COAL MINE HEALTH INSPECTION PROCEDURES HANDBOOK

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Chapter 3

NOISE

I. Purpose

The purpose of this chapter is to establish procedures and guidelines for conducting noise survey inspections, evaluating survey results, evaluating hearing conservation programs, and verifying that the operator is in compliance with the noise standard. This supersedes the previously issued Chapter 3.

II. Introduction

Many United States coal miners are exposed to loud and sustained noise levels. Hearing loss can occur after repeated exposure to sound levels at or above an 8-hour, time-weighted average of 85 decibels, A-weighted (dBA). The Mine Safety and Health Administration (MSHA) has determined that a large number of miners will suffer significant hearing loss unless preventative measures are taken to eliminate overexposure. Therefore, noise survey sampling is necessary to identify overexposure so that excessive noise exposures can be eliminated or effectively reduced.

III. Survey Inspections

A. Noise Survey Equipment

All MSHA noise surveys will be taken with a personal noise dosimeter. The Quest Q-200 and Quest Q-300 personal noise dosimeters have multiple internal dosimeters. The number I dosimeter must be set for evaluating noise related to the 85 dBA action level. It must operate with the A-weighted network, slow response, 80 dB threshold, 90 dB criterion level, and 5 dBA exchange rate. The number II dosimeter must be set for evaluating noise related to the 90 dBA permissible exposure level (PEL). It must be set to operate with the A-weighted network, slow response, 90 dB threshold, 90 dB criterion level, and 5 dBA exchange rate. The number III dosimeter, if applicable, must be set at the same parameters as the number II dosimeter.

All personal dosimeters must be set to the parameters listed in Table 1. Please note that the RANGE and A/C weighting are set once and affects all of these dosimeter readings.

After the initial setup, Technical Support personnel will set up the dosimeters during the annual calibration and lock the codes in place. This will prohibit the settings from inadvertently being changed in the field.

TABLE 1

Quest Parameter Settings

Measurement Parameter	**Value**		
	Dosimeter I	**Dosimeter II**	**Dosimeter III**
Calibration (CA-10)	114	114	114
Range	HI	HI	HI
UL (Upper Limit Level)	117	117	117
CL (Criterion Level)	90	90	90
ER (Exchange Rate)	5	5	5
TL (Lower Threshold Level)	80	90	90
Fast/Slow (Response Time)	Slow	Slow	Slow
A/C (Frequency Weighting)	A	A	A

B. Frequency of Noise Survey Equipment Calibration

Personal noise dosimeters and acoustical calibrators are required to be calibrated annually. A calibration schedule for all dosimeters and calibrators will be established for each district. The schedule must be strictly adhered to by each district to assure that all dosimeters and calibrators are properly calibrated. The address for shipping dosimeters and calibrators is as follows:

Mine Safety and Health Administration
Chief, Physical and Toxic Agents Division
Pittsburgh Safety and Health Technology Center
Cochrans Mill Road, P.O. Box 18233

Pittsburgh, PA 15236

C. Frequency of Surveying

1. Underground Mines

a. All Mechanized Mining Units (MMUs) will be surveyed on an annual basis. The minimum number of noise (BBB) surveys expected to be completed each year, on MMUs at underground mines, will be based on the number of producing MMUs as of the first of each month averaged over the fiscal year. A representative number of surveys will be collected on off-shifts and weekends where such activities are present. The requirements found in Chapter 1 - Respirable Dust, should be used as an appropriate guideline.

b. A representative number of outby individuals must be surveyed on an annual basis at each underground mine.

2. Surface Mines, Surface Facilities, and Surface Areas of Underground Mines

All surface mines, surface facilities, and surface areas of underground mines are to be surveyed on an annual basis. The number of noise (BBB) surveys expected to be completed will be based on the number of the above listed producing mine areas as of the first of each month averaged over the fiscal year. A representative number of surveys will be collected on off-shifts and weekends where such activities are present. The requirements found in Chapter 1 - Respirable Dust, should be used as an appropriate guideline.

3. Follow-up Surveys

When an evaluation based on the 90 PEL produces a dosimeter reading greater than 100 percent but less than 132 percent, a follow-up noise survey is required within the next 6 months.

