



# Health Hazard Evaluations: NOISE AND HEARING LOSS 1986-1997

**November 1998**



U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Public Health Service  
Centers for Disease Control and Prevention  
National Institute for Occupational Safety and Health





## Foreword

The National Institute for Occupational Safety and Health's (NIOSH) Health Hazard Evaluation and Technical Assistance (HETA) program responds to approximately 400 requests per year from employers, employees, employee representatives, other Federal agencies, and State and local agencies to examine suspected hazards in the workplace.

The typical HETA response to a request for assistance results in an evaluation of whether chemical, physical, biological, or other agents are hazardous as used or found in the workplace followed by the development of recommendations for control procedures, improved work practices, and medical programs to reduce exposure levels and prevent adverse health effects. The results of individual evaluations may trigger wider studies of similar exposures in other settings, or may stimulate recommendations for implementation or modification of health standards. Requests received by the HETA program tend to reflect emerging occupational problems. More than 8,000 evaluations have been completed since the inception of the HETA program in 1972 on hazards such as chemical exposures, indoor air quality, ergonomics and noise-induced hearing loss.

Noise-induced hearing loss is one of the most prevalent occupational health hazards facing American workers today. Approximately 30 million people are exposed to hazardous levels of noise at their work sites and an additional 9 million are at risk from other substances such as solvents and metals. While noise-induced hearing loss is irreversible, it is preventable and its risk can be reduced with the application of noise controls and occupational hearing loss prevention programs.

When evaluating noise during an Health Hazard Evaluation (HHE), staff may monitor noise exposures, survey worker medical information, conduct worker audiometric evaluations, assess worker use of hearing loss protection devices, and evaluate hearing loss prevention policies and standards. NIOSH researchers present written reports detailing the results of their evaluations to help companies assess workers exposure to noise, evaluate and plan noise controls, and develop employee education programs on hearing loss prevention.

This document presents summaries of the HHEs related to noise conducted from 1986-1997. The summaries are organized by industry. In several cases noise exposure was just one of many exposures that NIOSH researchers investigated at the work site.

The full reports listed in this document are available from the Hazard Evaluation and Technical Assistance Branch.

Contact:

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More information about the Health Hazard Evaluation Program is available on the web at <http://www.cdc.gov/niosh/hhe.html>.

## Agriculture, Forestry, and Fishing (SIC 0100-0999)

### Assessing Exposure to Noise during Aerial Pesticide Application

HETA 95-0248-2562

March 1996

**Purpose:** To investigate worker exposure to noise during aerial pesticide application.

**Keywords:** SIC 0721 (Crop Planting, Cultivating, and protecting) aerial dusting and spraying, pesticide exposure, organophosphate, carbamate, pyrethroid, skin exposure, mixer-loader, pilot, noise, personal hearing protection, hearing conservation program, heat stress.

**Abstract:** NIOSH researchers conducted a HHE at an aerial pesticide application firm in Arkansas. Personal noise monitoring was conducted on two pilots and all three mixer-loaders and spectral noise analyses were conducted to determine the dominant noise frequencies and to evaluate the flight helmets for noise attenuation. The noise monitoring showed that both pilots sampled were exposed TWA sound levels higher than the NIOSH REL and the OSHA PEL for noise. The TWA noise exposures of the mixer loaders also exceeded the NIOSH REL, but not the OSHA regulation. Recommendations are made for improving safety during the use of pesticides and for the implementation of a medical surveillance program.

## Construction (SIC 1500-1799)

### Assessing Workers' Exposure to Noise in Bridge Repainting

HETA 91-006-2193

March 1992

**Purpose:** To investigate exposure to noise in bridge repainting.

**Keywords:** SIC 1622 (Bridge, Tunnel, and Elevated Highway Construction), lead, abrasive blasting, construction, bridge workers.

