

TA 2571/2010
Prioritised hazardous substances;
Status in 2007 and emission prognoses

1 Introduction

This report presents data concerning prioritised substances that are encompassed by national goals for both reductions in emissions as well as complete cessations of emissions in 2005, 2010 and 2020 respectively (Ref. Prop.1 S (2009-2010)).

The national emissions of these substances for 1995 and 2007 have been surveyed and the reductions in emissions for the period 1995 – 2007 have been computed. Prognoses have been made for the emissions of hazardous substances in 2010 on the basis of commenced and planned measures. For the substances more recently added to the priority list, there is at present minimal data concerning consumption and emissions. The trends in the attainment of the goals for these substances will be assessed on the basis of the present emissions and in relation to the goal for 2020.

The reported data does not include emissions from contaminated sediments because no overview of such exists at present. For emissions from contaminated soil, data does exist for individual substances. The report does however contain information on the work conducted by the environmental authorities with contaminated sediments and soil pollution.

An overview is also given of important sources of emissions, the work with hazardous waste, international work, monitoring and of possible consequences to emissions and the spread of hazardous substances in consequence of climate changes.

References are made in the report to the SFT (Norwegian Pollution Control Authority). As of 18 January 2010, the SFT has changed its name to Klif (Climate and Pollution Agency).

2 Summary

The list of prioritised hazardous substances now encompasses some 30 substances and/or groups of substances. The total emissions of the hazardous substances on the priority list have been reduced from 1995 up to the present. For most of the substances, the national emissions in 2007 were reduced by over 50 % in relation to 1995, and by substantially more for many of these hazardous substances.

The prognoses show that for most of the prioritised hazardous substances, reductions in emissions will be obtained that accord with what was expected prior to 2010. Challenges remain nevertheless with some of the individual substances, including with individual brominated flame retardants, where their use has been increasing. It is also a challenge to acquire the requisite data to assess measures for the newer substances on the list. These are substances that are present in products, to a large part in imported products, and their consumption can be substantial. The emissions and prognoses are summarised in the table below. All the data is subject to some degree of uncertainty.

Hazardous substances	Emission* 1995 (approx. tons)	Emission* 2007 (approx. tons)	Emission reduction 1995 – 2007 (approx.%)**	Prognosis; Emission red. 1995-2010 Magnitude(%)**
<i>Substances whose emissions must be substantially reduced and eliminated before 2005:</i>				
Certain surfactants (DTDMAC, DSDMAC, DHTMAC)	8	1	86	Approx. 90
Chlorinated paraffins, short-chain (SCCP)	1	0	100	Approx. 100
Nonyl/octylphenols and their ethoxylates	25	2	93	Approx. 90
PCB (phasing out of existing applications)	487	176	64	Approx. 80
Pentachlorophenol (PCP)	10	0	100	Approx. 100
<i>Substances whose emissions must be reduced substantially before 2010:</i>				
Arsenic (As) (excl. contaminated soil)	36	28	23	25 – 30
Lead (Pb) (excl. contaminated soil)	600	199	67	Approx. 75
Brominated flame retardants	0.4	2.4	-500	
Diethylhexyl phthalate (DEHP) ¹	285	120	58	Approx 60
1,2-dichloroethane (EDC)	33	9	73	90 – 95
Dioxins (units of quantity in g TEQ)	74	24	67	60 – 70
Hexachlorobenzene (HCB)	0.09	0.008	91	Approx. 90
Cadmium (Cd) (ex. contaminated soil)	5	1.5	70	Approx. 70
Chlorinated alkyl benzenes (CAB, expressed as EOCl)	0.08	0.02	79	60 – 75
Chlorinated paraffins, medium-chained ¹	33	27	18	Approx. 20- 25
Chromium (Cr) (excl. contaminated soil)	100	40	60	50 – 60
Mercury (Hg) (excl. contaminated soil)	2.5	1	61	65 – 70
Musk xylenes	0.9	0.3	60	60 – 65
PFOS and PFOS-related compounds ***	22	0	100	100
Polycyclic aromatic hydrocarbons (PAH) (excl. contaminated soil)	268	144	46	Approx. 50
Tetrachloroethene (PER)	367	31	92	Approx. 90
Tributyl and triphenyl tin compounds (TBT and TFT)	29	0	100	100
Trichlorobenzene (TCB)	Approx. 0.021	0.11	-	Approx. 70
Trichloroethene (TRI)	620	36	94	Approx. 90

¹ Based on consumption being 1 % of the EU's turnover.

Hazardous substances	Emission* 1995 (approx. tons)	Emission* 2007 (approx. tons)	Emission reduction 1995 – 2007 (approx.%)**	Prognosis; Emission red. 1995-2010 Magnitude(%)**
<i>New substances:</i>				
Bisphenol A		unknown		
Decamethylcyclopentasiloxane (D5)		unknown		
Dodecylphenol		unknown		
PFOA		Approx. 0.015		
Triclosan		1.5		
2,4,6-tri-tert-butylphenol (TTB-phenol)		unknown		

* Excepting emissions from contaminated soil

** In consequence of the low levels of emissions, small changes in the data for emissions may lead to relatively large changes in the computed percentage reduction.

