BCIT Safety Manual

HEARING CONSERVATION PROGRAM

Contents

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1. Purpose

This hearing conservation program is designed to minimize employee and student exposure to noise from machinery, processes and equipment during their work. It is also ensures that students and employees are provided with education and control measures regarding hearing conservation. The program consists of:

- Noise measurement
- Education and training
- Noise control
- Hearing protection
- Hearing tests
- Warning signs
- Program review

This program applies to all BCIT staff and students who work in noise hazard areas or who have the potential to develop noise-induced hearing loss (NIHL) as a result of their work.

NOTE: Nuisance noise may be irritating or annoying but is not loud enough to cause noise-induced hearing loss (NIHL). Nuisance noise is not covered by this Hearing Conservation Program. Concerns of this type of noise are assessed separately, as required.

2. Definitions

2.1 Noise

Unwanted sound energy in the workplace or workshops

2.2 Daily Exposure

The amount of noise, stated in dBA Lex, to which an employee or student is exposed during the workday

2.3 dBA

Decibels of noise, measured with an A-weighted filter

2.4 dBA Lex

The level of total exposure to noise in dBA, averaged over the entire workday or practicum day and adjusted to an equivalent 8 hour exposure

2.5 Peak Sound Level

The maximum instantaneous sound level, in dBC

2.6 Exposure Limits

The maximum levels designated by WorkSafeBC, above which, a worker must not be exposed

2.7 Audiometric Testing

Hearing tests conducted by a qualified technician that include pure tone tests, verbal counseling and specific paperwork submitted to WorkSafeBC

2.8 Employee

A person employed at BCIT fulltime, part time or auxiliary

2.9 Student

A person enrolled in a full-time or part-time program (or any courses) at BCIT, including students in practicum and apprenticeship

3. Applicable Legislation and Reference Materials

WorkSafeBC Regulation Guidelines Part 7 – Noise, Vibration, Radiation and Temperature
WorkSafeBC Sound Advice – A Guide to Hearing Loss Prevention Program
WorkSafeBC Hearing Protection
CCOHS Hearing Protectors

4. Roles & Responsibilities

4.1 BCIT Responsibilities

BCIT commits to support this program and take all reasonable precautions to protect its employees, students and visitors from hazardous noise exposure. Document review?

4.2 OH&S Committee

- Note noise concerns found during monthly inspections on inspection reports
- Review the effectiveness of the Hearing Conservation Program with input on an annual basis

4.3 OH&S Group

- Review department/school noise exposure control plans, when necessary
- Conduct noise surveys, measurements, and hazard assessments, when necessary
- Reassess affected areas when changes have been made to equipment and design
- Coordinate annual review of the program
- Work with supervisors to ensure that education is provided to employees with regard to hazards of noise and control measures
- Liaise with external agencies/jurisdictions with regard to regulations for noise

4.4 Audiometric Technician

- Conduct annual hearing tests for BCIT employees and apprentice trade students who may be exposed to hazardous noise on campus, in addition to tests for staff/students prior to their departure from BCIT
- Report NIHL cases to WorkSafeBC

- Develop and maintain an effective database for hearing test results and scheduling of hearing tests to ensure testing is up-to-date
- Offer hearing tests to employees who have medical, trauma or age related hearing loss
- Work as a resource to provide education and training on noise hazards and personal protective equipment
- Forward/distribute WorkSafeBC educational materials to employees and students
- Provide confidential counseling and referral to an appropriate health care practitioner
- Participate in noise surveys, hazard assessments and investigations, when necessary
- Ensure hearing test facilities are functional and calibrated
- Maintain confidential personal records in accordance with WorkSafeBC requirements

4.5 School/Department & Facilities Management

- Ensure consideration is given to noise concerns during the design phase of new buildings and prior to the purchase of new equipment and tools
- Ensure that recommended engineering controls and other remedial measures are implemented
- Keep records of training, investigations and inspections

