

Revised source screening of priority substances under the WFD Results for (20) Lead (priority substance)

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Comments on version 1 received from: Greenpeace. Sheet also amended to take account of E-PRTR (2008) data
(Comments have been put on the CIRCA website)

The *Concept paper on the control of emissions, discharges and losses of priority substances and priority hazardous substances in the framework of article 16 of Directive 2000/60/EC* (August 2005) outlines the steps needed to identify the relevant measures for emission controls for priority substances. **Source screening** is the first step. For substances identified as PS or PHS in the first list of priority substances, source screening sheets were agreed in 2004 based on the information in draft fact sheets produced by Haskoning (available on CIRCA), supplemented by other information and expert judgement. The process took into account the results of the consultation with the Expert Advisory Forum on Priority Substances. General details on the classification system applied can be found in the concept paper and can be summarised as follows:

- Category 1: source/pathway may result in or contribute to potential failure of WFD objectives
- Category 2: Not enough quantitative information available to allow classification in category 1 or 3; source/pathway will be reviewed as more data become available
- Category 3: no potential release from source/pathway or source/pathway does not contribute to potential failure of WFD objectives.

This revised sheet takes account of more recent information from the sources in the reference list.

Summary of production and uses

Lead is produced from the yield of ores and concentrates and/or from recycling. In Europe lead is produced using a pyrometallurgical process involving sintering and blast furnacing (ECB 2008). In 2006, 1.66 million tonnes of lead was produced, 50% of which was from recycling (OSPAR 2009). Primary lead from mining is often produced as a by-product or a co-product with other metals such as zinc, silver, copper and cadmium. Lead is the most recycled non-ferrous metal in the world, with secondary production surpassing primary output for the first time in 1989 (OSPAR 2009). Most recycled lead is recover from batteries and constructon materials (e.g. lead sheet and piping). It is also recovered from electronic equipment and the automotive industry (ECB 2008).

Lead is used in a number of industrial processes and is contained in numerous products (OSPAR 2009). Main identified areas and sources of use are:

- Metallic lead:
 - Batteries and accumulators;
 - Lead shots;
 - Boat keels;
 - Weights in fishing nets, sinkers/lures, vehicle wheels;
 - Building materials (e.g. radiation protection in hospitals, lead roofing materials, flashing/weathering);
 - Curtain hems;
 - Mantles in high voltage ground/sea electric cables;
 - Alloys;
- Lead in products:
 - Paint;

- Leaded gasoline;
- Glass (e.g. TV and computer screens);
- Electronic and electric equipment;
- Fertilisers;
- Additive to plastics (e.g. PVC);
- Solder material (e.g. in water pipes);
- Glazes and enamels on ceramic products;

The use of lead chromate and lead sulphate in paints has been banned within the EU. The use of lead in electrical and electronic equipment is banned with specific exemptions, as is the use of lead in batteries and certain vehicle parts. The use of lead in vehicle fuel has been phased out, although leaded vehicle fuel is still manufactured within the EU.

The PVC industry has voluntarily agreed to phase out the use of lead in PVC by 2015 (OSPAR 2009).

Source/pathway	Results of the classifications		
	Category 1	Category 2	Category 3
Losses to surface waters by diffuse sources			
S1 Atmospheric deposition on the water surface	X		
S2 Via drainage and deep ground water			X
S3 Due to agricultural, forestry and aquacultural activities (via leaching, erosion, direct drainage discharges) ➤ Leaching and erosion ➤ Hunting/fishing	X X		
S4 Due to transport and infrastructure without connection to canalisation/sewers (ships, trains, automobiles and airplanes and their respective infrastructures and maintenance outside the urban area)	X		
S5 Accidental spills		X	
S6 Release from materials and constructions in non sewered areas	X		
Discharges to surface waters by point sources			
S7 Discharges in sewage effluents or storm water as a result of run off from buildings and constructions in paved urban areas (roofs, paints) (including run off from agricultural fields connected to sewage systems)	X		
S8 Discharges in sewage effluents or storm water as a result of households, consumer use ➤ Batteries ➤ Waterpipes ➤ Fittings	X X X		
S9 Due to industrial activities S9.1 Small and medium enterprises (SME), direct or via STP (non IPPC installations including discharges from farmyards and aquacultural facilities) ➤ Car repair shops ➤ Laboratory activities ➤ Combustion installations other than those covered under S9.2	X X X		
S9 Due to industrial activities S9.2 Large industrial point sources, direct or via STP (IPPC installations)			
Production of metal ore	X		
Production of pig iron and steel	X		
Production and Processing of ferrous metals	X		

