MILJØVERNDEPARTEMENTET

Ministry of the Environment

NORWEGIAN IMPLEMENTATION PLAN FOR

THE STOCKHOLM CONVENTION ON

PERSISTENT ORGANIC POLLUTANTS (POPs)

Norway's implementation plan for the Stockholm Convention was drawn up by the Norwegian Climate and Pollution Agency and the Norwegian Food Safety Authority, which are the competent authorities for chemicals and pesticides respectively. The plan has been approved by the Ministry of the Environment.

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Sammendrag

Hva er persistente organiske miljøgifter?

Persistente organiske miljøgifter er organiske stoffer som er lite nedbrytbare og forblir lenge i miljøet. De bioakkumulerer og kan forårsake skadelige effekter på menneskers helse og på miljøet. De kan transporteres over lange avstander med havstrømmer og i atmosfæren og dermed kan effekter av persistente organiske miljøgifter bli observert på steder der de aldri har vært brukt. Norges beliggenhet gjør at vi får store tilførsler av miljøgifter via langtransport. Dette er særlig tilfelle i det norske arktiske området. Høye nivåer av miljøgifter er funnet i Arktis og skadelige effekter er observert hos blant annet mennesker, isbjørn og sjøfugl. På grunn av grensekryssende transport av miljøgifter er global handling essensiell for å kunne løse problemet.

Oversikt over Stockholmkonvensjonen

Stockholmkonvensjonen om persistente organiske miljøgifter (POPs) er en global avtale som har som formål å beskytte menneskers helse og miljøet mot POPs. Konvensjonen trådte i kraft 17. mai 2004 og pålegger partene å iverksette tiltak mot de miljøgifter som er oppført i konvensjonen. Partene i konvensjonen er pålagt og:

- iverksette tiltak for å redusere eller stanse utslipp fra tilsiktet produksjon og bruk
- iverksette tiltak for å redusere eller stanse utslipp fra utilsiktet produksjon
- iverksette tiltak for å redusere eller stanse utslipp fra kjemikalielagre og avfall
- utvikle og implementere en nasjonal plan for gjennomføring av nevnte tiltak og rapportere til konvensjonen
- gjennomføre andre tiltak:
    - nominer flere stoffer til konvensjonen
    - fremme forskning, utvikling og overvåking
    - bidra til offentlig informasjon, bevisstgjøring og utdanning
    - gi teknisk bistand og økonomiske ressurser

Bakgrunnen for og formålet med Norges oppdaterte NIP

Ifølge artikkel 7 i konvensjonen er hver part forpliktet til å utvikle en nasjonal implementeringsplan (NIP) som viser hvordan forpliktelsene i konvensjonen gjennomføres.

NIPen skal gjennomgås og oppdateres med jevne mellomrom som angitt av vedtak i Partsmøtet (COP).

Norge ratifiserte Stockholmkonvensjonen 11. juli 2002. Den første norske NIPen ble utarbeidet og sendt til Stockholmkonvensjonen juni 2006. Den beskriver våre nasjonale tiltak for de 12 første POPene listet i konvensjonen (aldrin, klordan, DDT, dieldrin, endrin, heptaklor, Mirex, toksafen, polyklorerte bifenyler (PCB), dioksiner og furaner (PCDD / PCDF) og heksaklorbenzen (HCB)). Siden 2009 er ytterligere ti kjemikalier lagt til konvensjonen. De ti kjemikaliene er plantevernmidlene; chlordecone, hexabromobiphenyl, teknisk endosulfan og tilhørende isomerer, penta klorbenzen (PeCB), alfa heksaklorsykloheksan (α-HCH), beta heksaklorsykloheksan (β-HCH), og lindan (gamma heksaklorsykloheksan; γ-HCH), og industri kjemikaliene; tetrabromodiphenyl-og pentabromodiphenyl eter (penta-BDE), hexabromodiphenyl eter, heptabromodiphenyl eter (okta-BDE), perfluoroktankarboksylsyre sulfonsyre, dens salter og perfluoroktankarboksylsyre sulfonyl fluorid (heretter kalt PFOS). Den nye NIPen gir en oversikt over gjeldende nasjonal politikk for farlige stoffer og beskriver hvordan Norge oppfyller sine forpliktelser under Stockholmkonvensjonen. Med særlig vekt på de ti nylig listete POPene, beskriver NIPen regelverk og andre tiltak for å redusere eller eliminere dagens bruk, utslipp fra lagre og avfall, miljøovervåkning, forskning og screening, samt teknisk og finansiell bistand til andre land.

POPer i Norge og tiltak for å redusere og/eller eliminere utslipp

Flertallet av de 12 opprinnelige POPene (beskrevet i den første NIP) er ikke beskrevet i dette dokumentet fordi de representerer liten miljømessig bekymring i Norge og status for disse kjemikaliene er ikke vesentlig endret siden den første NIPen ble utviklet. Men PCB og dioksiner er fortsatt i fokus. De norske miljømyndigheter har gjennomført en handlingsplan (2009-2012) for å redusere utslipp av PCB til miljøet. En utfasing og opprydding av PCB i produkter, avfall, forurenset grunn og sedimenter har vært sentralt i arbeidet. Drøyt 90 prosent av PCB-produktene som var i bruk i 1980 var tatt ut av bruk ved utgangen av 2010. PCB-nivået i det norske miljøet er redusert de siste årene. Men høye nivåer av PCB har blitt målt i topp-predatorer i norsk Arktis og lave PCB-nivåer har også blitt målt i luften på Svalbard med liten endring de siste årene. I likhet med PCB, står dioksiner på den norske prioritetslisten over stoffer der utslippene skal reduseres vesentlig med mål om å stanse utslippene innen 2020. Utslipp av dioksiner i Norge er betydelig redusert (ca. 70 %) i perioden fra 1995 til 2009. Deponering av dioksiner i Norge fra

kilder utenfor Norge er omtrent like stort som det nasjonale utslippet, derfor er internasjonale tiltak for å redusere utslipp av dioksiner viktig.

Av de ti nye miljøgiftene omfattet av konvensjonen, er sju plantevernmidler. Av disse har bare lindan og endosulfan vært godkjent for bruk i Norge. Lindan ble brukt i Norge fra ca. 1950 til 1992 og endosulfan ble brukt fra 1970-tallet frem til det sist ble tillatt solgt i 1997.

PFOS brukes som overflateaktive stoffer i ulike produkter (dvs. tekstiler og lær produkter, galvanoteknisk, matemballasje, brannskum, gulv polish, fotografisk og fotolitografiske industri, og i hydraulikkvæsker i luftfartsindustrien). Under Stockholmkonvensjonen er produksjon og bruk av PFOS fortsatt tillatt for enkelte formål og totalt 20 akseptable bruksområder og konkrete unntak er oppført i konvensjonen. PFOS har aldri vært produsert i Norge og bruken av PFOS ble så godt som stoppet i 2007, da en utstrakt regulering på forbruk, eksport, import og omsetning ble innført. Bruken av PFOS i brannskum er stanset i Norge. Før forbudet representerte brannskum den største bruken av PFOS nasjonalt. Det arbeides med å få på plass en opprydding av de grunnområdene som er forurenset etter bruk av PFOS.

Produksjon, import, eksport, omsetning og bruk av stoffene, preparater og produkter som inneholder 0,1 vekt prosent eller mer av penta- og okta-BDE har vært forbudt i Norge siden 2004. Noen produkter som inneholder penta- eller okta-BDE kan fortsatt være i bruk, først og fremst finner vi disse bromerte flammehemmerne i elektrisk og elektronisk utstyr (EE-produkter) og i avfall fra disse produktene. I Norge er tiltak for å stanse utslipp av penta- og okta-BDE innført for å sikre forsvarlig håndtering av avfall, og da spesielt EE-avfall. Det er etablert returselskaper som samler og håndterer slikt avfall og alle forhandlere av EE-produkter er forpliktet til å ta imot brukte EE-produkter og levere til returselskapene. For å ta hånd om PCB-holdig avfall er det også etablert et gratis retursystem for kasserte PCB-holdige isolerglassruter.

I henhold til Artikkel 6 i konvensjonen har hver part plikt til å gjennomføre tiltak for å redusere eller eliminere utslipp fra lagre og fra avfall som består av eller inneholder POPer og sikre at lagrene, avfall og produkter og artikler som kan bli avfall, forvaltes på en måte som beskytter menneskelig helse og miljø. Lagre av kjemikalier som omfattes av Stockholmkonvensjonen eksisterer ikke i Norge i dag. Organiske miljøgifter som bromerte flammehemmere og PFOS kan fortsatt finnes i produkter som er i bruk i Norge. Produktene vil fortsette å gå inn i avfallsstrømmen i noen år fremover, men mengdene avtar etterhvert. I tråd med bestemmelsene i

avfallsforskriften skal avfall som inneholder POPer på eller over en gitt konsentrasjon behandles som farlig avfall. Grenseverdiene spenner fra 0,005 til 0,25 vekt % avhengig av POP. Forbrenning av POPs-holdig avfall skal, så langt det er mulig, utføres slik at skader på miljø og helse forebygges og reduseres. Det stilles strenge krav til slik forbrenning. Forbrenningsrester klassifisert som farlig avfall blir også behandlet i samsvar med bestemmelsene i avfallsforskriften. Med hensyn til eksport eller import følges retningslinjer fastsatt under Baselkonvensjonen som omhandler kontroll av grensekryssende transport av farlig avfall og deres disposisjon.

Opprydding i forurenset grunn har høy prioritet i Norge og opprydding har pågått i flere år. Høyeste prioritet er gitt til områder hvor forurensning utgjør en risiko for menneskers helse eller hvor miljøgifter i grunnen kan lekke ut og bli tatt opp i det biologiske kretsløpet og ende opp i vårt eget matfat. Jord med et innhold av PCB på 50 ppm eller mer skal behandles som farlig avfall. Undersøkelser har vist at PFOS fra brannskum har forurenset grunnen i og rundt flyplasser der brannøvelser har blitt utført. Jorden i tilknytning til brannøvingsfeltene er til dels alvorlig forurenset med PFOS. Det pågår et arbeid for å kartlegge og rydde opp i denne forurensningen.

Konklusjon

Norge har en streng miljølovgivning som gir nødvendig juridisk grunnlag for å kunne oppfylle kravene i Stockholmkonvensjonen. Norge mener å ha oppfylt sine forpliktelser i henhold til konvensjonen med hensyn til produksjon, omsetning, bruk, import og eksport av alle stoffene listet i Stockholmkonvensjonen. I tillegg har vi også innført føre-var-prinsippet og substitusjonsprinsippet, for å bidra til at farlige stoffer erstattes av mindre farlige stoffer. Vi har også et prinsipp om at forurenser betaler. Det er et nasjonalt mål at utslipp av helse- og miljøgifter skal stanses eller reduseres vesentlig innen 2020. Hvilke stoff som omfattes av dette målet er avhengig av kriterier som bioakkumulering, persistens og giftighet. Det er identifisert en nasjonal liste med ca. 30 stoffer/ stoffgrupper som oppfyller kriteriene for å bli omfattet av 2020-målet. Vi har utarbeidet konkrete handlingsplaner for å fase ut flere av POPene.

Executive summary

What are persistent organic pollutants (POPs)?

POPs are organic substances that resist degradation and remain for long periods in the environment. They also undergo bioaccumulation and can cause harmful effects on human health and the environment. They can be transported over long distances by ocean currents and in the atmosphere hence effects of POPs can be found at locations where they have never been used. Norway's geographical position means that it receives large inputs of pollutants via long-range transport. This is particularly the case in the Norwegian Arctic area. High levels of POPs have been found in the Arctic and harmful effects have been observed in humans, polar bears and sea birds. Because of the transboundary movements of POPs released into the environment, global action is needed to address the problem.

Overview of the Stockholm Convention

The Stockholm Convention on Persistent Organic Pollutants (POPs) is a global agreement whose objective is to protect human health and the environment from POPs. The Convention entered into force 17 May 2004 and obliges Parties to take action against the POPs that are listed in the Convention. Parties to the Convention are required to:

- implement measures to reduce or eliminate releases from intentional production and use
- implement measures to reduce or eliminate releases from unintentional production
- implement measures to reduce or eliminate releases from stockpiles and waste
- develop and implement a national implementation plan for the above mentioned measures and report to the Convention
- implement other measures:
    - nominate additional substances to the Convention
    - research, development and monitoring
    - public information, awareness and education
    - technical assistance and financial resources

Background for and purpose of Norway's updated National Implementation Plan (NIP)
As described in Article 7 of the Convention each Party has to develop a National Implementation Plan (NIP) that shows how the obligations of the Convention will be implemented. The NIP should be reviewed and updated on a periodic basis and in a manner to be specified by a decision of the Conference of the Parties (COP).

Norway ratified the Stockholm Convention on 11 July 2002. The first Norwegian NIP was submitted in June 2006 describing our national measures for the 12 original POPs (aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex, toxaphene, polychlorinated biphenyls (PCBs), dioxins and furans (PCDD/PCDF) and hexachlorobenzene (HCB)). At the fourth and fifth meeting of the COP ten additional chemicals were added to the convention. The ten chemicals are the pesticides; chlordecone, hexabromobiphenyl, technical endosulfan and its related isomers, penta chlorobenzene (PeCB), alpha hexachlorocyclohexane (α-HCH), beta hexachlorocyclohexane (β-HCH), and lindane (gamma hexachlorocyclohexane; γ-HCH), the industrial chemicals; tetrabromodiphenyl- and pentabromodiphenyl ether, hexabromodiphenyl ether, heptabromodiphenyl ether (hereafter referred to as brominated flame retardants), perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride (hereafter referred to as PFOS). The present document contains Norway's updated NIP and gives an overview of the current national policy on hazardous substances and describes how Norway is meeting its obligations under the Stockholm Convention. With a particular emphasis on the ten newly listed chemicals initiatives ranging from regulations to planned and completed measures to reduce or eliminate current use, releases from stockpiles and wastes, environmental monitoring, research and screening, technical and financial assistance to other countries is described.

The POPs issue in Norway and measures to reduce and or eliminate releases
The majority of the 12 original POPs (described in the first NIP) are not described in this document because they present little environmental concern in Norway and the status of these chemicals has not changed significantly since the first NIP was submitted. However PCBs and dioxins are still a national concern. The Norwegian Environmental Authorities have implemented an action plan (2009-2012) to reduce new input of PCBs to the environment. The plan involves phasing out and remediation of PCBs in products, waste, contaminated soil and sediments. Existing mass of PCBs have been reduced by 90% since 1980ties when all new use of PCBs were prohibited. PCB levels in the Norwegian environment are decreasing. However high levels of PCBs have been measured in top predators in the Norwegian Arctic and low PCB levels

have also been measured in the air at Svalbard with little change the last few years. Like PCBs, dioxins are on the Norwegian priority list of substances whose emissions are to be substantially reduced with the aim of elimination by 2020. Emission of dioxins in Norway has been significantly reduced (approx. 70%) in the period from 1995 to 2009. Since deposition of dioxins from sources outside Norway is similar to the national level, efforts to reduce dioxin emissions internationally are important.

Of the ten new POPs included in the Convention since 2009, seven are pesticides. Only lindane and endosulfan has been authorized for use in Norway. Lindane was used in Norway from about 1950 until 1992 and endosulfan was used from the 1970-ties until it was last allowed sold in 1997.

