



NORWEGIAN MINISTRY OF  
THE ENVIRONMENT

Report No. 14 (2006–2007) to the Storting

# Working together towards a non-toxic environment and a safer future

– Norway's chemicals policy





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*Recommendation of 15 December 2006 from the Ministry of the Environment,  
approved by the Council of State on the same date.  
(the Stoltenberg II Government)*

## 1 The Government's policy for a non-toxic environment

The Government's aim is for this white paper to provide a framework that will enable us to work together towards a non-toxic environment and a safer future. Norway will play a leading role in efforts to prevent chemicals from causing injury to health or environmental damage.

Much has been done to reduce the health and environmental risks associated with hazardous substances, but this is not sufficient to deal with the long-term problems. Ecological toxins are accumulating in the environment and in the food we eat. Ecological toxins that are being released today, even the small quantities each of us leaves behind without stopping to think, will create major problems for our children and grandchildren. Thus, they will be a serious threat to the health of later generations, the environment and future food supplies. The potential consequences are so serious that we must maintain a high level of ambition.

People are already suffering both acute and chronic injury to health as a result of exposure to hazardous substances, and the release of these substances can also cause environmental damage. Several hundred thousand employees in Norway are exposed to harmful chemicals at work; such substances may be causal factors in disease. Con-

sumers are also exposed to hazardous substances via the products they buy, and can for example develop serious allergies. The Government will minimise the risks to both health and the environment from releases of and exposure to all types of dangerous chemicals. Generation of the various types of hazardous waste is also to be reduced. Norway's chemicals policy and the action that is to be taken are intended to ensure a high level of protection for consumers and employees, against exposure via the environment, and for the environment. The precautionary principle will be applied when information on the risks to health and the environment is uncertain.

Norway will call for and play a leading role in ensuring stricter international regulation of hazardous substances. Norway will also play a leading role in proposing more substances for inclusion in international agreements that prohibit or strictly regulate the use of ecological toxins. More specifically, the Government will ensure that proposals are made for regulation of two new substances, endosulfan and hexabromocyclododecane (HBCDD). Norway will also work actively towards a new global instrument to eliminate releases of mercury and other heavy metals. Hazardous sub-

stances will be a priority area of development cooperation policy.

Norway will also advocate a high level of protection for health and the environment in the development of the new EU chemicals legislation REACH (Registration, Evaluation and Authorisation of Chemicals). 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.

Although we are aware of the impacts some chemicals may have on health and the environment, our knowledge of most substances is very limited. In order to choose alternatives that have the least negative impact on health and the environment, we all need information on which substances and options are least harmful to our health and environmentally favourable. The Government intends to develop a knowledge-based management regime for chemicals, and will therefore support a substantial increase in research on and monitoring of ecological toxins and other hazardous substances. In the High North we have a unique opportunity to monitor global trends, and the Government will give special priority to surveys and monitoring of ecological toxins in this area.

A large proportion of wealth creation and production in Norway is dependent on a clean environment. Moreover, a clean environment is an essential basis for the production of clean food in Norway. 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. In future, economic activity in Norway should as far possible take place without releases of ecological toxins, and as a general rule all such releases are to be eliminated by 2020.

In future, all the products we use should be safe both for our health and for the environment. It will therefore be necessary to find alternatives to hazardous substances. The Government will prohibit a number of the most dangerous substances, particularly in consumer products. These may include mercury, perfluorooctyl sulphonate (PFOS), brominated flame retardants and several other substances. The Government wishes more information to be provided on hazardous substances so that we can all protect ourselves, other people and the environment by choosing to buy products with a low content of hazardous substances.



Figure 1.1

Photo: Marianne Otterdahl-Jensen

As a general rule, ecological toxins are to be taken out of circulation, and materials containing ecological toxins should not be recycled or reused. Steps will be taken to prevent pollution that has previously been released into soil or water from spreading further or being taken up by plants, animals or people. To this end, the Government will implement new action plans to deal with contaminated sediments and with contaminated soil in day care centres and playgrounds. Various types of waste and residual products that contain ecological toxins must be managed soundly, and ecological toxins are to be taken out of circulation and removed from product life cycles.

The Government intends to ensure that health and environmental concerns are integrated into the management regime for chemicals in the best possible way. Inspection and enforcement measures must be extensive enough to be a good tool for ensuring compliance with the legislation. Compliance with all new legislation within the sphere of responsibility of the environmental authorities will be controlled within two years of its entry into force. There must be a real risk of incurring sanc-

tions in cases of non-compliance. The Government will strengthen inspection and enforcement of the legislation, among other things to reduce releases of pollutants and reduce the number of products on the market that do not comply with the legislation. This will give greater assurance of health, environmental and consumer safety, and in addition raise awareness of the legislation and provide greater equality before the law.

The Government is inviting everyone, whether as managers, as employees or as private individuals, to join in the efforts to deal with the major challenges we are facing as regards chemicals. Together we can achieve a great deal, but we will not make progress unless every one of us makes a contribution. Environmental protection takes time – but it works.

