

Chapter 18: [Hearing Conservation](#)

Hazard Analysis and Control Procedures

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1 Purpose

The purpose of these procedures is to protect personnel from hearing loss caused by occupational exposure to excessive noise. They cover identifying and evaluating noise hazards and implementing controls. They apply to workers, supervisors, area and building managers, the hearing conservation program manager, and Occupational Health.

1.1 Standards for Occupational Noise Exposure

For occupational noise, the Department of Energy has mandated the use of the ACGIH *threshold limit value (TLV)* as the *occupational exposure limit (OEL)*.¹ The TLV for noise is defined as an eight-hour *time-weighted average (TWA)* of 85 dBA (*decibels A-weighted scale*).² This means that in an area where the intensity of noise exceeds an average of 85 dBA over eight hours, the amount of time workers may work in the area, without *hearing protection*, must be reduced in relation to the amount that the noise exceeds 85 dBA, as shown in Table 1.

Table 1 Maximum Number of Hours of Exposure Allowed (includes impact noise)

Noise Level (dBA)	Duration (Hours)
80	24
82	16
85	8
88	4
91	2
94	1
97	0.5
100	0.25
103	0.125

- 1 The American Conference of Governmental Industrial Hygienists (ACGIH), Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs) ([ACGIH TLVs and BEIs](#))
- 2 The limit is exceeded when the dose is more than 100 percent as indicated on a dosimeter set with a 3 dB time-intensity exchange rate and an eight-hour criteria level of 85 dBA.

For example, if the noise in an area is measured at an average of 88 dBA over an eight-hour period, personnel may only work in that area without wearing hearing protection for a maximum of four hours. If the noise does not exceed an average of 85 dBA over an eight-hour period, personnel may work a full eight-hour shift without wearing hearing protection.

2 Procedures

The hearing conservation program reduces potential noise exposure to acceptable levels by

- Anticipating, recognizing, and evaluating noise hazards before they exist
- Surveying hazards that already exist
- Implementing recommended engineering controls where feasible (reducing machine noise using dampeners, insulation, isolation, distance)
- Implementing administrative controls (wearing hearing protection, limiting exposure time, training, medical surveillance) when engineering controls are not feasible

2.1 Design Review

New projects involving machinery and other high noise-producing equipment are submitted to the hearing conservation program manager for evaluation as part of ESH project review (see [General Policy and Responsibilities: ESH Project Review Procedure](#)). The hearing conservation program manager identifies any areas of concern, provides comments and recommendations for safe use, and may require noise level monitoring before equipment is used by personnel.

2.2 Identifying and Working in High Noise Areas

Areas where noise levels may be *high* (at or above 85 dBA as continuous noise or for eight hours or an entire shift) must be identified, evaluated, and, if confirmed to have high noise levels, posted. Workers in such areas must wear hearing protection and must be evaluated for enrollment in the hearing conservation program (see Section 2.3).

Step	Person	Action
1.	Worker/supervisor/area or building manager	Requests a noise survey (by contacting the hearing conservation program manager) when any of these conditions apply: <ul style="list-style-type: none">▪ It is difficult to hear someone speak when they are less than three feet away.▪ You must raise your voice considerably to be heard due to noise interference.▪ Impact noises (at intervals greater than 1 second) cause discomfort when heard.▪ Ordinary noises sound muffled to you after you have finished a work shift.
2.	Hearing conservation program manager	If the noise is area specific, <ul style="list-style-type: none">▪ Conducts a noise survey of the area (following Hearing Conservation: Noise Survey Requirements)

Step	Person	Action
		If the noise is activity specific, <ul style="list-style-type: none"> Arranges for personal noise dosimetry for a representative, affected worker (see Section 2.3)
3.	Hearing conservation program manager	If the survey indicates continuous noise levels at or above 85 dBA for eight hours or an entire shift or periodic impact noise of 140 dB or higher: <ul style="list-style-type: none"> Designates the area a <i>high noise area</i> and adds it to the designated high noise area list (Hearing Conservation: Designated High Noise Area List) Notifies the area/building manager, recommending appropriate hearing protection (see Section 2.4) Arranges for personal noise dosimetry for a representative, affected worker (see Section 2.3)
4.	Area/building manager	If notified that the area is a high noise area: <ul style="list-style-type: none"> Posts an effective hazard warning sign at all entrances to the area. The sign must clearly state the noise hazard and requirements of the area. (See Section 2.2.1.)
5.	Worker	Follows posted requirements, including wearing hearing protection, whenever working in a designated high noise area (and wears hearing protection during activities that generate high noise levels)
6.	Worker/supervisor/area or building manager	Contacts the hearing conservation program manager to resurvey the area if there is a change in production, process, equipment, or controls that may increase noise levels

2.2.1 Posting Requirements

The area/building manager must post an effective hazard warning sign at all entrances to a designated high noise area. The sign must clearly state the noise hazard and requirements of the area. See Figure 1 for an example.



Figure 1 Sample Designated High Noise Area Warning Sign

2.3 Enrolling Workers in the Hearing Conservation Program

Workers who may be exposed to high noise levels routinely for an entire shift or eight hours, either because they work in high noise areas or because of activities they perform, are subject to personal noise dosimetry (that is, wearing a personal noise dosimeter for a shift to measure their noise exposure during that time). If the dosimetry indicates a high average noise level (at or above 85 dBA for eight hours or an entire shift), the person must be enrolled in the hearing conservation program, which entails training and medical surveillance. Other affected workers, routinely working in the same area or performing the same activities, must also be enrolled in the program. Dosimetry for each individual is not necessary.

Workers who perform brief tasks or jobs while exposed to high noise levels are not required to enroll in the program; however, they must wear hearing protection.

