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EURACOAL'S POSITION ON THE REVISED VERSION OF THE RECOMMENDATION FROM THE SCIENTIFIC EXPERT GROUP ON OCCUPATIONAL EXPOSURE LIMITS FOR NITROGEN DIOXIDE FROM SEPTEMBER 2008 (SEG/SUM /53)

Introduction

The Scientific Committee on Occupational Exposure Limits (SCOEL) revised their former paper on nitrogen dioxide (SEG/SUM/53D from June 1997) in September 2008 (SEG/SUM/53). However, although additional new information was collected in the meantime these new findings obviously had no impact on the recommendation given by the SCOEL. The committee still recommends a low limit value for NO_2 of 0.2 ppm (8h-TWA). This is not justifiable in the light of some of the new findings. In the following the new studies reported by the SCOEL to justify a new recommendation, will be briefly presented while focussing on epidemiology and on one important new toxicological investigation. The reliability of these new studies will be discussed and conclusions be presented. This comment also covers the review by the Health Council of the Netherlands 2004 because it lists no further relevant new studies not discussed by SCOEL 2008.

New Data: Epidemiology

Arbex et al. 2007 studied cross-sectionally the lung function of 37 Brazilian cooks (31 women) in four hospital kitchens. Current exposure levels were measured to vary between 0.01 ppm and 0.1 ppm NO_2. The authors described small effects of a

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crude measure of cumulative NO_2-exposure on FEV_1 and FEV_{25-75} in linear regressions. No effect of exposure was found when analysing FVC. However, adjustment for age, height and gender was done only by applying external reference values. It remains unclear whether this crude procedure was able to adjust for the effects of these potentially confounding variables appropriately. The effect on FEV_1 was no longer significant in linear regression after adjustment for a smoking indicator. Co-pollutants, like damp of fat, were not considered in the analyses. Due to these limitations this small study on Brazilian cooks appears not to be informative about the effect of NO_2-exposure on lung function. Thus, this study is not of sufficient precision and quality to be used in a limit value setting procedure.

Certain theoretically effects of inhalation exposure have been reported by the study of the Federal Institute for Occupational Safety and Health in German potash mines (Lotz et al. 2008) but the authors were unable to discriminate between effects of the exposure components, nitrogen dioxide and -monoxide, diesel motor emissions and salt dust. A study on airway inflammatory responses in iron ore miners suffered from similar correlation problems and was not able to identify the possible contribution of NO_2 to the described effects (Adelroth et al. 2006). Thus, both studied do not support any conclusions about a possible 8h-TWA for NO_2.

<u>New Data: Toxicology</u>

Recent findings from animal experiments on 100 Wistar rats that inhaled NO_2 over 90 days were summarized by the authors as follows: “The inhalation of measured concentrations of up to 2.15 ppm NO_2 by male and female rats did not cause any treatment-related findings in all examined parameters including biochemical and cytological examination of the blood, histopathological examinations of the whole respiratory tract, cell proliferation and apoptosis rate in the lung” (Ma-Hock et al.

2007). This study was performed at a high level and meets all standards of a modern toxicological study. Thus, it is informative and should be applied in limit value setting. In this rat study, the no observed adverse effect level was higher than 2.15 ppm NO_2.

Further Information

The result of Ma-Hock et al 2007 that no effects could be found up to levels of 2.15 ppm NO_2 in rats may be compared with findings from other new overviews on health effects of oxides of nitrogen. The US Environmental Protection Agency (EPA) published a review report in 2008. EPA (U.S. EPA 2008) noted that human clinical studies did not find direct effects of NO_2 on lung function in healthy adults at levels as high as 4 ppm although the authors concluded that evidence increased that respiratory illness is linked to ambient NO_2 exposure. A new and comprehensive review on environmental NOx studies was published by Latza et al. 2008. The authors judged the evidence of health effects from nitrogen oxides as moderate at best. Again, this sheds doubt on the study by Arbex et al. 2007 but appears to be consistent with the new findings of Ma-Hock et al 2007 that contradict the view that low-level NO_2 exposure is causally linked to health effects (in support of a threshold effect).

The SCOEL missed to discuss a British cross-sectional study of 560 coal miners (Robertson et al. 1984). This epidemiological investigation found that nitrogen oxide emissions underground had no significant impact on lung function parameters. In the light of these findings from British coal mining new studies in German coal mining were launched to measure the health effect of nitrogen oxide exposure on lung function parameters. Results will probably become available in 2009.

It is also important to note that the proposed SCOEL limits are well below any realistic measurement control technology. There is no technology currently available for use in coal mines which would be able to accurately measure real time exposures below about 1ppm. It is possible to take samples and subsequently analyse them. This can determine the levels of exposure below 1ppm in a range of circumstances, but this could not provide a control mechanism. UK Coal and TES are currently undertaking a project to determine exposure levels in a range of circumstances using the sampling and analysis approach. This will provide information but still not a means of control.

Conclusion

The values recommended by SCOEL 2008 do not appear to be supported by evidence in particular because the committee ignored the findings from the well-performed new toxicological study by Ma-Hock et al. 2007 in their evaluation. Thus, EURACOAL considers the recommendation by the SCOEL as scientifically not justified.

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