*** Quantities of PFOS and PFOS-related compounds in fire fighting foam 2005 (comprises the majority of products in which PFOS compounds have been used)

Status of emissions

The national emissions of *short-chained chlorinated paraffins, nonyl/octylphenols and their ethoxylates, pentachlorophenol and certain surfactants (DTDMAC, DSDMAC, DHTMAC)*, hexachlorobenzene (HCB), PFOS and PFOS-related compounds, tetrachloroethene (PER), tributyl tin compounds (TBT) and trichloroethene (TRI) have been reduced by an order of magnitude of 90 - 100 % during the period 1995-2007.

Products have been the most important sources of emissions for most of these substances and product regulations have now been initiated. The most important activities in the future will be to conduct inspections to see that the initiated regulations are being adhered to.

The national emissions of *mercury, cadmium, chromium, lead, dioxins, musk xylenes, 1,2-dichloroethane (EDC), and CABs* were reduced by an order of magnitude of 60 % - 80 % during the period of 1995 – 2007. For lead, cadmium and mercury the Norwegian emissions are significantly less than the quantities that are brought to Norway via long-distance atmospheric transport from other countries. Dioxins brought by long-distance atmospheric transport are being deposited in quantities that are of the same order of magnitude as the national emissions. International work to limit the use and emissions of these substances thus is important to further reductions of their impact on Norway.

The work with reducing PCB emissions has primarily been carried out by phasing out products containing PCBs and ensuring the responsible handling and disposition of waste containing PCBs. Calculations show that approx. 87 % of all PCBs placed into service before 1980 had been phased out as of 2007. The reduction in PCB use during the period 1995 – 2007 is computed to be approx. 64 %. It is estimated that over 90 % of all PCBs will have been phased out during the period 1980 - 2010. PCBs may also be created by combustion and similar processes, however the emissions from these sources are small.

Consumption and emissions of diethylhexylphthalate (DEHP) have, according to data from the Norwegian Product Register, been reduced by more than roughly 90 % during the period 1995 – 2007. More recent information and calculations based upon EU data indicates however that Norwegian data for consumption and emissions of DEHP is underestimating such and that the actual consumption in Norway, and hence also the DEHP emissions in Norway, are significantly larger. Based on EU data, the actual

reduction in emissions (and consumption reduction) was of an order of magnitude of 60 % during the period 1995 - 2007. DEHP is at present banned in toys and products for small children. Work is being done in the EU on regulating DEHP.

The consumption and emissions of MCCP have, according to data from the Product Register, been reduced by roughly 75 % during the period 1995 – 2007. However, these figures do not include MCCP in set, imported products. The uncertainty in the consumption and emission data hence is relatively large. Calculations based upon EU data indicate that this estimate underestimates the actual consumption in Norway and thus that the MCCP emissions in Norway are substantially larger. Based on EU data, the actual reduction in emissions (and consumption reduction) was of an order of magnitude of 18 % during the period 1995 - 2007. National regulation of MCCP is under assessment.

The national reductions in emissions of *arsenic* amounted to 23 % during the period 1995 – 2007. Existing applications of CCA - impregnated wood are the dominant source of emissions of arsenic. Even though the use of CCA impregnated wood is strictly limited now, arsenic and chromium will leak out from the existing applications with CCA impregnated wood, i.e. from CCA impregnated wood already in use in wood structures, for a long time to come. Rebuilding all the existing wooden structures is deemed to hardly be appropriate because the costs of carrying out such a measure would not be proportionate to the environmental gains. Current waste management systems and procedures are assessed as being able to handle waste with CCA impregnated wood in an environmentally responsible manner.

The national emission reductions for *PAH* amount to a 46 % reduction since 1995. The emissions have been significantly reduced in 2007 in relation to 2006. This is primarily due to modernisation of the production processes in the aluminium industry. The diffuse emissions of PAH (from residential heating with biofuels and wood heating, traffic) will probably be the largest sources of emissions in 2010.

The total consumption of *brominated flame retardants* has increased significantly since 1995 from slightly less than approx. 100 tons to approx. 450 tons in 2007. A ban has been introduced on penta, octa and deca BDE, which is causing a reduction in the emissions of these substances. The increased emissions in Norway are primarily due to increased use of products that contain the brominated flame retardants HBCDD and TBBPA. Important emission routes are via municipal drainage systems and from waste management and landfills. The national action plan for brominated flame retardants from 2002 was updated in 2009. Measures with respect to the action plan are expected to reduce emissions of brominated flame retardants in accordance with the goals set for 2020.

There has been increased use of *TCB* for research purposes in 2007. The emissions have been extremely small though.

SFT has on the basis of new knowledge and the criteria for prioritised hazardous substances, identified six substances for the priority list since 2006. Little consumption and emission data exists at present for these new hazardous substances: *bisphenol A*, *decamethylcyclopentasiloxane (D5)*, *dodecylphenol*, *perfluorooctanoic acid (PFOA)*, *2,4,6-tri-tert-butylphenol* and *triclosan*. What these substances have in common is that

they are found in products that are used both commercially as well as privately, and that they occur to a large extent in imported products. It is thus estimated that the actual consumption in Norway is greater than what is registered in the Product Register because the content of hazardous substances in set, imported products is not registered. Work has been commenced on improving the underlying data for these substances.