

SUBJECT AREA CONTENT

[\[Introduction\]](#) [\[Contents\]](#) [\[Forms/Exhibits\]](#) [\[References\]](#) [\[Definitions\]](#) [\[Instructions\]](#) [\[Keywords\]](#) [\[Changes\]](#)

Management System: [Worker Safety and Health](#)

Subject Area: Noise and Hearing Conservation

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Effective Date: Jun 23, 2014 (Rev 4.2) Periodic Review Due: Jun 23, 2019	Subject Matter Expert: Christopher Weilandics	Management System Executive: Ed Nowak	Management System Steward: Gail Mattson
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Introduction

This subject area provides an overview of the Noise and Hearing Conservation Program and describes the procedures for implementing the regulatory requirements and exposure standards in OSHA Title 29 of the Code of Federal Regulations Part 1910.95 and the ACGIH (American Conference of Governmental Industrial Hygienists). It gives requirements to implement hearing conservation controls for work areas where noise levels exceed occupational exposure limits.

The BNL Noise and Hearing Conservation Program contains the following provisions:

- Investigating alternative control measures, including engineering and administrative controls;
- Evaluating the work conditions to prescribe the correct hearing protection equipment;
- Conducting medical monitoring;
- Training users and supervisors in the elements of the program and hearing conservation fundamentals.

Contents

Section

Overview of Content (see section for full process)

[1. Planning Operations and Facilities Involving Noise Exposure](#)

- Minimize noise exposure in the planning stage.
- Include noise abatement in engineering design.
- Conduct hazard assessment.

[2. Evaluating Noise Hazards](#)

- Evaluate operations/areas that generate noise.
- Conduct assessment and complete written report.
- Maintain report.

[3. Controlling Noise Exposure](#)

- Implement controls.
- Use Personal Protective Equipment.

[4. Conducting Medical Surveillance](#)

- Complete OMC forms.
- Complete baseline audiogram.
- Retest if results show an STS.
- If retest confirms an STS, see an otolaryngologist.
- Evaluate individual's operations and workplaces.
- Document and maintain records.

[5. Contractor's Noise & Hearing Conservation Program](#)

- Assess job hazards.
- Monitor hearing protection program.
- Properly wear, maintain, clean, and store equipment.
- Maintain documentation.

[Definitions](#)

Exhibits

[BNL Exposure Limit](#)

[Noise Hazard Posting](#)

[Noise Personal Protective Equipment & Hearing Protection Controls - Requirements & Recommendations](#)

[OSHA Occupational Noise Exposure Regulation](#)

Forms

None

Training Requirements and Reporting Obligations

This subject area contains the following training requirements (see the [BNL Training and Qualifications](#) website):

- Noise and Hearing Conservation (TQ-NOISE).

This subject area does not contain reporting obligations.

External/Internal Requirements

Requirement Number	Requirement Title
<u>10 CFR 851</u>	Worker Safety and Health Program
<u>20 CFR Parts 1 and 30 (EEOICPA)</u>	Interim Final Rule Implementing the Energy Employees Occupational Illness Compensation Program Act (EEOICPA)

29 CFR 1910	Labor/Occupational Safety and Health Standards
29 CFR 1926	Labor/Safety and Health Regulations for Construction
ACGIH TLVs	Threshold Limit Values for Chemical Substances and Physical Agents
BSA Contract No. DE-SC0012704 - Clause C.4	Statement Of Work
BSA Contract No. DE-SC0012704 - Clause H.27 (ACT)	Non-Federal Agreements for Commercializing Technology (Pilot) (ACT)
BSA Contract No. DE-SC0012704 - Clause H.3	Contractor Assurance System

References

29CFR1910.95: OSHA Occupational Noise Exposure

[Job Assessment \(JAF\) & Additional Medical Surveillance \(AMS\) Forms](#), [Occupational Medicine Clinic Home page](#)

[OSHA Hearing Conservation Publication 3074](#)

[OSHA's Noise and Hearing Conservation](#) Web site

[Records Management](#) Subject Area

[Work Planning and Control for Experiments and Operations](#) Subject Area

Standards of Performance

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

Managers shall analyze work for hazards, authorize work to proceed, and ensure that work is performed within established controls.