PFOS are used as surface-active agents in various applications (i.e. textiles and leather products; metal plating; food packaging; fire-fighting foams; floor polishes; photographic and photolithographic industry; and in hydraulic fluids in the aviation industry). Under the Stockholm Convention production and use of PFOS is still allowed for specific use areas and a total of 20 acceptable purposes and specific exemptions are listed in the Convention. PFOS has never been produced in Norway and consumption and use of PFOS and PFOS-related compounds was virtually halted in 2007, when a severe restriction on the consumption, use, export, import and placing on the market was introduced. The use of PFOS in fire-fighting foam is stopped in Norway. Before the ban, the main national use of PFOS was in fire-fighting foam. Work is in progress to clean-up the areas where soil has been contaminated by the use of PFOS.

The manufacture, import, export, sale and use of substances, preparations and products that contain 0.1 per cent or more by weight of penta- and octa-BDE have been banned in Norway since 2004. However products containing penta- or octa-BDE can still be in use and primarily we find these brominated flame retardants in electric and electronic equipment (EE-equipment) and in waste from these products. In Norway an important measure for eliminating releases of penta- and octa-BDE as well has other POPs has therefore been to ensure proper handling of waste, EE-waste in particular. Take-back companies have been set up that collect and handle waste from EE-equipment and all dealers of EE-products have the responsibility of collecting used products and deliver to collection systems. To take care of PCB-containing waste take-back companies has been established for discarded insulating double-glass units containing PCBs.

According to Article 6 of the Convention each Party has to implement measures to reduce or eliminate releases from stockpiles and waste consisting of or containing POPs and to ensure that stockpiles, waste and products and articles upon becoming waste, are managed in a manner protective of human health and the environment. To our knowledge stockpiles of the chemicals covered by the Stockholm Convention does not exist in Norway. POPs such as flame retardants and PFOS can still be found in products currently in use in Norway and will continue to enter the waste stream for some years, although in presumably lower and decreasing volumes. In line with the provisions of the Waste Regulations waste containing POP levels at or above a certain set limit value should be treated as hazardous waste. The limit values ranges from 0.005 to 0.25 % depending on the POP. According to the same regulation incineration of POPs-containing hazardous waste must take place in a proper and controlled fashion to prevent and reduce damage to the environment and to human health as far as possible. Incineration residue classified as hazardous waste shall also be treated in accordance with the provisions in the Waste Regulation on hazardous waste. With regard to export or import of waste the guidelines set under Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal is to be taken into account.

Remediation of contaminated sites is of high priority and clean-up operations have been in progress for several years in Norway and highest priority have been given to sites where pollution constitutes a risk to human health or were pollutants in soil can end up in the food web. Soil with a content of PCB 50 ppm or more must be treated as hazardous waste. Surveys have shown that PFOS in fire-fighting foam has contaminated soil in and around airports where fire-fighting training has been performed. This investigation shows that fire training over the years has resulted in quite severe contamination with PFOS in the environment. The national authorities have surveyed and sat in place measures for the responsible party to investigate and remediate areas that were contaminated.

Conclusions

The legal measures taken through the Norwegian environment regulations are considered sufficiently comprehensive so there is no need for further legislative measures to meet the obligations under the Stockholm Convention. Norway considers that it has fulfilled its obligations under the Convention with regard to the production, placing on the market, use, import and export of all the substances listed in the Convention. In addition, we have also introduced the precautionary principle and the substitution principle, to ensure that hazardous

substances are replaced by less hazardous substances. Another fundamental principle of the Norwegian chemical policy is the polluter-pays principle Furthermore it is a national goal that emission of hazardous substances must be eliminated or substantially reduced by 2020. Criteria for bioaccumulation, persistence and toxicity are established to identify new hazardous substances. A list of about 30 substances and groups of substances of particularly high concern has been identified (the List of Priority Hazardous Chemicals). The list sets national targets for the elimination of use and releases of these substances by 2020. Specific action plans for some of the POPs are also important tools in phasing out the POPs.

1. Introduction

1.1 POPs and the Stockholm Convention

Persistent organic pollutants (POPs) are organic compounds that resist degradation and remain intact for a very long time in the environment, accumulate in living organisms (bioaccumulate), and have harmful effects on health and/or the environment. If such substances enter the environment, they remain there for long periods of time. They can be transported over long distances by ocean currents or in the atmosphere as gases or bound to particulate matter. Because of their tendency to bioaccumulate, they can also be transported over long distances by birds, fish and marine mammals, and their concentrations are higher at higher levels in the food chains. Thus, exposure to these substances may be prolonged and can cause both acute and chronic damage. If exposure takes place via the food chain, POPs are also transferred from mother to offspring, for example through breast milk.

Because of their properties, POPs that are released to the environment spread globally, and can be found in remote areas where they have never been used. The global atmospheric and ocean current systems tend to concentrate POPs released throughout the northern hemisphere in the Arctic. High levels of POPs have been found in the environment and in living organisms in the Arctic, and harmful effects have been observed, for example in polar bears and seabirds. There is concern about the high levels of POPs in the Arctic population, and recent research has shown harmful effects on people in certain parts of the Arctic. In addition monitoring in other regions has made it clear that the occurrence of POPs is widespread in the global environment, with levels of concern in top predators, vulnerable species and humans. POPs have been detected in breast milk in women in all parts of the world, including Norway. There is a global awareness of the risks of POP exposure and that the problem can only be resolved through regional and global agreements. Because of the transboundary dispersal of POPs, national measures are not sufficient to deal with the problem.

POPs include industrial chemicals such as PCBs, pesticides such as DDT, and by-products of industrial processes and combustion such as polychlorinated dioxins and furans (popularly known as dioxins).

1.2 Brief introduction to the Stockholm Convention

The Stockholm Convention is a global agreement, developed under the auspices of the UN Environment Programme (UNEP), whose objective is to protect human health and the environment from POPs. Negotiations on the Convention began in 1998 and were completed in December 2000. 12 POPs were listed for ban or restrictions under the Convention. The convention entered into force on 17 May 2004, and by March 2006 151 states had signed it and 120 had ratified it. Norway ratified the Convention on 11 July 2002. As of June 2012 there are 177 Parties to the Convention. There is a mechanism for listing additional substances in the Convention and ten new POPs have been added to the Convention in 2009 and 2011.

The Stockholm Convention of 2012 establishes measures to reduce or eliminate releases of 22 substances and groups of substances that have been used as pesticides or industrial chemicals or that are unintentional by-products of industrial processes. These substances are listed in Annexes A, B and C of the Convention.

In addition to banning and restricting of substances the following obligations under the Stockholm Convention are relevant for Norway as a developed country:

- obligations relating to the import, export, production, use, release, stockpiles and waste management of POPs
- obligations on Parties to require the use of best available techniques (BAT) and best environmental practices (BEP) to reduce and if possible eliminate releases of POPs unintentionally produced during combustion and certain industrial processes
- an obligation for Parties to take measures to regulate, with the aim of preventing, the production and use of new POPs
- obligation to facilitate information exchange relevant to reduction of production, use, and release as well as alternatives to POPs
- developed country have obligations to provide financial resources, technical assistance and technology transfer to countries in development
- monitoring and research
- notifications

Norway has so far nominated two substances for listing in the Convention. PentaBDE was nominated in 2005 and HBCD in 2008. When new substances are listed each Party may register for specific exemptions (Article 4).

Since the Stockholm Convention contains obligations relating to hazardous waste and the export and import of POPs and waste containing POPs, it has close links to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal and to the Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade.

1.3 National Implementation Plan (NIP)

In line with the Convention each Party has to develop a National Implementation Plan (NIP) describing what the Party has done and intends to do to meet its obligations under the Convention. The plan must be submitted to the Conference of the Parties within two years of the entry into force of the Convention for that party. Furthermore parties are required to review and update their NIP specified by a decision of the Conference of the Parties (SC-1/12). At its first meeting the Conference of the Parties adopted guidance on reviewing and updating NIPs. Among others the guidance identifies changes in obligations arising from amendments to the Convention or its annexes, including the addition of chemicals to Annexes A, B, or C as an external factor that triggers the need for a Party to review and update its NIP. Thus, those Parties for which the amendments have entered into force must review and update their NIP and transmit it to the Conference of the Parties. When reviewing and updating their NIP parties should take into account the need to implement the following measures with respect to the newly listed POPs:

- Develop and implement action plans for unintentionally produced chemicals (Article 5).
- Develop and implement strategies for identifying stockpiles, products, article in use, and wastes with POPs (Article 6).
- Implement control measures to reduce or eliminate releases from intentional production and use (Article 3 and 4).
- Include the new chemicals in the programme for the effectiveness evaluation (Article 16).
- Include the new chemicals in the reporting (Article 15).

The Norwegian NIP gives an overview of national policy on hazardous chemicals and describes how Norway is meeting its obligations under the Stockholm Convention. It also gives an account of further action that is planned to eliminate and minimise releases of POPs.

1.4 Substances regulated through the Stockholm Convention

Originally the convention obliged governments to take action against 12 POPs or groups of POPs, i.e. aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex, toxaphene, polychlorinated biphenyls (PCBs), dioxins and furans (PCDD/PCDF) and hexachlorobenzene (HCB). At the fourth and fifth meeting (May 2009 and April 2011) of the Conference of the Parties (COP), the COP considered the Committee's recommendations and decided on listing ten additional chemicals. The ten new chemicals are chlordecone, hexabromobiphenyl, alpha hexachlorocyclohexane (α-HCH), beta hexachlorocyclohexane (β-HCH), lindane (gamma hexachlorocyclohexane; γ-HCH), tetrabromodiphenyl- and pentabromodiphenyl ether (PBDEs), hexabromodiphenyl ether, heptabromodiphenyl ether, perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOS-F), technical endosulfan and its related isomers, and penta chlorobenzene (PeCB).

All these chemicals fulfil the criteria of being POPs and are considered to require global action because they are persistent, bioaccumulative, subject to long-range transport and toxic. Table 1 lists these substances according to category.

Table 1: Substances to which the Stockholm Convention applies

Name	Category of chemical			Listed in Annex
	Pesticide	Industrial chemical	By-product	
Aldrin	X			A
Chlordane	X			A
DDT	X			B
Dieldrin	X			A
Endrin	X			A
Heptachlor	X			A
Mirex	X			A
Toxaphene	X			A
Hexachlorobenzene	X	X	X	A, C
Polychlorinated biphenyls (PCB)		X	X	A, C
Polychlorinated dioxins and furans			X	C
Chlordecone	X			A
Hexabromobiphenyl		X		A
Alpha- and beta hexachlorocyclohexane	X	X		A
Lindane	X			A
Tetra-, penta-, hexa-, hepta-, bromodiphenyl ether		X		A
Perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOS-F)		X		B
Technical endosulfan and its related isomers	X			A
Pentachlorobenzene (PeCB)	X	X	X	A, C

2. Norway and POPs

2.1 Geography, economy and Norway's relation with the EU

Norway is the northernmost country in Europe and borders on Sweden, Finland and Russia. The mainland coastline is 25 148 km long, and the country covers an area of 324,135 square kilometres. In addition, Norway is administratively responsible for Svalbard (61 020 km^2) and Jan Mayen (377 km^2). Norway is a developed, industrial country with an open, export-oriented economy with a population of 4 920 305 as of 1 January 2011. Norway is not a member state of the European Union (EU), but participates in the EU common market as a signatory to the European Economic Area (EEA) Agreement between the countries of the EU and the European Free Trade Association (EFTA).

2.2 Norwegian environmental policy – an overview

The development of Norwegian environmental policy has involved several processes: building up knowledge of the functioning of the natural world, the development of broad-based public engagement in environmental issues, the introduction of ambitious national targets and extensive legislation in the environmental field, and the establishment of institutions to draw up and implement strategies and action. It is generally accepted that all sectors of society share a responsibility for avoiding unnecessary pressure on the environment. The precautionary principle must be used as a basis where there is a risk of serious damage to health or the environment. As a developed country, Norway has a special responsibility to play an active part in efforts to reduce global pressure on the environment and in integrating issues relating to chemicals into international development efforts.

In the report "*Working together towards a non-toxic environment and a safer future – Norway's chemical policy*" the Norwegian Government (Report No. 14, 2006-2007) aims to provide a framework that will enable us to work together towards a non-toxic environment and a safer future. It is further stated that Norway will call for and play a leading role in ensuring stricter international regulation of hazardous substances and that we will play a leading role in proposing more substances for inclusion in international agreements that prohibit or strictly regulate the use of ecological toxins. Hazardous substances will be a priority area of development cooperation policy and Norway will play an active role in evaluating the health and environmental risks associated with priority substances, and advocate the introduction of regulation at European level

where necessary. In the Government's view, all wealth creation in Norway should be instrumental in maintaining a clean environment, and its policy is that businesses should take responsibility for ensuring that production processes and products do not constitute a risk to health and the environment. Economic activity in Norway should as far as possible take place without releases of hazardous substances and it is a national goal that emissions of hazardous substances must be eliminated or substantially reduced. The Norwegian climate and pollution agency (Klif) is responsible for the review of possible new candidate pollutants that pose a serious threat to health or the environment and that these chemicals are continuously reduced with a goal to eliminating them by 2020 and for this purpose a priority list of chemicals has been established. About 30 substances or groups of substances are presently on the list of priority pollutants and the list is updated annually. To ensure that action is taken when new information on dangerous substances becomes available, the priority list has been supplemented with a set of criteria. The criteria were developed on the basis of the screening criteria set out in international agreements in the EU and Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) and are similar to the criteria used under the Stockholm Conventions screening of new chemicals for listing in Annex A, B and/or C. Substances are reviewed based on their persistency, bioaccumulation and toxicity. Information regarding the list of priority substances and criteria can be found on the following web page (http://www.environment.no/Topics/Hazardous-chemicals/Hazardous-chemical-lists/List-of-Priority-Substances/).

The Norwegian Government bases its chemicals policy on certain key principles to ensure that it is consistent and predictable. These principles provide general guidelines for the Government's efforts to achieve its goals for hazardous substances and they provide important guidelines for business and other actors.

Precautionary measures

The precautionary principle (PP) is another important element of Norway's chemicals policy, where restrictions on specific substances can be introduced if there are strong indications that they may have harmful effects. When an activity raises threats to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. The process of applying the precautionary principle must be open, informed and democratic and must include potentially affected parties. The obligation to take precautionary measures is also closely linked to internationally recognized principles e.g.

Principle 15 of the Rio Declaration and subsequent developments in the Cartagena Protocol, the Stockholm Convention and other international instruments.

Substitution Principle

Substitution is a statutory obligation and requires all businesses, both in public and private sectors, who use products with health and environmentally hazardous chemicals, switching to less hazardous alternatives. The obligation does not apply if it causes unreasonable costs or business inconvenience. It is important to identify the substances that have the most dangerous features and begin to replace them.

The Polluter Pays Principle

The Polluter Pays Principle states that the person who pursue or have pursued an activity or taken a measure that causes damage or detriment to the environment are responsible, until such time as the damage or detriment ceases, for remedying it to the extent deemed reasonable. In this context the proponent of an activity, rather than the public, should bear the burden of proof.

Klif has the main responsibility for following up work on POPs under the Stockholm Convention and for chemicals otherwise (emissions from industry, use in products, waste management, and authorization of biocides). However, the Norwegian Food Safety Authority is responsible for authorization of pesticides in Norway. Norway has had a system for authorisation of pesticides since 1964. Pesticides that are not authorised are in effect prohibited. The substitution principle has also been incorporated into the authorisation system for pesticides.