4.6 Supervisor/Instructor

- Perform hazard assessments to identify:
    - Employees/students who are or may be overexposed to noise
    - Potential or existing noise sources and activities which may cause overexposure to noise (seek OHS Group assistance if necessary)
- Develop task specific safe work procedures
- Provide employees and students with adequate education and awareness of noise hazards, control measures and hearing tests
- Set an example for employees and students by complying with this program and other relevant OHS regulations
- Maintain sufficient supervision to ensure that those employees and students who are exposed to a noise level above the exposure limits wear appropriate hearing protection
- Ensure that noise exposed employees and students sign up for annual hearing tests and attend their tests
- Ensure that machinery and equipment are in good condition and receive regular maintenance to minimize the level of noise generated

- Ensure that noise exposed employees who have terminated employment undergo audiometric testing prior to departure
- Consult with the OHS Group in regard to complaints, hearing loss associated with noise and corresponding control strategies

4.7 BCIT Employee/Students

All staff and students who may be exposed to hazardous noise levels shall:

- Report any noise concerns to their Supervisor
- Attend the training, awareness and education that is provided
- Follow task specific safe work procedures
- Use and ensure good maintenance of the provided facilities and assigned hearing protection equipment to prevent overexposure to noise
- Attend the scheduled annual hearing tests
- Follow the advice given by the Audiometric Technician and medical professionals
- Implement recommended remedial actions/measures
- Report accidental hearing loss to the Supervisor and First Aid Attendant

5. Procedures

Noise is a common physical hazard in many areas at BCIT. Over time, if noise from machinery, processes and equipment is too loud, it can cause hearing loss. Hearing conservation requires measurement and control of noise, in addition to education and testing of employees and students.

5.1 Noise Measurement

Noise hazard areas and noise exposed employees/students will be identified by Supervisors, Departments and OHS Committees in conjunction with the OHS Group.

If an employee or student is, or may be exposed to potentially harmful levels of noise, or if information indicates that an employee or student may be exposed to a level exceeding 82 dBA Lex, the supervisor will request a measurement of the noise exposure from the OHS Group. The BCIT Hygiene Coordinator will perform an exposure measurement following acceptable standards and report findings to the supervisor.

The supervisor must inform affected employees and/or students of the results of noise exposure measurement and the significance of the measurement to the risk of hearing loss.

For any significant workplace changes (such as the introduction of new equipment or design change) Supervisors must contact the OHS Group to arrange for a reassessment to determine the changes in noise exposure.

NOTE: Noise measurement is not required if an employee/student is identified as being exposed to noise in excess of an exposure limit based on other information or an effective noise control

and hearing conservation program has been established for the employee/student. Other workers/students in the workplace may still need to have their noise exposure measured.

5.2 Education and Training

Education has high priority in hearing conservation. At BCIT the following means are used to inform staff and students about noise hazards, exposure limits, ways to prevent hearing loss, and the significance of noise measurement and hearing tests.

(a) For **entry level ELTT students**, a 45 minute theory session is provided during orientation, covering information about noise and its effect on hearing. Prevention of Noise Induced Hearing Loss (NIHL) is stressed.

(b) The **first year apprentices** are asked to view WorkSafeBC "Hearing Video" prior to having their hearing tested. The video delivers much information regarding noise and related matters in an entertaining format. Newer CD format of the video is available for loan out in the Audiometric Office and trades sections

(c) The **second, third and fourth year apprentices** are asked to read WorkSafeBC pamphlets: "Testing Your Hearing – How and Why" and "Hear for Good" prior to their hearing test. These pamphlets are informative and remind the students of the purpose and process involved in audiometric testing

(d) **Students in Occupational Health and Safety program** and **Occupational Health and Safety nurses** are provided a 2-hour hands on audio laboratory practicum

(e) **Instructors in relevant departments** are asked to sit in on an information session and watch WorkSafeBC "Hearing Video"

(f) For **BCIT staff**, a 15-minute information session and updates are available. Personal counseling is available at time of hearing test

(g) For **BCIT general public**, there are opportunities each year to participate in the healthy workplace month fair and the NAOSH fair. Posters are set up in booths. Visitors can attend the "Question and Answer" sessions

(h) Counseling
As part of the hearing test procedure (Section 5.6), employees/students are counseled on the categorization of the hearing test as well as the necessity, use, maintenance and replacement of hearing protection

5.3 Noise Control

If an employee or student may be exposed to noise above the applicable exposure limits, the Supervisor must inform the OHS Group and investigate options for engineered noise control.