**Abstract:** NIOSH conducted a Health Hazard Evaluation (HHE) to evaluate workers' exposure to noise during repainting of the Brent Spence Bridge, a double-level

highway bridge over the Ohio River in Covington, Kentucky. Personal exposures to noise, expressed as 8-hour time-weighted averages (TWAs), ranged from 89.6 decibels on the A-weighted slow weighting network [dB(A)] to 105.4 dB(A). Most workers surveyed had 8-hr TWA noise exposures exceeding the NIOSH Recommended Exposure Limit (REL) of 85 dB(A), and the Occupational Safety and Health Administration (OSHA) permissible exposure limit (PEL) of 90 dB(A). All workers were provided, and used, hearing protection devices (earplugs); however, they were not protected by a comprehensive hearing conservation program. Recommendations for an improved hearing conservation program are presented in the full report.

## Manufacturing (SIC 2000-3999)

### Evaluation of Planned Noise Abatement Procedures in Two Sawmill Facilities

HETA 88-030-2109

April 1991

**Purpose:** To investigate planned noise abatement procedures in two sawmill facilities.

**Keywords:** SIC 2421 (Sawmills and Planing Mills, General), noise exposure, hearing loss, noise control engineering, hearing conservation programs.

**Abstract:** In this evaluation, NIOSH assisted a sawmill company in evaluating the effects of noise abatement procedures planned for its two milling facilities. Additionally, employee data were gathered on hearing ability, employment history at the company, and any noise exposure or medical problems that might affect hearing. Results revealed that 73% of the surveyed job descriptions in the mills had average noise levels in excess of the NIOSH REL. The noise controls tested in the mill were found to produce varying amounts of noise reduction to the workers. The hearing tests revealed that 72.5% of the employees exhibited some degree of hearing impairment at one or more audiometric test frequency. NIOSH investigators concluded that a health hazard exists for the company's employees. It was recommended that a comprehensive hearing conservation program minimally complying with OSHA regulations should be implemented in order to protect these employees from excessive noise exposures in the work place.

## Evaluating Noise Controls at a Paper Mill Facility

HETA 86-437-1818

July 1987

**Purpose:** To investigate the effectiveness of a rotary knife blade enclosure in reducing worker exposure to noise at a paper mill facility.

**Keywords:** SIC 2645 (DieCut Paper and Paperboard and Cardboard), noise, paper making industry, paper cutters, enclosures.

**Abstract:** NIOSH conducted an evaluation of the noise levels found in the small paper cutter area of an Ohio paper mill before and after installing an enclosure over the rotary knife blade. The results of the area noise sampling showed a noise reduction of 13 dB(A) as a function of the knife blade enclosure, going from 108 dB(A) prior to installation to 95 dB(A) after enclosing the blade. However, the personal noise dosimetry results showed little change from the preenclosure to postenclosure sampling period. This apparent paradox was partially explained as the result of different operators and their work practices or different weights of paper. It does, however, point out the difference between noise exposures to workers and noise levels being emitted by machinery. A noise hazard was found to exist in the small cutter area of the paper mill. The potential for excess noise exposure was reduced by enclosing the rotary knife blade, however eighthour TWA values in excess of 85 dB(A) were common in the area even after the blade was enclosed. Recommendations to further reduce the noise hazard and to protect the workers' hearing are provided in the full report.

## Noise Exposures at a Specialty Chemical Plant

HETA 86-071-1817

July 1987

**Purpose:** To investigate worker exposure to noise at a specialty chemical manufacturing plant.

**Keywords:** SIC 2842 (Specialty Cleaning, Polishing, and Sanitation Preparations) batch process, methylene chloride, noise, acids, alkaline dust, ventilation, personal protective equipment.

**Abstract:** NIOSH conducted a HHE to determine worker exposure to noise at a specialty chemical manufacturing plant. Fullshift noise exposures ranged from 78 to 88 dB(A) TWA with a mean of 82 dB(A) TWA. The percent of the daily allowable noise exposure based on the OSHA noise PEL of 90 dB(A) for eight hours ranged from 19 to 74%. Five workers had fullshift noise exposures at or above 85 dB(A) TWA, the NIOSH recommended exposure limit. Maximum one minute average noise levels encountered by workers during the shift ranged from 88 to 113 dB(A). Overall area noise measurements ranged from 84 to 96 dB(A). Noise levels in the facility represent a risk for potential hearing impairment. Some areas and equipment generate sufficiently high noise levels (85 dB(A) or greater) to present an auditory hazard for unprotected workers in the immediate area. Recommendations addressing a hearing conservation program are presented in the full report.

