



Scientific Committee on Health and Environmental Risks

SCHER

## Opinion on Voluntary Risk Assessment Report on lead and lead compounds

### Human Health Part

CAS No: 7439-92-1, 1317-36-8, 1314-41-6, 69011-06-9, 12036-76-9,  
12202-17-4, 12065-90-6, 1072-35-1, 12578-12-0, 12141-20-  
7, 90268-59-0, 1319-46-6, 62229-08-7

EINECS No: 231-100-4, 215-267-0, 215-235-6, 273-688-5, 234-853-7,  
235-380-9, 235-067-7, 214-005-2, 235-702-8, 235-252-2,  
290-862-6, 215-290-6, 263-467-1



The SCHER adopted this opinion by written procedure on 12 February 2009

### About the Scientific Committees

Three independent non-food Scientific Committees provide the Commission with the scientific advice it needs when preparing policy and proposals relating to consumer safety, public health and the environment. The Committees also draw the Commission's attention to the new or emerging problems which may pose an actual or potential threat.

They are: the Scientific Committee on Consumer Products (SCCP), the Scientific Committee on Health and Environmental Risks (SCHER) and the Scientific Committee on Emerging and Newly-Identified Health Risks (SCENIHR) and are made up of external experts.

In addition, the Commission relies upon the work of the European Food Safety Authority (EFSA), the European Medicines Evaluation Agency (EMA), the European Centre for Disease prevention and Control (ECDC) and the European Chemicals Agency (ECHA).

### SCHER

Questions relating to examinations of the toxicity and ecotoxicity of chemicals, biochemicals and biological compound whose use may have harmful consequences for human health and the environment.

In particular, the Committee addresses questions related to new and existing chemicals, the restriction and marketing of dangerous substances, biocides, waste, environmental contaminants, plastic and other materials used for water pipe work (e.g. new organics substances), drinking water, indoor and ambient air quality. It addresses questions relating to human exposure to mixtures of chemicals, sensitisation and identification of endocrine disrupters.

### Scientific Committee members

Herman Autrup, Peter Calow, Wolfgang Dekant, Helmut Greim, Hanke Wojciech, Colin Janssen, Bo Jansson, Hannu Komulainen, Ole Ladefoged, Jan Linders, Inge Mangelsdorf, Marco Nuti, Anne Steenhout, Jose Tarazona, Emanuela Testai, Marco Vighi, Matti Viluksela

### Contact:

European Commission  
Health & Consumer Protection DG  
Directorate C: Public Health and Risk Assessment  
Unit C7 - Risk Assessment  
Office: B232 B-1049 Brussels

[Sanco-Sc8-Secretariat@ec.europa.eu](mailto:Sanco-Sc8-Secretariat@ec.europa.eu)

© European Commission 2009

The opinions of the Scientific Committees present the views of the independent scientists who are members of the committees. They do not necessarily reflect the views of the European Commission. The opinions are published by the European Commission in their original language only.

[http://ec.europa.eu/health/ph\\_risk/risk\\_en.htm](http://ec.europa.eu/health/ph_risk/risk_en.htm)

## **ACKNOWLEDGMENTS**

The rapporteur is acknowledged for his valuable contribution to this opinion:

Prof. W. Dekant, Universität Würzburg, Germany

The additional contribution from the following expert is gratefully acknowledged:

Prof. A. Steenhout, Université Libre de Bruxelles, Belgium

Keywords: SCHER, scientific opinion, risk assessment, Regulation 793/93, lead, CAS 7439-92-1, 1317-36-8, 1314-41-6, 69011-06-9, 12036-76-9, 12202-17-4, 12065-90-6, 1072-35-1, 12578-12-0, 12141-20-7, 90268-59-0, 1319-46-6, 62229-08-7

Opinion to be cited as:

SCHER, scientific opinion on the voluntary risk assessment report on lead and lead compounds, human health part, CAS 7439-92-1, 1317-36-8, 1314-41-6, 69011-06-9, 12036-76-9, 12202-17-4, 12065-90-6, 1072-35-1, 12578-12-0, 12141-20-7, 90268-59-0, 1319-46-6, 62229-08-7, 12 February 2009