Whenever practicable, one or more options for engineered control must be implemented to reduce noise exposure to, or below, the exposure limits. Methods of controlling noise exposure include engineering control and administrative control.

Engineering Control

Engineering control has top priority amongst control measures. It includes, but is not limited to, noise reduction at the source, enclosure of the noise source or isolation of the employee/student from the noise source, and acoustical design and treatment of the work area.

a) Reduction at Source

Many potential noise problems can be solved by choosing quieter equipment. When new equipment is purchased, specifications should include either a limit on the noise, or a requirement for the vendor to provide noise performance data. If noise is not engineered out in the design stage, retrofitting existing equipment with noise control devices such as mufflers, silencers, special nozzles, or isolators may be possible and should be considered.

Substituting quieter equipment for noisy equipment is another method of noise reduction at source. When purchasing it is necessary to ensure that equipment noise performance data indicate that the sound levels of the equipment are below 85 dBA.

Some noise can be reduced by damping vibrations. Regular maintenance and balance of rotating parts of tools/equipment can reduce noise generation at source.

b) Enclosures

Enclosures reduce employee/student noise exposure by acting as a barrier and as a sound absorber. Noise reduction up to 25 dB has been achieved in certain instances. When enclosures are used to decrease noise levels, the ceiling and walls of the enclosure should be lined with sound-absorbing material to minimize reverberation inside the enclosure.

Enclosing employees/students in a booth is practical when the employees/students only leave the enclosure occasionally. An operator booth can typically achieve a 20 dB reduction of noise level.

c) Acoustical Treatment

Acoustical treatment of workshops, such lining the walls and ceiling with sound-absorbing panels or hanging baffles can reduce noise levels within the space. This method benefits all people in the workshop and does not interfere with access to machinery. However, direct noise will remain a problem near any noise sources.

Administrative Controls

Administrative controls refer to minimizing noise exposure by means of administration measures such as shift schedule and distancing operators from noise sources.

a) Reduction of the Length of Exposure

Whenever possible, the length of time employees/students are exposed to hazardous noise should be minimized. The duration of exposure can be reduced by task/job rotation, adjusting work procedures, rescheduling of noisy activities, and automation or partial automation.

b) Separating the Operator from the Noise Source

Because noise levels decrease as the distance increases from the noise source, employees/students should stay as far from the noise source as practicably achievable. The distance between operators and noise sources should be taken into account during the design of job/task and equipment layouts in the workplace.

5.4 Hearing Protection

Engineering and administrative controls are the preferred methods for reducing noise exposure. If this is not feasible or practical, hearing protection must be used where noise levels regularly exceed 85 dBA or where an individual's personal exposure may exceed the limits set by WorkSafeBC as listed in the following Table

Exposure Duration per a Workday (Hours)	**Maximum Permissible Continuous or Intermittent Noise Levels (dBA)**
16	82
8	85
4	88
2	91
1	94
1/2	97
1/4	100
1/8	103
0	106
Exposure Duration per a Workday (Hours)	**Maximum Permissible Peak Noise (dBC)**
0	>140

For regular noise exposure between 80-85 dBA, hearing protection is not mandatory but is highly recommended and will be provided upon request.

All employees and students who are in areas with noise level in excess of the limits outlined in the table will be required to wear hearing protection provided by Supervisors or the BCIT Audiometric Technician. Supervisors shall ensure that these requirements are being followed.

Hearing protection devices (HPDs) include earplugs and earmuffs. HPDs must be selected and maintained in accordance with *CSA Standard Z94.2-02, Hearing Protection Devices - Performance, Selection, Care, and Use*. An employee or student may need to consult the BCIT Audiometric Technician or healthcare practitioner prior to selecting an appropriate HPD.

Some of the HPDs provided on campus include:

Manufacture	Name	NRR
E.A.R	UltraFit	21
E.A.R	Caps	17
Howard Leight	Max Lite	30
Howard Leight	Max	33

All of the trade students are offered a pair of the EAR-Ultrafit, non-disposable earplugs at the time of their hearing test. Earmuffs are also available by signing out from tool cribs.

