Lead

Lead occurs naturally in the environment and it is a vital element in everyday life. Mining, smelting and industrial use of lead has led to the widespread elevation of environmental lead concentrations. Lead for industrial or commercial use is derived from mining, smelting and refining of geological ores. Its main use worldwide has been for lead-acid batteries for vehicles, emergency systems and industrial batteries. It is also used in accumulators, lead shots, boat keels, building products such as paint, leaded petrol, glass, electronic and electrical equipment, plastic, and ceramic products.

What is the problem?

Lead is persistent and an acute toxic compound for mammals and aquatic organisms and thus is a contaminant of concern both for the marine environment and for human consumption of fish and other seafood. The main sources of lead to the environment are primary production processes such as ferrous and non-ferrous metal production and mining. Other relevant sources are transport, glass production and recycling processes, ceramics production, offshore industry, and waste incineration and disposal. The main pathway of lead to the sea is via air and it can be carried long distances from its source.

What has been done?

OSPAR measures and subsequent EU measures regulate the main industrial sources for lead releases to the environment. Specific restrictions in the EU framework promote the substitution of lead in paints, PVC products and in various other products and articles, include limit values for lead in ambient air and prohibit marketing of leaded petrol.

Did it work?

Lead production in Europe has risen steadily over the period 1998 – 2006 in response to increasing consumption. By 2006, 50% of the total lead production in Europe was from recycling. Important remaining sources of lead emissions and discharges are primary production processes such as ferrous and non-ferrous metal production, mining, glass production and recycling processes, ceramics production, offshore industry, and waste incineration and disposal. As many primary pollutant sources are regulated, the need to assess secondary sources increases. In this context, contaminated sediments and hazardous waste sites on the coast are especially important as long-term sources.

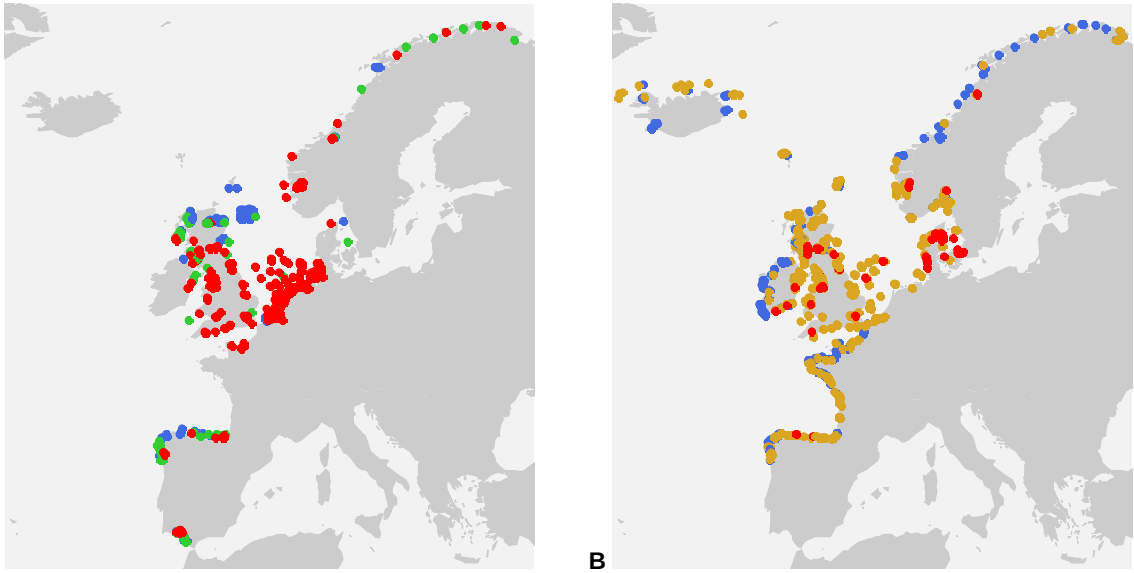
Since 1998, total emissions of lead to air have decreased by more than two thirds according to data reported to EMEP. By 2005, emissions from combustion in power plants and in industry and industrial process were the main contributors to total atmospheric deposition of lead. The most significant reduction in the OSPAR area of around 90% has been achieved in emissions from road transport through the phase-out of leaded petrol in the OSPAR Convention area. However, by 2005 road transport still accounted for 25% of the total emissions being the second largest emission source after combustion in power plants and industry and before industrial processes. Over the same period, emissions from air transport have increased by one third and reductions for industrial and combustion processes were less pronounced. Waterborne inputs have gained more relative significance as atmospheric inputs to the sea have reduced over the period 1990 – 2006 and, in the Greater North Sea Region, may now account for approximately 50% of lead inputs.

