1.0 Purpose

The purpose of this program is to help protect Sunbelt Controls employees from hearing loss due to occupational noise exposure. Although Sunbelt Controls attempts to control noise exposures, certain operations and workstations may expose employees to significant noise levels. All personnel who are regularly exposed to occupational noise levels at or exceeding an 8-hour time-weighted average of 85dBA are included in the Hearing Conservation Program (HCP). This applies only to employees who incur exposure as part of their regularly assigned job duties.

2.0 Responsibilities

Department Heads, Managers, Supervisors, and Principal Investigators:

- Provide work environments that minimize noise to the greatest extent reasonable
- Provide hearing protective devices for employees where needed
- Request that EH&S evaluate noisy operations
- Ensure that employees exposed to noise over the action level are given training and provided with audiometric exams and hearing protective devices
- Provide easy access to hearing protective devices and ensure that employees use such devices where appropriate
- Post areas known to present noise hazards with signs requiring the use of hearing protectors

Employees and Visitors:

- Wear approved hearing protective devices in posted noise hazard areas
- Maintain hearing protectors in sanitary condition and proper working order
- Report noise hazards and hearing protector problems to the appropriate supervisor

Environment, Health & Safety (EH&S):

- Monitor work sites for noise levels and inform employees and supervisors of results
- Recommend appropriate engineering and administrative noise control measures
- Assist employees in selection of proper protective devices and provide instruction on their use

Audiometric Testing Contractor/Consultant:

- Provide baseline, annual, and post-employment audiometric exams
- Communicate any identified standard threshold shifts to the employee and his or her supervisor
- Provide information and training on noise hazards and hearing conservation
- Establish any work restrictions necessary to prevent additional hearing loss

3.0 Definitions

Action Level – the level of noise exposure at which:

- An employee must be enrolled in the Hearing Conservation Program and provided audiometric testing
- Representative noise exposure monitoring is required by EH&S
- Hearing protectors and training on noise hazards must be provided to the employee

* ***OSHA has set the current action level at 85 A-weighted decibels, or dBA, over an eight-hour period***.

Audiometric Testing – exams that measure the sensitivity of a person's hearing threshold in decibels. The testing also establishes a baseline hearing threshold that is compared to later exams to determine if hearing loss has occurred.

Decibel (dB) – the standard unit used to measure sound level. The A-weighted decibel scale, abbreviated as dBA, is commonly used to measure sounds heard by the human ear. The decibel scale is logarithmic, and every three dBA is a doubling of the sound level.

Hertz (Hz) – the unit of measure for noise frequency in cycles per second. (1 cycle/ second = 1Hz)

Permissible Exposure Limit (PEL) – the maximum legal noise exposure, established by OSHA. The current PEL is 90 dBA over an eight-hour period.

Noise Reduction Rating (NRR) – a measure of the noise reduction that a given hearing protective device provides.

Standard Threshold Shift (STS) – a change in hearing threshold relative to the baseline audiogram of an average of 10 DBA or more at 2000, 3000, and 4000 Hz in either ear.

4.0 Program Overview

4.1 Who Should Be Included in the Program

Employees who are routinely exposed to an eight-hour time-weighted average of 85 dBA

4.2 What Departments or Occupations Are at Risk for Elevated Noise Levels

- Sheet Metal Shop Area
- Piping Shop Area

4.3 Major Elements of the Program

- Noise exposure assessments
- Audiometric testing
- Hearing protective equipment
- Employee awareness training
- Recordkeeping

4.4 Noise Exposure Assessments

Noise exposure is described either in terms of an 8-hour time-weighted average sound level or a noise dose (in percent at the 8-hour allowable exposure).

Employee exposure to occupational noise should be maintained within the limits outlined in Table 1.

When employee exposure to occupational noise is expected to equal or exceed an 8-hour time-weighted average of 85 dBA, or equivalently, a dose of 50 percent or greater, the

employee must be included in an effective hearing conservation program as outlined in this document.

4.5 Exposure Monitoring

EH&S performs noise exposure monitoring of employees who may be exposed to noise over OSHA's 85-decibel dBA action level on an eight-hour time-weighted average basis. Personal or area noise monitoring is conducted to identify employees for inclusion in the Hearing Conservation Program and to enable the proper selection of hearing protectors. Area noise monitoring is also used to identify locations where average noise levels exceed OSHA's 90 dBA permissible exposure limit. These are areas where hearing protection should always be worn.

