-contaminated material before melting; or • Poor control of splashes in pouring steps.
Step 5	Supervisors ensure that workers with the potential for lead exposure above the action level have completed training. See the Training and Qualifications Web Site.
Step 6	Lead Workers wear exposure-monitoring equipment as required by the Lead Hazard Assessor. Use personal protective equipment (PPE), such as gloves, impervious suits, and respiratory protection as required by the Lead Hazard Assessor and departmental written procedures on lead use, if applicable. Verify that the PPE is safe for high-temperature applications.

Step 7	Lead Workers melt lead in a manner so that atmosphere from the apparatus is directed away from the breathing zone of all workers. Provide local capture ventilation whenever feasible.
Step 8	Lead Workers conduct proper housekeeping of surfaces where lead is used and stored. Wet wipe, masslinn wipe, or use a HEPA vacuum as needed to maintain lead-dust-free areas. Establish a regular schedule of clean-up of the splatters to maintain a lead-free area. **Note:** The Lead Hazard Assessor may conduct post- surface wipe sampling of areas with lead contamination, if appropriate.
Step 9	Lead Workers contact the Environmental Safety and Health Coordinator or Environmental Compliance Representative to determine the method to handle collected lead splatter, tailings, and droplets. Collect waste lead in containers labeled "Lead Scrap for Recycling." When the container is full, contact Central Shops Division to arrange for removal.
Step 10	The Occupational Medicine Clinic (OMC) may need to perform medical surveillance of BNL lead workers depending on the level and duration of exposure. Based on past exposure monitoring of this operation, it is known that this operation typically does not create worker-exposure levels that trigger medical surveillance requirements. However, if the Lead Hazard Assessor requires exposure monitoring, the Department/Division must notify the OMC of the employees who were exposed at or above the action level for 30 or more days per year for mandatory medical surveillance and blood testing. **Note:** Medical surveillance evaluations are provided at least annually thereafter on lead workers that remain at or above the action level for 30 or more days per year. **Note**: Departments/Divisions may develop alternative OMC notification protocols for lead workers that meet the intent of the OSHA requirements and are approved by the Lead Subject Matter Expert.
Step 11	Lead Workers dispose of lead-containing debris (including decontamination clean-up material: vacuum debris and wipe rags) through the Waste Management Division (WMD). Waste material will be hazardous waste and must be disposed of according to guidance from the WMD. Follow the Hazardous Waste Management Subject Area before generating the waste. If the material is also radioactive, follow the Mixed Waste Management Subject Area before generating the waste. Label lead-contaminated PPE with the Contaminated PPE Label attached to the exterior of the disposal or laundry shipment bag.

Guidelines

In determining if existing work planning document is adequate and in preparing work planning and control documentation, consider implications and risks related to

- Hazards and exposure limits;
- Storage requirements;
- Disposal requirements;
- Cost (of the chemical itself, implementing requirements, mitigating impacts, disposal);
- Use requirements;
- Controls on use, storage, and disposal;
- Environmental impacts and environmentally regulated chemicals;
- National Environmental Policy Act (NEPA) documentation requirements (See the National Environmental Policy Act (NEPA) and Cultural Resources Evaluations Subject Area);
- Cover horizontal surfaces with heat resistant drop covering to make clean-up of splatter easier.

References

National Environmental Policy Act (NEPA) and Cultural Resources Evaluations Subject Area

Training and Qualifications Web Site

Work Planning and Control for Experiments and Operations Subject Area

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Contaminated PPE Label

CAUTION

Clothing contaminated with Lead

Do not remove dust by blowing or shaking.

Dispose of lead contaminated wash water in accordance with applicable Local, State, and Federal Regulations.

Contact your Waste Management Representative or Environmental Compliance Representative for assistance.

Subject Area: ***Lead***

Disposal of Lead Solder Waste

Effective Date: **May 2002**

Point of Contact: Lead Subject Matter Expert

Waste solder from electronics repair and assembly operations is typically composed of tin/lead or tin/silver solder. Collect waste solder in a container labeled "Solder Scrap for Recycling." Use a single container located near the soldering operations.

When solder stations are cleaned, empty waste solder to the labeled container. When the container is full, it can be taken to Central Shops Division, where it will be sent off-site for recycling. Call Ext. 3352 to make arrangements to bring it to Central Shops.

If solder wastes are **not** recycled, then they must be managed as Hazardous Wastes due to lead or silver content.

- Use a single Satellite Accumulation Area located near the soldering operations. See the section Establishing a Satellite Accumulation Area in the Hazardous Waste Management Subject Area for information.
- Label the container with a Hazardous Waste Label, include a description of the contents, and keep the container closed except when adding or removing waste. See the Hazardous Waste Management Subject Area for information.
- After filling the container, complete a Nonradioactive Waste Control Form and move the container to the 90-Day Accumulation Area for pick up by Waste Management. See the Hazardous Waste Management Subject Area for information.

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Lead Warning Sign

WARNING

Lead Working Area

Poison, No Smoking or Eating

APPLICATION FOR USE OF BNL FIREARMS RANGE FOR NON-DOE PURPOSES

INSTRUCTIONS TO APPLICANTS

Please submit two (2) copies of this form along with a completed Certification of Liability Insurance to Manager, Safeguards and Security Division, Brookhaven National Laboratory, Upton, New York 11973. Application and certificate must be received two weeks before requested date of use.