Step	Person	Action
1.	Hearing conservation program manager	If a noise survey indicates continuous noise levels at or above 85 dBA for eight hours or an entire shift in an area or an activity is suspected of exposing a worker to such noise levels <ul style="list-style-type: none"> ▪ Arranges for personal noise dosimetry (following Hearing Conservation: Noise Survey Requirements)
2.	Worker	Wears personal noise dosimeter for a full shift, as directed by the hearing conservation program manager
3.	Hearing conservation program manager	Observes and records general information about personnel work processes
4.	Hearing conservation program manager	Retrieves dosimetry, records readings
5.	Hearing conservation program manager	Develops a personal notification memo and sends it in a timely manner directly to the person who wore the dosimeter, his or her supervisor, the area/building manager, and the ESH coordinator
6.	Hearing conservation program manager	If the dosimetry indicates a high average noise level (at or above 85 dBA for eight hours or an entire shift) <ul style="list-style-type: none"> ▪ Instructs supervisors to enroll personnel in the hearing conservation program by assigning training and medical surveillance
7.	Supervisor	Assigns required training (ESH Course 222) and medical surveillance (ESH Course 222ME) to all affected personnel (both the person who wore the dosimeter and others who work in the same area or perform the same activities)
8.	Worker	Completes required training (ESH Course 222)
9.	Occupational Health	Conducts baseline and annual audiometric testing (ESH Course 222ME) (see Hearing Conservation: Medical Surveillance Requirements)
10.	Worker	Participates in baseline and annual audiometric testing
11.	Worker	Properly uses hearing protection in designated high noise areas and during activities that generate high noise levels

2.4 Personal Protective Equipment – Hearing Protection

Hearing protection is **recommended** anytime personnel are exposed to noise levels at or above 85 dBA, irrespective of the duration of exposure. As appropriate, and in compliance with the TLV, a reduction in standard area hearing protection requirements may be made by the program manager for passersby or others in high noise areas based on the duration of the time in the noisy area.

Hearing protection is **required** if there is the potential to be exposed in excess of the TLV (85 dBA for an eight-hour TWA). Appropriate hearing protection must be chosen that reduces the exposure to less than 100 percent of the TLV.

Personnel who work in designated high noise areas must be provided with and wear appropriate personal hearing protectors when equipment is operating. The protection must reduce noise exposure to acceptable levels (below 85 dBA or 140 dB for impact noise). In some areas, dual hearing protection (such as ear muffs and earplugs) is necessary to sufficiently reduce exposure to meet this criterion.

Hearing protectors have a *noise reduction rating (NRR)* number as specified by the manufacturer on the packaging. The NRR is a general guide to the level of noise reduction (in decibels) the protector provides in laboratory test situations if it is fitted and worn properly.

To determine the effective noise reduction of a hearing protector used in the workplace, subtract 7 dB from the NRR, if using the A-weighted sound data.

For dual protection, such as ear muffs and earplugs worn simultaneously:

Check the NRR between muff and plugs and use the highest one

- If using the A-weighted sound level data, correct the above NRR by subtracting 7 dB
- For adding the remaining and less effective NRR, simply add the arbitrary value of 5 dB

Personnel must follow manufacturers' instructions for cleaning, wearing and storing hearing protectors.

[Occupational Health](#) will supply and fit custom-molded earplugs for personnel who, for medical reasons, cannot use standard, disposable earplugs or earmuffs.

3 Forms

The following forms and systems are required by these procedures:

- [Hearing Conservation: Designated High Noise Area List](#). Lists designated high noise level areas
- [Industrial Hygiene Document Database](#). Database of SLAC industrial hygiene reports

4 Recordkeeping

The following recordkeeping requirements apply for these procedures:

- The hearing conservation program manager maintains a list of designated high noise areas ([Hearing Conservation: Designated High Noise Area List](#)).

- The hearing conservation program manager maintains noise level survey records and personal notification memos (in the [Industrial Hygiene Document Database](#)).

5 References

[SLAC Environment, Safety, and Health Manual](#) (SLAC-I-720-0A29Z-001)

- [Chapter 18, “Hearing Conservation”](#)
 - [Hearing Conservation: Noise Survey Requirements](#) (SLAC-I-730-0A09S-044). Describes requirements for noise surveys
 - [Hearing Conservation: Medical Surveillance Requirements](#) (SLAC-I-730-0A09S-045). Describes requirements for baseline and annual audiometric testing
 - [Hearing Conservation Program Site](#) (SharePoint)
- [Chapter 1, “General Policy and Responsibilities”](#)
 - [General Policy and Responsibilities: ESH Project Review Procedure](#) (SLAC-I-720-0A24C-001)

Other SLAC Documents

- ESH Course 222, Hearing Conservation Training ([ESH Course 222](#))
- ESH Course 222ME, Hearing Conservation Medical Exam ([ESH Course 222ME](#))
- [SLAC Occupational Health Center](#)

Other Documents

- Title 8, *California Code of Regulations*, “Industrial Relations”, Division 1, “Department of Industrial Relations”, Chapter 3.2, “California Occupational Safety and Health Regulations (Cal/OSHA)”, Subchapter 7, “General Industry Safety Orders”, Group 15, “Occupational Noise”, Article 105, “Control of Noise Exposure” ([8 CCR 5095–5100](#))
- Title 8, *California Code of Regulations*, “Industrial Relations”, Division 1, “Department of Industrial Relations”, Chapter 3.2, “California Occupational Safety and Health Regulations (Cal/OSHA)”, Subchapter 4, “Construction Safety Orders”, Article 3, “General”, Section 1521, “Ear Protection” ([8 CCR 1521](#))
- American Conference of Governmental Industrial Hygienists (ACGIH). Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs) ([ACGIH TLVs and BEIs](#))