2.3 International environmental cooperation

Norway's geographical position means that it receives considerable inputs of pollutants via long-range transport with air and ocean currents. This is particularly the case in Arctic areas of Norway, where pollutants originating from much lower latitudes condense and are deposited in the environment as a result of the low temperatures. Norway's success in reaching its national environmental targets is dependent on international environmental cooperation - long-range transport and deposition of POPs can only be halted through binding global agreements. Norway therefore plays an active role in efforts to establish legally binding international cooperation on environmental issues.

Environmental and resource management policies comprise key components of Norwegian foreign and development cooperation policy. Satisfactory environmental conditions help to promote stability and security and a healthy, diverse environment is necessary in order to alleviate poverty and achieve sustainable development to the benefit of all the peoples of the world. The objective is that Norwegian efforts to improve the environmental situation shall ensure a more sustainable development in our region as well as in developing countries.

The Ministry of the Environment and the Climate and pollution Agency focus their international efforts on four main areas:

1. Environmental cooperation with developing countries

The aim of Norway's environmentally-oriented development cooperation is to enable developing countries to fulfil their environmental obligations. Norway gives priority to cooperation with countries which influence the global environment and global environmental policies. This subject is covered more substantially in section 2.6. The Ministry of Environment works through the Global Environmental Facility (GEF) which is a financing mechanism for global environmental conventions. GEF co-finances environmental projects in developing countries and provides loans and grants to projects in many environmentally-related areas. Norway has a general yearly contributes to the GEF in addition to providing co-financing for projects under certain operational programs.

2. Environmental work in the UN

The Norwegian Ministry of the Environment engages with many UN bodies in order to help solve global environmental challenges. Norway's policy on hazardous substances is also bound by a number of international agreements. Norway has ratified the following conventions:

Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade. This convention was established to prevent chemical products that have been banned in industrialized countries from being dumped in developing countries.

Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. The Basel Convention was established to avoid dumping of hazardous waste in developing countries.

Protocols under the LRTAP Convention. Protocols dealing with heavy metals and POPs have been adopted under the Convention on Long-Range Transboundary Air Pollution (LRTAP Convention)

OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic OSPAR (Oslo – Paris Convention) has worked to identify threats to the marine environment and has organised, across its maritime area, programmes and measures to ensure effective national action to combat them.

3. The environment in international trade and investment

The Ministry of Environment works to promote environmental and sustainable development in key trade policy arenas such as the Committee on Trade and Environment (CTE) organized under the World Trade Organisation (WTO), Norway's bilateral trade agreements (EFTA and bilateral agreements), and within Norway's investment protection agreements.

4. Environment and EU/EEA

The EEA agreement entails broadly-based and binding cooperation with the EU in the environmental field. EU´s environmental policies have substantial influence on the formation of Norwegian environmental policies. This subject is covered more substantially in section 2.4.

2.4 Norwegian chemical legislation and EU/EEA

Through the EEA Agreement Norway has implemented the EU legislation on chemicals including the regulation on POPs. POPs covered by the Stockholm Convention and the UN-ECE POPs protocol are in Norway therefore regulated through Regulation (EC) No 850/2004 that is implemented in Norwegian law via the Norwegian Product Control Regulation Chapter 4. Regulation (EC) No 850/2004 contains provisions for the production, sale, use, discharge and disposal of POPs. The regulation provides an overview of the POPs currently covered by the prohibition against the manufacture, sale and use. Furthermore, the regulation provides an

overview of substances unintentionally produced in industrial processes and to which the requirements for emission reductions. The regulation also describes requirements for waste treatment. Adjustments and amendments to the Stockholm Convention are in EU implemented through additional regulations to Regulation (EC) No 850/2004. These additional regulations become part of the EEA-agreement and are then implemented by Norway.

In 2008, a new regulation on the Registration, Evaluation, Authorization and restriction of CHemicals (REACH) entered into force. The aim of the regulation is to improve the protection of human health and the environment through better and earlier identification of the properties of chemicals, and to reduce the use of the most hazardous substances. It will also give industry in the EU/EEA area greater responsibility for obtaining and providing information on chemicals, preparing chemical safety reports, managing risks, and ensuring safe use of chemicals. Under REACH, national authorities may evaluate priority substances and put forward proposals for regulation or authorization. Norway makes an active contribution to regulation at European level of the substances identified as priority ecological toxins (the Norwegian national priority list).

In the EU, Regulation (EC) 1272/2008 on the classification, labelling and packaging of substances and mixtures (CLP-Regulation) stepwise replaces Directive 67/548/ECC and aligns the EU system with the United Nations Globally Harmonized System (GHS). This system facilitates global trade and harmonized communication of hazard information of chemicals and promotes regulatory efficiency. The new EU CLP (GHS) Regulation enters into force in phases starting 1 December 2010. Norway implemented this Regulation in June 2012.

EU directive (EC) 08/98 introduced harmonised ruler for authorisation of active biocide substances and biocidal products on the EU/EEA market. Biocidal products are used to control harmful organisms. Many of these products are hazardous to human health and the environment. The biocidal products directive is implemented in Norwegian law through the Norwegian biocides regulation which entered into force in 2004. A new EU regulation on biocides was adopted 22 May 2012 and will enter into force 1 September 2013. Norway will implement this regulation as part of the EEA agreement.

2.5 Assistance and bilateral cooperation

According to Article 12 of the convention parties shall cooperate to provide technical assistance to developing countries and countries with economies in transition upon request. Furthermore each party undertakes to provide, within its capability, financial support to assist developing countries and countries with economies in transition in their implementation of the convention through bilateral, regional and multilateral sources (Article 13). Norway puts great emphasis on facilitating international conditions in non-environmental areas (both within parties- and non-parties to the convention) which promote an environmentally favorable development at the global, regional and national levels. The aim of the Norwegian effort is to improve the environmental situation and promote a more sustainable development in neighboring areas and in developing countries.

The Arctic Council

Norway participates actively in the working groups and task forces under the Arctic Council, most notably the Arctic Monitoring and Assessment Programme (AMAP) and the Arctic Contaminants Action Programme (ACAP). Norway contributes with both funding and expertise to a large number of projects implemented by the working groups and task forces.

AMAP is responsible for measuring the levels, and assessing the effects of anthropogenic pollutants in all compartments of the Arctic environment, including humans. AMAP's current objective is "providing reliable and sufficient information on the status of, and threats to, the Arctic environment, and providing scientific advice on actions to be taken in order to support Arctic governments in their efforts to take remedial and preventive actions relating to contaminants". AMAP's priorities include persistent organic contaminants (POPs), heavy metals and combined effects of pollutants and other stressors on both ecosystems and humans.

The goal of ACAP is to reduce emissions of pollutants into the environment in order to reduce the pollution risks. ACAP also encourages national actions for Arctic State governments to take remedial and preventive actions relating to contaminants and other releases of pollutants. Currently, the ACAP working group has representation from seven of the eight Arctic Countries: Canada, Denmark, Finland, Norway, Russia, Sweden and USA. In addition, representatives from the indigenous peoples of the Arctic and observers (international and national organizations) take part in the work.

The Barents Euro-Arctic Council

The Barents Euro-Arctic Council (BEAC) is the forum for intergovernmental cooperation on issues concerning the Barents Region. The chairmanship rotates every second year, between Norway, Finland, Russia and Sweden. Norway took over the BEAC Chairmanship in October 2011.

Working group on Environment (WGE)

The Barents Region is becoming a strategic region for Europe. Its natural resources and new transportation routes will change the global map on resource use and transportation. An important challenge for the region is to promote responsible, sustainable and environmentally sound economic activities. The Working Group on Environment was launched in 1999 and the chairmanship rotates between Sweden, Finland, Russia and Norway. The WGE is expected to cover a wide specter of environmental issues and to be able to deal with both strong priorities of the Barents Cooperation and great environmental challenges. The work is therefore organized in sub groups and prioritized themes. Norway contributes mainly with expertise, and to some funding, to projects and activities implemented by the WGE and the subgroups.

Bilateral Cooperation

Norway has bilateral environmental cooperation agreements with several countries including Russia, India, South Africa and Brazil.

In addition, environment and climate change are key priorities for the EEA (European Economic Area) and Norway Grants. Iceland, Liechtenstein and Norway contribute to reducing disparities in Europe and to strengthening bilateral relations with 15 countries in central and southern Europe. For 2009-14 the Norwegian Environmental Authorities are partners in 18 environmental programmes in 11 countries. Among the Environmental Programme Areas one is concentrating on "contributing to prevent injury and adverse environmental effects caused by chemicals and hazardous waste". Within this area the Climate and Pollution Agency will enter into Programme Partnership with the Romanian Ministry of Environment and Forests.

Most bilateral projects have up to now dealt with environmental management, i.e. regulation and compliance monitoring where management of chemicals and heavy metals is an integrated part of the projects. Norway is exploring the possibility of launching projects targeted at chemicals management in several countries including, India, South Africa and Russia. For Russia, who

recently became party to the Stockholm Convention, the proposed main focus will be the establishment of the National Implementation Plan.

2.6 National legislation for pesticides

Pesticides are governed by the national Pesticides Regulation of 26th July 2004 pursuant to the Act relating to food production and food safety (Food Safety Act). The regulations lay down that all pesticides must be authorised by the Norwegian Food Safety Authority, and that authorisation is valid for a period of five years. Pesticides may only be authorised if they do not cause unacceptable harm to people, livestock, animals and plants, biodiversity, or the environment otherwise, and are thus considered to be acceptable in ecological and toxicological terms. The regulations also incorporate the substitution principle, and provide that authorisation may only be granted if an overall evaluation shows that a product is as suitable as already authorised products or other methods for achieving the same purpose, or has advantages over them. Of the fourteen pesticides listed in Annex A and Annex B, only lindane and endosulfan has been authorised for use in Norway. Endosulfan was used in Norway during the 70ties and was last sold in Norway in 1997. Lindane or gamma-hexachlorcyclohexane (γ-HCH) is an insecticide and it was approved for use in Norway from the 1950ties. Lindane was mainly used as insecticide during storage of timber. The last registered product containing lindane was sold in Norway in 1992. A campaign promoting the delivery of obsolete pesticides was carried out in 1993, and no stockpiles or waste containing these pesticides are known to exist today.

2.7 Status for substances covered by the Stockholm Convention

This section gives a general overview of the status for the chemicals covered by the Stockholm Convention more supplementary information can be found in Chapter 6. Production and new use of PCBs was prohibited in 1980 and no stockpiles of these substances exist today. The main uses of PCBs were in transformers and large capacitors, and these have been collected and properly disposed of. They were phased out in 1994–95. However, PCBs may still found in old insulating double-glazed glass units, in ballasts in fluorescent light fittings, in high-voltage equipment, in capacitors in old radios and in old building materials (such as paints, sealants etc.).
Hexabromodiphenyl ether and heptabromodiphenyl ether are commercially known as octabromodiphenyl ether (c-octaBDE). Tetrabromodiphenyl ether and pentabromodiphenyl ether are commercially known as pentabromodiphenyl ether (c-pentaBDE). These chemical mixes are

mainly used as flame retardants in electrical and electronic products (TVs, DVD players, PCs etc). In 2004 Norway introduced a national ban on the use of these chemicals (c-octa BDE and c-penta BDE) and in 2008 we also induced a national ban on the use of deca-BDE Perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOS-F) are not produced in Norway. Substances are imported, either as chemical products or constituents in manufactured products. The main use of PFOS in Norway has been in fire fighting foam. In Norway all use of PFOS in fire fighting foam, textiles, and impregnation agents was banned in 2007.

Unintentionally produced substances are listed in Annex C in the Stockholm Convention. At present there are 4 substances listed in this Annex; hexachlorobenzene (HCB), pentachlorobenzene (PeCB), polychlorinated biphenyls (PCB), and polychlorinated dibenzo-p-dioxins and dibezofurans (PCDD/PCDF). PCBs, PFOS and PFOS-related substances, penta- and octaBDE, HCB and dioxins are on the Norwegian priority list of substances whose releases are to be substantially reduced by 2010 and eliminated by 2020. Efforts to reduce releases of PCB, HCB and dioxin have had high priority for a number of years. Pentachlorobenzene (PeCB) is mainly produced as an unintentional substance in industrial processes.

3. Waste management

The overall objective of the Norwegian waste policy is to increase the utilization of waste as a resource, while emissions of greenhouse gases and pollutants from the waste is minimized. Hazardous waste shall be properly handled, either by recycling or be secured by adequate national treatment. The goal is that generation of different types of hazardous waste shall be reduced by 2020 compared with 2005 levels. The extent of environmental problems from waste depends on the amount and type of waste produced, and the standard of the facilities where the waste is processed. Stricter requirements for final processing and the use of more environmentally friendly technology have helped to significantly reduce emissions from disposal of waste.

In Norway waste volumes have increased by 34 per cent since 1995. More than 80 per cent of the non-hazardous waste is recovered, and more than 90 per cent of the hazardous waste is collected. Proper treatment of hazardous waste is particularly important to prevent releases of dangerous substances into the environment. Economic growth is one reason for the rising quantities of waste. There is increasing amount of hazardous waste from consumer goods such as computers and mobile phones. However, with more waste recovery, the quantity of waste delivered for final disposal has declined. According to preliminary figures from Statistics Norway 82 per cent of all non-hazardous waste was recovered in 2010. Releases from waste treatment have been reduced in recent years.

The current Norwegian regulations on EE-waste were adopted in 2006 in the Waste Regulation Chapter 1. The regulation includes the implementation of the European WEEE Directive (Directive on waste electric and electronic equipment). The legal base of the WEEE Directive allows stricter implementation and the Norwegian regulation on EE-waste is wider than this directive. Norway has, for instance, also included EE-waste from industry in the scope of the regulation.

3.1 Hazardous waste treatment

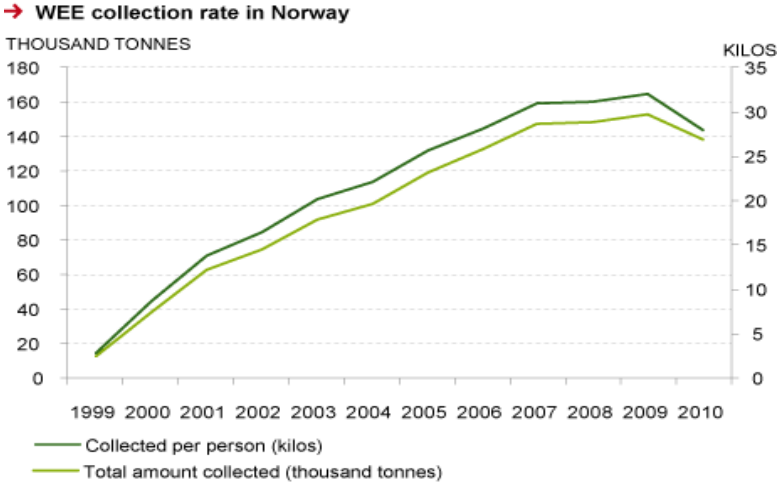
In 2010, a total of 1.2 million tonnes of hazardous waste was handled according to approved treatment. This represents a 14 per cent increase from the previous year. Ninety-four per cent of hazardous waste was treated at approved facilities, according to estimations from Statistics

Norway. This was up 1 per cent from the previous year. Thirty-one per cent of the waste treated as approved was recycled, while 69 per cent were disposed of, mainly at specially-designed landfills.