## Evaluating Noise at a Pipe Fabricating Plant

HETA 88-214-1952

March 1989

**Purpose:** To investigate noise exposure at a pipe fabricating plant.

**Keywords:** SIC 3079 (Pipe Fabrication), extruding, polyvinyl chloride, polyethylene, polystyrene, noise.

**Abstract:** NIOSH researchers investigated exposures to hazardous levels of noise at a pipe fabricating plant in West Virginia. Personal, TWA noise exposure measurements taken over a three-day period ranged from 80 dB(A) to 104 dB(A). Job categories working in areas with hazardous noise levels included grinder, line takeoff attendant, and hopper attendant. Workers in the grinding area used hearing protection; however, workers in the other areas did not use hearing protection and some were exposed to hazardous noise levels. On the basis of data obtained during this evaluation, NIOSH investigators concluded that some workers receive hazardous noise exposures. Recommendations to correct these occupational health/safety problems are presented in the full report.



## Evaluation of Noise Exposures at a Glass Products Manufacturing Facility

HETA 89-137-2005

January 1990

**Purpose:** To investigate worker exposure to noise in a glass products manufacturing facility.

**Keywords:** SIC 3231 (Glass Products, Made of Purchased Glass), silica, hydrofluoric acid, sulfuric acid, organic vapors, mineral spirits, pine oil, noise, cumulative trauma disorder, ventilation.

**Abstract:** NIOSH conducted an evaluation of employee exposures to noise in a glass manufacturing facility along with many other occupational exposures. Noise exposures were assessed by measuring the sound levels in the Furnace, Decorating, and Mirroring Departments. Personal noise exposures ranged from 79 to 92 dB(A), TWA, in the areas tested. Noise levels in excess of the NIOSH REL were found in several departments. Based on the data collected during this evaluation, NIOSH investigators concluded that employees in several departments at the company were exposed to excessive levels of noise. Recommendations for implementing hearing conservation programs are included in the full report.

## Noise Exposures and Hearing Loss in Workers Involved in the Manufacture of Roofing Granules

HETA 91-0091-2418

May 1994

**Purpose:** To investigate noise exposures and hearing loss in roofing granules manufacturing.

**Keywords:** SIC 3295 (Minerals and Earths, Ground or Otherwise Treated), silica, noise, hearing conservation.

**Abstract:** This investigation was performed in response to a request from the Oil, Chemical and Atomic Workers' union that listed hearing loss as a health concern in workers involved in the manufacture of roofing granules. Hearing losses were reportedly documented by company hearing tests, but the union reported that the manufacturer did not address the losses. NIOSH investigators performed a walk-

through inspection of the plant. Medical records from both individual employees and the company medical department, and health survey questionnaires distributed by the local union were reviewed. Noise dosimeter measurements and area noise levels were made in several areas of the plant. Personal noise dosimetry revealed that a majority of the samples were in excess of the NIOSH REL of 85dB(A) for an 8-hour TWA. Recommendations for reducing exposures to noise are included in full report.

## Field Survey at an Oxygen Process Shop to Evaluate Potential Hazards from Air Contaminants, Noise, Heat Stress, and Ergonomic Problems

HETA 92-0230-2471

November 1994

**Purpose:** To investigate noise exposures in oxygen processing.

**Keywords:** SIC 3312 (Steel Works, Blast Furnaces [including coke ovens], and Rolling Mills), air contaminants, metals, sulfur dioxide, noise, hearing aids, heat stress, ergonomics, vibration, lifting.

