INTRODUCTION

We live in a quantitative age in which it is said that if something isn’t measured or measurable it hardly exists, has no meaning or it cannot be managed. It is a very pervasive and persuasive creed. Politicians, managers and consumers feel happier and more in control if they have numerical scores to judge success or failure or productivity. In the arena of risk and risk management quantification dominates and when it comes to chemical exposure at work the demand is always for a limit, a number to work to. But what do such numbers mean and where did they come from? Interestingly, they are a relatively recent invention and before they existed governments had other ways of regulating risks from chemical exposure.

To understand what occupational exposure limits (OELs) are, we need to examine where they came from, which professional groups produced and promulgated them and what we buy into when we ask that fateful question: is exposure below the OEL?

This contributions will describe how work processes lead to certain exposures. Specifically, in the first section, it will describe the typical exposures of three work groups exposed to silica dust and how such exposures were regulated in the 19th and early 20th Centuries. The chapter then goes on to examine the development of industrial hygiene (IH) and industrial toxicology (IT), and the OEL paradigm these professions forged. This will involve setting out a working definition of the paradigm. The development and mean-
ing of Threshold Limit Values (TLVs), still the exemplary OEL, will be ex-
amined. TLVs are ‘reasonably practicable’ OELs and this reality will lead
to a description of what, ‘as far as is reasonably practicable’ (AFARP) means
in practice and the way ‘soft’ evidence of health effects comes up against
the ‘hard’ facts of practicability and cost. Having described the boundaries
in which OELs setting is constrained, the working definition of the OEL para-
digm will be revisited and redefined, leading to a discussion of the range
of factors which affect the setting of limits and, conversely, the effects single
number OELs have on control of risk from chemical exposure. Out of these
discussions come arguments for a paradigm shift. The modified paradigm
will probably require the setting of two types of standards and how this
might be done is described. Finally, just before the conclusions, we return
to the stoneworkers we start with and examine what difference the modified
paradigm would make to them and the risk of silicosis.

**PROCESSES, JOBS & EXPOSURE**

Before delving into the history, meaning and problems which come with
OELs, it is important to put the discussion in a work context and this context
is all about the industries people work in and the processes they undertake
or work with. We will start with three groups of workers who are exposed
to silica dust. Fine (respirable) silica dust causes silicosis, a progressive lung
scarring disease. Ever since humans have dug mines and extracted minerals
from the earth people have contracted silicosis. The risk is not new. Now-
adays, people are still exposed to silica dust and still contract silicosis.

The first group works in a quarry in charge of a primary crusher and
is exposed on average to 0.8 milligrams per cubic metre of air (mg/m\(^3\)) re-
spirable quartz dust. The second group are stonemasons working on high
silica architectural stone, using various traditional chisels but also regularly
using powered tools. This group is exposed on average to 2.0 mg/m\(^3\) respir-
able quartz dust (see Photographs 1 and 2). The third group are pottery
workers pouring china slip into moulds, making cups and vases. This group
is exposed on average to 0.2 mg/m\(^3\).