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.

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[Questions/Comments](#)

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PROCEDURE: PLANNING OPERATIONS AND FACILITIES INVOLVING NOISE EXPOSURE

Management System: Worker Safety and Health		
Subject Area: Noise and Hearing Conservation		
1. Planning Operations and Facilities Involving Noise Exposure		
Effective Date: Jun 23, 2014	Subject Matter Expert: Christopher Weilandics	Management System Executive: Ed Nowak

Applicability

This information applies to BNL staff who plan operations and facilities that have the potential to cause hazardous noise exposure.

Required Procedure

Contact an [Safety & Health Representative](#) or an [ES&H Coordinator](#) for assistance with this procedure.

Step 1	<p>When new facilities or renovations are planned, evaluate potential noise exposures by consulting with the Modernization Project Office or other organizations on the design of buildings, machines, and layout of floor plans to minimize noise exposure to occupants. Include evaluation of the following sources:</p> <ul style="list-style-type: none"> • Ambient/background noise, • Machines and equipment that will operate continuously or intermittently, • Continuous or intermittent release of energy that may startle the worker (e.g. gaseous releases/high pressure releases even if sporadic or infrequent).
Step 2	<p>When acquiring equipment that has the potential to produce hazardous noise levels, if possible obtain noise ratings from manufacturers so that the lowest noise-generating equipment is selected. Contact a Safety & Health Representative for assistance in this evaluation.</p>
Step 3	<p>When planning work where hazardous noise levels are anticipated, check "Noise" on the work planning and control documentation. See the Work Planning and Control for Experiments and Operations Subject Area. Ensure that a hazard assessment of the operation is conducted (see the section Evaluating Noise Hazards), addressing the following:</p> <ul style="list-style-type: none"> • Engineering controls, substitution or elimination; • Administrative controls; • Personal Protective Equipment (PPE); • Exposure monitoring; • Medical surveillance.

References

[Work Planning and Control for Experiments and Operations](#) Subject Area

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PROCEDURE: EVALUATING NOISE HAZARDS

Management System: Worker Safety and Health		
Subject Area: Noise and Hearing Conservation		
2. Evaluating Noise Hazards		
Effective Date: Jun 23, 2014	Subject Matter Expert: Christopher Weilandics	Management System Executive: Ed Nowak

Applicability

This information applies to BNL staff who plan operations in areas that have the potential to cause hazardous noise exposure.

Required Procedure

Step 1	Supervisors or Staff determine from existing documentation or postings whether areas or operations have potential hazardous noise levels. Include the following sources: <ul style="list-style-type: none"> • Ambient/background noise, • Machines and equipment that will operate continuously or intermittently, • Continuous or intermittent release of energy that may startle the worker (e.g gaseous releases/high pressure releases even if sporadic or infrequent).
Step 2	If there is no documentation/posting or an operation has changed that affects noise levels, the Work Planner, Supervisor, or Staff contacts the ES&H Coordinator or Designee to arrange for a noise area survey.
Step 3	The ES&H Coordinator or Designee contacts a Safety & Health Representative or Facility Support Representative to perform a noise area survey and to prepare a written report of the assessment with recommendations on engineering controls, administrative controls (e.g., postings, barriers) and Personal Protective Equipment (PPE) to use. When area surveys indicate exposure above the OSHA Action Level, a Safety & Health Representative or Facility Support Representative performs dosimetry or an exposure evaluation on representative workers for compliance with the BNL Exposure Limit and prepares a written report of the assessment with recommendations on administrative controls (e.g., time limits) and PPE.
Step 4	Staff preparing dosimetry and area survey reports distribute reports to the Supervisor, ES&H Coordinator, Line Management, the Occupational Medicine Clinic (dosimetry), and the Industrial Hygiene Group.
Step 5	The Industrial Hygiene Group maintains the file of written hazard assessment reports and exposure monitoring records.
Step 6	When noise levels above the OSHA Action Level are measured in areas with the potential for