Waste that contains hazardous substances must be managed as hazardous waste in accordance with the Norwegian Waste Regulation. The classification of hazardous waste is primarily based on the European list of waste, and on the content of substances with hazardous properties in the waste above limit values from the European chemical legislation. The Waste Regulation Chapter 11 include a list of general limit values for hazardous properties to be used in the consideration of weather the waste is hazardous or not. In addition the regulation set specific limit values for a few hazardous substances for the definition of hazardous waste. EU is currently discussing the low POP levels for the new POPs and will amend the EU POPs regulation (EC) 850/2004 to include the limits for the new POPs this year. Once the work has been completed, we will evaluate whether current Norwegian legislation meets the necessary standards.

Electrical and electronic equipment (WEEE) containing dangerous substances are classified as hazardous waste. WEEE a wide variety of products and appliances, ranging from vacuum cleaners, televisions, computers and photocopiers to mobile phones, fluorescent lamps, cables and flexes. Most equipment of this kind contains hazardous substances in varying amounts, such as brominated flame retardants, heavy metals, PCBs, phthalates and mercury. From 1999, when reporting on the collection of EE-waste was initiated, the collection rate has risen continuously, see figure below. More than 138 000 tonnes of EE-waste was collected in Norway in 2010. This is about 28 kg per capita. After collection, waste equipment is dismantled manually at special facilities. Components that contain hazardous substances are treated as hazardous waste, but as much as possible is recovered. According to reports from the take-back companies, the material recovery rate of collected EE-waste was about 83 percent in 2010, and the energy recovery rate was about 9 percent. About 8 percent was reported as landfilled in 2010. Figure 1 show that there was a decrease in collection rate for certain products from private household such as electronic tools, computers and small electronic appliances. Such variations may occur from year to year.

Figure 1 show WEE collection in Norway during the period 1999 - 2010



3.2 Collection and return schemes

In 1998 an Agreement between Ministry of the Environment and the producers and importers was signed to set up take-back companies for electric and electronic waste (EE-waste). Norway established a producer responsibility for electrical and electronic equipment (EE-equipment) in 1999 through the national Regulations on EE-waste (Waste regulation Chapter 1). Proper management of EE-waste is a producer responsibility, and producers are defined as Norwegian manufacturers and importers of EE-equipment. All who on a commercial basis import, or manufacture, EE-equipment in Norway for the Norwegian market, are required to finance the collection and environmentally sound treatment of EE-waste through either:

1. Membership in a *collectively* financed take-back company that is approved by the Climate and Pollution Agency

or

2. Membership in an *individually* financed take-back company that is approved by the Climate and Pollution Agency

The obligation to be a member of an approved take-back company applies to domestic producers and to importers of both components and independent products that are EE-equipment. Being a member in a collectively financed take-back company entails that the domestic producer / importer enters into an agreement for the purchase of services from an approved take-back company, and hands over most of the responsibility of meeting the requirements in the Waste

Regulations to the take-back company. The take-back companies are responsible for collection and environmentally sound treatment of EE-waste as well as PCB-capacitors and light fixtures with PCB-containing capacitors.

In 2004, a duty for producers and importers of insulating glass units to participate in approved take-back schemes for discarded glass units containing PCBs was introduced (Waste Regulations, Chapter 14). Furthermore there is a requirement for a waste management plan to be drawn up before restoration or demolition of old buildings can be started. The purpose of this is to ensure sound management of hazardous waste, such as building materials containing PCBs. The requirements came into force on 1 January 2008 and regulated through the regulation of technical requirements for buildings ("Byggteknisk forskrift" Chapter 9).

3.3 Transboundary movement of hazardous waste – the Basel Convention

Norway has ratified the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, as well as the 1995 Basel Ban Amendment regarding export to non-OECD countries. The main purpose of the Conventions is to protect human health and the environment against the adverse effects resulting from the generation, transboundary movement and management of hazardous wastes. In Norway, chapter 13 of the Waste Regulation deals with transboundary movement of waste. This chapter is an implementation of the European Union legislation (EC) 1013/2006 on shipments of waste. The regulation includes a prior informed consent procedure on transboundary movement of hazardous waste and other waste. Under the Basel Convention, work is in progress on the environmentally sound management of waste POPs and waste containing POPs. The Basel Convention guidelines for the new POPs added to the Stockholm Convention will establish what is meant by a low content of POPs and destruction or irreversible transformation so that waste no longer exhibits the characteristics of POPs. Norway is following this closely by participation in the small intercessional working group.

3.4 Waste containing chemicals regulated by the Stockholm Convention

In Norway POP waste defined as hazardous waste, must be managed as hazardous waste in accordance with the Waste Regulations. The waste must be delivered to approved facilities, and

a permit from the environmental authorities is required. This means that discarded products containing hazardous substances such as PCBs (ballasts in light fittings, insulating double-glazed glass units, filling compounds, etc) must be treated as hazardous waste. The Norwegian waste incineration regulations are based on the European Union Directive 2000/76/EC on the incineration of waste. Incineration of waste must takes place in a proper and controlled fashion to prevent and reduce damage to the environment and to human health as far as possible. Incineration residue classified as hazardous waste shall be treated in accordance with the provisions in the Waste regulation (Chapter 11) on hazardous waste. For incinerators that burn hazardous waste containing more than 1% halogenated organic compounds, expressed as chlorine (Cl), the temperature has to be at least 1100 ° C for a minimum of 2 seconds. Emission limits for dioxins in waste incineration are set in the Waste regulation chapter 10. Waste with a content of hazardous substances exceeding one or several of the limit values is defined as hazardous waste.

3.5 Stockpiles containing chemicals regulated by the Stockholm Convention

Historically there were stockpiles of substances covered by the Stockholm Convention in Norway. Large quantities of fire fighting foam (FFF) containing PFOS were stored throughout the country. The amounts of PFOS-containing FFF in stockpiles have been surveyed and by the end of 2007, to our knowledge, most of the foam had been destroyed. PFOS is still allowed used in Norway in some exempted use categories. There are conditions for handling and storage of stockpiles of PFOS in the pollution permits to industry and in Norwegian regulations for specific industry sectors, such as the metal plating industry. Prohibitions for production and use of other new POPs have already existed for several years and for most of them stockpiles have been collected and treated as hazardous waste for several years.

However products containing pentaBDE and oktaBDE can still be in use. They are mainly used in electronic products. To ensure safe handling, storage and environmentally sound management of stockpiles and waste a collection system of EE-equipment have been established (see section 3.1).

3.6 Landfill

Disposal of waste into landfills has been reduced by 2/3 the last few years. Disposal of waste is regulated by the Waste regulation chapter 9. The purpose of the Waste Regulations, Chapter 9 is that the landfills will operate in a controlled and safe manner, so that damage to humans and the environment are avoided to the greatest extent possible.

The Norwegian Waste Regulation Chapter 9 is an implementation of the European Union's landfill directive and Council Decision establishing criteria and procedures for the acceptance of waste at landfills. With these regulations, the landfills have to fulfil new and strict demands and the risk for emissions of hazardous components should be reduced. In accordance to this Regulation, the waste producers are obliged to make a full characterization of the waste to be landfilled. This obligation may in a long perspective reduce use of hazardous components. There are three classes of landfills and each landfill has to be classified into one of the following classes: Class 1: landfills for hazardous waste, Class 2: landfills for non-hazardous waste, and Class 3: landfills for inert waste. Only hazardous waste and waste that fulfils the criteria laid down by the authority is permitted to be deposited at landfills for hazardous waste
The landfill Regulations require double bottom sealing of landfills and collection and treatment of leachate and prior knowledge of the waste characteristics. Waste that is hazardous to the environment should not be placed in landfills. Environmental requirements result in reduced emissions of PCBs, brominated flame retardants, phthalates, metal compounds and other contaminants leaking from landfills. This is of great importance because landfills are among the sources that contribute to contaminated soil, and environmental problems in our coastal waters with contaminated sediments, fish and shellfish.

3.7 Contaminated sites

Pollutants released from industrial and other activities in the past have contaminated the soil at many sites in Norway. Sources of pollution include local releases from business and industry, old landfills and fugitive emissions from such sources as road traffic, fuelwood use, fires, surface treatment processes and building materials. There is little dilution of hazardous substances that end up in soil. They remain in the same place for a long time, slowly leaching into the surroundings. Remediation of contaminated sites is a national priority task. Norway’s targets were to complete work at the most heavily contaminated sites where action was most urgently needed, and to clarify the status of less contaminated sites, both by the end of 2005. These targets have largely been achieved, and a strategy for further work has been drawn up.

Nevertheless, there are still several thousand sites where the soil is known or believed to be contaminated and there may be sites where further action is required because pollution pose a risk to human health or leach into marine sediments in areas scheduled for remediation. Hazardous substances are also released from buildings. For instance, PCBs in exterior paints, insulation foams and concrete can spread to the nearby soil and sediments. The Government will consider measures to deal with this type of soil contamination and its sources.

In the white paper "Working together towards a non-toxic environment and a safer future" (Report No. 14 (2006-2007) to the Storting) the Norwegian Government further states that at around 130 of the 500 sites that have recently been investigated, there is a risk to human health and a risk of dispersal of hazardous substances. At the same time, other sites where there are similar risks have been identified. The Government will ensure that action is taken at the sites where pollution is shown to be most serious by 2012; this means sites where pollution from contaminated soil is released to priority areas for remediation of contaminated sediments (high-risk areas and areas where consumption advisories have been issued) and sites where pollution can pose a human health risk. In addition, priority is being given to the interests of particularly vulnerable groups such as children. The Government aims to provide children with a non-toxic environment and has performed clean-up operations in day care centres, playgrounds and schools (See Action plan for clean-up of contaminated soil in day cares, Klif 2011).

A nationwide database on contaminated sites has been established, which includes data on all contaminated sites that are known to the pollution control authorities. The database is updated as new information becomes available and is reported. The database contains information on which properties are contaminated (by property registration number), the type of contamination, the type of polluting activity that has taken place on the property, whether the pollution control authorities have issued orders for any investigations or action, investigations and clean-up operations that have been carried out, and the current level of pollution. The localities can also be shown on a map. The database is available to the public (http://grunn.klif.no/ in Norwegian only). There is also a possibility to report sites where one suspects that the ground is contaminated. Currently over 4000 contaminated sites are registered. In 2012, over 300 sites are identified as heavily contaminated and in need of remediation. The inventory is directly linked to the Cadastre Authorities, Norway's national land register (Kartverket). This ensures that sellers and buyers of land and the municipality are informed about contaminated soil on their properties.

3.8 Polluted sediments

Pollutants originating from earlier industrial activities have been deposited in sediments in many harbours and fjords along the coast. These pollutants are primarily a threat to the marine flora and fauna, and may have both acute effects and long-term effects such as genetic and reproductive disorders. Some pollutants are also transferred along the aquatic food chain and may end up in fish and shellfish eaten by people. Direct releases, long-range transport of pollution and releases from contaminated sediments have resulted in substantial levels of pollution in a number of fjords. The Norwegian Food Safety Authority has therefore issued consumption advisories for many fjords or parts of fjords, with recommendations on the kinds and quantities of fish and shellfish caught in the fjords that may be safely eaten. A strategy for polluted sediments was presented in the white paper "*Protecting the Riches of the Sea"* (Report No. 12 (2001-2002) to the Storting). This has three main elements: preventing the spread of environmentally hazardous substances from high-risk areas and harbours; developing county action plans; and building up knowledge through pilot projects, and research. The government also proposed the creation of a special council to compile data in this area and provide advice on conducting investigations and implementing measures. This resulted in the Norwegian Council on Contaminated Sediments being appointed by the Norwegian Ministry of the Environment on 1 October 2003, with a mandate until 30 June 2006. The first phase in the development of county action plans involved 29 selected areas. Action plans were drawn up for 17 of these in 2005. These are now being implemented. Plans are to be completed for all other coastal areas by 2009. Furthermore, new areas of contaminated sediment where the need for measures must be considered are frequently revealed by monitoring, control, construction and other activities. The action plan for contaminated sediments must therefore be flexible, and priorities and funding measures are subject to change.

4. Environmental monitoring, screening and research

Norway runs several national monitoring programmes that perform routine monitoring of environmental pollutants, including POPs, in air, freshwater and marine environment, biota (and food). The objective of this monitoring is to provide information on the environmental status in Norway and the Norwegian Arctic including knowledge of sources, releases and levels of these pollutants to/ in various environmental media. Samples are taken from air, freshwater, marine environment (sediment, water) and from selected species. The potential effects and consequences for the ecosystem and selected species are studied. Binding international monitoring is integrated with the national monitoring programs. In addition to the regular monitoring activities, environmental screening for novel environmental pollutants is conducted yearly. The screening programmes primarily include new hazardous substances where little or no known information from the Norwegian environment is available. Besides providing information on the environmental levels of hazardous substances the screening can also give an early warning for new potential environmental and health problems. This can help prioritize which chemicals should be included in the long-term monitoring programmes in the future. In some cases, screening is conducted to provide information on novel environmental issues arising from releases and/ or exposure to already well-known pollutants.

Altogether there are currently about 30 different monitoring and screening programmes for environmental pollutants. These are thematically organized and cover air, coast and oceans and fresh water. In addition, pesticide residues in water are monitored as part of the agricultural environmental monitoring programme (JOVA), a programme that is run by the Norwegian Food Safety Authority. The Norwegian Food Safety Authority also monitors pesticide and environmental pollutants in food. The monitoring- and screening data from these programmes are actively used as basis for the national environmental policy, to develop strategies and action plans and to take concrete measures when needed. Through its monitoring activities Norway supply international and regional treaties and collaboration networks with data thereby fulfilling international obligations and contributing to international focus on important environmental issues. Together with data from other countries data from the Norwegian monitoring and screening programmes highlight cross-border regional and global pollution challenges and provides Norwegian authorities with a knowledge base that is used in international negotiations. Data from the monitoring and screening programmes is provided to the Global Monitoring Plan (GMP) of the Stockholm Convention, the Convention of Long-range Transboundary Air

Pollution (LRTAP), the Arctic Monitoring and Assessment Programme (AMAP) of the Arctic Council, the Coordinated Environmental Monitoring Programme (CEMP) and the Joint Assessment and Monitoring Programme (JAMP) of the Oslo- and Paris Convention (OSPAR), the Nordic Council of Ministers with its subgroups and the European Environment Agency (EEA). Furthermore, Norway is taking part in the global programme for biomonitoring of human milk for POPs under the auspices of World Health Organisation (WHO).

Norway is also taking an active part in research and monitoring within the framework of Nordic cooperation and in cooperation in the Arctic Council. The Arctic Monitoring and Assessment Programme (AMAP) under the Arctic Council are particularly important. The programme has provided valuable data on levels of POPs in people and the environment in the Arctic, and has revealed serious adverse effects on people, mammals and birds. AMAP's work is particularly important because the presence of POPs in predators and people in Arctic areas where there are no local sources of these substances is evidence of their persistence in the environment, their long-range transport and their bioaccumulation potential. AMAP will continue to be important in revealing new chemicals with the characteristics of POPs and in efforts to evaluate the efficiency of existing international agreements. Norway also participates in the Arctic Council Action Plan to Eliminate Pollution of the Arctic (ACAP). Projects under this plan include identifying and surveying releases of priority substances from various sources in the Arctic states, and measures to reduce releases of these substances.

