

# Exposure to quartz at workplaces in Germany: Distribution of exposure

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## Background

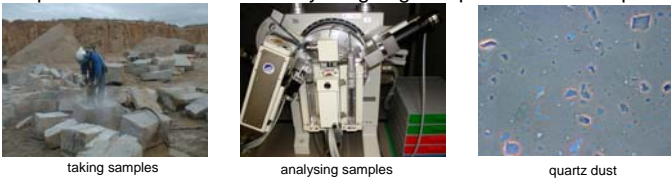
Quartz is used as a material in a large number of working processes in various sectors of industry. Released as dust, it is a source of exposure to respirable quartz dust. Despite technological advances and considerable efforts to reduce dust, exposure to quartz dust today is still a significant problem. Owing to the long latency period, silicosis ranks in Germany among the occupational diseases with high annual numbers of suspected and recognized cases. In view of these facts, there was a need for a general review of the quartz situation.

Available exposure data was to be processed if possible according to the sector of industry and field of activity, for example extraction of quartz sand, extraction and processing of minerals and earths, ceramics and glass industry, foundries, chemical industry or construction industry. The goal of these activities was to support prevention in occupational safety and health. At the same time, it was possible to refer to the statistical parameters of the measured data to permit data comparability during risk assessment.

## Methods

### 1. Investigation of exposure data

Measured values for quartz and respirable dust have been recorded in the four decades since 1972 in the quality controlled measurement system for exposure assessment of the German Social Accident Insurance Institutions, the MGU (formerly BGMG) and were entered in the MEGA exposure database, a database of measured data relating to exposure to hazardous substances at the workplace. The sampling was conducted in about 8,900 companies in accordance with MGU standard procedures. The standard MGU procedure was also employed for analysis. For quartz analysis, x-ray diffraction was primarily used, and also to a small degree infrared spectroscopy. The values measured for respirable dust were obtained by weighing and  $\beta$ -radiation absorption.



### 2. Assessments of exposure data

Some 105,000 measurement values of quartz were assessed. The readings have been broken down into sectors and where possible further into working areas. Statistical evaluations were performed for 54 industrial sectors and 240 working areas.

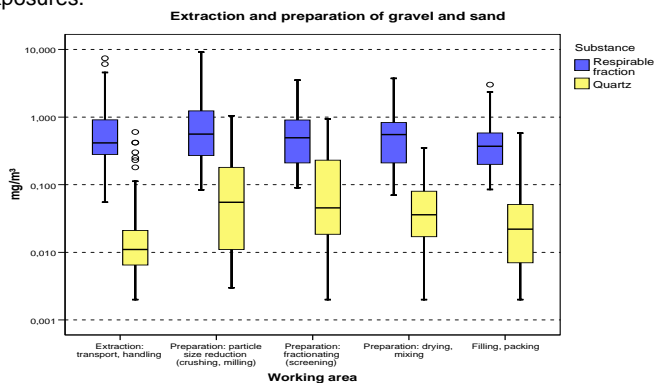
Table 1: Number of measurement values for sectors (extract):

Foundry	39,989
Ceramic and glass industry	14,476
Tunnel mineshaft construction	11,584
Chemical industry	5,316
Metal industry	3,910
Quarry industry	3,300

## Results: Report 8/2006e „Quartz exposure at the workplace“

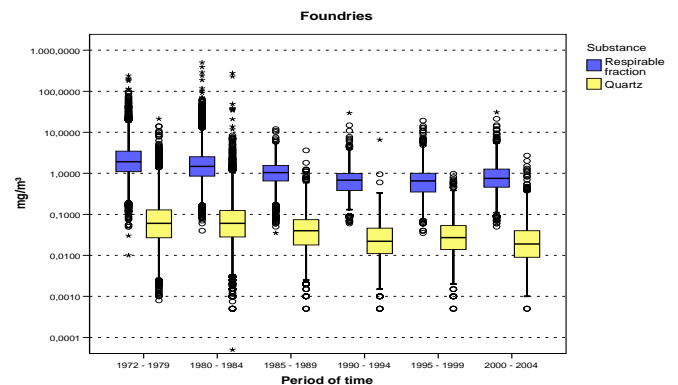
### 3. Example of a quartz exposure for selected working areas

Gravels and sands extracted from the deposits by either wet or dry processes are prepared to form products differing in their particle size fraction. The graph shows mean shift values for the concentration of the respirable dust fraction and for the quartz concentration in different working areas during the extraction and preparation of gravel and sand, selected for the period from 1995 to 2004. The data collective shows that crushing and milling in particular are associated with the highest exposures.



### 4. Example of a time trend in foundries

Foundries are industrial plants in which materials are shaped by casting. In the casting process, a liquid material – the melt, generally metal – is poured into moulds, where it solidifies to form a casting. In terms of production technology, casting is primary forming. Main technical measures to reduce dust and quartz concentrations have been developed and put into practise in the 1970s and 1980s.



## Discussion

On the basis of these results, a description is provided of the quartz exposure situation over the last four decades in Germany and is intended as a basis for the management of preventive measures and monitoring of exposure. The assessments can also be used for quantifying past exposure to quartz in the context of cases of suspected occupational disease. By comparison with a current in-plant state the results could be used for risk assessments.

The report 8/2006e is available for download: <http://www.dguv.de/ifa>, Webcode 440513