Managing Health in the Aluminium Industry

edited by

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Cover Photograph. Aluminium potline – kindly provided by Alcan.

2. WHAT DO WE NEED TO MONITOR IN THE WORKPLACE?

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SUMMARY

We can measure the incidence of illnesses but this can be many years after an exposure. Moreover it may be extraordinarily difficult to separate the normal incidence of disease from the occupational incidence of disease. We must realise and express to management that occupational hygiene exposure assessments including exposure monitoring are good leading indicators of our performance in protecting the health of our workers. Within the paper, recommendations are made and standards described regarding the monitoring of health risks in bauxite mining and refining, aluminium smelting, casting, rolling, extrusion by chemical, physical or biological methods.

WHY MONITOR?

My definition of "monitor" is to measure exposures to chemical, physical and biological agents. There are many ways to respond to this question. Rather than simply identify what I feel are the most significant exposures in the aluminium industry, what I plan to do is create some context for what we need to monitor, by first addressing why we need to monitor. Once I've established the purpose and strategy for monitoring, I'll then address some of the more remarkable exposures in the various aluminium industry production processes.

Why do we need to monitor exposures in the workplace? The easy and simple answer is, we monitor to compare measured values for dust, fumes, gases, vapours, noise, and radiation to Occupational Exposure Limits (OELs). Essentially, we are assessing compliance with exposure limits.

Of course, all of us who attended the Montreal meeting, attended because we take a more comprehensive view of occupational health, and in this more comprehensive approach, "monitoring" is an element of exposure assessment, and exposure assessment is an element

PROCESS-RELATED EXPOSURES

At this point I would like to describe some of the significant exposures present in each major segment of the aluminium industry. It should be emphasised that whether or not a specific exposure is significant should be determined by a workplace specific exposure assessment.

BAUXITE MINING

The logical place to start is with bauxite mining. In my experience, the most significant exposure in bauxite mining is noise. Dust exposures may or may not be a concern depending upon weather conditions, material handling equipment and proximity of employees to dusty operations. Bauxite is a mixture of Gibbsite and other minerals, and as with any ore, the bauxite contains various elements and minor impurities. Exposure to crystalline silica could be a concern, but for most bauxite's, quartz is not present at significant levels. Among the minor elements are the radioactive isotopes of radium, thorium and uranium. In general, the concentrations of these isotopes in most forms of bauxite are insignificant.

BAUXITE REFINING

Similar to mining, noise is generally the most significant health risk in refining. Exposure to bauxite dust can also be a concern, again depending upon weather and operating equipment. The large quantities of concentrated hot caustic used to extract the alumina from bauxite are a serious safety concern but airborne concentrations of caustic mist are seldom present at significant levels. Other significant exposures in bauxite refining include asbestos and mineral fibres used in thermal insulation, and crystalline silica refractories used in calciners. The structural steel and some process equipment are frequently coated with paints containing lead, and exposures to lead occurring in conjunction with maintenance activities can be significant.

Most Bayer plants process very large quantities of bauxite, and we should not overlook the possibility that some of the trace elements in bauxite could concentrate and create identifiable exposures. For example, we have looked at mercury vapour exposures in our refineries, and they are generally insignificant. Similarly, the naturally occurring radioactive materials present in bauxite will concentrate in the Bayer process, and our investigations have shown that these elements partition to the bauxite residue rather than the alumina product.