In Norway, research activity on POPs and other hazardous substances is financed through the Norwegian Research Council, through direct subsidies to national research institutions and through strategic initiatives such as the establishment of the High North Research Centre for Climate and the Environment (Fram Centre) in Tromsø. The Fram Centre is sponsored by the Norwegian Ministry of the Environment and consists of about 500 scientists from 21 institutions involved in interdisciplinary research in the fields of natural science, technology and social sciences and is an important measure of the Norwegian High North Strategy. The Centre was established to further the knowledge about effects of climate change and pollutant loads and effects in the Arctic. Among the national research institutes the Norwegian Polar Institute along with the Norwegian Institute for Air Research, the Norwegian Institute for Water Research, the Norwegian Veterinary Institute, the University Centre in Svalbard, plays a key role in initiating and coordinating research on hazardous substances in the Arctic environment. Norway also provides research funds to the EU and selected countries via bilateral agreements.

5. Public information

Under the Stockholm Convention each Party is required, within its capabilities, to promote and facilitate awareness and educational programmes with regard to POPs and ensure that the public is provided with updated information on POPs, their health and environmental effects, and on alternatives to POPs. Each Party is also required to consider the establishment of mechanisms for the collection and dissemination of information on the annual quantities of the chemicals listed in Annex A, B and C that are released or disposed of.

In Norway the public's right to knowledge and awareness about POPs, other hazardous chemicals and environmental issues is ensured/ laid down by law. On 1 January 2004, the Environmental Information Act entered into force in Norway. This entitles the public to information of relevance to the environment from both public authorities and private undertakings. The public's right to information was further strengthened on 1 June 2009 by the introduction of the Environmental Information Regulations which supplement the Environmental Information Act in particular regarding the public's right to access to documents in the public administration.

The Norwegian environmental authorities host several websites and databases to provide the public with updated environmental data, general information and knowledge of environmental issues. The environmental authorities' website www.miljostatus.no provides information on a number of environmentally hazardous substances, including several POPs, their presence in the environment, properties, effects, and action to deal with them. There is also information on sources and their presence in products. Some of this information is also available in English. Another website http://www.erdetfarlig.no/ is a site for public information on hazardous chemicals, including POPs, in consumer products. Klif is responsible for this website in collaboration with the Norwegian Food Safety Authority and "Miljømerking" (Ecological labelling). Information on hazardous chemicals is also provided through the homepages of the Ministry of the Environment (http://www.regjeringen.no/md) and the Climate and Pollution Agency (www.klif.no). The information published on these pages spans from national policies and regulations to environmental news, publications including environmental surveys, screening and monitoring data, reports, action plans and white papers. For example information on annual releases of substances on the Norwegian priority list (including POPs such as PCBs, HCB, dioxins and furans) split by source is published by the Norwegian Pollution Control Authority in

the report Prioriterte miljøgifter: Nasjonale utslipp (“Priority Substances: National emission), which is updated every year. Information on releases of certain POPs from industrial processes and waste incineration for individual enterprises can be found in the Norwegian Pollutant Release and Transfer Register (http://www.norskeutslipp.no/, in Norwegian only). Norwegian environmental authorities also seek to promote awareness about environmental activities through targeted campaigns and activities. One example is the project "Environmental Journalists" a nationwide educational program where students were encouraged to identify and write about unacceptable environmental conditions in their own municipality.

6. How Norway is meeting its obligations under the Stockholm Convention – measures planned and implemented

6.1 The 12 original POPs

This section provides updated or new information on three of the 12 original POPs; PCB, PCDD/PCDF and HCB which still remain an environmental concern in Norway and require further measures by national authorities. The rest of the original 12 POPs are not included in this NIP because they presently causes limited environmental concern in Norway and as the status for these POPs has changed little over the past six years. The available information on these original POPs can be found in the first Norwegian NIP (NIP, 2006), along with information on PCB, PCDD/PCDF and HCB.

6.1.1 Polychlorinated biphenyls (PCBs)

Production and use

PCBs have never been produced in Norway, but they were extensively used until their production, placing on the market and new use was prohibited in 1980. PCB therefore still exists in some products and materials produced before 1980. In Norway PCB containing products was mapped through an extensive survey. Later, an action plan was adopted to reduce releases of PCBs and phase out PCB containing products and waste. The aim is to stop or virtually eliminate all releases of PCB from the Norwegian environment by year 2020. The first action plan was adopted in 2003 and it has since been updated several times.

The main areas of use in Norway were in large oil-filled capacitors and transformers. These were phased out already in 1994–95 and have been collected and destroyed in an environmentally sound manner. The use of ballasts containing PCBs in indoor fluorescent light fixtures has been prohibited since 1 January 2005, and a prohibition on the use of electricity lead-ins containing PCBs were enforced from 1 January 2010 (Product Regulations, sections 2-1 and 2-30).

Our national goal is to continue:

- the collection of PCB-containing insulation windows and electric/electronic waste;
- to secure proper treatment of waste containing PCB;
- to keep-up the planned clean-up of polluted ground and sediments.

Internationally we will continue to follow up the obligations regulated by the Stockholm Convention and other international agreements and conventions.

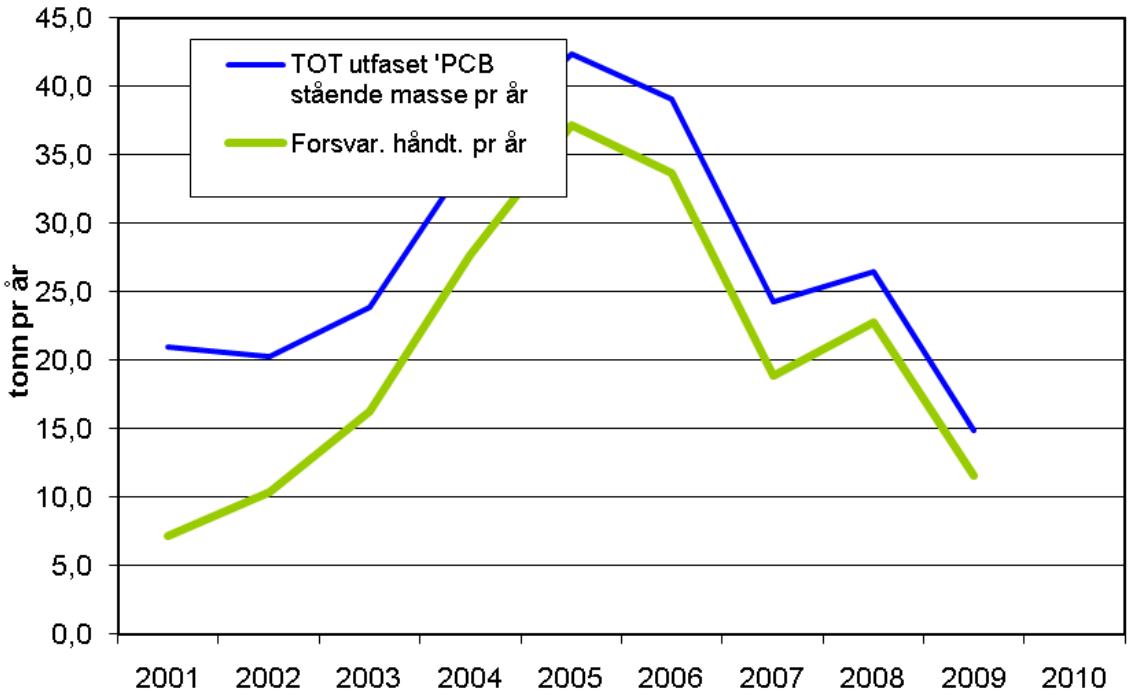
Based on a survey from 2008, more than 1300 tons were imported up until the ban in 1980. About 90 % of the original PCB-containing products were phased out (as of 31.12.2008). The most important sources to PCB contamination were we have the ability to prevent pollution is:

- discarded PCB-containing products;
- buildings from 1940-1980 with PCB-containing building material;
- combustion processes where PCBs could be produced unintentionally like dioxins and HCB.

Emission

Overall levels of PCBs have been reduced over the last decades but we still find elevated levels some media. In Norway and globally, releases of PCBs form both local and more remote sources still continues. PCBs are supplied to the Norwegian nature by air and ocean currents. Long-range transport of PCBs in the atmosphere is considered the most important dispersal route, on a global scale. Nationally we find elevated levels in fish and mussel in close proximity to industry and populated areas (http://www.miljostatus.no/Tema/Kjemikalier/Noen-farlige kjemikalier/PCB/#A). However, the national emission of PCB is reduced in line with the reduced use of PCB-containing products as such products and articles are taken out of use and deposited according to the waste regulations. Measurements of sewage sludge show that the content of PCB in waste water is reduced significantly in recent years (Fig.2)

Figure 2 shows PCB content in waste water in the period 2001 - 2009:



Waste

Waste containing 0.005 % by weight PCB has to be treated as hazardous waste in Norway and this is regulated through the Product Regulation, chapter 4, annex 1and the POPs Regulation (EC 850/2004), that specify that recycling/reclamation of waste containing PCB should not occur.

Measures

Older insulating double-glazed glass units contain PCBs, as do various older types of building materials such as sealants, additives to concrete and paints waste (Action plan for PCB, Klif 2009-2012). To ensure the environmentally sound disposal of these building materials the Norwegian environmental authorities has taken several measures; a recycling system has been established that ensures that PCB containing windows may be delivered to waste collection facilities without any additional costs, cooperation with the construction industry to increase the competence for the identification and remediation of PCBs in buildings, stricter requirements for environmentally sound redevelopment of buildings with PCB-containing joints, plaster and paint priority have been put in place.

Table 3 show regulations and measures for PCBs:

Measure	Regulation	Comment
Prohibition of the use- and requirements for phasing out PCB-containing products and articles	Product regulation §§2-1, 2-3	Clean-up of contaminated soil in day cares. Clean-up of sediments in harbours
Regulation of hazardous waste, combustion and deposition of PCB-containing waste	Waste regulation Chapter 10 (in Norwegian only) Basel Convention	
Requirements for analysis and purification of waste water	Pollution regulation	Directive 96/61/EC
Analysis and purification of waste water	Pollution regulation, Chapter 11-14	
Action plan for emission reduction	National action plan for PCB (2009)	
International agreements	Long-range Transboundary Air Pollution (LRTAP) (UNECE) Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR)	POPs protocol under LRTAP

PCBs at Svalbard

Norway has high ambitions for environmental management in the Arctic and in Svalbard. A survey of the status on PCB contamination in Svalbard was performed in 2008. The objective was to survey PCB in and around Svalbard. PCBs in Svalbard come from several sources; many have been verified as long range air transport and oceanic currents.

6.1.2 Polychlorinated dioxins and furans (PCDD/PCDF)

Dioxins are on the Norwegian priority list of substances whose emissions are to be substantially reduced with the aim of elimination by 2020. Emission of dioxins in Norway has been significantly reduced in the period from 1995 to 2009. The TEQ was in 2009 approximately 21g which is down from 33 g reported in the previous NIP (2006). Dioxins are transported over long distances through air- and water flows. Model estimates indicate that the deposition of dioxins in Norway is a result of both national sources as well as long-range transport (Report from Klif TA-2874/2011).

Emission

The emission of dioxins has been reduced by approximately 70 % in the period from 1995 to 2009. Of the total national dioxin emission in Norway in 2009 the majority goes to air. A small part ends up in soil and a minimum in water. The big reduction in dioxin emission from land-based industry is mainly due to the closure of certain industries.

Measures

Since 1995, a number of measures both in Norway and internationally to reduce emissions of dioxins has been conducted. Emission from diffuse sources like household and boats are the main category of dioxin emission. Control of current emissions and regulations are important measures to ensure that emission continue to stay low. The Norwegian authorities have also focused on dioxins in waste. Filter dust and fly ash from incineration plants must always be treated as hazardous waste. Bottom ash is not classified as hazardous waste if it can be documented that it does not contain hazardous substances. The implementation of planned measures to reduce releases of dioxins will continue. Planned measures to reduce releases of dioxins are also expected to reduce PCB and HCB releases from the same sources.

6.1.3 Hexachlorobenzene (HCB)

HCB (CAS No 118-74-1) is mainly formed during thermal processes if chlorine and carbon are present. Between 1995 and 2009 the national emission of HCB was reduced by more than 90%. HCB, like dioxins, is unintentionally formed during thermal processes containing chlorine and carbon. Hence, measures to reduce dioxin emission will also reduce emission of HCB. Most of the emission goes to air.

6.2 The ten new POPs

The section provides a comprehensive description of the 10 new POPs that were included in the convention following the fourth and fifth Conference of the Parties (COP) meeting in 2009 and 2010, respectively.

At its fourth-and fifth meeting (2009 and 2010) the COP adopted amendments to Annexes A, B and C to the Stockholm Convention to list nine new persistent organic pollutants (SC-4/10-SC-4/18, SC-5/3). The following substances were listed:

- **Pesticides:** chlordecone, alpha hexachlorocyclohexane, beta hexachlorocyclohexane, lindane, pentachlorobenzene; technical endosulfan and its related isomers
- **Industrial chemicals:** hexabromobiphenyl, hexabromodiphenyl ether and heptabromodiphenyl ether, pentachlorobenzene, perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride, tetrabromodiphenyl ether and pentabromodiphenyl ether; and

- **By-products:** alpha hexachlorocyclohexane, beta hexachlorocyclohexane and pentachlorobenzene.

None of the pesticides to be phased out under the Convention is authorised for use in Norway today. Pesticides that are not authorised are in effect prohibited.

Table 4: Listing of 10 new substances in the Stockholm Convention

Chemicals	Annex	Specific exemption/Acceptable purpose
Alpha hexachlorocyclohexane	A	Production: none / Use: none
Beta hexachlorocyclohexane	A	Production: none / Use: none
Chlordecone	A	Production: none / Use: none
Hexabromobiphenyl	A	Production: none / Use: none
Hexabromodiphenyl ether and heptabromodiphenyl ether	A	Production: none Use: recycling of articles that contain or may contain hexabromodiphenyl ether and heptabromodiphenyl ether, in accordance with provision of Part IV of Annex A
Lindane	A	Production: none Use: human health pharmaceutical for control of head lice and scabies as second line treatment
Tetrabromodiphenyl ether pentabromodiphenyl ether	A	Production: none Use: recycling of articles that contain or may contain tetrabromodiphenyl ether and pentabromodiphenyl ether, in accordance with provision of Part V of Annex A
Pentachlorobenzene	A and C	Production: none / Use: none
Perfluorooctane sulfonic acid its salts and perfluorooctane sulfonyl fluoride	B	Production: for the use as listed in section 3.2.5 Use: several acceptable purposes and specific exemptions in accordance with Part III of Annex B
Technical endosulfan and its related isomers	A	Production: as allowed for the parties listed in the Register Use: Crop-pest complexes as listed in accordance with the provisions of part VI of this Annex

6.2.1 Chlordecone

Chlordecone (CAS No 143-50-0) is a synthetic chlorinated compound that never has been authorized for use in Norway. It is a highly persistent substance with health risks for humans and the environment (UNEP-a, 2007). To our knowledge there has been no production or use of chlordecone in Norway. Chlordecone is a synthetic chlorinated organic compound, which has

mainly been used as an agricultural insecticide, miticide and fungicide. Chlordecone is closely related chemically to mirex, a pesticide which is already listed under the Stockholm Convention.