	employee exposure, the Staff Member performing the hazard assessment, in conjunction with Line Management, determines the appropriate mechanism to demarcate the hazardous areas using signage or other effective mechanisms. See the exhibit Noise Hazard Posting for examples of acceptable wording for signs.
Step 7	When the workforce comprises workers of reproductive age, perform an occupational workplace evaluation to determine if there is unacceptable risk from reproductive hazards posed to the worker(s) from occupational noise exposure. If so, supervisors reassess job assignments and controls to eliminate the hazard.

Guidelines

Contact your Supervisor, [Facility Support Representative](#), [Environmental Safety and Health Coordinator](#), [Work Control Managers/Coordinator](#), or [Safety & Health Representative](#) for assistance.

Physical hazards in the workplace (including ultrasound and noise) can pose reproductive hazards.

An organization can post noise survey and dosimetry results as information for staff.

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PROCEDURE: CONTROLLING NOISE EXPOSURE

Management System: [worker Safety and Health](#)

Subject Area: [Noise and Hearing Conservation](#)

3. Controlling Noise Exposure

Effective Date: Jun 23, 2014

Subject Matter Expert: [Christopher Weilandics](#)

Management System Executive: [Ed Nowak](#)

Applicability

This information applies to BNL staff who conduct operations in areas that have the potential to cause hazardous noise exposure.

When controlling workplace stressors, the process for determining feasible and effective controls is to be based on the following hierarchy of controls:

- Elimination;
- Substitution;
- Engineering controls;
- Administrative controls;
- Personal protective equipment.

The best controls are those that eliminate the hazard, followed by those that control the source or shield the worker from the source. Next in the hierarchy is work planning that limits a worker's exposure to the source. The least desirable approach is controlling exposure at the worker's location, especially the use of protective equipment worn by the worker.

Required Procedure

Step 1	If an uncharacterized work area has the potential for hazardous noise exposure, go to the section Evaluating Noise Hazards to determine the hazard and controls.
Step 2	If equipment is causing excessive noise exposure to employees, the Supervisor or Designee contacts Plant Engineering, or the equipment manufacturer for feasibility of implementing engineering controls, repairs, or modifications.
Step 3	In areas with high noise levels, the Supervisor or Designee implements the engineering and administrative controls, specified in the hazard assessment report in the section Evaluating Noise Hazards .
Step 4	In areas above the OSHA Action Level, Line Management and Staff select personal protective equipment (PPE) listed in existing work planning & control, or other documentation that specifies hearing-protection equipment or contacting a qualified PPE selector (e.g., an SME qualified Facility Support Representative, Safety & Health Representative, or ESH Coordinator.) Note: See the exhibit Noise Personal Protective Equipment & Hearing Protection Controls - Requirements & Recommendations for the requirements and recommendations on selecting PPE.

Step 5

In areas above the OSHA Action Level, staff follow administrative controls and Personal Protective Hearing Equipment specified in a hazard assessment report or work planning and control for experiments and operations documentation.

- Use PPE capable of reducing the noise levels to the BNL Exposure Limit (85 dBA TWA-8hr) for the duration of exposure to the noise source.
- When the reduction of noise by PPE alone does not reduce the noise levels to the BNL Exposure Limit (85 dBA TWA-8hr), wear the maximum hearing protection (including double protection) and limit exposure time in the area to the length stated in the [BNL Exposure Limit](#) exhibit.
- Inspect equipment before each donning.
- Clean and properly store or dispose of hearing-protection equipment after each use.

Guidelines

Hearing protection may be stored at the entrance of posted noise areas, but they need to be kept cleaned and protected.