Name of Group or Organization:		Telephone Number:
Address (Number and Street)	Town or Village and Zip Code	County

INFORMATION REQUESTED FOR USE OF BNL FIREARMS RANGE

DATE & TIME REQUESTED:	From: Month, Day, Hour (am/pm)	Estimated Attendance:
	To: Month, Day, Hour (am/pm)	

CONDITIONS FOR USE OF BNL FIREARMS RANGE FOR NON-DOE PURPOSES

1. All users of the BNL Firearms Range shall comply with all rules and regulations governing visitors to the Laboratory site, as well as those rules and regulations specifically applicable to the use of firearms at the Range.
2. Users of the BNL Firearms Range must leave such property in good order after use.

The following paragraphs are omitted for agencies of the U.S. Government

3. The applicant agrees to indemnify and hold harmless the Government of the United States and Brookhaven Science Associates, their employees, officers, agents, or any other persons acting on their behalf, against loss or expense, including attorneys' fees, except in cases of the Government′s or Brookhaven Science Associates′ sole negligence, for damage because of bodily injury including death at any time resulting there from, sustained by any person or persons; or on account of damage to property arising out of or in consequence of the use of property covered by this agreement; whether such injuries to persons or damage to property are due or claimed to be due to any active or passive negligence of the Government of the United States or Brookhaven Science Associates, their employees, officers, agents or any other persons.

Check the Appropriate Box Below

4. ☐ This application shall be accompanied by a certificate of comprehensive general liability insurance with limits of not less than $500,000 per person/$1,000,000 per occurrence for bodily injury, and $100,000 per occurrence for property damage. The Government of the United States and Brookhaven Science Associates must be named as additional insureds for this activity. Failure to do so will result in the disapproval of application.

or

☐ The applicant certifies that it is a self-insurer and that it will indemnify the Government of the United States and Brookhaven Science Associates in accordance with paragraph 3.

CERTIFICATION OF APPLICANT

We, as duly authorized representatives of the group or organization named in this application, have read and agree to abide by the above conditions.

Signature of Applicant	Telephone	Signature of Presiding Officer of Group/Org
Printed Name and Address of Applicant		Printed Name and Title of Presiding Officer

BROOKHAVEN NATIONAL LABORATORY

SAFEGUARDS AND SECURITY DIVISION

POLICE GROUP

OUTSIDE AGENCY USER STATEMENT

"Range Instructors of Federal and local groups shall be provided with a copy of the Range Regulations and be required to sign a statement that the regulations are understood and will be followed before permission to use the Live Fire Range is given."

I _____ have received, read, and understand the Brookhaven National Laboratory Live Fire Range regulations.

Signature_____ **Date**_____

Definitions: Lead

Effective Date: **May 2002**

Point of Contact: Lead Subject Matter Expert

Term	Definition
action level	Airborne concentration of lead particulate specified by OSHA (30 ug/m3) to serve as an indicator of the need to perform an action that may include (depending on specific circumstances) training, medical surveillance, and exposure monitoring.
BNL contracting organization	Any BNL organization that enters into an agreement with a non-BNL company or organization to perform work at BNL when the work will involve or disturb lead, cause potential worker or environmental exposure to lead above exposure limits, or in any other way trigger an action stated in this subject area.
container	A bottle, box, jar, bag, vial, or other vessel in which lead metal powder or a lead-containing compound is stored.
exposure limit	Airborne concentration of lead particulate exceeding the lower of the published concentration of the OSHA Permissible Exposure Limit or the ACGIH Threshold Limit Value®. The exposure limit represents the highest airborne concentration to which an employee may be exposed without engineering controls, administrative controls, respiratory protection, and full medical surveillance.
laboratory scale	Work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by one person. "Laboratory scale" excludes those workplaces whose function is to produce commercial quantities of materials.
lead	Elemental Lead, all inorganic lead compounds, and organic lead soaps. (No lower limit in OSHA.)
lead-based paint (LBP)	Protective coating applied to wood, metal, concrete or other substrate that contains measurable lead by XRF exceeding 1 mg/cm2 or AA/ICP analysis exceeding 5000 mg/kg (0.5%).
Lead Hazard Assessor	A person qualified to perform lead hazard assessment, collect lead in paint analysis data, and recommend engineering controls, personal protective equipment, exposure monitoring, and medical surveillance needs. The role is typically filled by certain Facility Support Representatives of the Radiological Control Division; however, personnel from other BNL organizational units may meet the qualification criteria established by the Lead Subject Matter Expert (SME). Qualification of the person is by a combination of educational training and work experience that demonstrates, to the satisfaction of the Lead SME, knowledge of the duties, role, and implication of the work to be performed.
controls	Activities that lessen the ability to generate dusts, such as wetting a surface before scraping.
worker protection	Use of HEPA-filtered or supplied air respirator, protective clothing, baseline lead medical exams and periodic surveillance, and lead hazard awareness training.

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Revision History: Lead

Point of Contact: Lead Subject Matter Expert

Revision History of this Subject Area

Date	Description	Management System
May 2002	This subject area describes the procedures for safely working with lead at BNL. It establishes procedures for control measures, hazard assessments, exposure monitoring, medical surveillance, and waste disposal. This subject area complies with OSHA and EPA requirements for worker safety and environmental protection regarding lead.	Worker Safety and Health

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