

ABSTRACT OF THESIS

A NOISE EXPOSURE ASSESSMENT OF COAL-FIRED ELECTRIC GENERATION STATIONS

Occupational noise exposure data was collected from nine coal-fired electric generation stations. Seven of the plants operated in Colorado and two in Texas. The data was gathered during 36 collection campaigns, conducted from October 1998 to September 1999. The collection campaigns resulted in 253 individual noise exposure assessments. The noise exposure assessments were produced through the use of noise dosimeters, which were worn by the workers included in the study for their entire work shift, and worker interviews. The data collected included information on personal noise exposure dose and time-weighted average (TWA) exposure, employee job class, work location and work performed. Specific information regarding the power output, number of boiler units and the ages of each plant were also obtained.

The dosimeter data was collected using the exposure assessment criteria of the Occupational Safety and Health Administration (OSHA) for comparison to the OSHA Noise Regulation (29 CFR 1910.95). The data obtained using the OSHA criteria was also mathematically converted to reflect the exposure assessment criteria of the American Conference of Governmental Industrial Hygienists (ACGIH) and the National Institute for Occupational Safety and Health (NIOSH). The method for mathematical conversion between exposure criteria was developed for this study.

The exposure dose results of this study showed that 21.7% of the power plant operations workers, 30.6% of the plant maintenance workers, and 3.2% of

the plant support workers would be required to participate in a continuing, effective OSHA hearing conservation program (HCP). In addition, 4.8% of the operations workers, 9.3% of the maintenance workers, and none of the support workers were overexposed to noise under OSHA criteria. The exposure dose results obtained using ACGIH/NIOSH criteria showed that 22.9% of the operations workers, 32.4% of the maintenance workers, and 3.2% of the support workers would be required to participate in a continuing, effective hearing loss prevention program (HLPP). These same percentages of workers were also overexposed to noise under ACGIH/NIOSH criteria.

Noise dose measurements using ACGIH/NIOSH criteria produced higher overall doses, and higher average doses than produced when using OSHA criteria data, but the percentages of workers in all job classes required to participate in a TIC? or HLPP were not significantly different. The number of plant operations and maintenance workers overexposed to noise was significantly impacted when using ACGIH/NIOSH criteria, instead of OSHA criteria. The use of ACGIH/NIOSH criteria raised the percentage of plant operations personnel overexposures from 4.8% under OSHA, to 22.9%. The use of ACGIH/NIOSH criteria raised the percentage of plant maintenance personnel overexposures from 9.3% using OSHA, to 32.4%. The use of ACGIH/NIOSH exposure criteria had no impact over the use of OSHA exposure criteria for support employees.

Operations and maintenance personnel did not show significant differences in noise exposure from each other, using either criteria. Operations and maintenance personnel did show significantly higher overall noise exposures and percentages of workers to be included in a HCP or HLPP than support workers. None of the three

job classes showed significant differences from one another in the number of workers overexposed using OSHA criteria. Both the number of maintenance and operations workers overexposed to noise was significantly higher than support workers when using ACGIH/NIOSH criteria data.

Employees should wear both earmuffs and earplugs during coal car shaker operation, and during full shift work in coal pulverizer or boiler feed pump areas, or in soot blowing air compressor and soot blower areas. The use of either earmuffs or earplugs by themselves was found to be adequate for all other sampled job tasks.

Plant age, output capacity in megawatts, and output per boiler unit, modeled with job class, all showed significant relationships with worker noise exposure. The only particular job class exposures that showed possible correlations with these power plant variables was for maintenance workers. The correlation was positive in all cases, i.e. the newer the plant, the greater the plant output capacity, or the greater the individual boiler unit size the higher the exposure doses were for maintenance workers.

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