Inform your Supervisor, [Environmental Safety and Health Coordinator](#), [Safety & Health Representative](#), or the [Noise and Hearing Subject Matter Expert](#) of any problems encountered in using the hearing-protection equipment or suggestions for improvements of the BNL program.

More information on hearing protection is available from the [OSHA's Noise and Hearing Conservation](#) Web site and in [OSHA Hearing Conservation Publication 3074](#).

See the exhibit [OSHA Occupational Noise Exposure Regulation](#) for more information on OSHA hearing program requirements.

References

[OSHA Hearing Conservation Publication 3074](#)

[OSHA's Noise and Hearing Conservation](#) Web site

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PROCEDURE: CONDUCTING MEDICAL SURVEILLANCE

Management System: Worker Safety and Health		
Subject Area: Noise and Hearing Conservation		
4. Conducting Medical Surveillance		
Effective Date: Jun 23, 2014	Subject Matter Expert: Christopher Weilandics	Management System Executive: Ed Nowak

Applicability

This information applies to BNL staff who are involved with medical surveillance.

Required Procedure

Step 1	The Supervisor completes the OMC Job Assessment Form and indicates "Noise" for personnel with the potential for exposure above 85dBA.
Step 2	The ESH Coordinator, Safety & Health Representative, or Facility Support Representative complete the OMC Additional Medical Surveillance Form : <ul style="list-style-type: none"> • As soon as possible after staff have their first occupational noise exposure at or above the OSHA Action Level (85 dBA 8-hr time weighted average) on any day; • Annually for staff who continue to be exposed at or above the OSHA Action Level.
Step 3	The Occupational Medicine Clinic (OMC) schedules and performs a baseline audiogram in response to this request.
Step 4	If an audiogram shows a Standard Threshold Shift (STS), then the individual is retested within 30 days.
Step 5	If the retest audiogram confirms an STS, then OMC refers the individual for an evaluation by an otolaryngologist.
Step 6	The OMC reviews the otolaryngologist's evaluation and notifies the OSHA Recordkeeper if OMC determines that the STS is noise-induced.
Step 7	The Occupational Injury/Illness Coordinator requests that the Industrial Hygiene Representative conducts an evaluation of the individual's operations and/or workplaces for excessive noise exposure.
Step 8	The Industrial Hygiene Representative conducts, documents, and maintains records of the evaluation and transmits them to the Occupational Injury/Illness Coordinator, Line Management, and the individual.
Step 9	The Occupational Injury/Illness Coordinator records the STS as caused or aggravated by BNL occupational noise exposure.
Step 10	Line Management ensures that the following steps are taken when a work-related STS occurs and potential exposure at or above the Action Level continues: <ul style="list-style-type: none"> • Staff not using hearing protection are fitted with hearing protectors, trained in their use and care,

and required to use them.

- Staff already using hearing protectors are refitted and retrained in the use of hearing protectors and provided with hearing protectors offering greater attenuation if necessary.

Guidelines

Contact your Supervisor, [Facility Support Representative](#), [Environmental Safety and Health Coordinator](#), [Work Control Managers/Coordinator](#), or [Safety & Health Representative](#) for assistance.

The Supervisor, Safety & Health Representative, Facility Support Representative, or ESH Coordinator can complete the Additional Medical Surveillance Form before exposure for staff with potential exposure at or above the OSHA Action Level on any day.

References

[Job Assessment \(JAF\) & Additional Medical Surveillance \(AMS\) Forms](#), [Occupational Medicine Clinic](#) Web site

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PROCEDURE: CONTRACTOR'S NOISE & HEARING CONSERVATION PROGRAM

Subject Area: [Noise and Hearing Conservation](#)

5. Contractor's Noise & Hearing Conservation Program

Effective Date: **Jun 23, 2014**

Subject Matter Expert: [Christopher Weilandics](#)

Management System Executive: [Ed Nowak](#)

Applicability

This information applies to the BNL Contracting Organization and the Contractor when the project has the potential to meet or exceed the Action Level for noise.