Table 1: Permissible Noise Exposure

Cal/OSHA Permissible Exposure Limits for Occupational Noise	
Sound Pressure Level (dB(A))	**Duration Time (hours)**
80	32
81	27.9
82	24.3
83	21.1
84	18.4
85	16
86	13.9
87	12.1
88	10.6
89	9.2
90	8
91	7
92	6.2
93	5.3

Sound Pressure Level (dB(A))	Duration Time (hours)
94	4.3
95	4
96	3.5
97	3
98	2.6
99	2.3
100	2
101	1.7
102	1.5
103	1.4
104	1.3
105	1
106	0.87
107	0.76
108	0.66
109	0.57
110	0.5

111	0.44
112	0.38
113	0.33
114	0.29
115	0.25
116	0.22
117	0.19
118	0.16
119	0.14
120	0.125
121	0.11
122	0.095
123	0.082
124	0.072
125	0.063
126	0.054
127	0.047
128	0.041
129	0.036
130	0.031

Employees or their supervisors should contact EH&S to schedule noise monitoring if they suspect exposures to excessive noise on the job, or if previously monitored noise levels may have changed due to modifications to equipment or processes. EH&S should also be contacted to schedule monitoring if the hearing protectors in use are suspected of being inadequate. If desired, employees or their representatives may observe the noise monitoring procedure by arranging with EH&S prior to the date of the monitoring.

Evaluations of employee exposure are recorded and printed via the noise dosimeter. The report allows for the documentation of all necessary information including name of

employee, job classification, employee number; date, location, and results of measurements; and description of the noise measurement equipment and calibration information.

Persons whose noise exposures have been monitored may request written notification of their exposure monitoring results from EH&S. Persons whose eight-hour time-weighted average noise exposure exceeds the action level will be enrolled in the Hearing Conservation Program.

These individuals will be offered audiometric testing, will have hearing protectors made available to them, and will be provided training on the fitting, use, and care of these devices. Persons whose eight-hour time-weighted average noise exposure is less than 85 dBA may be enrolled in the Hearing Conservation Program at the departmental manager's discretion, and generally do not require audiometric testing, training, or the use of hearing protectors. Additional monitoring of their personal noise exposures should not be required unless a significant change is perceived in the workplace noise level.

4.6 Preliminary Noise Survey

A preliminary noise survey consists of a "walk-through" of all facility areas with a sound-level meter to identify operations or areas where employees may be exposed to hazardous noise levels. A facility layout or grid of plant areas may be useful for recording noise levels and identifying areas that require further study; shift changes, operation of noise-generating equipment, or other factors that could affect baseline levels.

Where information indicates that employees in that area may be exposed to noise levels equal to or greater than 50 percent of the permissible exposure (e.g., 85 dBA over eight hours), more specific measurements should be obtained.

4.7 Detailed Noise Survey

The data gathered in the preliminary noise survey will determine which locations require more study. The detailed noise survey will:

- Use a noise dosimeter to provide specific information of the noise levels at individual workstations
- Evaluate time-weighted average employee exposure
- Define areas where noise exposure may exceed permissible levels and should be designated as a noise hazard area, which requires the use of hearing protection
- Determine which employees should be included in the Hearing Conservation Program and receive audiometric testing
- In this study, measurements are recorded as close as practical to the employee's workstation at approximated ear level.

4.7.1 Controls

Employee exposure to occupational noise is controlled as much as technologically and economically feasible by applying engineering principles that reduce noise levels. They may include:

- Quieter machinery
- Quieter processes
- Reduction of noise transmission

- Isolation of equipment or equipment operator
- Proper maintenance of machinery and equipment
- Purchasing procedures that specify criteria for maximum noise levels
- Administrative controls are also applied, when feasible. They may include:
- Rotation of employees to limit exposure times
- Flexible machinery operation schedules to limit exposures
- Work task arrangements that reduce the time an employee must spend in a noisy area

Where engineering and administrative controls are not feasible or during the evaluation and implementation of such controls, personal hearing protective equipment is used to protect employees from excessive noise exposure. This protection is provided as one part of an effective hearing conservation program.

4.7.2 Audiometric Testing

When an employee is enrolled in the Sunbelt Controls Hearing Conservation Program, he or she must complete baseline, annual, and post-employment audiometric tests.

Audiometric tests can be scheduled by calling the testing contractor/consultant chosen by the responsible departmental manager. A list of available, reputable testing contractors can be requested from EH&S.

It is the responsibility of the supervisor of the identified department to schedule audiometric exams. The cost of the test and all necessary PPE is covered by the employee's department and is free to the employee.

To ensure accuracy, the audiometric test should be preceded by at least 14 hours without exposure to workplace noise. This will reduce the potential for the employee to be suffering from a temporary threshold shift, which would result in an incorrect evaluation of the employee's hearing threshold. Hearing protection may be used to provide the pre-test exposure control, providing its use is well supervised.

4.8 Baseline Audiograms

Everyone enrolled in the Hearing Conservation Program must undergo testing to establish a baseline audiogram and to determine the person's "hearing threshold" and against which to compare subsequent audiograms. It is desirable to obtain the baseline audiogram as soon as possible (preferably within 60 days) from the date of the employee's first exposure to high noise levels.