When any such survey has a reading that is greater than or equal to 132 percent, a follow up noise survey must be conducted following the implementation of feasible engineering and administrative controls. An additional survey must be conducted to determine continued compliance within 60 days following the initial follow-up survey.

D. Types of Entities Surveyed

1. Mechanized Mining Units (MMUs)

A full-shift survey must be conducted on at least five (5) individuals performing different occupations, if available, on each MMU. These must include the miner operator(s), roof bolters, shuttle cars and any mobile bridge conveyor operators.

2. Outby Areas Underground

A full-shift survey must be collected from a representative number of outby individuals where high levels of noise may exist. These should include, but not be limited to, motormen and belt cleaners.

3. Surface Areas of Underground Mines

A full-shift survey must be conducted on at least five (5) individuals, if available, on the surface area of an underground mine where high levels of noise may exist.

4. Surface Mines and Surface Facilities

A full-shift survey must be conducted on at least five (5) individuals, if available, at each surface mine. These must include bulldozer operators and other heavy equipment operators.

E. Pre-Inspection Procedures

MSHA records such as previous BBB (Noise Technical Investigation) results, listing of entities assigned P-Codes (see section H for description of P Code) and the Uniform Mine File must be reviewed prior to beginning the inspection at the mine.

Before each survey, the calibration label on the dosimeter and calibrator must be checked to ensure that the instruments have been calibrated within the last year. A field calibration check must be conducted before and after each survey shift. If the dosimeter does not operate within a tolerance range of **+/- 1.0** dB with either calibration check, the instrument or survey results must not be used. The record documenting that the before and after shift calibration checks were made, including the serial number of the dosimeter and field calibrator, will be included on Form 2000-84 as shown in Post Inspection Procedures.

Procedural instructions for checking the calibration of the instruments are contained in Appendix 1.

F. **Survey Inspection Procedures**

1. **Dosimeters**

Noise exposure measurements must be made in accordance with the manufacturer's recommendations. This requires the dosimeter microphone to be located at the top of the shoulder midway between the neck and end of the shoulder, with the microphone diaphragm pointing in a vertical upward direction. The microphone should be located on the shoulder that is normally between the principal noise source and the miner's ear. To the extent practicable, the dosimeter instrument and microphone cable must be positioned underneath exterior clothing to minimize potential safety problems and damage to the instrument. The microphone must not be covered by clothing. **A wind screen must be used on the dosimeter at all times to protect the microphone from water and dust and to prevent adverse effects of air velocity exceeding 20 miles per hour (1760 ft/min) in the survey location.**

The personal noise dosimeter must be worn by the miner whose noise exposure is being measured for an entire normal work shift, even if the normal work shift is in excess of 8 hours. A normal work shift would not include occasional overtime work. During each full-shift survey, the inspector must observe the miner being surveyed on a frequent basis.

The inspector/s must accompany the miners to the work area and remain on the section or with the miners to assess the following:

a. ensure that the dosimeters are located in the correct environment;

b. observe working conditions and activities, and to document any changes that may occur during the survey shift which may affect the level of noise to which miners are exposed;

c. observe miners during the shift to verify the job classifications previously recorded; and

d. determine from discussions with a representative number of miners whether working conditions and activities during surveying by either MSHA or the operator are representative of non-survey periods and document any

relevant findings in the inspector's notes. Since any shift may exhibit wide variations in working conditions and activities, it must be determined if these are "typical" conditions.

Inspectors must remain in the work area as stated above where **surveying** is being conducted to ensure the survey is representative of the normal activities. The inspector must observe enough of the work activity to ensure that the dosimeters are maintained in the environment being surveyed, dosimeters are not abused, normal mining activities are taking place, a determination of production is made, noise controls are documented, etc. This requirement does not preclude the inspector from doing other inspection work while conducting the noise survey. Normally, the inspector will accompany the miners out of the mine.

When surveying outby areas, an inspector normally should not remain with the individuals for the entire survey shift. Instead, the inspector must spend sufficient time to observe and record the operating conditions and work activities in the area, the noise controls in use with a general description and whether or not they seem adequate, and potential sources of noise exposure.