Required Procedure

Step 1	The BNL Contracting Organization determines if the project has the potential to meet or exceed the Action Level as per the sections Planning Operations and Facilities Involving Noise Exposure and Evaluating Noise Hazards .
Step 2	<p>The BNL Contracting Organization</p> <ul style="list-style-type: none"> ● Specifies in the bid package that <ul style="list-style-type: none"> ○ the contractor's and any subcontractor's programs must comply with 29CFR1910.95: OSHA Occupational Noise Exposure and American Conference of Governmental Industrial Hygienists, Inc. (ACGIH) Threshold Limit Values (TLVs); ○ the contractor and any subcontractor provide all exposure monitoring data for the contracted work to the BNL Contracting Organization; ● Monitors the implementation of the hearing-protection program by the Contractor; ● Stops work by Contractors that fail to comply with their program.
Step 3	<p>The BNL Contracting Organization ensures that the Contractor's and Subcontractor's Health & Safety Plans address the following:</p> <ul style="list-style-type: none"> ● Employee exposure monitoring; ● Audiometric testing; ● Personal Protective Equipment (PPE) and its noise-reduction rating to adequately protect the Contractor's employee from noise hazards.
Step 4	<p>The BNL Contracting Organization ensures that the Contractor's workers properly wear and maintain PPE as per the Contractor's Health & Safety Plan, by</p> <ul style="list-style-type: none"> ● Periodically Inspecting the work site; ● Reviewing the Contractor's documentation on compliance.
Step 5	<p>For workers exposed at or above the OSHA Action Level, the BNL Contracting Organization ensures that the Contractor provides the BNL Contracting Organization with</p> <ul style="list-style-type: none"> ● Exposure monitoring data; ● Proof of an OSHA-compliant audiometric testing program;

- Proof of an OSHA-compliant Noise & Hearing Conservation Training Program.

Step 6

The BNL Contracting Organization maintains Contractor's documentation provided in step 5 according to the [Records Management](#) Subject Area by providing a copy of exposure records to the Safety and Health Services Division.

References

[Records Management](#) Subject Area

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| [SBMS Home Page](#) | [Top of Subject Area](#) | [Instructions](#) | [Changes](#) |

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DEFINITIONS

Definition: Noise and Hearing Conservation

Term	Definition
A weighted	The curve defined in national standards relating to the measurement of sound pressure level when assessing potential hearing damage and other noise health effects at all sound levels.
Action Level, OSHA	8-hour Time Weighted Average (TWA) of 85dBA.
Additional Medical Surveillance Form (AMS)	BNL form used to request surveillance for those items not on the JAF. These evaluations can be done at the time of the scheduled examination or on request or at any time.
administrative controls	A procedure exercised by a supervisor for protecting staff from hazardous noise levels by limiting their exposure time. Such procedures may include <ul style="list-style-type: none"> • Reducing exposure time; • Posting warning signs at entrances and/or at the periphery of areas where there is sustained noise in excess of the limits.
audiometric testing	Evaluation of an individual's hearing, using audiograms and other elements in a program in full compliance with 29CFR 1910.95 (g).
BNL contracting organization	A BNL Organization who administers a contract to a non-BNL Contractor to perform work in a high noise area or perform an operation that will produce high noise exposure levels to BNL employees or the Contractor's employees.
canal band (canal cap)	A personal hearing protector that is held into the external ear canal by a band.
decibel (dB)	A nondimensional unit used to express sound pressure levels. It is the log of the ratio of the measured sound pressure level to a reference level.
ear muff	A personal hearing protector that fits over the entire ear, snug against the head.
ear plug	A personal hearing protector that is inserted into the external ear canal.
engineering controls	A means of protecting personnel from hazardous noise levels by reducing the noise before it reaches the exposed individual. Such methods may include <ul style="list-style-type: none"> • Alternative equipment design; • Vibration isolation; • Dampening enclosures/barriers.
hazardous noise exposure	An employee exposure that exceeds an 8-hour Time Weighted Average (TWA) of 85dBA. This is derived from the ACGIH Threshold Limit Value® and the OSHA Action Level at which hearing protection, medical