**Abstract:** NIOSH investigators conducted a field survey at an oxygen process shop to evaluate potential hazards from noise. Employee reports of tinnitus (ringing in the ears) related to work schedules and long-term hearing problems suggest that the company's hearing conservation program might not be effective. The interviewed employees identified the following sources of noise: warning sirens and horns, scrap dropping into the charge, plates hitting the floor, furnaces, mixers, discharge of the electric arc, preheaters, heavy equipment such as grade-alls and cranes, air hammers, and poorly functioning air-conditioning units. The maximum area noise measurements ranged from 80 to 106 dB(A), depending on the area. The findings of this health hazard evaluation indicate that the shop employees are potentially exposed to dangerous levels of noise, which may be having a deleterious effect on employee hearing. Specific recommendations for reducing employee exposure to noise are made in the full report.

## Evaluating Noise Exposures Occurring in the Manufacture of Road Signs

HETA 86-191-1836

February 1987

**Purpose:** To investigate noise levels in a sign manufacturing shop.

**Keywords:** SIC 3499 (Fabricated Metal Products, Not Elsewhere Classified) silk-screening, organic solvents, inks, noise, sign fabrication.

**Abstract:** NIOSH investigators evaluated noise exposures from the sign fabrication process conducted at a sign shop in West Virginia. Personal noise exposure measurements were taken using a noise dosimeter and a portable sound level meter with an octave band analyzer. Personal, TWA noise exposures from the sign fabrication shop did not exceed allowable exposure levels as averaged over the entire work shift. However, some workers received brief exposures to sound levels above 115 dB(A) from the operation of the metal saw. NIOSH investigators concluded that some workers receive potentially hazardous noise exposures in the sign fabrication shop. Recommendations for prevention of these problems are presented in the full report.

## Evaluating Noise Levels at an Outboard Motor Manufacturing Facility

HETA 93-0498-2409

March 1994

**Purpose:** To investigate noise in outboard motor manufacturing.

**Keywords:** SIC 3519 (Internal Combustion Engines, Not Elsewhere Classified), outboard marine motor manufacturing, noise dosimetry, octave-band analysis, hearing conservation, engineering controls.

**Abstract:** Investigators from NIOSH conducted a HHE to evaluate noise levels at an outboard motor manufacturing facility. A request from the joint union/management team at the company asked for assistance from NIOSH to help meet a company noise reduction goal of 82 dB(A). The team felt that a reduction in plant noise would improve workers' ability to communicate, reduce stress in the work place, and improve product quality while protecting workers from occupational hearing loss. Personal noise exposure measurements collected with noise

dosimeters on eighteen employees and octave band analyses of various departments were completed over two days at the facility. Prominent noise sources included the use of compressed air in several operations and outboard motor noise generated during the wet and dyno testing operations. The results of the evaluation revealed that employees in the machining, assembly, and testing departments were exposed to potentially harmful noise. A majority of the TWA noise exposure levels exceed the NIOSH REL for occupational noise. Recommendations for implementing specific elements of a hearing conservation program as well as suggestions for noise controls that should help to reduce the noise levels in the facility were offered in the full report.

## Evaluating Worker Exposure to Noise at a Manufacturer of Industrial Centrifugal Equipment

HETA 95-0167-2539

November 1995

**Purpose:** To investigate exposure to noise in industrial centrifugal manufacturing.

**Keywords:** SIC 3559 (Special industry machinery, not elsewhere classified), industrial centrifugal equipment manufacture, noise exposure, noise dosimetry, hearing conservation.

**Abstract:** NIOSH received a request from employees and from a United Auto Workers local at a manufacturer of industrial centrifugal equipment to conduct a health hazard evaluation at the facility. The concern was worker noise exposure in the main building, particularly the noise associated with a recently installed air compressor. In the request, it was pointed out that a few employees had been identified as having hearing loss at a local hospital. The employees were concerned that the losses may be occupationally related. A NIOSH investigator conducted a full-shift noise survey in the main building of the facility using noise dosimeters. Additional noise measurements were made with a real-time analyzer to determine the spectral content of specific noisy operations. Based on the results of the noise data analyses and observations made during the evaluation, the NIOSH investigator concluded that a health hazard related to potential hearing loss exists for employees at facility. A majority of the workers were exposed to time-weighted noise levels in excess of the NIOSH recommendation, while 35%



of the sampled employees exceeded the OSHA action level that stipulates that a hearing conservation program needs to be implemented. Hearing conservation program recommendations toward reducing the noise exposures and preventing further hearing losses were offered in the report.