2. **Sound Level Meters**

MSHA noise dosimeters can be used in the sound level meter (SLM) mode to check a miner's noise exposure above 115 dBA. However, a dosimeter used in the SLM mode must not be used in the dosimeter mode on the same shift. The following method can be used to check for overexposure above 115 dBA using the dosimeter in the SLM mode:

a. The calibration checks required in the Pre-Inspection Procedures (Section E) must be followed.

b. The dosimeter microphone must be held at arm's length within 1 or 2 feet of the miner's ear in a normal work area, with the microphone pointed upward. At frequencies above 1,000 Hz, a significant deviation from reference noise readings can occur when the wind screen is left on the microphone. When using the dosimeter in the SLM mode, remove the wind screen from the microphone before noise measurements are made, and replace it after use. **A wind screen must be used on the sound level meter at all times to protect the microphone from water and dust and to prevent adverse effects of air velocity exceeding 20 miles per hour (1760 ft/min) in the survey location.**

c. Readings of at least 30 seconds duration should be taken from areas that may be exceeding the maximum levels.

d. Compliance or noncompliance decisions must be based on Section H of this chapter.

e. Inspectors should not take noise measurements with sound level meters on moving equipment, such as shuttle cars and bulldozers, unless safe seating arrangements are provided.

G. Post Inspection Procedures

1. Complete the MSHA Form 2000-84 (October 2000, Revised) for each inspection where noise surveys are conducted and review the information for clarity, legibility, and accuracy. The revised Form 2000-84 is now sequentially numbered when printed to help uniquely identify each noise survey. Therefore, use only original preprinted forms.

   a. **Mine ID/Contractor ID Number** - Enter the mine identification number assigned by MSHA and if appropriate, the three- or four-digit contractor ID.

   b. **Event Number** - Enter the event number for the inspection or investigation during which the noise surveys were taken.

   c. **AR/RE Number** - Enter the five-digit identification number from the AR/RE card of authorization (MSHA Form 1000-186).

   d. **Field Office No**. - Enter the five-digit number assigned to the MSHA CMS&H office under which the coal mine is inspected.

   e. **Survey Date** - Enter date of survey(s) in two-digit month-day-year format. This date must be the same for all noise surveys documented on the same Form 2000-84. (Please note that when entering this data in the noise survey database, a four-digit year must be used.)

   f. **Activity Code** - Enter the activity code for the type of event during which the noise surveys were conducted.

   g. **Mine Name** - Enter the mine name as it appears on the Legal ID.

h. **Company Name** - Enter the company name as it appears on the Legal ID.

i. **Survey Sample Number** - The survey sample number is designated on the form for up to six samples per form.

j. **Survey Type** - This is a new data field. Check the box that applies, indicating whether the noise survey is an initial survey or a follow-up survey.

k. **P-Code** - This is a new data field for Coal. P-Codes may be issued to a mine operator where MSHA has determined that a piece of equipment cannot be brought into compliance with the noise standards through the use of engineering and administrative controls. Enter the specific MSHA P-Code for the equipment being surveyed.

l. **MMU/Pit/Area Surveyed** - This is an expanded data field. Enter the MMU/DA/DWP identification number assigned to the section, entity or surface area(s) where the survey was conducted. For non-MMU/DA/DWP locations, enter the Other Location Code that best describes the location where the survey was conducted. A list of location codes has been added to the back of the revised MSHA Form 2000-84.

m. **Instrument Property Number** - Enter the number from the MSHA property ticket affixed to the instrument.

n. **Calibrator Property Number** - Enter the number from the MSHA property ticket affixed to the calibrator.

o. **Miner's Last Name & First Initial** - Enter the last name and first initial for each miner for which a noise survey was conducted.

p. **Occupation Code** - Enter the MSHA three-digit code that best describes the duties performed during the survey period.

q. **Machine Code** - Enter the appropriate two-digit machine code from the list on the reverse side of MSHA Form 2000-84.

r. **Manufacturer's Code** - Enter the appropriate three-digit manufacturer's code from the list on the reverse side of MSHA Form 2000-84.

s. **Time Start** - Enter the 24-hour clock time when each survey was begun.

t. **Total Survey Time** - Enter the total survey time in **minutes** for each survey conducted.

u. **Production This Shift** - Enter raw production in tons for the survey period (underground MMUs only).