**TABLE OF CONTENTS**

ACKNOWLEDGMENTS ..... 3

1. BACKGROUND..... 5

2. TERMS OF REFERENCE ..... 5

3. OPINION ..... 5

    3.1 General comments ..... 5

    3.2 Specific comments ..... 5

        3.2.1 Exposure assessment ..... 5

        3.2.2 Effect assessment ..... 6

        3.2.3 Risk characterisation ..... 6

4. LIST OF ABBREVIATIONS..... 7

## 1. BACKGROUND

Council Regulation 793/93 provides the framework for the evaluation and control of the risk of existing substances. Member States prepare Risk Assessment Reports on priority substances. The Reports are then examined by the Technical Committee under the Regulation and, when appropriate, the Commission invites the Scientific Committee on Health and Environmental Risks (SCHER) to give its opinion.

## 2. TERMS OF REFERENCE

On the basis of the examination of the Voluntary Risk Assessment Report the SCHER is invited to examine the following issues:

- (1) Does the SCHER agree with the conclusions of the Risk Assessment Report?
- (2) If the SCHER disagrees with such conclusions, it is invited to elaborate on the reasons.
- (3) If the SCHER disagrees with the approaches or methods used to assess the risks, it is invited to suggest possible alternatives.

## 3. OPINION

### 3.1 General comments

The health part of the document is of good quality, it is comprehensive, and the exposure and effects assessment follow the Technical Guidance Document. The RAR bases most of its conclusions on human data and only uses animal data when necessary.

### 3.2 Specific comments

#### 3.2.1 Exposure assessment

The exposure assessment mainly relies on measured values and is based on blood levels of lead in occupationally exposed people and the general population. Consumer exposure by indirect pathways relies on the extensive data base on concentrations of lead in food and drinking water. Some estimates were performed based on EASE, but the limitations of the application of this model to metals are clearly indicated.

The occupational exposure considers eleven exposure scenarios. It relies on blood lead levels for assessment of health risks of most of these scenarios since adequate data are available for most of them. The occupational exposure assessment supports its conclusions on blood lead levels as a biomarker of exposure due to the large database.

Consumer exposure addresses known sources of lead as well as a number of non-typical exposure scenarios such as release from lead to drinking water from leaded pipes, use of lead in candle wicks and ammunition. For these specific exposures, worst-case scenarios are developed usually relying on measured data on lead contents or reasonable estimates.

The indirect exposure assessment relies on dietary surveys and concentrations of lead in soil and dust using reasonable intake assessment for these media. The conclusions are compared with the large surveys determining blood levels of lead in the general population.

These blood levels have decreased from the 1970s to 2006 from more than 10 µg/dL to 1 – 3 µg/dL (due to the removal of leaded gasoline).

The exposure assessment could be expanded to specifically address aggregate exposures of children to lead from different sources.

### 3.2.2 Effect assessment

Most conclusions are based on effects of lead observed in humans, often in occupationally exposed populations where lead blood levels have been measured and effect levels have been well defined in large epidemiology studies. Data on effects of lead in animals are only used for the purpose of classification and labelling and to delineate mechanism of action. The RAR recognizes the major differences in lead bioavailability after oral administration between adults (10 % of an oral dose absorbed) and children (up to 50 % absorption). Absorption after inhalation is set at 100 % and dermal absorption is considered to be very low. Absorbed lead is mainly distributed to bone with some storage in soft tissue. SCHER agrees with these conclusions.

Regarding repeated dose toxicity, the major human target organs of lead are the hematopoietic system, the kidney and the central nervous system. NOAELs for these effects are derived based on observations in large cohorts of humans and are forwarded to risk characterisation. Regarding effects on the central nervous system in children (deficits in development of the intelligence quotient, IQ), the RAR states that a threshold for effects could not be demonstrated. However, based on considerations of the sensitivity and precision of IQ-measurements, 5 µg/dL lead are used as a "practical" NOAEL since methods to detect changes in IQ-development are not sufficiently sensitive to observe effects at blood levels of 5 µg/dL, and any effects present are considered secondary in magnitude to other factors influencing child development. A blood level of 5 µg/dL is also considered as a target value for reduction measures. This low target value is also selected to avoid high probability to exceed a blood level of 10 µg/dL in children. The approach and the justification are acceptable to SCHER.