### Evaluating Employees' Noise Exposures in Conjunction with the Use of Personal Radio Headsets on the Job Site

**HETA 90-281-2319**

**May 1993**

**Purpose:** To investigate noise exposures and personal radio headset usage in an electrical distribution equipment manufacturing facility.

**Keywords:** SIC 3613 (Electric Transmission and Distribution Equipment, Switchgear and Switchboard Apparatus), noise, personal radio headsets, hearing conservation programs.

**Abstract:** NIOSH received a request for a HHE to evaluate employees' occupational noise exposures in conjunction with the use of personal radio headsets on the job site. One portion of the request concerned the applicability of employees using a radio headset over plugged ears in areas requiring hearing protection. Employee noise exposures measured with noise dosimeters revealed a median 8 hour TWA noise exposure of 84.6 dB(A). One full-shift noise sample exceeded 90 dB(A), the OSHA PEL. Because 50% of the noise exposures equaled or exceeded the recommended limits, investigators determined that a potential for employee exposure to excessive noise exists. The company should continue with its hearing conservation program that was in place at the time of the survey. Also, the potential for excessive noise produced by personal radio headsets turned to full volume should lead the company to educate the employees on the hazards associated with the devices. Specific recommendations are contained in the full report.

### Evaluation of Potential Exposures to Noise at an Energy and Automation Plant

**HETA 91-305-2267**

**November 1992**

**Purpose:** To investigate noise exposures in an energy automation plant.

**Keywords:** SIC 3621 (Motors and Generators), motor manufacturing, trace metals, noise, welding, brazing, soldering.

**Abstract:** A HHE was conducted to evaluate potential exposures to noise at an energy and automation plant. Employee interviews and an area noise survey were conducted. The survey identified several areas of the plant where workers may have been overexposed to noise. A full-shift noise survey was conducted to document employees personal noise exposures in the welding, punch press, and machine taping areas. Results of the environmental monitoring indicate that a health hazard existed for welders and press operators from overexposures to noise. Recommendations were provided to reduce noise exposures and improve the hazard communication program.

### Evaluating Noise Exposure in an Electronics Manufacturing Plant

**HETA 91-021-2144**

**October 1991**

**Purpose:** To investigate noise exposure in an electronic manufacturing plant.

**Keywords:** SIC 3651 (Household Audio and Video Equipment), noise exposure, noise control engineering, hearing conservation programs.

**Abstract:** At the request of company management, NIOSH conducted a HHE at an electronics manufacturing plant to assist the company in determining the spectral characteristics of worker noise exposures for the purpose of the reduction of these levels by the company's plant engineering department. Area noise sampling and worker noise dosimeter measurements were made in several locations of the facility to determine workers noise exposures during their work shifts. The results of the noise measurements revealed several areas in the plant where the workers are exposed to noise levels in excess of 85 dB(A), but not in excess of 90 dB(A). Because several of the area noise measurements and the worker's personal noise dosimetry values were in excess of the NIOSH Recommended Exposure Limit of 85 dB(A), NIOSH investigators conclude that a potential health hazard exists for the employees. However, because no employee audiometric records were evaluated in this evaluation, it cannot be determined if these noise levels have had a deleterious effect on the workers' hearing. It was recommended that the company use the spectral

noise data to devise noise reduction controls in the affected departments. Specific recommendations were given for the implementation of a comprehensive hearing conservation program that should be activated until the noise exposures can be permanently reduced to levels below 85 dB(A).

## Evaluating Worker Exposure to Noise at a Plastic Accessories Manufacturing Plant

**HETA 87-159-1962**

**April 1989**

**Purpose:** To investigate worker exposure to noise at a plastic accessories manufacturing plant.

**Keywords:** SIC 3751 (Motorcycles), acetone, styrene, noise.

**Abstract:** NIOSH conducted an evaluation of workers noise exposures at a plastic accessories manufacturing plant. Nine employees wore personal noise dosimeters to assess their noise exposures. A total of two-thirds of the full shift noise exposures were in excess of the NIOSH REL for noise and the OSHA action level for implementation of a hearing conservation program. Because of this finding, attempts to implement engineering controls in some of the noisier operations should be investigated. Measures to reduce noise exposures and improve workers safety and health are recommended in the full report.