v. **85 Action Level Dose (Dosimeter I)** - Enter the dose percent value as a truncated whole number (no decimals) for the noise exposure at the 85 dBA action level from Dosimeter I.

w. **90 PEL Dose (Dosimeter II)** - Enter the dose percent value as a truncated whole number (no decimals) for the noise exposure at the 90 dBA permissible exposure level from Dosimeter II.

x. **90 PEL Max** - Enter the maximum dBA level as a truncated whole number (no decimals) indicated for the noise exposure at the 90 dBA permissible exposure level from Dosimeter II.

y. **Upper Control Limit Time** - Enter the duration of exposure in **whole minutes** for noise above 117 dB.

z. **Calibration Check** - Note here the appropriate calibration checks made before and after each noise survey. Check the boxes that apply.

aa. **Type of Hearing Protective Device(s)** - Mark the box(es) for all type(s) of HPDs worn by each miner surveyed.

ab. **Enrolled in HCP - Check this box if the miner sampled is enrolled in a Hearing Conservation Program regardless of his or her noise exposure.**

ac. **Citation Number** - Enter the citation number **only** if a citation is written for overexposure to noise under 30 CFR Part 62.

ad. **Comments** - Self-explanatory. The date(s) of the annual calibration checks of the dosimeters and/or calibrator may be entered here.

2. A completed **copy** of the MSHA Form 2000-84 (October 2000, Revised) must be

sent to the appropriate office within each District so the information can be entered into the noise database.

3. A field calibration check must be conducted after each shift of instrument use. If the instrument does not operate within a tolerance range of **+/- 1.0** dB with the post-shift calibration check, the survey results must not be used. The before and after calibration checks must be done with the same calibrator.

H. Compliance or Noncompliance Determination

1. When the action level as defined in 30 CFR 62.101 has been met or exceeded, a citation under 30 CFR 62.120 must be issued to the operator/contractor if the results of a noise survey show that:

   a. the full-shift noise exposure dose of any miner is 66 percent or greater; **and**

   b. the affected miner(s) is/are not enrolled in a Hearing Conservation Program as defined under 30 CFR 62.150.

   Note: The citable level of 66 percent is based on the action level of 50 percent dose (TWA_8 of 85 dBA) and a 16 percent (2 dBA) sampling error.

2. When the permissible exposure level, dual hearing protection level, or maximum level as defined in 30 CFR 62.101 has been exceeded, a citation under 30 CFR 62.130 must be issued to the operator if the results of a noise survey show that:

   the full-shift noise exposure dose of any miner is 132 percent or greater; and

   a. the inspector determines that all feasible engineering and administrative controls have **not** been implemented or administrative controls required to be in place are **not** being followed whether posted or not; or

   b. the conditions listed in the "P" code are not being followed.

   Note: If the inspector determines that all engineering and administrative controls have been implemented and the miner is enrolled in a HCP which includes the wearing of appropriate hearing protection, no citation should be issued until it is determined if this situation warrants a "P" code. In this situation, the inspector should follow the procedure for "P" codes outlined later in this section.

3. When the maximum sound levels have been exceeded, a citation under 30 CFR 62.130(a) must be issued to the operator if the results of a dosimeter survey indicate exposure at or above the 117 dBA level for 15 minutes or more and a sound level meter reading shows a single continuous noise level lasting at least 30 seconds at or above 117 dBA.
A citation issued for any of the criteria listed above should not identify the miner by name or social security number. Identification should be made by section identification number, occupation code, and if necessary other data such as "right side roof bolter." A statement must also be included that personal hearing protection must be worn until the exposures are reduced to or below the PEL and/or dual personal hearing protection must be worn until the sound levels are reduced to or below the dual hearing protection level (DHPL). A statement indicating the items of the Hearing Conservation Program that have not been implemented must be included in the body of the citation where the action level has been met or exceeded.

The following are partial examples of citations that should be used as guidance when issuing noise violations:

a. Based on the results of an MSHA full shift noise survey taken on 09/13/2000, the permissible exposure level has been exceeded on the continuous miner operator (036) in the 2 South section (MMU 003-0). The results obtained from a personal noise dosimeter showed a dose of 163 percent. Hearing protection must be provided and worn by the occupation identified until the exposures are reduced to the permissible exposure level.

