

Chapter 5 Noise Exposure Sampling Procedures

This chapter will demonstrate how to measure noise exposures using a dosimeter. MSHA requires two different levels be monitored in 30 CFR Part 62. Employees must be monitored to: 1) see if they must be enrolled in a Hearing Conservation Program (HCP) and 2) ensure their exposure does not exceed the Permissible Exposure Limit (PEL). Both the Action Level & PEL are summarized below; however it is important that all of MSHA's Part 62 are understood & followed. For example, if the person exceeds the Action Level described below, then a HCP must be developed in accordance to Part 62 & the employee must be enrolled.

Sampling procedures:

Sampling must consist of full-shift sampling. Employees must be sampled for MSHA's Action Level and PEL criteria (explained in more detail below). Using noise dosimeters that record sound pressure using at least 2 different sampling criteria makes the sampling much easier. The picture at the right shows a Quest noise dosimeter that will record the same noise exposure using both criteria. If your noise dosimeter will only record one set of criteria at a time, then two dosimeters may have to be used, or the sampling will have to be done twice. Noise exposures can be measured using a Sound Level Meter, however since Sound Level Meters do not record sound levels it will be very time consuming. Noise dosimeters must be set to record at the criteria set by MSHA. The criteria is listed below. MSHA requires that employees be notified before the sampling occurs and that certain notifications occur after the sampling. Be sure to read & be familiar with all requirements of Part 62.



Criteria Definitions:

Response:

Noise typically is not constant. If you were to try and read noise levels without a response time, it would be very difficult to read the meter due to the very fast fluctuations. Setting the response time to slow uses a constant of 1 second. Thus it slows the meter down so it can be read more easily.

Exchange Rate (Doubling Rate):

Refers to how the sound energy is averaged over time. Using the decibel scales, every time the sound energy doubles, the measured level increases by 5. Thus when the sound level increases from 80 – 85 decibels, the sound energy has doubled. MSHA uses a 5 decibel exchange rate (or doubling rate).

Criterion Level:

The criterion level is used in the Dose calculation. If the dosimeter is exposed to a decibel level equal to the criterion level for 8 hours the result will be 100% dose. The criterion level for MSHA's Action Level and PEL is 90 decibels. Please remember that although

the criterion for the Action Level & PEL are the same, the thresholds are different. Thus 100% dose for the action level equals 85 decibels and 100% dose for the PEL equals 90 decibels.

Example: MSHA mandates the criterion level (maximum allowable accumulated noise exposure) to be 90dB for 8 hours. For an 8 hour sample, an average level (LAVG) of 90dB will result in 100% dose.

Threshold:

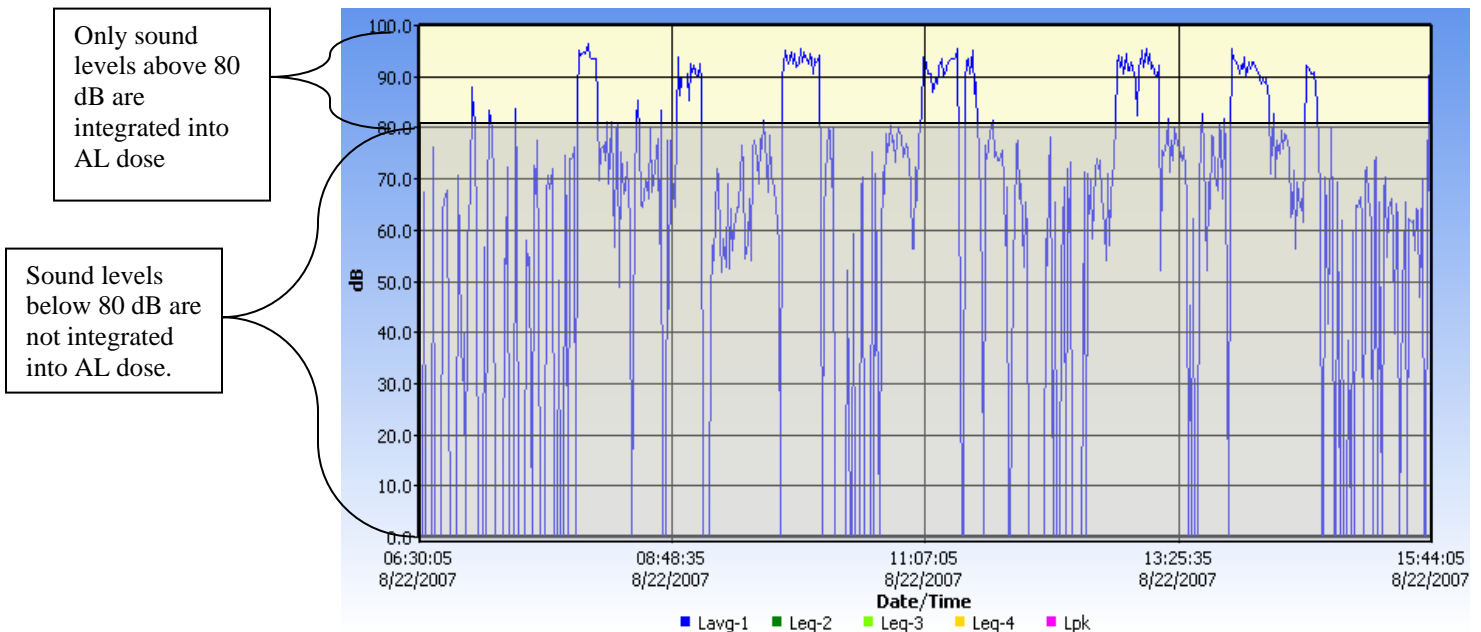
The threshold affects the LAVG, TWA, and DOSE measurements. All sound below the Threshold is considered non-existing noise for the averaging and integrating functions.

