

## Selection of substances

Analytical methods for chemical agents in workplace air are available from many sources. In Europe for example in France, Germany, Spain, and the UK “official” measurement methods for workplace air are published. Furthermore a number of ISO standards have promulgated the use in this field, but the most important source of methods from countries outside of Europe are those published by OSHA and NIOSH. The first task for the project group was therefore to define rules how to select substances for which method lists ought to be prepared.

The EU established a first list of 63 indicative occupational exposure limit values in Commission Directive 2000/39/EC and in a second step 48 additional limit values were proposed in 2003 (DOC 1048/1/03-EN). A further search showed that there are more than 1,000 different substances, mixtures and preparations with limit values for in Europe. It would be far beyond the scope of the project to select measurement methods for all substances with a limit value. In any case for many substances no measurement method exists. Furthermore, due to the very special problems of fibre measurements, it was decided not to evaluate fibre counting methods.

For this project, only methods for those substances of the highest interest were selected. To assign priorities to substances a table was prepared giving an overview of occupational exposure limit values within Europe. Additionally, information from the databases “Colchic” (INRS – France) and “MEGA” (BGIA – Germany) were introduced. For more than twenty years both institutes have analysed a large number of workplace air samples. In both cases, more than 500 different substances were analysed in the last decade. In total, INRS made 503,329 analyses in the period from 1987 to 2003, BGIA made 800,751 analyses between 1993 and 2003.

Both databases show a similar distribution of analyses across different substances. The majority of analyses is for about 150 substances and those are very similar in France and Germany. In both databases, the 20 most frequently analysed substances form a large proportion of all analyses (Colchic 56 %; MEGA 45 %, see table 1).

**Table 1: 20 most frequently analysed substances**

| Rank | Colchic         | MEGA                 |
|------|-----------------|----------------------|
| 1    | Inhalable dust  | Respirable dust      |
| 2    | Toluene         | Quartz               |
| 3    | Acetone         | Inhalable dust       |
| 4    | Respirable dust | Toluene              |
| 5    | Lead            | Hydrocarbon mixtures |
| 6    | Xylenes         | Xylenes              |
| 7    | Quartz          | Formaldehyde         |
| 8    | 2-Butanone*     | Ethyl acetate        |
| 9    | Iron*           | Ethyl benzene        |
| 10   | Ethyl acetate   | n-Butyl acetate      |
| 11   | Styrene         | Acetone              |
| 12   | Cristobalite    | Lead                 |

| Rank | Colchic              | MEGA                  |
|------|----------------------|-----------------------|
| 13   | Chromium             | Nickel                |
| 14   | Fibres*              | Metal working fluids* |
| 15   | Hydrocarbon mixtures | Styrene               |
| 16   | Nickel               | Ethanol               |
| 17   | n-Butyl acetate      | 2-Propanol*           |
| 18   | Ethyl benzene        | Chromium(VI)          |
| 19   | Formaldehyde         | Trimethyl benzene*    |
| 20   | Manganese*           | Diesel fume*          |

\* Substances not represented in both “Top 20”

## 1 Criteria for “High priority substances“

The substances for the method lists and method sheets were mainly selected from this group of substances:

- High number of measurements
- High profile substances (e.g. diesel fume)
- EU limit value and medium number of measurements
- Limit values in most EU countries

For homologous series of substances, it was decided that a substance could be added to the substance list if a homologue substance was listed in the high priority category.

Example: Short chain organic acids, formic acid and acetic acid fulfil the requirements for high priority and propionic acid can be easily analysed by the same measurement procedure.

## 2 Criteria for “Medium priority substances“

- EU limit value and small number of measurements
- Limit values in most EU countries but only medium number of measurements
- Medium number of measurements

## 3 Criteria for “Low priority substances“

- Limit values in not more than two EU countries
- Few or no measurements

## 4 Selected substances and substance groups

Based on these guidelines the task groups selected the substances for which they would prepare method lists and method sheets (see table 2).

**Table 2: Task group and substances**

| <b>Metals and aerosols</b>                          | <b>Organic substances</b>          | <b>Special Substances</b>  |
|---|------------------------------------|--|
| Chromium(VI)  | Acetonitrile                       | Ammonia (and Ammonium chloride)  |
| Crystalline silica                                  | Acrylates                          | Diesel exhaust   |
| Inhalable dust                                      | Alcohols                           | Halogens   |
| Mercury   | Aldehydes                          | Hydrogen cyanide, Cyanides   |
| Metals (As, Be, Cd, Co, Cr, Cu, Mn, Ni, Pb, Sb, Sn) | Aliphatic amines and alkanolamines | Hydrogen fluoride, Fluorides   |
| Respirable dust                                     | Aliphatic ethers                   | Hydroxides   |
| Silver compounds                                    | Aliphatic hydrocarbons             | Inorganic gases (CO, CO <sub>2</sub> , N <sub>2</sub> O, NO, NO <sub>2</sub> , PH <sub>3</sub> , SO <sub>2</sub> ) |
| Soluble metals (Ni – soluble, Ba – soluble)         | Amides                             | Metal working fluids/Oil mist  |
|   | Aromatic hydrocarbons              | Organic acids  |
|   | Chlorinated aromatic hydrocarbons  | Particulate inorganic acids and anhydrides   |
|   | Cyclic ethers                      | Volatile inorganic acids   |
|   | Cyclic hydrocarbons                |  |
|   | Esters                             |  |
|   | Glycol esters                      |  |
|   | Glycol ethers                      |  |
|   | Halogenated aliphatic hydrocarbons |  |
|   | Isocyanates                        |  |
|   | Ketones (aliphatic and cyclic)     |  |
|   | Oxiranes                           |  |
|   | Phenol, Cresols                    |  |