Section:	62.130(a)
Gravity:	Reasonably Likely Permanently Disabling S&S

b. Based on the results of an MSHA full shift noise survey taken on 09/13/2000, the permissible exposure level has been exceeded on the cleaning plant operator (374) in the preparation plant. The results obtained from a personal noise dosimeter showed a dose of 1263 percent. Dual Hearing protection must be provided and worn by the occupation identified until the exposures are reduced to the dual hearing protection level. Once noise levels are reduced to the dual hearing protection level, hearing protection must then continue to be provided and worn by the occupation identified until the exposure is reduced to or below the permissible exposure level.

Section: 62.130(a)
Gravity: Highly Likely
Permanently Disabling
S&S

c. Based on the results of an MSHA full shift noise survey taken on 09/13/2000, the action level has been exceeded on the bulldozer operator (368) in the 002 pit. The results obtained from a personal noise dosimeter showed a dose of 84 percent and all items required by 62.150 Hearing Conservation Program have not been implemented. The following items have not been implemented: 62.170 Audiometric Testing, and 62.180 Training.

Section: 62.120
Gravity: Unlikely
Permanently Disabling
Non S&S

I. P-Codes

The "P-Code" is an administrative device used to track a piece of machinery, occupation, or individual where all feasible engineering and administrative controls have been employed and compliance with the PEL still cannot be achieved.

1. In order to consider entities for a P-code, the inspector must determine what controls are in place. The inspector or district health specialist must document the following:

   a. A brief narrative describing the operation and working conditions that resulted in the overexposure and a sketch of the overall area.

   b. If the noise exposure can be linked to a discrete piece or pieces of equipment, the inspector must document the manufacturer's name, address, and telephone number, the machine type, model number, year manufactured, and serial number.

   c. Copies of any citations issued, extension(s), inspector field notes concerning the noise violation, and noise dosimeter and area sound level meter data.

   d. Any Technical Support evaluation reports, if applicable, including recommendations and photos.

e. Description and effectiveness (reduction of miners' exposure) of controls used.

f. Description of controls considered, but not used, and the reasons why they were not used.

g. Narrative explaining infeasibility of reasonable administrative controls.

h. Any consultant reports including recommendations and conclusions, test data and results.

i. Any other documentation pertinent to the condition.

j. Evaluation of noise sources, including sound level/time studies and noise frequency analysis.

2. This information will then be referred to the District Manager for review.

3. If the District Manager believes that a P-Code is warranted, the documentation and draft P-code recommendation must be forwarded to headquarters for approval. It will be reviewed by Coal Mine Safety and Health (Division of Health) in consultation with Technical Support and district personnel designated by the District Manager. The draft recommendation will state the minimum acceptable engineering or administrative controls that must be used in conjunction with the hearing protectors.

4. If headquarters determines that a P-Code is warranted, it will be assigned to that particular machinery, occupation or individual at that mine. The approved "P" code will be transmitted to the mine operator through the District Manager.

5. There are two scenarios where a P-Code can be issued. They are:

a. A survey has been conducted indicating miners' exposures exceed the PEL and all feasible engineering and administrative controls have already been put in place, all affected miners are enrolled in a Hearing Conservation Program according to 62.150, and hearing protection is being properly worn and maintained. A P-Code would be considered without issuing a citation.

b. Noncompliance has been determined by an MSHA survey. A citation has been issued to the mine operator or contractor. All feasible engineering and

administrative controls are put in place in an effort to achieve compliance. If compliance cannot then be achieved, a P-Code would be considered.

J. Reporting of Survey Results

Within 30 calendar days from completion of the survey, the data on the Form 2000-84 must be entered into the Coal Noise Survey Database at either the field office or the district office.

K. Violation Abatement Procedure

Upon issuance of a citation for a violation of the noise standard, the following procedures must be followed:

1. The inspector must conduct a follow-up full shift noise exposure survey upon expiration of the abatement time as originally set or extended, provided feasible noise controls have been implemented which may achieve compliance.

2. If the survey shows compliance, the citation must be terminated.

3. If compliance is not achieved:

    a. Additional noise controls may be required to lower the noise exposures further.

    b. If the Agency has determined that all feasible administrative and engineering controls have been implemented and a P-Code has been issued, the citation will be terminated referencing the P-Code number.