MSHA uses two different thresholds. The threshold for the Action Level is 80 dB and the threshold for the PEL is 90 dB. Therefore all sound levels above 80 dB are integrated into the Action Level dose and all sound levels above 90 dB are integrated into the PEL dose. Any sound levels below the threshold are not used.

Example #1: With a 80dB threshold, suppose you placed a 79dB calibrator on the unit for a period of time. Because all of the noise is below the threshold, there would be no average (you can think of it as an average of 0dB). If the calibrator were 80dB instead, then the average would be 80dB. On histogram printouts, typically 1-minute (or other specified increment) averages are printed. Because real noise fluctuates, it is quite possible to have an average level below the threshold. This also applies for the overall LAVG.

Example #2:

The chart below shows how sound levels accumulate towards the Action Level dose using a threshold of 80 decibels. Although the dosimeter records all sound levels, levels below 80 dB are not integrated in dose. The same principal applies to the PEL, however the threshold is 90 dB, not 80 dB. Therefore the sound levels below 90 dB are not integrated into the PEL dose. Only sound levels above 90 are integrated into the PEL dose.



Action Level:

This is the level MSHA has set that if exceeded, the employee must be enrolled in a Hearing Conservation Program. MSHA defines AL as “An 8-hour time-weighted average sound level (TWA₈) of 85 dBA, or equivalently a dose of 50%, integrating all sound levels from 80 dBA to at least 130 dBA.”

Permissible Exposure Level (PEL):

The level MSHA has set that employees TWA must not exceed for a full-shift sample. MSHA defines PEL as “A TWA₈ of 90 dBA or equivalently a dose of 100% of that permitted by the standard, integrating all sound levels from 90 dBA to at least 140 dBA.”

Dual Hearing Protection Level:

The level MSHA has set that employees must wear dual hearing protection if exceeded. MSHA defines Dual Hearing Protection Level as “A TWA₈ of 105 dBA, or equivalently, a dose of 800% of that permitted by the standard, integrating all sound levels from 90 dBA to at least 140 dBA.”

Noise measurements using a Noise Dosimeter

1. Pre - calibrate the noise dosimeter according to manufactures directions.
2. Set both dosimeters to the criteria listed in table 1.
3. Once you are ready to begin sampling, turn the dosimeter on & make sure it is in run mode.
4. Clip the microphone on the employee’s collar where it will not be obstructed with other clothing, jackets, etc. If the employee is wearing a radio, place the microphone on the opposite side, away from the radio speaker.
5. Place the dosimeter on the employee’s belt or in a pocket.
6. Explain to the employee that the microphone must not be covered up & to perform his/her duties as normal.
7. At the end of the shift, take the dosimeter out of run mode.
8. Post calibrate the dosimeter according to manufactures instructions.
9. If your dosimeter can be downloaded to the computer, download & get information from computer. If not, follow manufactures instructions to get needed information.
10. Record the Time Weighted Average (TWA) and the Dose. Most dosimeters will give you much more information than just the TWA & Dose and can get quite confusing. The TWA & Dose will allow you to compare to MSHA’s limits.
11. If the dose for the Action Level criteria is over 50%, then refer to 30 CFR Part 62.120 to determine if employee must be enrolled in your Hearing Conservation Program (HCP).