## Transportation and Public Utilities (SIC 4000-4971)

## Determining Noise Exposure of Postal Employees

**HETA 92-056-2223**

**May 1992**

**Purpose:** To investigate noise exposure from an automated Small Parcel and Bundle Sorter.

**Keywords:** SIC 4311 (United States Postal Service), noise, automated sorting machines, letter carriers.

**Abstract:** In response to postal employee concerns, an investigator from NIOSH conducted noise surveys at a local post office station to document noise

exposures experienced by employees in the letter sorting area which also houses an automated Small Parcel and Bundle Sorter (SPABS). Personal noise dosimetry was conducted on letter carriers in the sorting area and on postal clerks and mail handlers servicing the SPABS. Although no noise levels were measured that exceed current evaluation criteria for noise exposure and occupational hearing loss, the letter carriers do perceive that the noise emitted by the SPABS is stressful and interferes with their work. The noise from the automated sorting machine measured by the NIOSH investigator is clearly audible above the ambient noise in the letter sorting area, with the stop/start warning device being much louder than background noises. The type of noise emitted by the warning device, measured in the evaluation, meets several researchers' definition of noise as an occupational stressor because of its unpredictability and lack of controllability. Therefore, recommendations are made to reduce the noise in the SPABS and letter sorting areas. However, there are no current evaluation criteria to cite specific noise levels that must be reached in order to eliminate the non-auditory effects of the noise exposure.

## Evaluating Landfill Employee Exposure to Noise

**HETA 93-0696-2395**

**March 1994**

**Purpose:** To investigate noise exposure in landfills.

**Keywords:** SIC 4953 (Refuse Systems), landfill, silica, chromium, asbestos, noise, rubbish collection.

**Abstract:** In February 1993, NIOSH conducted a HHE at an Ohio landfill facility to determine if employee exposures to noise represented a health hazard. Employees were using hearing protection devices to guard against the hazards of occupational noise exposure. Noise dosimetry was conducted over two days on three heavy equipment operators, three mechanics, and a laborer. The results of noise dosimetry indicate that exposure to noise exceeded the PEL of 90 dB(A) for an 8 hour TWA. Recommendations are included in this report to develop a comprehensive hearing conservation program and gives suggestions for engineering controls to reduce worker exposure to noise.

## Evaluation of Noise Levels at a Hydroelectric Power Plant HETA 92-0243-2377 January 1994

**Purpose:** To investigate noise exposures in a hydroelectric power plant.

**Keywords:** SIC 4910 (Electric services), noise, audiometric testing, infrasound, hydroelectric power.

**Abstract:** NIOSH investigators conducted a HHE at an Arkansas hydroelectric power plant in response to employees' concerns about excessive noise levels in the power plant resulting from the generation of electricity. Personal noise exposure measurements were made on all of the electricians and mechanics at work on the days of the surveys with noise dosimeters set to measure noise according to Department of the Army noise regulations. Spot measurements of infrasound (sound below the sonic range of human hearing) and simple measurements of structural vibration were also made during the first site visit. All of the mechanics and electricians who worked in the power plant had noise exposures that exceeded the U.S. Army Corps of Engineers safety and health requirements. However, worker compliance with the wearing of hearing protective devices while working was observed to be good. Deficiencies were discovered in the audiometric testing program used at the power plant upon review of their records.