APPENDIX 1

Q-200 / Q-300 Series Noise Dosimeter
Quick Start Pocket Guide
(Calibration and Use)

Turn On:

1. Turn on unit by holding **MENU/ON/OFF** key down until display begins to initialize. After initialization, "ON" and the "pause" annunciator will be displayed.

2. If "LOBAT" is in display, put fresh battery in unit.

Reset:

3. Press and release **MENU/ON/OFF** key. When "rES5" is in the display, press and hold the **ENTER** key for the 5 second count down. Again, "ON" and the "pause" annunciator will be displayed.

   NOTE: Resetting unit erases all previously stored data from memory.

Calibrate:

4. Turn on calibrator and check LOBAT indicator. Replace batteries if needed.

5. Insert unit's microphone into calibrator using appropriate adapter.

6. Press up arrow once. "CAL" annunciator with calibration level will be in display. Be sure the calibration level displayed is the same level output from the calibrator (114 dB). Press **RUN/PAUSE** to begin calibration. Unit will perform self-calibration and return to 'CAL' screen.

7. Press and release **MENU/ON/OFF** key to return to "ON" with "pause" annunciator.

Set Lock

8. Press down arrow key until "SE10" is displayed. Press **ENTER** to get the "SET" annunciator. Press up arrow key to **Code:** display "SE11". Press **ENTER** to begin entering your code. Use the up and down arrow keys to select the first number of code, then press **ENTER** key. Repeat using the up and down arrow keys and the **ENTER** key to set all four numbers of your code. After entering the fourth number of your code and pressing the **ENTER** key, the display will return to "SE11". Momentarily press **MENU/ON/OFF** key. "ON" with "pause" annunciator will now be displayed. At this point, the survey can be started (go to step # 9) or the dosimeter can be turned off for transport to the mine. Once at mine, turn unit on by holding **MENU/ON/OFF** key down until display begins to initialize. After initialization, "ON" and the "pause" annunciator will be displayed. Again, at this point, the survey can be started (go to step # 9).

Begin

9. Begin study by pressing **RUN/PAUSE** key. Will now have "0---" with the "run" annunciator displayed. If a lock code has not been entered, "on" with the run annunciator will be displayed. At this point of the **Study:** dosimeter is running and locked.

End

10. From the "0---" screen, press up and down arrow keys to select the first number of your code, then press **ENTER**. Repeat **Study:** until you have entered all four of your numbers. When you press **ENTER** after the fourth number, will have "ON" and "run" annunciator on screen. The dosimeter is now unlocked. Press **RUN/PAUSE** key to stop study. Annunciator will now display "pause".

Review

11. Press LEVELS, DOSE, AVG, and TIMES to review data. Press the same keys repeatedly to review

data for all three **Data:** dosimeter setup configurations (A Roman Numeral..... I, II, or III annunciator will be displayed at the bottom center of the screen indicating which dosimeters' data is being displayed).

NOTE: The following information can be obtained by pressing the up or down arrow keys after selecting one of the data items:

LEVELS	**DOSE**	**AVG**	**TIMES**
SPL	EXP	LAVG	RT
MAX	PDOSE TWA	PT	
MIN	DOSE	SEL	UL
PEAK			

Required 12. 85 ACTION DOSE - Press DOSE key to select dosimeter I. Press the up and down arrow keys to select DOSE. This is the 85 ACTION DOSE reading (item **V** on the form).

90 PEL DOSE - Press DOSE key until dosimeter II is selected. Press up and down arrow keys to select DOSE. This is the **Information:** 90 PEL DOSE reading (item **W** on the form).

90 PEL MAX - Press LEVELS key until dosimeter II is selected. Press up and down arrow keys to select MAX. This is the 90 PEL MAX reading (item **X** on the form).

UCL - Press the TIMES key until dosimeter II is selected. Press up and down arrow keys to select UL which is displayed in upper right corner. This is the UCL time reading (item **Y** on the form). [Note: 00:hr is hours above UCL and 00:00 is minutes and seconds above UCL.

Turn Off: 13. Press and hold the **MENU/ON/OFF** key for the 5 second count down.