Parameter	Action Level	PEL
Response	Slow	Slow
Exchange Rate	5 dB	5 dB
Criterion Level	90 dB*	90 dB
Threshold	80 dB	90 dB
RMS Weighting	A	A

Table 1
 *MSHA sets criterion for the Action Level to 90 dB, thus a dose of 50% equals the action level of 85 dB.

12. If the dose for the PEL criteria is over 100%, then the employee's exposure has exceeded MSHA's PEL. Refer to 30 CFR Part 62.130 for control information.

The table below indicates the length of time an employee can be in an area at a certain decibel level without exceeding the PEL. For example, if the sound level in an area is 95 dBA, then the employee can be in the area for 4-hours until the PEL is reached. He or she would then have to avoid noise exposure for the rest of the shift.

dBA	T (hours)
80.....	32.0
85.....	16.0
86.....	13.9
87.....	12.1
88.....	10.6
89.....	9.2
90.....	8.0
91.....	7.0
92.....	6.1
93.....	5.3
94.....	4.6
95.....	4.0
96.....	3.5
97.....	3.0
98.....	2.6
99.....	2.3
100.....	2.0
101.....	1.7
102.....	1.5
103.....	1.3
104.....	1.1
105.....	1.0
106.....	0.87
107.....	0.76
108.....	0.66
109.....	0.57
110.....	0.50
111.....	0.44
112.....	0.38
113.....	0.33
114.....	0.29
115.....	0.25

Table 1 – Allowable time limits for sound levels

Hearing Conservation Program

Hearing Conservation Program

Pages 7 – 15 contain a draft Hearing Conservation Program and are intended to be an aid in creating a written HCP. Please use it as only that, an aid. A HCP must be specific to your site, thus this draft should be customized to your specific issues.

HEARING CONSERVATION PROGRAM

CONTENTS

	Section
1. Monitoring	1
2. Hearing Conservation Program	2
3. Hearing Protection	3
4. Training	4
5. Recordkeeping	5
6. Transfer/Termination of a Miner	6
7. Audiograms	7

In accordance with Federal regulations 30 CFR Part 62 the following program standards have been developed and will be followed at “SITE” “DATE”

1. Monitoring

(62.110a,b) Site wide Noise survey will continue to be conducted annually each November, utilizing the current dosimeter technology available on the mine site, to determine if there are any gross variances from previous readings.

Any readings over 85 decibels on the A weighted scale (dBA) will indicate a need for further evaluation of the work area or any personal exposures in that area. Any miner exposed to a TWA of 85 dBA or greater will be enrolled in “**SITES**” Hearing Conservation Program (HCP).

(62.130) TWA readings over 90 dBA will indicate a need for evaluation of the source in order to determine if there are any further feasible engineering controls or administrative controls that can be administered to reduce the exposure.

(62.150) Any TWA exposure over 105 dBA will require the use of dual hearing protection in addition to the above actions. Dual hearing protection is defined as “...the concurrent use of both an ear plug and an ear muff type hearing protector.”

(62.110d130) The results of the survey and notification of any engineering or administrative controls put in place will be posted on the area bulletin boards for the miners review.

(62.110/120) Operators who work in an area with the potential for a noise exposure over 85 dBA will be monitored for a shift using a dosimeter set to the following criteria as outlined in 30 CFR Part 62.110:

- a) 90 dB criteria level and a 5 dB exchange rate
- b) use the A weighting scale and slow response instruments settings
- c) be monitored for their entire shift but use the time weighted average of 8 hours (TWA8) to determine compliance
- d) test for noise exposure between 90 and 140 dBA
- e) no adjustment will be made for hearing protection values

(62.110c) Any miner may chose to observe the monitoring as it takes place. Dates and times of monitoring will be announced either verbally or in writing no later than the start of the shift that the miner will be sampled on. This will allow an opportunity for miners or their representatives to observe the monitoring conducted. Miners are advised that under part 62 the operator is not required to pay the miner observing the personal sampling being conducted if it is not part of the miner's regular duties.

(62.110d)Written and verbal notification of the results of the personal sampling will be distributed to the miner within 15 calendar days of the personal sampling being conducted and will include:

- a) written determination of exposure
- b) corrective actions being taken
- c) signatures of the tester and person being tested

The original will be sent to the employee's occupational health file and a copy given to the employee.

2. Hearing Conservation Program

(62.120/130) Any miner found to be exposed to noise levels of 85 dBA or greater will enrolled in the Hearing Conservation Program (HCP).

