Assessment of Cement Dust Concentrations and Noise Levels in a Cement Plant in Nicaragua

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In the last decade, cement production has been steadily rising in Nicaragua. Occupational exposure to Portland cement dust has been associated to high prevalence of respiratory symptoms and reduction of ventilatory capacity. Furthermore, it has been reported that children exposed to outdoor ambient cement dust pollution near cement plants present a trend of high prevalence of respiratory symptoms and asthma. Noise is another hazard in the cement industry. Noise levels, which have been reported to be as high as 120dB, may cause elevation in the hearing thresholds. To evaluate occupational exposures in a plant near Managua, we conducted air sampling, a noise survey and a worker safety survey all in response to the company's efforts to improve worker health and safety. One hour samples of PM2.5, PM4.0 and Total Suspended Particulates (TSP) were taken at five locations: maintenance area, packaging/loading area, the supply building and at two grinding process areas. In addition, PM2.5 was measured outside of the plant to assess potential community exposure.

Measurements for TSP ranged from 33 mg/m3 in the packaging area to 0.56 mg/m3 in the supply building. In the packaging area and in one of the grinding process areas, the average concentration of respirable dust exceeded the Nicaraguan permissible limit of 5mg/m3. In the packaging area, the average TSP concentration tripled the recommended limit of 10mg/m3. Measurements taken downwind from the plant had a concentration of 0.058 mg/m3, exceeding the current US Environmental Protection Agency standard of 0.035 mg/m3.

Noise levels measured during a preliminary walk-thru noise survey ranged from 55.2 to 110.8 dB outside of the worker training facility center and behind the packaging/truck loading area respectively. Areas of concern, where noise levels exceeded 95dB and where more in depth noise surveys should be conducted included: the clinker storage warehouse, areas near the clinker elevator, power house, raw material mill, and calcination area. Postings in these areas should be maintained so that workers make a conscious effort to wear their personal protective equipment as postings are faded and not clearly visible. Our independent observations of work practices indicated a poor level of compliance with personal protective equipment (PPE) policies. Workers were regularly without ear protection in areas where noise levels exceeded safe levels.

Due to the small sample size, the data obtained provide only preliminary results that may be used to plan future monitoring, in particular in the areas where measurements exceeded the recommended limits. As a result of this study, the Nicaraguan Ministry of Health plans to enforce regular and more in-depth occupational monitoring for dust and noise exposure