4.8.1 Annual Audiogram

A new audiogram is obtained at least annually for each employee exposed at or above the time-weighted average of 85 dBA. It is important to ensure that employees are protected from workplace noise proper to the audiometric test in order to obtain a valid measurement.

4.8.2 Post-Employment Audiogram

Post-employment audiograms must be completed when an employee leaves the job or workplace where he or she is no longer routinely exposed to noise level at or above

an 8-hour time-weighted average of 85 dBA. It is the responsibility of the employee and the supervisor to complete a post-employment audiogram.

4.8.3 Evaluation of the Audiogram

An audiologist will evaluate audiometric test results and schedule any necessary follow-up evaluations. When medical personnel identify an employee with a significant threshold shift or a baseline audiogram showing early indications of hearing loss (i.e., an existing hearing level of 25 dB or greater between 500 and 4000 Hz, according to ANSI s3.6-1969), this information will be provided to EH&S so the appropriate hearing conservation and training activities can be initiated to reduce the potential for further hearing loss. The employee will be notified of these results in writing within 21 days. He or she will be retrained on the hazards and precautions of working in noisy environments and will be issued hearing protective devices if they are determined appropriate by EH&S and the medical provider. Other modifications to the workplace may also be needed to reduce noise exposures to prevent additional hearing loss. Further medical evaluation maybe warranted.

4.9 Hearing Protective Equipment

Departments must provide hearing protectors (usually earplugs or earmuffs) to all persons exposed at or above the 85dBA action level. Hearing protectors must be free to the wearer and replaced when broken, defective, or unsanitary. A choice of at least *two* brands or types of hearing protectors must be available.

At Sunbelt Controls, the use of hearing protectors is required:

- For all personnel exposed above the 85dBA action level
- In all areas posted or otherwise designated as requiring hearing protection

A variety of suitable hearing protectors can be purchased, and employees can be given the opportunity to select their choice of hearing protection. PPE must be evaluated for the specific noise environment. Employees should be informed of the locations where the use of hearing protective equipment is required. Appropriate warning signs should be posted.

A hearing protector's ability to reduce noise is measured as its Noise Reduction Rating (NRR); the greater the NRR the better the noise attenuation. The NRR is usually listed on the hearing protector's box. EH&S can help determine appropriate types of hearing protectors for specific situations, and can provide training on the proper use of hearing protectors.

OSHA has in its field manual directed their inspectors to use the following formula for how to apply the Noise Reduction Rating (NRR):

If noise measurements are made with the dB(A) scale, the following formula applies –
Noise level [98dB] minus NRR divided by 2 [25 dB minus 7 dB divided by 2] = Noise level at ear, 89dB

If the noise level measurements are made with the dB(C) scale, this formula applies –
Noise level [98dB] minus NRR divided by two [25 dB divided by 2] = Noise level at ear, 85.5 dB

4.9.1 Types of Hearing Protectors

Aural (inserts): Plug-type protectors fit directly into the ear canal.

1. Pre-molded (sized or universal)
2. Moldable
3. Custom molded

Circumaural (muffs) – plastic domes that cover the ears and are connected with a spring band that fits on top of the head

Superaural (canal caps) – caps that achieve sound attenuation by sealing the external opening to the ear canal

It is the responsibility of managers, principal investigators, and supervisors to ensure that employees wear appropriate hearing protectors and that areas where noise levels are known to exceed 90 dBA have signs posted to alert visitors to the required use of hearing protectors.

4.10 Employee Awareness Training

All employees should receive information regarding the Hearing Conservation Program through employee orientation, job training and instruction, specific training programs, and periodic safety committee meetings. The employee's department shall maintain training records.

Training topics include:

- Statistics on occupational hearing loss
- Basic concepts and terms relating to sound pressure level
- Anatomy of the ear
- Types of hearing loss
- Types of hearing protectors and proper usage
- Activities related to non-occupational hearing loss
- Elements of Sunbelt Controls Hearing Conservation Program

Training is provided by EH&S and can be customized for work groups. Employees enrolled in the Hearing Conservation Program are required to attend annual training.

4.11 Recordkeeping

Noise exposure measurement records are maintained by the Industrial Hygiene division of EH&S. Area noise exposure data are retained for a minimum of two years, and personal exposure data are retained indefinitely.

Audiometric test results are maintained by the employee's department and should be retained for the duration of the person's employment at Sunbelt Controls. Employees have the right to review records of their noise exposure data and audiometric tests. It is common procedure that these records are made available to employees.

5.0 References

OSHA 29 CFR 1904
OSHA 29 CFR 1910
OSHA 29 CFR 1910.04
OSHA 29 CFR 1910.95
ANSI S1.11-1971
ANSI S1.25-1978
ANSI S1.4-1971
ANSI S3.6-1969
California Code of Regulations Title 8, Article 105, Sections 5096-5100