If a miner is found to be exposed to noise in the excess of the permissible exposure limits (PEL) as defined in the table 62-1 at any time during his/her shift, the following will apply:

- a) The department manager will be notified and the source reviewed to determine if all feasible engineering and administrative controls are in place to ensure the least amount of exposure possible for the miners.
- b) The miner will be notified and enrolled in a HCP program.

(62.130b) If the miner's exposure continues to exceed PEL's despite the use of feasible engineering and administrative controls, "**SITE**" will continue to evaluate for possible solutions to reduce the miners exposure to a level as low as possible.

(62.150) The hearing conservation program (HCP) will consist of the following elements:

- a) Monitoring
- b) Provision and use of hearing protectors
- c) Audiometric testing
- d) Training
- e) Recordkeeping

3. Hearing Protection

(62.150/160a2) “**SITE**” will supply 2 types of ear plugs and 2 types of ear muffs for their employees to choose from on site. In the event dual hearing protection is required the miner will be allowed to choose one plug and one muff type. Additional hearing protection, pre approved by the Safety Department and management, may be supplied on an individual or departmental basis.

(62.160a5) In the event that the miner is unable to utilize the hearing protection required due to a medical pathology of the ear, the miner will be allowed to choose from suitable hearing protection. (62.160a4) All hearing protection will be provided by “**SITE**” at no cost to the miner.

(62.140) Dual hearing protection (Plugs and Muffs) will be required and provided by the company when noise exposure exceeds a TWA of 105 dBA.

(62.160bc1,2) “**SITE**” will ensure that hearing protection is worn when exposure exceeds the action level of a TWA 85 dBA or permissible exposure level and prior to the implementation of any engineering or administrative controls.

(62.160a3) “**SITE**” will ensure that hearing protection is maintained in good condition and in accordance with manufacturer’s instructions during the annual audiogram and retraining and through periodic inspections conducted by supervisors in their work areas.

4. Training

(62.160a1/180) Initial training will be conducted within 30 days of a miner’s enrollment in an HCP program as outlined below:

- a) The general requirements of 30 CFR Part 62
- b) The purpose and value of audiometric testing and a summary of the procedures
- c) Discussion of their audiometric baseline results or if a pre existing baseline is available a comparison of the results and discussion of the miners on and off the job hearing practices.
- d) The effects of noise on hearing
- e) The purpose and value of wearing hearing protection
- f) Examples of the various hearing protectors offered by “SITE” – a minimum of 2 plug types and 2 muff types will be made available to the miner.
- g) Advantages and disadvantages of the hearing protectors offered
- h) Care, fitting, maintenance and use of each hearing protector offered
- i) Understand the hearing protection and replacements will be provided at no cost to the miner
- j) The miner will be allowed to select the one plug and one muff style of hearing protection they prefer from a minimum of 2 plug types and 2 muff types
- k) “SITE”s and the miners responsibilities in maintaining noise controls
- l) Written certification of the baseline or retest results, training conducted and date training as outlined above was completed.

5. Recordkeeping

(62.180b) Records will be maintained for as long as the employee is enrolled in the HCP and at least for 6 months after termination (OSHA requires retention for a minimum of 30 years post employment).

The original copy of the employee’s written certification will be filed in the employees occupational health file, a copy sent to safety for filing in their training file and a copy given to the employee as proof of training.

(62.190b) A single initial copy of all required records pertaining to the HCP will be provided to the miner or former miner at no cost within 15 days of a written request for such records. Additional copies may be requested at an additional cost.

(62.175b) Records pertaining to the HCP are considered to be confidential medical records of the miner and therefore will be distributed only with the miner's written consent.

(62.190a) Records must be made available to Federal representatives as required by 30 CFR Part 62.190a.

6. Transfer/Termination of a Miner

(62.190c1,2) Transfer of an employee's HCP records shall be made to a successor mine only with the written approval of the individual miner.

(62.190c1,2) In the event an experienced miner is hired at "**SITE**", a request for a transfer of existing occupational health records from the previous mine will be made by the miner to ensure his/her health on the mine site. The baselines received from the previous employer will be utilized if they are in compliance with 30 CFR Part 62. A current audiogram will be conducted upon employment and compared to previous baseline to assure the integrity of audiograms.

7. Audiograms

(62.170a2) A quiet period of a minimum of 14 hours is required prior to conducting any audiograms. The quiet period is defined as an exposure to no more than 80 dBA with or without hearing protection. Ideally, it is best to test the employee after their days off and having educated them in what is necessary to ensure an accurate baseline audiogram (see appendix A).