## Wholesale trade (SIC 5000-5199)

## Potentially Hazardous Noise in a Cosmetics and Drug Distribution Warehouse HETA 91-194-2153 October 1991

**Purpose:** To investigate noise exposure in a cosmetics and drug distribution warehouse.

**Keywords:** SIC 5122 (Drug Proprietaries, Drug Sundries), noise, warehousing.

**Abstract:** An investigation was conducted at a drug and cosmetics distribution warehouse to evaluate potentially hazardous noise in the workplace. During the investigation, personal noise dosimetry was

performed, along with octave band area noise measurements at various locations throughout the facility. Analysis of the results of the personal and area noise measurements indicated that the measured values in the shipping area of the facility approach the NIOSH REL and OSHA action level (AL) of 85 dB(A) for an 8-hour TWA. These noise results reveal that no noise hazard exists at the drug company. However, noise levels in the shipping area are only slightly below the NIOSH REL and OSHA AL. Therefore, recommendations are made to further reduce employee exposures to noise using engineering and administrative controls.

## Services (SIC 7000-8999)

## Evaluating Noise Exposure in a Biomedical Laboratory HETA 91-287-2228 June 1992

**Purpose:** To investigate noise exposure in a biomedical lab.

**Keywords:** SIC 8734 (Testing Laboratories), biosafety, agricultural, microbiological and biomedical laboratories, noise.

**Abstract:** This HHE was performed in response to a confidential employee request concerning microbiological safety in a biomedical laboratory. In addition, once the HHE was in progress, lab management requested an evaluation of noise exposures in the necropsy suite, in the electron microscopy lab, and in a veterinarian's office. NIOSH investigators administered a questionnaire to employees, performed industrial hygiene measurements during the operation of laboratory apparatus, evaluated selected laboratory hoods with a thermo anemometer and smoke tubes, and measured noise in the specified areas. The results showed that the noise levels in these areas did not approach those associated with the development of noise-induced hearing loss. Recommendations are made for further reducing the amount of noise to which workers are exposed.

## Public Administration (SIC 9000-9721)

### Evaluating Risk of Noise Induced Hearing Loss for Fire Fighters in a Metropolitan Area

HETA 88-0290-2460

September 1994

**Purpose:** To investigate noise exposure in fire fighters.

**Keywords:** SIC 9224 (Fire Departments, including volunteer), noise exposure, noise dosimetry, fire apparatus, hearing loss, hearing conservation.

**Abstract:** A HHE was conducted to evaluate noise exposure levels and hearing loss for fire fighters in a metropolitan area. Full-shift personal noise measurements and audiometric testing of fire fighters were done in the department. The noise dosimeter surveys revealed that average noise exposures were generally less than the NIOSH recommended exposure limits, but there were brief occurrences of noise levels greatly exceeding the exposure limits. These high exposures were usually associated with emergency response runs in the fire vehicles. A statistically significant relationship was found between length of time spent as a fire fighter and hearing loss. Based on the results of the audiometric data analyses, the NIOSH investigator concluded that a health hazard exists for fire fighters and recommended steps to the fire department to reduce the noise exposures to the fire fighters and help prevent further hearing losses.

### Evaluating Risk of Noise Induced Hearing Loss for Fire Fighters

HETA 89-0026-2495

March 1995

**Purpose:** To investigate noise exposure and hearing loss in fire fighters.

**Keywords:** SIC 9224 (Fire Departments, including volunteer), noise exposure, noise dosimetry, fire apparatus, hearing loss, hearing conservation.

**Abstract:** A health hazard evaluation was completed by testing noise exposure levels emitted by fire emergency vehicles, noise exposure at fire stations, and hearing loss for fire fighters. The noise surveys

revealed that while the 24-hour cumulative noise doses were generally less than the NIOSH recommended exposure limits, there were brief occurrences of noise levels greatly exceeding the exposure limits. These high exposures were usually associated with emergency response runs in the fire vehicles. The audiometric data showed a decline in hearing ability in the high frequency sound region, while at the same time, a significant “improvement” in hearing at the low audiometric test frequencies was discovered. These data suggest that, in spite of the fire fighters’ improved ability to take a hearing test, there was still a significant loss of hearing in the noise sensitive region. Based on the results of the audiometric data analyses, the NIOSH investigator concluded that a health hazard exists for fire fighters and recommended steps to the department to reduce the noise exposures to the fire fighters and help prevent further hearing losses.

