Occupational Noise Exposure in Scrap Steel Recycling Industry

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Abstract: In this study, noise levels at different sections of a steel recycling plant production floors were monitored with the aid of EXTECH 407735 sound level meter. This was with a view to studying employees' exposure level. Results revealed that workers at furnace, rolling mill, re-heating oven and billet forming sections are exposed to noise levels higher than 85 dB(A) 8- hour standard. There is a need for employee training on noise exposure hazards and enforcement of the use of protective devices.
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Introduction

Quite a number of works have been published on noise pollution in general (Digvijay and Joshi, 2010; Chauhan et al., 2010; Kerketta et al., 2011). However, occupational noise is distinct in that it is by definition associated with the workplace, and is therefore the responsibility of employers as well as individuals. High levels of occupational noise remain a problem in all regions of the world. In the United States of America for example, more than 30 million workers are exposed to hazardous noise (NIOSH, 1998). In Germany, 4−5 million people (12−15% of the workforce) are exposed to noise levels defined as hazardous by WHO (WHO, 2001). A review of the literatures revealed that workplace noise has a series of health effects which include hearing impairment (Arndt et al., 1996; Shaikh, 1996; Prince et al., 1997; Hessel, 2000; Sriwattanatamma and Breysse, 2000; Ahmed et al., 2001), annoyance, hypertension and ischemic heart disease (de Hollander et al., 2002). There is also epidemiological evidence for an effect of high levels of occupational exposure on hearing loss in unborn children (Lalande et al., 1986). The situation is improving in developed countries, as more widespread appreciation of the hazard has led to the introduction of protective measures. Data for developing countries are scarce, but available evidence suggests that average noise exposure are well above the occupational level recommended in many developed nations (Suter, 2000; WHO, 2001). The average noise exposure in developing countries may be increasing because industrialization is not always accompanied by protection.

Steel recycling process involves (1) gathering of junk metals (2) Cutting and shearing of scraps that are too large (3) Melting of the Scrap in a furnace (4) Molding of molten metal into billet through a series of casting machines, (5) Reheating in an oven (6) Rolling into desired smaller steel rods of different sizes, (7) Loading for sales. The economic benefits of steel recycling plant cannot be down played; private nonferrous recycling industries in the U.S. employed approximately 16,000 employees in 2001 (OSHA, 2008). Another benefit from environmental point of view includes getting rid of scraps from the environment. When dumped in the environment, car bodies a major source of raw material can leach toxic chemicals from oil, petrol, diesel, battery acid, coolants and transmission and brake fluids. Cars dumped in rivers can become lethal traps for swimmers and for wildlife and scrap metal dumped in the bush can spontaneously combust causing wildfires. Illegal dumping sites tend to create additional waste management problem which is the original problem that we are trying to avert.

While steel recycling plant holds a lot of advantages, it is a potential source of exposure to occupational noise which calls for investigation most especially in developing countries where most factory workers are not knowledgeable on the impact of such noise on their health. This study was carried out to investigate the noise level along major production floors of a steel recycling factory in Nigeria. The impetus for this work is to sensitize both the employer and monitoring authorities on the need to fashion out and enforce safety and protective measures for steel industry workers. The condition of this plant could be a representation of plant conditions in most developing countries of the world.

Materials and Methods

The maximum and minimum noise levels on major production floors of the steel recycling factory were measured with the aid of an EXTECH sound level

meter (Model 407735). The average noise level was determined as the arithmetic mean of the minimum and maximum noise levels recorded during each sampling. During each measurement, the EXTECH instrument was positioned on a flat surface to minimize vibration and switched on. Two measurement periods covering day (2:00-5:00 pm) and night time (12:30 – 2:00 am) were chosen for the study. A sampling time of 10 minutes was adopted. The average noise levels measured were compared with the regulatory limit of 85 dB (A) that is widely applied for an 8-hour day (Hessel and Sluis-Cremer, 1987; Alidrisi et al., 1990; Shaikh, 1996, Osibogun et al., 2000).

Results and Discussion

The maximum, minimum and average noise levels obtained at different point along the production floor during night and day time measurements are summarized in Tables 1 and 2, respectively.

Table1: Night Time Noise Level at Selected Points on a Steel Recycling Plant Production Floor

Location	Minimum Noise Level dB (A)	Maximum Noise Level dB (A)	Average Noise Level dB (A)
Scrap yard	69.6	83.3	76.5
Furnace	76.1	90.9	83.5
Billet forming (casting)	85.0	93.1	89.1
Re- heating oven	88.7	97.2	93.0
Rolling	86.1	101.2	93.7
Loading	62.6	84.6	73.6

Table 2: Day Time Noise Level at Selected Points on a Steel Recycling Plant Production Floor

Location	Minimum Noise Level dB (A)	Maximum Noise Level dB (A)	Average Noise Level dB (A)
Scrap yard	68.3	89.9	79.1
Furnace	81.7	96.9	89.3
Billet forming (casting)	78.2	97.7	88.0
Re- heating oven	86.2	96.0	91.1
Rolling	82.9	92.9	87.9
Loading	62.4	86.6	74.5

Results from Table 1 revealed that the night time average noise level at three sections (billet casting, re- heating oven and rolling mill) of the steel recycling plant production floor exceeded the recommended 85dB (A) 8 – hour daily exposure in developed countries. The highest night noise level of 93.7 dB (A) recorded was at the rolling mill section which is higher than 90dB (A) standard (FEPA, 1991) commonly used for developing countries. In addition to the three sections where the night time average noise level exceeded the 85db (A) limit, the day time measurement at the furnace was equally higher than this recommended standard. The plant operates two shifts within 24 hours, an indication that each worker spends up to 12 hours on the job each day. One observation during the study was that none of the worker used an ear protector. It has been reported in several literatures that exposure to such noise level without protection is highly harmful to human health.

Conclusion and recommendation

The study on the noise levels at major sections along the production floor of a steel recycling plant in Nigeria has revealed that employees are exposed to noise levels higher than 85 db (A) that is recommended for developed countries during an 8-hour duration. In some cases, the average noise levels got as high as 93 dB (A) which have the likelihood of posing serious health hazards in the long run. In view of this, enforcement of the use of protective devices is urgently needed. Also, the employees have to be enlightened on the dangers inherent in their work.

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