	surveillance, and training are initiated.
Job Assessment Form (JAF)	A BNL document used provide information to the Occupational Medicine Clinic (OMC) before an examination can be scheduled.
noise area, high	Area where noise routinely meets or exceeds the Action Level.
Noise Reduction Rating (NRR)	An approximation of the reduction in the noise level that will enter a person's ear when a hearing protector is worn.
Standard Threshold Shift (STS)	Change in hearing threshold relative to the baseline audiogram exceeding regulatory limits.

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Management System: [Worker Safety and Health](#)

Subject Area: [Noise and Hearing Conservation](#)

BNL Exposure Limit

Effective Date: Jul 14, 2009

BNL Adopted Exposure Limit (dBA) based on OSHA PEL and ACGIH TLV

Maximum Exposure Time			BNL Exposure Limit (dBA)
Hours	Minutes	Seconds	
24			80
16			82
8			85
4			88
2			91
1			94
	30		97
	15		100
	7.5		103
	3.75		106
	1.88		109
	0.94		112
		28	115
		14	118
		7.03	121
		3.52	124
		1.76	127
		0.88	130
		0.44	133
		0.22	136
		0.11	139
		0	140*

* No exposure to continuous, intermittent, or impact noise levels in excess of 140 dBC peak

OSHA Action Level is 85dBA TWA-8 with 5 db Exchange rate

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[Subject Matter Expert List](#)

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[Contact List \(Laboratory Roles\)](#)
[Employee Role Lookup](#)

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[SBMS Help Desk](#)
[SBMS Instructions](#)
[Frequently Asked Questions](#)
[Can't View PDFs?](#)
[Search Tips](#)
[Glossary/Definitions](#)
[Keywords](#)

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[Lessons Learned](#)
[Recalled Products](#)
[Assessment Tracking System](#)
[Human Performance \(HPI\)](#)
[ESS&H Policy](#)
[SBMS External](#)
[Prime Contract](#)



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- Home
- My SBMS
- Documents
- Forms & Exhibits
- Requirements
- Reports
- Tools
- Contacts
- Lessons Learned
- Help

- ABOUT
- PHONE
- MAPS
- CAREERS
- CONTACT US



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[Search Tips](#)

Management System: [Worker Safety and Health](#)

Subject Area: [Noise and Hearing Conservation](#)

Noise Hazard Posting

Effective Date: Jul 29, 2011

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- SBMS Help Desk
- SBMS Instructions
- Frequently Asked Questions
- Can't View PDFs?
- Search Tips
- Glossary/Definitions
- Keywords

Lab-wide Resources

- Lessons Learned
- Recalled Products
- Assessment Tracking System
- Human Performance (HPI)
- ESS&H Policy
- SBMS External
- Prime Contract



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Exhibit: Noise Hazard Posting

Signs: Use when posting areas.

<p>Sample Sign</p> 	
<p>Signal Word Required Word: CAUTION [Format: Black text color on yellow background; symbol is optional]</p>	
<p>Hazard Warning Recommended words: [Format: Black text color on white background]</p>	<p>Noise Hazard [also acceptable is High Noise Area or an equivalent message]</p>
<p>Hazard Warning</p>	<p>Recommended words for intermittent operations causing a high noise area: [Black text color on contrasting background color]</p> <p>Hearing protection required when equipment is operating</p>
<p>Recommended words for continuous high noise area with administrative controls: [Black text color on contrasting background color]</p>	<p>Hearing protection required when in this area more than ___ minutes</p>
<p>Recommended words for continuous high noise area: [Black text color on contrasting background color]</p>	<p>Hearing protection required in this area</p>
<p>Hazard Symbol [Symbol used on Hazard/Emergency Information Placard]</p>	
<p>PPE symbols [Optional symbol for Personal Protective Equipment used in the Hazard Warning Message]</p>	

[Home](#) | [My SBMS](#) | [Documents](#) | [Forms & Exhibits](#) | [Requirements](#) | [Reports](#)

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Standards-Based Management System



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SBMS Search

Management System: [Worker Safety and Health](#)

Subject Area: [Noise and Hearing Conservation](#)

Noise Personal Protective Equipment & Hearing Protection Controls - Requirements & Recommendations

Effective Date: Jul 14, 2009

The Noise Personal Protective Equipment & Hearing Protection Controls - Requirements & Recommendations is provided as a [Word](#) file.