Mixed results are available on the genotoxicity of lead with consistently negative data in bacteria, but both negative and positive results in mammalian cells. The RAR uses a weight of evidence approach to come to the conclusion that genotoxicity should not be forwarded as an endpoint to risk assessment. Regarding human carcinogenicity, results of epidemiology studies in lead-exposed populations are not consistent, but there is also no indication of causal relationships between lead exposures and tumour incidences. The observation of induction of kidney cancer by lead administration in rodents and an association between increased incidences of stomach cancer in lead exposed populations are forwarded to the risk assessment.

Regarding male fertility, a NOAEL of 45 µg lead/dL blood in humans is derived. Moreover, the RAR concludes that female fertility is only influenced at lead blood levels where other toxicities are predominant and the observed fertility impairment is likely secondary to these toxicities. The information of a possible influence of lead blood levels on the rate of spontaneous abortion is inconsistent. The available information indicates subtle effects in developmental neurotoxicity, which are concluded to be smaller than those induced by postnatal lead exposures. Regarding developmental neurotoxicity, a NOAEL of 10 µg/dL in maternal blood is forwarded to the risk assessment.

### 3.2.3 Risk characterisation

The NOAELs used for risk characterisation are based on blood levels of lead in humans relating to the different endpoints. The lowest NOAEL of 5 µg lead /dL is applied to children based on IQ development. The RAR uses only a MOS of 1 and justifies this due to the large database on effects of lead in humans and the well defined exposure conditions. However, real exposure conditions should be further assessed especially in groups that are vulnerable, such as children, pregnant women and the elderly and/or families with low socio-economic status. More consideration should also be given to reassess the "slope factor" and the MOS in such scenarios and conditions, with reference to the possibility of higher risks resulting from higher lead kinetics and dynamics and to international documentation about safety factors and vulnerable groups. SCHER supports

conclusion iii)<sup>1</sup> for some of the occupational scenarios due to a MOS of <1 and conclusion i) for cancer.

Regarding consumer exposure, most of the MOS are > 1 and therefore conclusion ii) is justified. SCHER also supports conclusion iii) for specific groups of the population due to high exposures such as leaded pipes for drinking water or lead containing paints applied indoors. Regarding carcinogenicity SCHER accepts conclusion ii) regarding kidney cancer in workers due to absence of an association of kidney tumour incidences with lead exposures in a number of studies with high quality exposure assessment, long follow-up and large numbers of individuals enrolled. Mechanistic studies also suggest that induction of nephropathy, which requires high doses of lead, is a prerequisite for renal tumour formation in animals. Regarding induction of stomach cancers in workers, conclusion i) is acceptable due to the inconsistent database.

SCHER supports conclusion iii) for use of lead in gasoline. Conclusion iii) is also supported for children living at some highly contaminated sites near lead production or processing plants, for various combinations of present sources and "ancient" ones ( such as lead paints and lead pipes) and for some specific exposure scenarios to products, as exposure to these sources can lead to excessive levels.

#### 4. LIST OF ABBREVIATIONS

EASE	Estimation and Assessment of Substance Exposure
IQ	Intelligence Quotient
MOS	Margin of Safety
NOAEL	No Observed Adverse Effect Level
RAR	Risk Assessment Report
TGD	Technical Guidance Document

---

<sup>1</sup> According to the Technical Guidance Document on Risk Assessment – European Communities 2003:

- conclusion i): *There is a need for further information and/or testing;*
- conclusion ii): *There is at present no need for further information and/or testing and for risk reduction measures beyond those which are being applied already;*
- conclusion iii): *There is a need for limiting the risks; risk reduction measures which are already being applied shall be taken into account.*