Zinc production/non-ferrous sector	X		
Surface treatment of metals and plastics using electrolytic or chemical processes	X		
Combustion installations	X		
Mining	X		
Mineral oil and gas refineries	X		
Gasification and liquefaction	X		
Production of basic (in)organic chemicals, pharmaceuticals, calcium carbide, biocides, fertilisers, explosives and pyrotechnic products	X		
Pulp and paper sector	X		
Textile sector (finishing)		X	
Slaughterhouses		X	
Surface treatment or products using organic solvents		X	
Production of cement klinkers, lime glass		X	
Melting mineral substances, including the production of mineral fibres		X	
Manufacture of glass, including glass fibre	X		
Treatment and processing of animal and vegetable materials in food and drink production		X	
Building of, painting or removal of paint from ships		X	
S10 Solid waste management			
S10.1 Landfills	X		
S10.2 Incineration	X		
Losses from historically contaminated sediments and soils			
S11.1 Losses from the historical pollution of sediments	X		
S11.2 Losses from the historical pollution of contaminated land			
Emissions to atmosphere			
A1 From agriculture, forestry and aquaculture			X
A2 From traffic and infrastructure (mainly from lead in petrol/gasoline)		X	
A3 From buildings			X
A4 From households and other consumer use ➤ Wood, oil and coal combustion			X
A5 From industry IPPC categories			
➤ Primary and secondary metal production (lead, copper, nickel, zinc)	X		
➤ Primary and secondary iron and steel production/coke ovens	X		
➤ Mineral oil and gas refineries	X		
➤ Cement klinkers/glass/lime production	X		
➤ Industrial combustion/waste incineration	X		
➤ Production of fertilisers, (in) organic chemicals	X		
➤ Pulp and paper sector	X		
➤ Surface treatment or products using organic solvents		X	
➤ Carbon/graphite production	X		
➤ Production of plastics			X
A6 From industry SME and other non IPPC categories			X?
A7 From waste disposal/treatment areas (land fill and others)	X		
A8 From contaminated land (historical pollution)			X

Data availability and uncertainties:

In general, a lot of quantitative data is available to be able to draw conclusions. Lead releases originate from many sources and pathways – the main difficulty is to distinguish between major and minor contributions to a potential failure to achieve the WFD objective for all the relevant pathways. E-PRTR (2007) provides information for 845 facilities in all 27 Member States. Total emissions of 542 t/y to air and 213 t/y to water are reported. E-PRTR (2008) provided information for 802 facilities in 26 Member States (no data for Cyprus). Total emissions were 484 t/y to air and 289 t/y to water.

Justification for classification:

General

Many data exist on releases to the environment. Only for a few sources and pathways it is clear that they can not result in lead releases to the environment (e.g. A1, A3, A8). Lead emissions to air are considerable and as a consequence, atmospheric deposition on soils and fresh water are also relevant pathways. Minor sources for emissions to air are considered not to contribute to a potential failure of the WFD objective and are therefore classified as category 3.

Many sources/pathways to fresh water are known and of relevance. It is not possible to differentiate between major and minor contributions to a potential failure of a WFD objective. All these sources/pathways have been classified as category 1.

S1 → Emissions to air are considerable. ECB (2008) states that atmospheric deposition is an entry route for lead to the aquatic environment. Pacyna *et al* (2009) conclude that concentrations of lead in the atmosphere, and atmospheric deposition of lead, has reduced since controls on leaded petrol were put in place. Transboundary air pollution from beyond EU borders will also contribute to atmospheric deposition.

S3 → the sources are fishing sinks and ammunition (hunting and clay pigeon shooting) (not of relevance in all countries) – also leaching/erosion from agricultural soils.

S4 → wear of tyres and propeller shaft grease result in (minor) releases to water

S6/S7 → release from building materials (paint, lead sheets, abrasive blasting) is considered to be of relevance by various countries.

S8 → releases due to the use of consumer products (e.g. paints, batteries, water pipes) by households and collected in UWWTPs are considered of relevance in the overall picture of available quantitative information. E-PRTR (2008) records emissions of 211 t/y from UWWTPs.

S9/A5 → according to the 2008 E-PRTR results, emissions to air via IPPC installations in the EU27 is 484 tonnes a year, releases to water (direct and indirect) count for 289 tonnes. All IPPC activities which discharged according to E-PRTR more than 100 kg/y have been classified as category 1.

Activities with emissions <100 kg/y have been classified as a category 2. Information from Spain on releases confirms the list of activities and provides a lot of detail on subsector level.

S10 → E-PRTR (2008) results show a release to water of about 2.15 tonnes/y via waste treatment.

A2 – Use of leaded petrol is now controlled in the EU therefore this source to air has been significantly reduced.

A7 E-PRTR (2008) records significant emissions to air of lead from waste treatment (468 kg/y) and landfills (275 kg/y).

References:

- Haskoning factsheet on lead
- HARP-HAZ prototype/Progress report to 5th North Sea Ministerial Conference
- OSPAR background document on lead (June 2002)

- Bekkengerichte kwantificering van diffuse verontreiniging van oppervlaktewater met zware metalen en metalloïden (Basin-oriented classification of diffuse pollution of surface water by heavy metals and metalloids) – Ecolas – June 2003.
- Uitspoeling van zware metalen uit landbouwgronden - Schatting van de bijdrage van uitspoeling uit landbouwgronden aan de belasting van het oppervlaktewater: modelaanpak en resultaten (Alterra (NL), draft, september 2003)
- Emissies van zeven zware metalen naar landbouwgrond (CBS (NL), 2003)
- Results of the 2003 EPER inventory
- E-PRTR (2007)
- E-PRTR (2008)
- European Chemicals Bureau (ECB) (2008) European Union Risk Assessment Report Lead and it's compounds, Draft Report, April 2008.
- OSPAR Commission (2009) Background Document on Lead
- Pacyna, JM, Pacyna, EG and Wenche, A (2009) Changes of emissions and atmospheric deposition of mercury, lead and cadmium, Atmospheric Environment, 43, 117-127.