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[Subject Matter Expert List](#)

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[Contact List \(Laboratory Roles\)](#)
[Employee Role Lookup](#)

Help

[SBMS Help Desk](#)
[SBMS Instructions](#)
[Frequently Asked Questions](#)
[Can't View PDFs?](#)
[Search Tips](#)
[Glossary/Definitions](#)
[Keywords](#)

Lab-wide Resources

[Lessons Learned](#)
[Recalled Products](#)
[Assessment Tracking System](#)
[Human Performance \(HPI\)](#)
[ESS&H Policy](#)
[SBMS External](#)
[Prime Contract](#)



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Noise Personal Protective Equipment & Hearing Protection Controls - Requirements & Recommendations

**Certification of Hazard Assessment
Selection of BNL Personal Protective Equipment (PPE)
for Noise & Hearing Conservation Protection**

These generic PPE requirements are based on typical noise exposure situations, operations, and controls at BNL. These determinations factor in noise attenuation of PPE; comfort and fit, impact of sensory perception, human performance tendencies; and typical personnel exposure.

Follow these requirements as a minimum, unless other less or more stringent requirements are stated in a written hazard assessment prepared by a person qualified by the Noise & Hearing conservation SME Officer to evaluate the noise exposure properties, protective characteristics of PPE, and job/exposure characteristics.

Certification by: C. Weilandics, CIH, 07/14/09 (BNL Noise and Hearing conservation SME)

A. USE OF HEARING PROTECTION DEVICES (HPD) IN HIGH NOISE AREAS

A1. BNL Requirement: Provide HPD to maintain the dose to the worker \leq 85dBA TWA-8.

A2: BNL Requirement: In areas with constant or intermittent noise levels \geq 85dBA, post the area with a caution sign requiring one of the following:

- Hearing protection at all times,
- Hearing protection required based on operational status (e.g., When operating equipment),
- Hearing protection required based on Time-based Administrative Controls (e.g., hearing protection required for exposure greater than ___ minutes). Incorporate a safety factor of half the allowable exposure time per the BNL Exposure Limit,
- Combination of HPD and Administrative controls.

Recommendation: When practical, label portable equipment (capable of creating exposure \geq 85dBA to operators under typical operating conditions) with a label requiring "hearing protection while operating this equipment"

Recommendation: When practical, HPD should be worn in areas with constant noise sources \geq 85dBA even when Administrative Controls are used.

Recommendation: When practical, double HPD (i.e., ear plugs and ear muffs) should be worn in areas >100 dBA even when Administrative Controls are used.

B. ACCEPTABLE TYPES OF HEARING PROTECTION DEVICES (HPD): The main types of hearing protection devices (HPD) used to protect workers' hearing are ear plugs, canal bands, and ear muffs. All three types are acceptable for use at BNL.

<p>EAR PLUGS: Soft, smooth moldable foam, typically with a tapered, rounded tip to aid insertion. Fits into and seals the ear canal; generally treated as "disposable" after each use. Some styles are reusable by a single user. Typically Noise Reduction Rating (NRR) of 21 to 33dB.</p>	
<p>CANAL BANDS: Headband with attached plugs that are positioned into the outer part of the ear canal and held in place by inward tension of the band. Reusable by a single user. Typically NRR of 20 to 22dB.</p>	

EAR MUFFS: Soft ear cushions seal around the outer ear. Ideal when frequent removal and replacement of hearing protection is necessary. Typically NRR of 20 to 30 dB.