(62.170b) Annual audiogram must be conducted every 12 months after the baseline to determine if a threshold shift has occurred. If a threshold shift of 10 dBA or more has occurred, "**SITE**" shall re-educate the employee in the use of hearing protection and retest the employees hearing after their days off in accordance with the initial baseline audiogram procedure to limit the statistical possibilities of error.

(62.172) The second test will determine whether the shift was temporary in nature or a standard threshold shift. The retest must be conducted within 15 days of the original.

If the retest still shows a shift of 10 dBA or more at 2000, 3000 or 4000 Hz in either ear, it shall be considered a Standard Threshold Shift (STS). If there is no shift, it is considered a temporary threshold shift (TTS). Retraining will be conducted in accordance with the training section of this plan with an emphasis on the need to wear hearing protection both on and off the job in either case.

If the STS exceeds 25 dB at 2000, 3000 or 4000 Hz in either ear relative to the baseline audiogram, the STS is considered to be reportable hearing loss and shall be reported according to 30 CFR Part 50 and state statutes.

(62.170c) Revision of the baseline audiogram may be made by a physician or audiologist under the following circumstances:

- a) A standard threshold shift is thought to be permanent, or
- b) The hearing threshold shown on the annual audiogram indicates a significant improvement over the previous baseline audiogram.

(62.171) Audiometric Test Procedures shall be conducted in accordance with CAOHC accepted standards.

- a) Begin the test by following CAOHC procedures
- b) Complete the test and print out results
- c) The audiometric record will include the following:
 - Date, name and job classification of the subject
 - Test results
 - Comments on any unusual characteristics of the test
 - Results of personal surveys conducted
- d) Review the results with the employee, sign the results, have the subject sign results, retain appropriate paperwork for records in a confidential manner as outlined in the record keeping section.
- e) Train the employee in accordance with section 62.160a/180 with the HCP's training requirements.

(62.170b,c 1,2/172) Audiograms must be conducted and evaluated by a physician, audiologist or the CAOHC technician under the direction of a physician or audiologist at no cost to the miner. Baseline audiograms will be obtained on all "SITE" employees no later than April 2001 or within the first week of employment at "SITE". All testing will be conducted under the following criteria:

- a) Determine if the audiogram is valid using standard CAOHC practices.
- b) Determine if a temporary or standard threshold shift or reportable hearing loss has occurred.
- c) Any information unrelated to the miners hearing loss due to occupational noise or the wearing of hearing protectors shall not be revealed to the mine operator.
- d) The audiogram must be interpreted and the results received within 15 days of the initial audiogram.

In determining whether an STS has occurred, allowance of aging may be made utilizing MSHA Table 62.3 and 62.4. To determine if an STS or reportable hearing loss has occurred, the baseline audiogram and current audiogram must be compared as follows:

- a) Determine age correction factors from tables 62.3 or 62.4
 - 1) Find the age at which the baseline audiogram was taken and record the corresponding values for age correction at 2,000, 3,000 and 4,000 Hz
 - 2) Find the age at which most recent annual test was conducted and record the corresponding values for age correction at 2,000, 3,000 and 4,000 Hz; and
 - 3) Subtract the values as appropriate – The difference is the corrected values for aging.
 - 4) Subtract the current adjusted audiogram results from the baseline to determine if a TTS(10dB), STS(10dB) or Reportable hearing loss (25dB) has occurred.

(62.173) If the CAOHC technician suspects that the audiogram is invalid for any reason then the employee will be referred to the overseeing physician or audiologist for further evaluation at no cost to the employee. Only occupational related issues will be revealed to the operator by the physician or audiologist.

If it is believed that there is a medical pathology of the ear caused by wearing hearing protection, aggravated by the employees exposure to occupational noise, or that it may limit the employees ability to use hearing protection provided by the company, then the employee must be referred for a clinical-audiological examination or an otological examination, as appropriate, at no cost to the employee.

If the pathology is determined not to be work related the employees will be billed for any treatment post diagnosis.

If a threshold shift of 10 dB or greater has occurred in the miners hearing the miner will be retested within 10 days after counseling in the definition of the quiet period and returning from their days off to minimize noise exposure.

(62.174a) If a Standard Threshold Shift of 10-25 dB has occurred the miner will be retrained in the use of hearing protection and provided with the opportunity to reselect adequate hearing protection for his/her work area.

(62.174b,c) A re-evaluation of the miners work environment by personal monitoring will also be conducted to assure the noise exposure is in the prescribed ranges that will include a review of the engineering and administrative controls for effectiveness.