6.2.2 Alpha, beta- and gamma hexachlorocyclohexane

A-HCH (CAS No 319-84-6) and β-HCH (CAS No 319-85-7) have never been authorized for use in Norway. The use of α-HCH and β-HCH as insecticides was phased out years ago. Lindane was authorized for use in Norway from approximately 1950 and last time it was allowed to sell a product containing lindane in Norway was in 1992. Of the three isomers, lindane is the most powerful for use as a pesticide. It was often employed to treat seeds, leaves, trees, wood and soil. Lindane was also used in the treatment of ectoparasites (external parasites) on cattle and humans, against head lice for example.

Production and use

Lindane has been banned as a pesticide in the Norway since 1995 (Norwegian Food Safety Authority). The use of lindane is regulated by the POP Regulation, (EC) 850/2004 and, production, sale and use of technical HCH and lindane in preparations or as a component of products are been banned throughout the EU (EC/850/2004). The ban is a consequence of adding HCH, including lindane, to the UNECE POP protocol. Lindane is also subject to the Prior Informed Consent procedure under the Rotterdam Convention.

Emission

A-HCH, β-HCH and lindane were not found in fruit or vegetables in Norway or in imported goods or in baby food in 2010 (report from the Norwegian Food Safety Authority "Rester av plantevernmidler i næringsmidler", 2010). The three HCH diastereomers, α-, β- and γ-HCH, were detected in the livers of cod and flounder. HCH in cod and founder liver was 1.4 ng/g (2.4ng/g lipid weight) and 0.8 ng/g wet weight (2.6 ng/g lipid weight), respectively. According to Klifs system for classification of environmental state, these levels can be regarded as background levels (class 1, slightly/negligible polluted) (Report from Klif TA-2821/2012).

Waste

HCH and lindane are treated as hazardous waste in Norway. Since the use of lindane stopped years ago we do not expect any significant amounts of waste. The concentration limit for hazardous waste is set to 50 mg/kg in Product Regulation Chapter 4 Annex 1.

6.2.3 Technical endosulfan and its related isomers

The Conference consider at POPRC6 to list technical endosulfan (CAS No 115-29-7), its related isomers (CAS No 959-98-8 and CAS No 33213-65-9) and endosulfan sulfate (CAS No 1031-07-8) in Annex A to the Convention with specific exemptions. In May 2011, the Stockholm Convention approved the recommendation for elimination of production and use of endosulfan and its isomers.

Endosulfan is an insecticide that has been used since the 1950s to control crop pests, tsetse flies and ectoparasites of cattle and as a wood preservative. As a broad-spectrum insecticide, endosulfan is currently used to control a wide range of pests on a variety of crops including coffee, cotton, rice, sorghum and soy. Endosulfan was used in Norway at least from the 1970-ties and was allowed last sold in 1997. Endosulfan and its related isomers were not found in fruit or vegetables in Norway or in imported goods or in baby food in 2010 (report from the Norwegian Food Safety Authority).

6.2.4 Hexabromobiphenyl (HBB)

Hexabromobiphenyl (CAS No 36355-01-8) is an industrial chemical that has been used as a flame retardant, mainly in the 1970s. According to available information, hexabromobiphenyl is not produced or used in Norway due to restrictions under national and international regulations.

6.2.5 Pentachlorobenzene (PeCB)

Pentachlorobenzene (CAS No 608-93-5) was used in PCB products, in dyestuff carriers, as a fungicide, a flame retardant and as a chemical intermediate e.g. for the production of quintozene. PeCB might still be used as an intermediate. PeCB is also produced unintentionally during combustion, thermal and industrial processes. The production of PeCB ceased some decades ago in the main producer countries as efficient and cost-effective alternatives are available.
PeCB and quintozene have not been registered in the Norwegian Product Register, a register for all chemical products imported or manufactured in quantities of more than 100 kg/year. PeCB has not been authorized as a pesticide in Norway since 1974.

6.2.6 PFOS, its salts and PFOS-F

Perfluorinated substances with long carbon chains, including perfluorooctane sulfonate (PFOS), are both lipid-repellent and water-repellent substances. Therefore, perfluorooctanesulfonate-related substances have been used as surface-active agents in various applications. PFOS can be formed by degradation from a large group of related substances, referred to as PFOS-related substances. The extreme persistence of these substances makes them suitable for high-temperature applications and for applications in contact with strong acids or bases. They are used in a wide variety of applications e.g. in textiles and leather products; metal plating; food packaging; fire-fighting foams; floor polishes; denture cleansers; shampoos; coatings and coating additives; in the photographic and photolithographic industry; and in hydraulic fluids in the aviation industry.

PFOS is toxic after continuous exposure and can have negative effects on reproduction in mammals. PFOS is toxic for aquatic organisms and can cause long-term effects in the aquatic environment. Furthermore, PFOS is persistent and has the ability to bioaccumulate in the food web. PFOS-related substances have been found at high concentrations in the blood of workers exposed to PFOS during production of these substances. PFOS can bind to proteins in the blood and accumulate in the human body especially in the liver and gallbladder. The first actions against PFOS production and use were taken in the United States in the end of the 1990s. 3M, a US company and the major global producer of PFOS until 2003, received increasing pressure from the US Environmental Protection Agency (EPA) in the late ‘90s, and the accumulating evidence of the toxicity of PFOS pushed 3M to announce on May 16, 2000 that it would begin to phase out PFOS production.

Listing under the Stockholm Convention

PFOS is listed in under Annex B of the Convention. PFOS and 96 PFOS-related substances have been identified and were part of the original nomination (Annex 1). Thus, the listing of PFOS includes, but is not limited to the following CAS no.:

Perfluorooctane sulfonic acid (CAS No: 1763-23-1), its salts[a] and perfluorooctane sulfonyl fluoride (CAS No: 307-35-7)

[a] For example: potassium perfluorooctane sulfonate (CAS no. 2795-39-3)
lithium perfluorooctane sulfonate (CAS no. 29457-72-5)

ammonium perfluorooctanesulfonate (CAS no. 29081-56-9)
diethanolammonium perfluorooctane sulfonate (CAS no. 70225-14-8)
tetraethylammonium perfluorooctane sulfonate (CAS no. 56773-42-3)
didecyldimethylammonium perfluorooctane sulfonate (CAS no. 251099-16-8)

Under the Stockholm Convention production and use of PFOS is still allowed for specific use areas (Table 5). A total of 20 acceptable purposes and specific exemptions are given:

Table 5: Overview of acceptable purposes and specific exemptions listed in Annex B of the Stockholm Convention

Acceptable purpose:	Specific exemption:
In accordance with Part III of this Annex for the following acceptable purposes, or as an intermediate in the production of chemicals with the following acceptable purposes: • Photo-imaging • Photo-resist and anti-reflective coatings for semi-conductors • Etching agent for compound semi-conductors and ceramic filters • Aviation hydraulic fluids • Metal plating (hard metal plating) only in closed-loop systems • Certain medical devices (such as ethylene tetrafluoroethylene copolymer (ETFE) layers and radio-opaque ETFE production, in-vitro diagnostic medical devices, and CCD colour filters) • Fire-fighting foam • Insect baits for control of leaf-cutting ants from *Atta spp.* and *Acromyrmex spp.*	For the following specific uses, or as an intermediate in the production of chemicals with the following specific uses: • Photo masks in the semiconductor and liquid crystal display (LCD) industries • Metal plating (hard metal plating) • Metal plating (decorative plating) • Electric and electronic parts for some colour printers and colour copy machines • Insecticides for control of red imported fire ants and termites • Chemically driven oil production • Carpets • Leather and apparel • Textiles and upholstery • Paper and packaging • Coatings and coating additives • Rubber and plastics

Production and use

For PFOS, its salt and PFOS-F there have been no production in Norway. Consumption and use of PFOS and PFOS-related compounds (herein after referred to as PFOS) was virtually halted in 2007, when the ban was introduced. Norway has however, registered for a specific exemption for the use of PFOS (CAS No: 1763-23-1), its salts and PFOS-F (CAS No: 307-35-7) in photo-masks in the semiconductor and liquid crystal display (LCD) industries. Norway has also registered for an acceptable purpose for the use of PFOS in photo-imaging, photo-resist and anti-reflective coatings for semi-conductors, etching agent for compound semi-conductors and ceramic filters, aviation hydraulic fluids, metal plating (hard metal plating) only in closed-loop systems.

PFOS is still used as a defoamer/ mist suppressant in chromium plating in the metal plating industry. The use however is very limited. In the case of fire-fighting foams the phase-out of PFOS was confirmed by a recent survey (January 2012) undertaken by the Climate and Pollution Agency. Though the aim of the survey was to map alternatives to the use of PFOS in open

applications the survey also checked that none of the businesses that answered the distributed questionnaire (about 35% of total) use fire-fighting foam containing PFOS or PFOS related substances. However a number of foams (about 65%) contain other fluorinated substances (and other substances) not listed in the Stockholm Convention. In addition to these imported chemical products PFOS containing articles and products imported to Norway before the ban took effect in 2007 may still be in use. Perfluorinated substances were used in a number of various products and articles ranging from fire fighting foam, impregnated textiles, paper and leather, paints and varnishes, electronics, floor polish to cleaning and degreasing agents.

Emission

Up until the ban, the main use of PFOS in Norway has been in fire-fighting foam known as aqueous film forming foam (AFFF). In 2004, Climate and Pollution Agency did a survey on the inventory of remaining quantities and historic emissions of fire extinguisher foam containing PFOS (TA-2139/2005). The table below shows estimated quantities of PFOS in the remaining foam as well as historic emission. Sectors with no estimates are marked n.e. (no estimate).

Table 6: Estimated quantities of PFOS in remaining foam in 2004 and historical use

Enterprise	Quantities of PFOS in remaining foam, kg	Historic emissions of PFOS, kg
Offshore installations	15 600	54 000
Mobile rigs	400	700
Ships and ferries	400	200
Refineries, onshore gas terminals	2 300	2 300
Petrochemical and other relevant industry	530	< 200
Tank farms	600	< 200
Airports	< 50	n.e.
Armed forces	1 500	n.e
Fire fighting training sites	< 50	n.e.
Fire and rescue brigades	< 50	n.e.
Total	21 500	Min. 57 600

Even if emissions of PFOS and PFOS-related compounds in Norway were more or less stopped in 2007, environmental monitoring and screening conducted by the Climate and Pollution Agency shows that PFOS remains a ubiquitous contaminant of the Norwegian environment and that it can be found in various environmental compartments including, soil, sediment, water and biota.

In 2007 a survey was conducted to investigate whether PFOS-containing fire-fighting foam had contaminated soil around areas where test for fire-fighting were performed. The Climate and Pollution Agency surveyed four selected fire training facilities in Norway, 2 in close proximity to airports, an oil refinery, and a producer of fire-fighting foam. The main focus of this investigation was on influence on the terrestrial environment. Another important aspect of the investigation was to determine how selected organisms in soil and water are influenced by PFOS from fire training facilities. The concentrations of PFOS found in the vicinity of the four fire training facilities show that soils in these areas are severely contaminated. Rough estimations of the total amounts of PFCs in soils around two of the investigated facilities show that 10-40% of PFOS used in aqueous film forming foams may still be present in the soil (these figures are uncertain). This investigation shows that fire training over the years has resulted in quite severe contamination with PFOS, in particular, but also with other PFCs in the environment. High mobility in some soils (sandy soils), high bioaccumulation potential of some PFCs, make these contaminants an environmental risk that should be further assessed (TA-2444/2008). The survey has been followed up with remediation where needed.

The national authorities continue to survey and will set in place measures for the responsible party to investigate and where needed, remediate areas contaminated with PFOS. Avinor is responsible for 46 airports in Norway. In 2011 they initiated a project where they aimed to investigate all test fields for fire-fighting in terms of PFC-contamination. The survey includes soil, ground and surface water reserves in addition to biota sampling. The preliminary results show that PFOS-contamination is found in the soil at almost all test fields for fire-fighting as well as in runoffs distant from the contaminated test field. The permeability of the soil is critical for the spreading of PFOS. The few existing data indicate that in ground and surface water PFOS-contamination could be a significant problem at some sites (Avinor report 168180-1/2011). The investigations will be followed up with risk assessments and remediation where needed.

As highlighted by the above examples, the main source of emission of PFOS in Norway is most likely old PFOS-containing fire-fighting foam which has contaminated the ground at the fire training/ drill sites and may still leak into the environment. The ban of PFOS-containing fire-fighting foam in 2007 was the most important measure to reach the goal of significant reduction in PFOS and PFOS related substances within 2020. It has been important to follow up the ban with surveys on use, substitution and alternatives to PFOS. Remediation of PFOS contaminated ground is underway. Besides fire-fighting foam and contaminated ground at fire training sites other sources to emissions may be articles in use and releases from waste.

Waste

As PFOS is currently still used for specific applications and still exist in products that were placed on the market before the ban was introduced in 2007. PFOS containing articles and products will continue to enter the waste stream for some years, although in presumably lower and decreasing volumes. In Norway PFOS is defined- and treated as hazardous waste and waste that contain 0.5 % by weight or more PFOS shall be treated as hazardous waste (Waste Regulation 11-4, Annex 1 and Annex 3).

Measures

Norway has taken several measures to reduce the emissions and potential environmental and health hazards resulting from exposure to PFOS (Table 9). In 2002 PFOS was put on the national list of Priority Substances which are to be phased out or substantially reduced by 2020. In 2005 an action plan was developed and put into effect. The action plan has since been updated regularly. The most important measure was a general ban on PFOS and PFOS-related substances which was introduced in April 2007. The emission, environmental levels and current use of PFOS is monitored regularly, by environmental monitoring and screening and by conducting targeted surveys and assessments as well as inspections to ensure compliance. Besides the national measures taken, Norway also follows and takes part in various international initiatives aiming to reduce emissions of PFOS by increasing the knowledge on the occurrence, use and environmental/ and health properties of PFOS. Relevant forums include the EU, OECD, AMAP, the Nordic Council of Ministers and OSPAR.

Norway has implemented the EU POPs regulation (EC) No 850/2004 in the Norwegian Product Regulation (Produktforskriften, section 4-1) and implements all later additional EU-regulations

under the EU POPs regulation as part of the EAA-agreement. In this way we implement the requirement for PFOS in the Stockholm Convention.

Work is in progress to list PFOS and its related substances in the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal and the Rotterdam Convention for the prior informed consent.

Table 7: Measures taken by Norwegian authorities to reduce or totally eliminate releases and emissions of PFOS

Measure	Regulation	Comments
Ban of the use of PFOS in various products	EU POPs regulation (EC) No 850/2004	Fire-fighting foams that contain PFOS or PFOS related compounds are prohibited at concentrations at or above 0.001 % by weigh are prohibited and shall be delivered to an approved facility for destruction. PFOS containing fire-fighting foams and PFOS in other applications have been replaced with other alternative products/ chemicals.
Regulation of hazardous waste, combustion, and deposition	Waste Regulations §11-4 Guidance on monitoring of leachate from landfills TA-2077/205	Norway do not allow export of PFOS-containing waste for recycling
Action plan for emission reduction measures List of Priority Substances Assessments, monitoring and screening	National action plan (2008)	PFOS emissions have been reduced PFOS is still a ubiquitous contaminant of the Norwegian environment.