### Evaluating Police Officers’ Exposures to Noise Generated by Gun Firing Exercises.

HETA 92-0034-2356

October 1993

**Purpose:** To investigate noise exposures during gun firing exercises.

**Keywords:** SIC 9221 (Police Protection), lead, firing range, noise, ventilation.

**Abstract:** NIOSH investigators conducted environmental monitoring of police officer firing exercises to assess potential occupational exposures to hazardous noise levels generated at the facility during the hand gun firing exercises. Peak noise measurements ranged from 157 to 160 dB(A) when officers were firing their weapons on the indoor range. The hearing protection devices used by officers are adequate protection when they are properly maintained and replaced when necessary. Recommendations are provided in the report about periodic maintenance and replacement for the hearing protection devices.



## Evaluate of Noise and Hearing Loss in Fire Fighters

HETA 86-138-2017

February 1990

**Purpose:** To investigate noise exposures and hearing loss in fire fighters assigned to airports.

**Keywords:** SIC 9224 (Fire departments, including volunteer), noise exposure, hearing loss, hearing conservation.

**Abstract:** NIOSH conducted noise surveys and audiometric examinations of fire fighters in a metropolitan area, some of whom were assigned to two fire stations serving a nearby airport. There was concern that these fire fighters were at greater risk of accruing hearing loss because of the addition of aircraft noise to their occupational noise exposures. The noise dosimetry results revealed timeweighted averages that ranged from 60 to 82 dB(A). However, the levels encountered during code three responses (warning lights, sirens, and air horns) reached 109 dB(A) for a oneminute time period. The audiometric results showed that the average fire fighter exhibited a characteristic noiseinduced permanent threshold shift. This hearing loss was statistically related to the amount of time that the fire fighter had been on the job, with decreasing hearing ability as a function of years of service. NIOSH investigators conclude that a health hazard exists for these fire fighters. A comprehensive hearing conservation program should be implemented in order to reduce the growth of hearing loss for fire fighters. Specific recommendations are presented in the full report.

## Evaluation of noise exposure for two Offices

HETA 91-0308-2376

January 1994

**Purpose:** To investigate excessive noise in an office environment.

**Keywords:** SIC 9311 (Public Finance, Taxation, and Monetary Policy), indoor environmental quality, ventilation, medical questionnaire, office noise, IEQ, GSA.

**Abstract:** Investigators from NIOSH conducted a health hazard evaluation for several offices in an office building in Michigan. Noise conditions in the office

setting were evaluated for their effects on speech intelligibility, telephone usage, and work interruption rather than on the risk of hearing damage. NIOSH investigators examined noise levels and determined that the office environments are suited for only fair to moderate listening conditions. Recommendations that address communication concerns are offered in the report.

## Evaluation of an Air Traffic Approach Control Tower

HETA 96-0184-2663

November 1997

**Purpose:** To investigate the noise exposure of workers in an air traffic approach control tower.

**Keywords:** SIC 9621 (Regulation and Administration of Transportation Programs), air traffic control operations-government, noise, radio headsets, compression circuits, noise-limiting circuits, audiometric testing, hearing conservation program.

**Abstract:** In this evaluation, NIOSH visited the airfield to measure noise levels from the communication systems used by the air traffic control (ATC) specialists while a noise compression using was inserted into the communication line, as well as when the unit was removed and unattenuated signals were allowed to reach the headset receiver. Also, ambient background noise measurements were made in the controllers work area. Finally, audiometric test results from the ATC specialists and a copy of the occupational injury and illness log were reviewed. Analysis of the headset receiver and the compression unit showed the controllers could be exposed to equivalent free field noise levels up to 104 dB(A), but that the compression units functionally reduced the exposure to a safe level. Analysis of the audiometric records did not reveal any systematic occupational hearing loss in the population of controllers. Researchers found deficiencies in the manner in which the compression unit was used and in the hearing tests given to the controllers. There was a moderately high level of background noise in the work area that could possibly interfere with speech intelligibility. Recommendations to alleviate these deficiencies are given in the last section of this report.

**For Information on Other  
Occupational Safety  
and Health Concerns**

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or visit the NIOSH Homepage at:  
<http://www.cdc.gov/niosh>