C. PROTECTION ASSIGNED TO HPD

- The ability of a hearing protection device to reduce noise is expressed as a **Noise Reduction Rating (NRR)**. The higher the NRR, the more protective the device. A third-party certifies the NRR based on a standardized protocol. The NRR is determined under a controlled laboratory setting and does not necessarily represent the protection level workers in the field will receive.
- **Requirement:** Adjust the NRR for A-weighting by subtracting 7dB from the NRR listed for the HPD.
- **Requirement:** When a second set of HPD is added (i.e., ear plugs and ear muffs worn simultaneously), the NRR for the lower of the two HPD is assigned a value of 5 dBA.

C1. BNL Requirement: For compliance reporting, the $TWA_{8\text{ dBA}}$ must be below the BNL Exposure Limit (i.e., $85\text{ dBA } TWA_8$) based on the following:

Compliance $TWA_{8\text{ dBA}} = \text{Measured } TWA_{8\text{ dBA}} - (\text{NRR}-7)$
If double HPD used, Compliance $TWA_{8\text{ dBA}} = \text{Measured } TWA_{8\text{ dBA}} - (\text{NRR}-7) - 5\text{dB}$

C2. BNL Recommendation: For HPD selection, the $TWA_{8\text{ dBA}}$ should be below the BNL Exposure Limit ($85\text{ } TWA_{8\text{ dBA}}$) after subtracting the NRR- 7dB / 2, based on the following:

BNL Recommended Protection = Measured or anticipated $TWA_{8\text{ dBA}} - (\text{NRR}-7) / 2$
If double HPD used, BNL Recommended Protection = $TWA_{8\text{ dBA}} - (\text{NRR}-7) / 2 - 5\text{dB}$

Example: The NRR applied to a typical exposure scenario:

Example: NRR on box of ear muffs is 29dB, and the worker exposure is $93\text{ dBA } TWA_8$
Compliance $TWA_{8\text{ dBA}} = \text{Measured } TWA_{8\text{ dBA}} - (\text{NRR}-7)$ $= 93 - (29 - 7)$ $= 93 - 22$ $= 71\text{ dBA}$
If a second HDP is added: Compliance $TWA_{8\text{ dBA}} = 71\text{ dBA} - 5\text{dB} = 66\text{ dBA}$
BNL Recommended Protection = Measured or anticipated $TWA_{8\text{ dBA}} - (\text{NRR}-7) / 2$ $= 93 - (29\text{dB} - 7\text{db}) / 2$ $= 93 - 11$ $= 82\text{ dBA}$
If a second HDP is added: BNL Recommended Protection = $82\text{ dBA} - 5\text{dB} = 77\text{ dBA}$

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OSHA Occupational Noise Exposure Regulation

Effective Date: Jul 14, 2009

The OSHA Occupational Noise Exposure Regulation exhibit is provided as a [Word](#) file.

The only official copy of this file is the one on-line in SBMS.

Before using a printed copy, verify that it is the most current version by checking the *effective date*.

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OSHA Occupational Noise Exposure Regulation

The OSHA regulation for Noise and Hearing Conservation is available at

-   1910.95 Occupational noise exposure.
-   Appendix Appendix A to § 1910.95--Noise Exposure Computation.
-   Appendix Appendix B to § 1910.95--Methods for Estimating the Adequacy of Hearing Protector Attenuation.
-   Appendix Appendix C to § 1910.95--Audiometric Measuring Instruments.
-   Appendix Appendix D to § 1910.95--Audiometric Test Rooms.
-   Appendix Appendix E to § 1910.95--Acoustic Calibration of Audiometers.
-   Appendix Appendix F to § 1910.95--Calculations and Application of Age Corrections to Audiograms.
-   Appendix Appendix G to § 1910.95--Monitoring Noise Levels Non-Mandatory Informational Appendix..
-   Appendix Appendix H to § 1910.95--Availability of Referenced Documents.