6.2.7 Commercial pentabromodiphenyl ether (penta-BDE) and Commercial octabromodiphenyl ether (octa-BDE)

Polybromodiphenyl ethers (PBDEs) include tetra-, penta-, hexa-, and hepta-BDE congeners inhibit or suppress combustion in organic materials and are therefore used as additive flame retardants in polymers, plastics and textile industries to make them non-flammable. These materials are also used in the casings of electronic and electric equipment, such as printed circuit boards and plastic casings.

Listing under the Stockholm Convention

PentaBDE is included in the Stockholm Convention as tetrabromodiphenyl ether and pentabromodiphenyl ether which refer to:
2.2',4.4'-tetrabromodiphenyl ether (BDE-47 with CAS number 5436-43-1),
2.2',4.4',5'-pentabromodiphenyl ether (BDE-99 with CAS number 60348-60-9) and other tetrabromodiphenyl and pentabromodiphenyl ethers present in commercial pentaBDE (c-penta BDE).

OctaBDE is included in the Stockholm Convention as hexabromodiphenyl ether and heptabromodiphenyl ether, which refer to:
2.2',4.4',5.5'-hexabromodiphenyl ether (BDE-153 with CAS number 68631-49-2),
2.2',4.4',5.6'-hexabromodiphenyl ether (BDE-154 with CAS number 207122-15-4),
2.2',3.3',4.5',6 -heptabromodiphenyl ether (BDE-175 with CAS number 446255-22-7),
2.2',3.4,4',5',6-heptabromodiphenyl ether (BDE-183 with CAS number 207122-16-5) and other hexabromodiphenyl and heptabromodiphenyl ethers present in commercial octaBDE (c-octaBDE).

OctaBDE and pentaBDE are listed under Annex A with a specific exemption for use as articles in accordance with the provisions of respectively part IV and part V of Annex A.

Production and use

Penta- and octaBDE are not produced in Norway. The manufacture, import, export, sale and use of substances, preparations and products that contain 0.1 per cent or more by weight of penta- and octaBDE have been banned in Norway since 2004. However products containing penta- or octaBDE can still be in use.

Emission

PBDEs used as flame retardants are not chemically bound to the products to which they are added, and can therefore gradually leach to the surroundings. Emissions of penta- and octaBDE in Norway are likely to be very low but may nonetheless still occur due to leakage from waste or products in use that were placed on the market before the ban in 2004.

Waste and Recycling

All products containing 0.25 % of pentaBDE or octaBDE are to be treated as hazardous waste. Discarded electronic or electric equipment (EE-products) take part in a return system and all dealers of EE-products have the responsibility of collecting used products and deliver to collection systems. PBDE in electric- and electronic equipment is regulated in the EU WEEE Directive. This directive, as part of the EEA agreement, is implemented in Norway through the Waste Regulations (Avfallsforskriften, chapter 1 and 11). The legal base of the WEEE Directive allows stricter implementation and the Norwegian regulation on EE-waste is wider than this directive. Norway has, for instance, also included EE-waste from industry in the scope of the regulation.

Measures

Norway made an action plan for the brominated flame retardants in 2002 and this plan has been revised twice. A new revision will be prepared in 2012-2013. Norway's national target is for releases and use of priority substances to be continuously reduced with the goal of elimination by 2020. The action plan will give an account of the progress Norway has made in reducing releases and identify areas where further action is needed.

Regulation (EC) No 850/2004 on persistent organic pollutants (POPs) regulates production, use, emission and treatment of waste set out in the Stockholm Convention and ECE POPs-protocol under the Convention on Long-Range Transboundary Air Pollution. Norway has implemented the EU POPs regulation (EC) No 850/2004 in the Norwegian Product Regulation (Produktforskriften, section 4-1) and implements all later additional EU-regulations as part of the EEA-agreement. In this way we implement the requirement for BDEs in the Stockholm Convention.

Penta- and octaBDE is on the list of priority substances in the water management regulations (in Norwegian implementation of the EU Water Framework Directive), and it will therefore be subject for monitoring the occurrence in different environments.

In addition octaBDE (and derivatives) are regulated by the REACH Directive EF 552/2009 Annex XVII, part 45. It states there that octaBDE (and derivatives) may not be sold or used as a substance or in mixtures at a concentration exceeding 0.1% by weight. In addition, items may not be sold if they, or their flame retardant components, contain a concentration of octaBDE exceeding 0.1% by weight.

Electric and electronic equipment (EEE) are covered by the RoHS Directive 2002/95/EC. There has been a ban on the presence of PBDEs in EEE since 1 July 2006 (Directive 2002/95/EC). This regulation is implemented in Norwegian Product Regulation (Produktforskriften, section 2-22).

The IPPC Directive is implemented in Norwegian regulation through the Norwegian Pollution Regulation (Forurensningsforskriften).

In Norway, all major municipal wastewater treatment plant (with pe> 50 000) were required to analyse, among other brominated flame retardants three times per year in both the inlet and outlet water from 2005 (Forurensningsforskriften, chapter 11).

Table 8: Regulations for brominated substances

Substance	Regulation	National regulation
Hexabromobiphenyl (HBB)	POPs Regulation (EC) No 850/2004 of the European Parliament and of the Council of 29 April 2004 on persistent organic pollutants and amending Directive 79/117/EEC.	Product regulations (2008): section 4-1
Commercial mixtures of Penta-BDE Commercial mixtures of Octa-BDE	REACH Commission Regulation (EC) No 552/2009 of 22 June 2009 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) as regards Annex XVII	and REACH regulations (2008) Annex XVII, (part 45)
Polybrominated-BDE (PBDE)	RoHS Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment	Product regulations (2008): section 2-22
Polybrominated-BDE (PBDE)	WEEE Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment	Waste regulations (2005): chapter 1
Hazardous substances	IPPC Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control	Pollution Regulations (2004):
Commercial mixtures of Penta-BDE Commercial mixtures of Octa-BDE	Water Framework Directive 2000/60/EC	Water management regulations (2000)

Substance	Other agreements	National measures
PBDE	OSPAR List of Chemicals of Priority Action	Monitoring programs
Brominated flame retardants		Pollution regulations (2004): chapter 11. Analyses of municipal wastewater in treatment plants

References

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2. Action plan for clean-up of contaminated soil in day cares, Handlingsplan for opprydding i forurenset jord I barnehager (in Norwegian), Klif 2011.
3. Action plan for brominated flame retardants, Handlingsplan for reduksjon av utslipp av bromerte flammehemmere, Klif 2009
4. Action plan for perfluorinated compounds (revised 2008-2009), SFTs arbeid med perfluorerte forbindelser 2008-2009 – revidert, Klif TA-2395/2008
5. Report No. 12 to the Storting, "*Protecting the Riches of the Sea"*, (2001-2002)
6. Report No. 14 to the Storting, "Working together towards a non-toxic environment and a safer future", (2006-2007)
7. Prioriterte miljøgifter: Nasjonale utslipp – status 2009 (in Norwegian), Klif TA-2874/2011
8. Contaminants in fish from Etnefjorden, Norway, Klif TA-2821/2012
9. Kartlegging av PFOS i brannskum, Klif TA-2139/2005
10. Screening of polyfluorinated organic compounds at four fire training facilities in Norway, Klif TA-2444/2008
11. Miljøtekniske grunnundersøkelser ved Avinors lufthavner, Avinor report 168180-1/2011.
12. Rester av plantevernmidler i næringsmidler 2010, Bioforsk – Mattilsynet 2011

Annex 1 PFOS related substances

Ref.-nr.	CAS- nummer	PFOS-relatert forbindelse
1	307-35-7	1-Octanesulphonyl fluoride, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-
2	376-14-7	2-Propenoic acid, 2-methyl-, 2-[ethyl[(heptadecafluorooctyl)sulphonyl]amino]ethyl ester
3	383-07-3	2-Propenoic acid, 2-[butyl[(heptadecafluorooctyl)sulphonyl]amino]ethyl ester
4	423-82-5	2-Propenoic acid, 2-[ethyl[(heptadecafluorooctyl)sulphonyl]amino]ethyl ester
5	423-86-9	1-Octanesulphonamide, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-*N*-2-propenyl-
6	754-91-6	1-Octanesulphonamide, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-
7	1652-63-7	1-Propanaminium, 3-[[(heptadecafluorooctyl)sulphonyl]amino]-*N*,*N*,*N*-trimethyl-, iodide
8	1691-99-2	1-Octanesulphonamide, *N*-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-*N*-(2-hydroxyethyl)-
9	1763-23-1	1-Octanesulphonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-
10	1869-77-8	Glycine, *N*-ethyl-*N*-[(heptadecafluorooctyl)sulphonyl]-, ethyl ester
11	2250-98-8	1-Octanesulphonamide, *N*,*N*',*N*''- [phosphinylidynetris(oxy-2,1-ethanediyl)]tris[*N*-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-
12	2263-09-4	1-Octanesulphonamide, *N*-butyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-*N*-(2-hydroxyethyl)-
13	2795-39-3	1-Octanesulphonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-, potassium salt
14	2991-50-6	Glycine, *N*-ethyl-*N*-[(heptadecafluorooctyl)sulphonyl]-
15	2991-51-7	Glycine, *N*-ethyl-*N*-[(heptadecafluorooctyl)sulphonyl]-, potassium salt
16	3820-83-5	1-Octanesulphonamide, *N*-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-*N*-[2-(phosphonooxy)ethyl]-
17	3871-50-9	Glycine, *N*-ethyl-*N*-[(heptadecafluorooctyl)sulphonyl]-, sodium salt
18	4151-50-2	1-Octanesulphonamide, *N*-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-
19	13417-01-1	1-Octanesulphonamide, *N*-[3-(dimethylamino)propyl]-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-
20	14650-24-9	2-Propenoic acid, 2-methyl-, 2- [[(heptadecafluorooctyl)sulphonyl]methylamino]ethyl ester
21	24448-09-7	1-Octanesulphonamide, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-*N*-(2-hydroxyethyl)-*N*-methyl-
22	24924-36-5	1-Octanesulphonamide, *N*-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-*N*-2-propenyl-
23	25268-77-3	2-Propenoic acid, 2-[[(heptadecafluorooctyl)sulphonyl]methylamino]ethyl ester
24	29081-56-9	1-Octanesulphonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-, ammonium salt
25	29117-08-6	Poly(oxy-1,2-ethanediyl), .alpha.-[2-[ethyl[(heptadecafluorooctyl)sulphonyl]amino]ethyl]-.omega.-hydroxy-
26	29457-72-5	1-Octanesulphonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-, lithium salt
27	30295-51-3	1-Octanesulphonamide, N-[3-(dimethyloxidoamino)propyl]-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-
28	30381-98-7	1-Octanesulphonamide, *N*,*N*'-[phosphinicobis(oxy-2,1-ethanediyl)]bis[*N*-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-, ammonium salt
29	31506-32-8	1-Octanesulphonamide, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-*N*-methyl-
30	38006-74-5	1-Propanaminium, 3-[[(heptadecafluorooctyl)sulphonyl]amino]-*N*,*N*',*N*''-trimethyl-, chloride

Ref.-nr.	CAS- nummer	PFOS-relatert forbindelse
31	50598-29-3	1-Octanesulphonamide, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-*N*-(phenylmethyl)-
32	52550-45-5	Poly(oxy-1,2-ethanediyl), α-[2-[[(heptadecafluorooctyl)sulphonyl]propylamino]ethyl]-ω -hydroxy-
33	56773-42-3	Ethanaminium, *N,N',N''*-triethyl-, salt with 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-1-octanesulphonic acid (1:1)
34	57589-85-2	Benzoic acid, 2,3,4,5-tetrachloro-6-[[[3-[[(heptadecafluorooctyl)sulphonyl]oxy]phenyl]amino]carbonyl]-, monopotassium salt
35	58920-31-3	2-Propenoic acid, 4-[[(heptadecafluorooctyl)sulphonyl]methylamino]butyl ester
36	61577-14-8	2-Propenoic acid, 2-methyl-, 4-[[(heptadecafluorooctyl)sulphonyl]methylamino]butyl ester
37	61660-12-6	1-Octanesulphonamide, *N*-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-*N*-[3-(trimethoxysilyl)propyl]-
38	67939-42-8	1-Octanesulphonamide, *N*-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-*N*-[3-(trichlorosilyl)propyl]-
39	67969-69-1	1-Octanesulphonamide, *N*-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-*N*-[2-(phosphonooxy)ethyl]-, diammonium salt
40	67939-88-2	1-Octanesulphonamide, *N*-[3-(dimethylamino)propyl]-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-, monohydrochloride
41	68081-83-4	Carbamic acid, (4-methyl-1,3-phenylene)bis-, bis[2-[ethyl[(perfluoro-C4-8-alkyl)sulphonyl]amino]ethyl] ester
42	68298-11-3	1-Propanaminium, 3-[[(heptadecafluorooctyl)sulphonyl](3-sulphopropyl)amino]-*N*-(2-hydroxyethyl)-*N,N*-dimethyl-, hydroxide, inner salt
43	68329-56-6	2-Propenoic acid, eicosyl ester, polymer with 2-[[(heptadecafluorooctyl)sulphonyl] methylamino]ethyl 2-propenoate, hexadecyl 2-propenoate, 2-[methyl[(nonafluorobutyl)sulphonyl]amino]ethyl 2-propenoate, 2-[methyl[(pentadecafluoroheptyl)sulphonyl]amino]ethyl 2-propenoate, 2-[methyl[(tridecafluorohexyl)sulphonyl]amino]ethyl 2-propenoate, 2-[methyl[(undecafluoropentyl)sulphonyl]amino]ethyl 2-propenoate and octadecyl 2-propenoate
44	68239-73-6	1-Octanesulphonamide, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-*N*-(4-hydroxybutyl)-*N*-methyl-
45	68310-75-8	1-Propanaminium, 3-[[(heptadecafluorooctyl)sulphonyl]amino]-*N,N',N''*-trimethyl-, iodide, ammonium salt
46	68541-80-0	2-Propenoic acid, polymer with 2-[ethyl[(heptadecafluorooctyl)sulphonyl]amino]ethyl 2-methyl-2-propenoate and octadecyl 2-propenoate
47	68555-90-8	2-Propenoic acid, butyl ester,polymer with 2-[[(heptadecafluorooctyl)sulphonyl]methylamino]ethyl 2-propenoate, 2-[methyl[(nonafluorobutyl)sulphonyl]amino]ethyl 2-propenoate, 2-[methyl[(pentadecafluoroheptyl)sulphonyl]amino]ethyl 2-propenoate, 2-[methyl[(tridecafluorohexyl)sulphonyl]amino]ethyl 2-propenoate and 2-[methyl[(undecafluoropentyl)sulphonyl]amino]ethyl 2-propenoate
48	68555-91-9	2-Propenoic acid, 2-methyl-, 2-[ethyl[(heptadecafluorooctyl)sulphonyl]amino]ethyl ester, polymer with 2-[ethyl[(nonafluorobutyl)sulphonyl]amino] ethyl 2-methyl-2-propenoate, 2-[ethyl[(pentadecafluoroheptyl)sulphonyl]amino]ethyl 2-methyl-2-propenoate, 2-[ethyl[(tridecafluorohexyl)sulphonyl]amino]ethyl 2-methyl-2-propenoate, 2- [ethyl[(undecafluoropentyl)sulphonyl]amino]ethyl 2-methyl-2-propenoate and octadecyl 2-methyl-2-propenoate
49	68555-92-0	2-Propenoic acid, 2-methyl-, 2-[[(heptadecafluorooctyl)sulphonyl]methylamino]ethyl ester, polymer with 2- [methyl[(nonafluorobutyl)sulphonyl]amino]ethyl 2-methyl-2-propenoate, 2- [methyl[(pentadecafluoroheptyl)sulphonyl]amino]ethyl 2-methyl-2-propenoate, 2- [methyl[(tridecafluorohexyl)sulphonyl]amino]ethyl 2-methyl-2-propenoate, 2- [methyl[(undecafluoropentyl)sulphonyl]amino]ethyl 2-methyl-2-propenoate and octadecyl 2-methyl-2-propenoate