Posters showing how to fit and wear HPDs effectively will be posted in all workshops at BCIT. Area supervisors may request a poster from the BCIT Audiometric Technician.

Worn or damaged HPDs must be replaced. Supervisors must ensure that enough hearing protection or replacement parts are available at any time so that only well-maintained HPDs are used.

NOTE: The selection of HPDs is an ongoing process that is based on user requirements in relation to the noise type, intensity and the particular needs of the Department and individual. The NRR in the above table is the Noise Reduction Ratio which indicates the level of attenuation provided by the hearing protection.

It is important to recognize that some individuals are more susceptible to the effects of noise and may be at risk of developing NIHL when regularly exposed to sound levels between 80 and 85 dBA. Staff and students working in such situations should be aware of this and offered appropriate hearing protection.

5.5 Noise Hazard Areas

An area or location is considered a noise hazard if sound levels are regularly at, or above, 85 dBA. Below is a list of buildings on campus where hazardous noise has been identified:

Buildings	SW9
	NW3, NW6
	SE1, SE9, SE30
	NE1, NE2, NE4, NE6, NE8, NE10, NE12, NE16, NE18, NE20

Conspicuous and clearly visible warning signs must be posted at the approaches to areas where noise levels regularly exceed 85 dBA or peak sound levels exceed 140 dBC. These warning signs must

clearly indicate that use of hearing protection is mandatory for entry. In situations where a piece of equipment or machinery presents a noise hazard, a sign must be affixed to the machine, in a clearly visible location, indicating that the operator must wear appropriate hearing protection.

An employee/student must wear hearing protection in all posted noise hazard areas and in accordance with instructions provided by Supervisors.

5.6 Hearing Tests

Audiometric testing helps develop a baseline of hearing for an employee/student and allows for the early detection of NIHL. Changes in an employee's/student's audiometric results may signal to the examiner that noise conditions in the workplace have changed or that hearing protection has not been used, or is ineffective.

Audiometric testing is conducted on campus by qualified Audiometric Technicians authorized by WorkSafeBC. The testing, including counseling, usually takes approximately 15 minutes per person. During a test, hearing thresholds at frequencies of 500, 1000, 2000, 3000, 4000, 6000, and 8000 Hz are measured using pure-tone, non-masking, and air conduction techniques.

Appendix B lists the contact information for arranging audiometric tests at the BCIT Burnaby campus and the satellite campuses.

Procedures for audiometric tests at the Burnaby campus and satellite campus are listed in Appendix C.

It is noteworthy that audiometry does not prevent hearing loss in any way but is a recognized measure of the effectiveness of the hearing conservation program.

Staff

- All staff who work in areas with noise levels in excess of 85 dBA Lex or 140 dBC peak sound level are required to have a base line Audiometric test within the first 6 months of employment
- All staff working in areas with noise levels in excess of 85 dBA Lex or 140 dBC peak sound level or showing any abnormalities in their base line audiogram are required to have annual Audiometric tests
- Some BCIT staff have had Audiometric testing conducted in the past but are no longer required under the criteria outlined by WorkSafeBC. If they choose to continue to have an annual Audiometric test, BCIT will perform the test without sending their audiograms to WorkSafeBC
- Annual testing is also available for BCIT employees who have medical, trauma or age related hearing loss
- General employees who are interested in having a hearing test done as part of a routine physical or general auditory acuity monitoring are welcome to make an appointment for a

hearing test with the BCIT Audiometric Technician

Students

- All BCIT students who work in areas with noise level in excess of 85 dBA Lex or 140 dBC peak sound level are recommended to have a base line Audiometric test within the first 6 months of starting their apprenticeship
- All BCIT students who are in the construction sub-trades must have a valid Hearing Test Card, or receive an Audiometric Test over the course of their program

Additional Tests

An employee or student shall receive additional periodic follow-up hearing tests in any of the following circumstance:

a) Where an employee/student has been exposed to an unusually loud noise such as explosion
b) Where an ear infection, head injury or complaint related to the ear has occurred
c) Where an audiogram has been classified as "abnormal change (AC)"

Audiometric Results

Staff and students with noise exposure between 82 dBA Lex and 85 dBA Lex will be informed of:

- The results of any noise exposure measurements
- The significance of those results
- On request, the purpose of hearing protection and testing

Employees and students with noise exposure above 85 dBA Lex or 140 dBC peak sound levels will be informed of:

- The results of any noise exposure measurements
- The effect of noise on hearing
- The use and maintenance of hearing protection
- The purpose of hearing testing

6. Documentation

The applicable School/Department, the BCIT Audiometric Technician and the OHS Group are responsible for the documentation of the program as described below.