How does this affect the quality status?

Where they can be detected trends in lead concentrations over the period 1990 – 2006 are generally downward. The picture of downward trends since 2000 is slightly more significant than for cadmium and mercury.

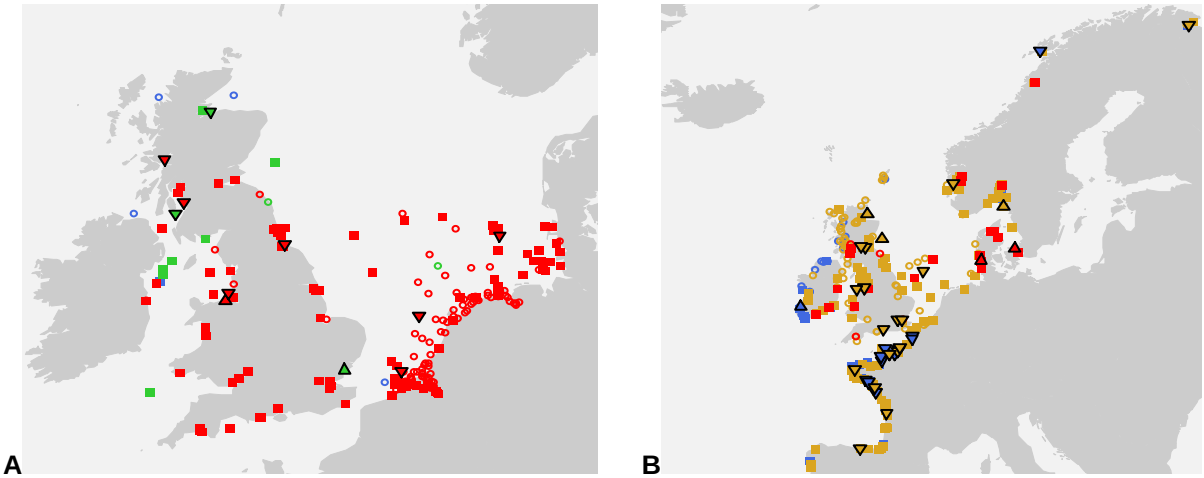
Concentrations of lead in sediment are at levels which may pose a unacceptable risk of pollution effects over large parts of the southern North Sea, both inshore and offshore, the Channel and the Irish Sea. Scattered high concentrations are also found along the coast of Norway and in some

locations near urban industrialised areas in northern Spain. However, concentrations in the northern UK, northern Norway and northern Spain are generally approaching or at background. Concentrations in biota exceeding EU dietary limits are less widespread, and the locations can generally be linked to urban and industrial activity, *e.g.* around Denmark, several UK estuaries and certain sites in southern Ireland and northern Spain. Concentrations in the offshore area around the Dogger Bank are at near coastal levels. This has been attributed to enhanced fine sediment fraction and riverine humic acids in that area which are carriers for lead. Lead concentrations in fish and shellfish remain above background over much of the coasts of Regions II (Greater North Sea), III (Celtic Seas) and IV (Bay of Biscay/Iberian Coast), although background levels are evident in western Ireland, the north west coast of Norway, the west of Ireland, and some stations in northern Spain and along the coast of northern France. Concentrations above background at sites around Iceland may be the result of natural geological factors.



A B

Status of lead concentrations in (A) sediments and (B) biota: background (blue), acceptable (green) or below EU dietary limits (amber), and unacceptable (red)



A B

Temporal trends of lead concentrations in (A) sediment and (B) biota: downward ▽, upward △, insufficient data for trend assessment ○

Electronic navigator to OSPAR publication sources (publication number):

- ➥ Status and trend of marine chemical pollution (395/2009)
- ➥ Towards the cessation target (354/2008)
- ➥ Trends and concentrations in marine sediments and biota (390/2009)
- ➥ Trends in waterborne inputs (448/2009)
- ➥ Trends in atmospheric concentrations and deposition (447/2009)
- ➥ Background Document for lead (398/2009) (as updated)