Ref.-nr.	CAS- nummer	PFOS-relatert forbindelse
50	68608-14-0	Sulphonamides, C4-8-alkane, perfluoro, *N*-ethyl-*N*-(hydroxyethyl), reaction products with 1,1'-methylenebis[4-isocyanatobenzene]
51	68649-26-3	1-Octanesulphonamide, *N*-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-*N*-(2-hydroxyethyl)-, reaction products with *N*-ethyl-1,1,2,2,3,3,4,4,4-nonafluoro-*N*-(2-hydroxyethyl)-1-butanesulphonamide, *N*-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoro-*N*-(2-hydroxyethyl)- 1-heptanesulphonamide, *N*-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluoro-*N*-(2-hydroxyethyl)-1-hexanesulphonamide, *N*-ethyl-1,1,2,2,3,3,4,4,5,5,5-undecafluoro-*N*-(2-hydroxyethyl)-1-pentanesulphonamide, polymethylenepolyphenyleneisocyanate and stearyl alc.
52	68867-60-7	2-Propenoic acid, 2-[[(heptadecafluorooctyl)sulphonyl]methylamino]ethyl ester, polymer with 2-[methyl[(nonafluorobutyl)sulphonyl]amino]ethyl 2-propenoate, 2-[methyl[(pentadecafluoroheptyl)sulphonyl]amino]ethyl 2-propenoate, 2-[methyl[(tridecafluorohexyl)sulphonyl]amino]ethyl 2-propenoate, 2-[methyl[(undecafluoropentyl)sulphonyl]amino]ethyl 2-propenoate and.alpha.-(1-oxo-2-propenyl)-.omega.-methoxypoly(oxy-1,2-ethanediyl)
53	68877-32-7	2-Propenoic acid, 2-methyl-, 2-[ethyl[(heptadecafluorooctyl)sulphonyl]amino]ethyl ester, polymer with 2-[ethyl[(nonafluorobutyl)sulphonyl]amino]ethyl 2-methyl-2-propenoate, 2-[ethyl[(pentadecafluoroheptyl)sulphonyl]amino]ethyl 2-methyl-2-propenoate, 2-[ethyl[(tridecafluoro-hexyl)sulphonyl]amino]ethyl 2-methyl-2-propenoate, 2-[ethyl[(undecafluoro-pentyl)sulphonyl]amino]ethyl 2-methyl-2-propenoate and 2-methyl-1,3-butadiene
54	68891-96-3	Chromium, diaquatetrachloro[.mu.-[*N*-ethyl-*N*- [(heptadecafluorooctyl)sulphonyl] glycinato-.kappa.O:.kappa.O']]-.mu.-hydroxybis(2-methylpropanol)di-
55	68909-15-9	2-Propenoic acid, eicosyl ester, polymers with branched octylacrylate, 2-[[(heptadecafluorooctyl)sulphonyl]methylamino]ethyl acrylate, 2-[methyl [(nonafluorobutyl)sulphonyl]amino]ethyl acrylate, 2-[methyl[(pentadecafluoroheptyl)sulphonyl]amino]ethyl acrylate, 2-[methyl[(tridecafluorohexyl)sulphonyl]amino]ethyl acrylate, 2-[methyl[(undecafluoropentyl)sulphonyl]amino]ethyl acrylate, polyethylene glycol acrylate Me ether and stearyl acrylate
56	68958-61-2	Poly(oxy-1,2-ethanediyl), .alpha.-[2-[ethyl[(heptadecafluorooctyl)sulphonyl]amino]ethyl]-.omega.-methoxy-
57	70225-14-8	1-Octanesulphonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-, compd. with 2,2'-iminobis[ethanol] (1:1)
58	70776-36-2	2-Propenoic acid, 2-methyl-, octadecyl ester, polymer with 1,1-dichloroethene, 2-[[(heptadecafluorooctyl)sulphonyl]methylamino]ethyl 2-propenoate, *N*-(hydroxymethyl)-2-propenamide, 2-[methyl[(nonafluorobutyl)sulphonyl]amino]ethyl 2-propenoate, 2-[methyl[(pentadecafluoroheptyl)sulphonyl]amino]ethyl 2-propenoate, 2-[methyl[(tridecafluorohexyl)sulphonyl]amino]ethyl 2-propenoate and 2-[methyl[(undecafluoropentyl)sulphonyl]amino]ethyl 2-propenoate
59	71463-78-0	Phosphonic acid, [3-[ethyl[(heptadecafluorooctyl)sulphonyl]amino]propyl]-
60	71463-80-4	Phosphonic acid, [3-[ethyl[(heptadecafluorooctyl)sulphonyl]amino]propyl]-, diethyl ester
61	71487-20-2	2-Propenoic acid, 2-methyl-, methyl ester, polymer with ethenylbenzene, 2-[[(heptadecafluorooctyl)sulphonyl]methylamino]ethyl 2-propenoate, 2-[methyl[(nonafluorobutyl)sulphonyl]amino]ethyl 2-propenoate, 2-[methyl[(pentadecafluoroheptyl)sulphonyl]amino]ethyl 2-propenoate, 2-[methyl[(tridecafluorohexyl)sulphonyl]amino]ethyl 2-propenoate, 2-[methyl[(undecafluoropentyl)sulphonyl]amino]ethyl 2-propenoate and 2-propenoic acid
62	91081-99-1	Sulphonamides, C_{4-8}-alkane, perfluoro, *N*-(hydroxyethyl)-*N*-methyl, reaction products with epichlorohydrin, adipates (esters)
63	92265-81-1	Ethanaminium, *N*,*N*,*N*-trimethyl-2-[(2-methyl-1-oxo-2-propenyl)oxy]-, chloride, polymer with 2-ethoxyethyl 2-propenoate, 2-[[(heptadecafluorooctyl)sulphonyl] methylamino]ethyl 2-propenoate and oxiranylmethyl 2-methyl-2-propenoate

64	94133-90-1	1-Propanesulphonic acid, 3-[[3-(dimethylamino)propyl][(heptadecafluorooctyl) sulphonyl]amino]-2-hydroxy-, monosodium salt
65	94313-84-5	Carbamic acid, [5-[[[2-[[(heptadecafluorooctyl)sulphonyl]methylamino]ethoxy]carbonyl]amino]-2-methylphenyl]-, 9-octadecenyl ester, (Z)-
66	98999-57-6	Sulphonamides, C_{7-8}-alkane, perfluoro, *N*-methyl-*N*-[2-[(1-oxo-2-propenyl)oxy]ethyl], polymers with 2-ethoxyethyl acrylate, glycidyl methacrylate and *N*,*N*,*N*-trimethyl-2-[(2-methyl-1-oxo-2-propenyl)oxy]ethanaminium chloride
67	127133-66-8	2-Propenoic acid, 2-methyl-, polymers with Bu methacrylate, lauryl methacrylate and 2-[methyl[(perfluoro-C_{4-8}-alkyl)sulphonyl]amino]ethyl methacrylate
68	129813-71-4	Sulphonamides, C_{4-8}-alkane, perfluoro, *N*-methyl-*N*-(oxiranylmethyl)
69	148240-78-2	Fatty acids, C_{18}-unsatd., trimers, 2-[[heptadecafluorooctyl)sulphonyl]methylamino]ethyl esters
70	148684-79-1	Sulphonamides, C_{4-8}-alkane, perfluoro, *N*-(hydroxyethyl)-*N*-methyl, reaction products with 1,6-diisocyanatohexane homopolymer and ethylene glycol
71	160901-25-7	Sulphonamides, C_{4-8}-alkane, perfluoro, *N*-ethyl-*N*-(hydroxyethyl), reaction products with 2-ethyl-1-hexanol and polymethylenepolyphenylene isocyanate
72	178094-69-4	1-Octanesulphonamide, *N*-[3-(dimethyloxidoamino)propyl]-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-,potassium salt
73	178535-22-3	Sulphonamides, C_{4-8}-alkane, perfluoro, *N*-ethyl-*N*-(hydroxyethyl)-, polymers with 1,1'-methylenebis[4-isocyanatobenzene] and polymethylenepolyphenylene isocyanate, 2-ethylhexyl esters, Me Et ketone oxime-blocked
74	182700-90-9	1-Octanesulphonamide, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-*N*-methyl-, reaction products with benzene-chlorine-sulphur chloride (S_2Cl_2) reaction products chlorides
75	L-92-0151 (US Pre-manufacture notice)	2-Propenoic acid, 2-methyl-, butyl ester, polymer with 2-[ethyl[(heptadecafluorooctyl)sulphonyl]amino]ethyl 2-methyl-2-propenoate, 2-[ethyl[(nonafluorobutyl)sulphonyl]amino]ethyl 2-methyl-2-propenoate, 2-[ethyl[(pentadecafluoroheptyl)sulphonyl]amino]ethyl 2-methyl-2-propenoate, 2-[ethyl[(tridecafluorohexyl)sulphonyl]amino]ethyl 2-methyl-2-propenoate and 2-propenoic acid
76	P-94-2205 (US Pre-manufacture notice)	Polymethylenepolyphenylene isocyanate and bis(4-NCO-phenyl)methane reaction products with 2-ethyl-1-hexanol, 2-butanone, oxime, *N*-ethyl-*N*-(2- hydroxyethyl)-1-C_4-C_8 perfluoroalkanesulphonamide
77	192662-29-6	Sulphonamides, C_{4-8}-alkane, perfluoro, *N*-[3-(dimethylamino)propyl], reaction products with acrylic acid
78	251099-16-8	1-Decanaminium, *N*-decyl-*N*,*N*-dimethyl-, salt with 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-1-octanesulphonic acid (1:1)
79	306973-46-6	Fatty acids, linseed-oil, dimers, 2-[[(heptadecafluorooctyl)sulphonyl]methylamino]ethyl esters
80	306973-47-7	Sulphonamides, C_{4-8}-alkane, perfluoro, *N*-(hydroxyethyl)-*N*-methyl, reaction products with 12-hydroxystearic acid and 2,4-TDI, ammonium salts
81	306974-19-6	Sulphonamides, C_{4-8}-alkane, perfluoro, *N*-methyl-*N*-[(3-octadecyl-2-oxo-5-oxazolidinyl)methyl]
82	306974-28-7	Siloxanes and Silicones, di-Me, mono[3-[(2-methyl-1-oxo-2-propenyl)oxy]propylgroup] -terminated, polymers with 2-[methyl[(perfluoro-C4-8-alkyl)sulphonyl]amino]ethyl acrylate and stearyl methacrylate
83	306974-45-8	Sulphonic acids, C_{6-8}-alkane, perfluoro, compounds with polyethylene-polypropylene glycol bis(2-aminopropyl) ether
84	306974-63-0	Fatty acids, C_{18}-unsatd.,dimers, 2-[methyl[(perfluoro-C_{4-8}-alkyl)sulphonyl]amino] ethyl esters
85	306975-56-4	Propanoic acid, 3-hydroxy-2- (hydroxymethyl)-2-methyl-, polymer with 2-ethyl-2-(hydroxymethyl)-1,3-propanediol and *N*,*N'*,2-tris(6-isocyanatohexyl)imidodicarbonic diamide, reaction products with *N*-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-*N*-(2-hydroxyethyl)-1-octanesulphonamide and *N*-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoro-*N*-(2-hydroxyethyl)-1-heptanesulphonamide, compounds with triethylamine

86	306975-57-5	Propanoic acid, 3-hydroxy-2-(hydroxymethyl)-2-methyl-, polymer with 1,1'-methylenebis[4- isocyanatobenzene] and 1,2,3-propanetriol, reaction products with *N*-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-*N*-(2-hydroxyethyl)-1-octanesulphonamide and *N*-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoro-*N*-(2-hydroxyethyl)-1-heptanesulphonamide, compounds with morpholine
87	306975-62-2	2-Propenoic acid, 2-methyl-, dodecyl ester, polymers with 2- [methyl[(perfluoro-C_{4-8}-alkyl)sulphonyl]amino]ethyl acrylate and vinylidene chloride
88	306975-84-8	Poly(oxy-1,2-ethanediyl), .alpha.-hydro-.omega.-hydroxy-, polymer with 1,6-diisocyanatohexane, *N*-(hydroxyethyl)-*N*-methyl perfluoro C_{4-8}-alkane sulphonamides-blocked
89	306975-85-9	2-Propenoic acid, 2-methyl-, dodecyl ester, polymers with *N*-(hydroxymethyl)-2-propenamide, 2-[methyl[(perfluoro-C_{4-8}-alkyl)sulphonyl]amino]ethyl methacrylate, stearyl methacrylate and vinylidene chloride
90	306976-25-0	1-Hexadecanaminium, *N*,*N*-dimethyl-*N*-[2-[(2-methyl-1-oxo-2-propenyl)oxy]ethyl]-, bromide, polymers with Bu acrylate, Bu methacrylate and 2-[methyl[(perfluoro-C_{4-8}-alkyl)sulphonyl]amino]ethyl acrylate
91	306976-55-6	2-Propenoic acid, 2-methyl-, 2-methylpropyl ester, polymer with 2,4-diisocyanato-1-methylbenzene, 2-ethyl-2-(hydroxymethyl)-1,3-propanediol and 2-propenoic acid, *N*-ethyl-*N*-(hydroxyethyl)perfluoro-C_{4-8}-alkanesulphonamides-blocked
92	306977-58-2	2-Propenoic acid, 2-methyl-, 3-(trimethoxysilyl)propyl ester, polymers with acrylic acid, 2-[methyl[(perfluoro-C_{4-8}-alkyl)sulphonyl]amino]ethyl acrylate and propylene glycol monoacrylate, hydrolysed, compounds with 2,2'-(methylimino)bis[ethanol]
93	306978-04-1	2-Propenoic acid, butyl ester, polymers with acrylamide, 2-[methyl[(perfluoro-C_{4-8}-alkyl)sulphonyl]amino]ethyl acrylate and vinylidene chloride
94	306978-65-4	Hexane, 1,6-diisocyanato-, homopolymer, *N*-(hydroxyethyl)-*N*-methyl perfluoro-C_{4-8}-alkane sulphonamides- and stearyl alc.-blocked
95	306979-40-8	Poly(oxy-1,2-ethanediyl), .alpha.-[2-(methylamino)ethyl]-.omega.-[(1,1,3,3-tetramethylbutyl)phenoxy]-, *N*-[(perfluoro-C_{4-8}-alkyl)sulphonyl]
96	306980-27-8	Sulphonamides, C_{4-8}-alkane, perfluoro, *N*,*N'*-[1,6-hexanediylbis[(2-oxo-3,5-oxazolidinediyl)methylene]]bis[*N*-methyl-