- Records of noise levels and noise control will be kept by the appropriate Department as well as the OHS Group
- Each School/Department must establish, maintain and update a list of employees and students who are at risk for noise induced hearing loss. The list must indicate whether these employees or students have received noise hazard awareness education/training and whether they are participating in the Audiometric Testing Program. A copy of this list should be forwarded to the BCIT Audiometric Technician
- The Audiometric Technician must record hearing tests in a manner required by WorkSafeBC,

provide a copy of test results, upon request, to an employee/student, and submit the test results to WorkSafeBC Prevention Records Investigation Division if applicable
- The BCIT Audiometric Technician will keep testing records in a locked cabinet to ensure confidentiality. The records will be kept as long as an employee works at BCIT. These records will not be released to anyone without the written permission of the employee
- Training/education and investigation records related to noise exposure will be kept for 10 years

7. Program Review

This Hearing Conservation Program will be reviewed annually by the OHS Group in conjunction with the Joint Occupational Health and Safety Committee. The review will address for the following:

- The need for further noise measurement due to equipment/design/task changes or newly identified areas of concern
- The effectiveness of education and training in regard to hearing conservation
- The adequacy of control measures
- The selection and use of hearing protection and its effectiveness
- Audiometric results and their implications
- Information on the rate and extent of occupational hearing loss

Appendix A-
Noise Survey Report

INVESTIGATION REPORT

Noise Concern for
(Building, Room, Activity)

Prepared by

Safety and Security

Date

OCCUPATIONAL HEALTH & SAFETY REPORT

Nature of Event	
Date of Event	***Time of Event***
Date Reported	***Time Reported***

Description of Event

OSH Group received a report regarding _____ on _____

An on-site inspection, questionnaire and cursory sound level measurement were conducted by _____ on _____ to investigate the concern.

The purpose of the investigation was to:

1. Evaluate the acoustic environment in _____
2. Estimate noise exposures and compare with applicable regulations
3. Recommend control measures for reducing noise exposure

1. OBSERVATION, QUESTIONNAIRE & MEASUREMNT

_____

During the investigation, a _____ minute preliminary sound level survey was performed with a Type 2 noise dosimeter (Model CEL-320/360S, Casella). The sound level meter was set on an A-weighted network, with a dynamic range of 50 dB and a crest factor of 30 dB and was placed near the ears of _____ to conduct the test.

The preliminary survey showed:

- Sound level near the ears of _____ was continuously above _____ dBA (without oral communication)
- _____ minute averaged sound level was _____ dBA
- The peak sound level was _____ dBA

2. ANALYSES

WorkSafeBC requires that

1) An employer must ensure that a worker is not exposed to noise levels above either of the following exposure limits:
   a. 85 dBA Lex daily noise exposure level;
   b. 140 dBC peak sound level.

2) If a worker is or may be exposed to potentially harmful levels of noise, or if information indicates that a worker may be exposed to a level exceeding 82 dBA Lex, the employer must measure the noise exposure or establishes an effective noise control and hearing conservation program for that worker.

3) The exposure limit must be adjusted by the 3 dB exchange rate that is when the sound level increases by 3 dBA, the allowable duration for exposure must be halved. This means that for _____ daily exposure, the maximum sound level must be below _____ dBA.

(As the _____ minute preliminary sampling showed that noise level was _____ dBA, an effective noise control and hearing conservation program therefore must be developed and implemented.)

3. RECOMMENDATIONS

1. Engineering Controls

2. Administrative Control

- If the engineering controls recommended above are infeasible and the noise level cannot be reduced to ensure compliance with the following limits set by WorkSafeBC,

Time Period	Limits
8 hour exposure	85 dBA Lex*
4 hour exposure	88 dBA Lex
2 hour exposure	91 dBA Lex
1 hour exposure	94 dBA Lex
0.5 hour exposure	97 dBA Lex
15 minute exposure	100 dBA Lex
Peak sound level	140 dBC

** Given that there is no other noise exposures during the rest of the workday*

then according to *OHSR 7.5,*

1) An effective noise control plan and hearing conservation program* must be developed
2) _____ must be sufficiently trained and educated on the effects of noise on hearing and the proper use and maintenance of hearing protection devices
3) Annual hearing test must be conducted

* *Institute Hearing Conservation and Audiometric Program has been developed*

- (Post a sign in the area indicating that hearing protection is necessary when machine is in operation)
- Contact the OHS Group for further noise level testing after taking remedial measures

3. Personal Protective Equipment

- If it is not practicable to reduce noise levels to or below the exposure limit, WorkSafeBC requires that hearing protection that meets the requirements of CSA Standard Z94.2-02, Hearing Protection Devices - Performance, Selection, Care, and Use must be effectively worn for noise hazard tasks. The hearing protection must be sufficiently maintained to continuously meet those standards.
- Refer to the following table to provide appropriate types of hearing protection devices so that sufficient protection is ensured:

Time-Weighted Average (TWA) Noise Exposure (expressed in dBA	Recommended Class of Hearing Protection[1]
TWA less than 85 dBA	Hearing protection not required[2]
TWA up to 89 dBA	Class C hearing protector
TWA up to 95 dBA	Class B hearing protector
TWA up to 105 dBA	Class A hearing protector
TWA up to 110 dBA	Class A earplug + Class A or Class B earmuff
TWA greater than 110 dBA	Class A earplug + Class A or Class B earmuff & limited exposure

- Hearing protection equipment must be maintained in a good and hygienic condition, and must be changed regularly.

Corrective Actions

Assigned Corrective Action	*Person In Charge*	*Due Date*
Take noise measurement or re-assess noise level if necessary		Pending

Appendix B-
Contact Information for Audiometric Tests

Campus	Contact Person	Title	Location	Phone
Burnaby	Kathy Deyell	Audiometric Technician	NE16 - 127	(604)432.8712
Aerospace Technology	Robert Grasby Keeley Steimecke	Chief Instructor Supervisor/First Aid Attendant	ATC 120 D ATC 115F	(604)419.3702 (604)419.3729
Great Northern Way	Carol Akasaka Gerry Warne	Administrative Chief Instructor	GNW 103A GNW 103G	(604)451.7054 (604)451.6822

Appendix C- Procedures for Audiometric Tests

Procedures for Audiometric Tests in Burnaby Campus

1	The Audiometric Technician and the Supervisors of each trade group sets up a testing schedule that accommodates the trade group each month, or instructors make testing requests for students in the trades at BCIT and work with the Audiometric Technician to set up a schedule
2	The Audiometric Technician and Supervisors or Instructors set up short information sessions for groups prior to their hearing test appointments
3	Employees come to the Audiometric Office for testing Students are tested as a whole class and should come to the Audiometric Office for testing in pairs
4	If an individual in the group is unable to attend the initial session, another date/time will be offered If the individual is unable to make the second appointment then he/she must call the Audiometric Technician and arrange to have the test done at his/her earliest convenience
5	The Audiometric Technician tests one person on automatic mode while going through the history form with the other
6	The employees/students switch places to complete the form filling and testing procedures
7	Employees/students counsel the Audiometric Technician regarding hearing conservation and the testing results
8	The employees/students return to work/class and the next pair come to the Audiometric Office for testing
9	The Audiometric Technician keeps all test records confidentially and sends the original audiograms to the Hearing Conservation Section of WorkSafeBC if applicable

Procedures for Audiometric Tests in Satellite Campuses

1	The secretary from the contracted audiometric company (Adio Lab) phones the contacts listed
2	Date, time and place are set up three weeks prior to the annual hearing test data listed for the respective campuses
3	The audiometric contractor sends the original audiograms to the Hearing Conservation Section of WorkSafeBC
4	The satellite campuses keep the copy of the hearing test in their office files
5	The contact persons send a list of the employees/students who were tested and the fee for services rendered to the Audiometric Technician in Burnaby campus