## 2 Problems associated with hazardous substances

### 2.1 About chemicals

#### *Everything is made of chemicals*

Chemical substances are the building blocks of our world, and are constituents of everything we surround ourselves with. Chemicals include elements and chemical compounds, which contain atoms of different elements joined by chemical bonds. Ordinary table salt, for example, is a chemical compound of the elements sodium and chlorine. Chemical substances can also be mixed together without reacting chemically with each other, and such mixtures are called preparations. The term chemicals includes elements, chemical compounds and preparations, regardless of whether they occur naturally or are deliberately manufactured or formed as unintentional by-products. Thus, chemicals include substances that are useful and others that are not, hazardous and harmless substances, and natural and man-made substances.

This white paper does not deal with radioactive substances.

#### *Most chemicals are useful*

Chemicals and trade in chemicals make an essential contribution to our welfare and to better products and services for society as whole. Thus, chemicals provide many public goods, and we should be

able to reap the benefits of their use. The use of dangerous substances too is often needed for wealth creation. The risks associated with using a particular chemical must therefore be weighed against the benefits derived from it, and against the risks associated with alternative substances. Even though most chemicals are useful, the use of certain substances can involve unacceptable risks for health and the environment.

#### *Some substances are hazardous to health and the environment*

Chemicals that may be dangerous to health and the environment are called hazardous substances. Their properties vary: they may be acutely toxic, corrosive, irritating to skin, sensitising or explosive. Carcinogenic, reprotoxic and mutagenic substances are considered to be most hazardous to health. Some hazardous substances are persistent (not easily broken down in the environment) and bioaccumulative (accumulate in food chains and in the human body). They are the substances that are most dangerous for the environment, and may also be very hazardous to health. They are categorised as ecological toxins (see 2.3).

People and the environment are exposed to hazardous substances through releases from production processes, in the working environment, during the use of products and from waste. This



Figure 2.1 Chemicals are found both in finished products and in solid and liquid substances and preparations

Photo: Norwegian Pollution Control Authority and Scanpix

### Box 2.1 From Silent Spring to ecological toxins



Figure 2.2 A cloud of DDT being sprayed over a beach in New York in 1945

Photo: UPI/Bettmann, National Geographic

It is more than 40 years since ecological toxins first made the headlines. In 1962, Rachel Carson published *Silent Spring*, which focused on the effects of the pesticide dichlorodiphenyltrichloroethane, or DDT. At the time, its use was considered to be acceptable in Norway as well. Rachel Carson produced evidence of how DDT became concentrated along food chains and gave rise to serious

problems, for example by disrupting reproduction in birds. Until then, DDT had been seen as highly effective in the fight against insect pests. Other substances whose use increased after the Second World War were polychlorinated biphenyls (PCBs) and mercury compounds. The scientific evidence presented in the 1960s and 1970s led to the establishment of international agreements to prevent releases of such substances. One of the earliest was the 1972 Oslo Convention, which addressed dumping of waste in the North-East Atlantic. A later example is the 2001 Stockholm Convention on Persistent Organic Pollutants, which is a global agreement.

During the 1980s, comprehensive systems were introduced to control industrial emissions, and releases of substances such as PCBs and dioxins have subsequently been dramatically reduced. Certain substances, such as PCBs, have been totally banned. Lead in petrol has been phased out.

Thus, long-term efforts make it possible to protect our health and the environment against ecological toxins. But it has often taken many years to stop the use of such substances.

may entail risks to the health of the general population, the labour force, animals and other living organisms.

Injury to health and environmental damage can also be caused by accidents involving chemicals (industrial spills, accidents during transport of dangerous chemicals by road, rail or sea, fires, and accidents in the workplace and at home) and by abuse of chemicals (inhalants, intoxicants).

The scope of work on chemicals has traditionally been wider in the context of the working environment than in the context of the environment, since people may be exposed to such a wide range of chemicals in different working environments. In addition to those categorised as ecological toxins, they often include reactive compounds that readily break down in the environment and thus do not constitute an environmental threat or a health risk for the population as a whole, although they may pose a health risk for workers.

### Box 2.2 Hazard and risk

Chemicals differ from each other in their intrinsic properties, for example their water and fat solubility, and the ways in which they are hazardous to health and the environment. For example, a substance may trigger allergy, be carcinogenic, or be toxic to aquatic animals and plants. Thus, the *hazards* a substance represents are related to its intrinsic properties. If people or animals are exposed to hazardous substances, they may be exposed to a *risk*, depending on the degree of exposure. Thus, whether a substance poses a risk depends not only on its hazardous properties but also on how much is released and the degree of exposure.

The risk of environmental damage or injury to health caused by chemicals is related to the level of exposure, see box 2.2. It is usually neither possible nor desirable to avoid the use of hazardous substances entirely, but it is important to keep the level of exposure low enough to be safe. This of course requires sufficient knowledge to determine safe levels of exposure. The fact that a substance is found in the environment or in people does not in itself mean that it constitutes a risk to health or the environment. The fact that many substances are being more and more widely detected in people and animals, on the other hand, is an indication that they are spreading to the environment and being taken up by living organisms, although the increasing sensitivity of analytical techniques may also be a partial explanation.

## 2.2 Hazardous substances can cause irreversible damage

Hazardous substances can cause various forms of irreversible long-term damage. Since 1999, the Norwegian Medical Birth Registry has registered the number of new-born boys with undescended testicles. The number is rising, and one hypothesis is that endocrine disruptors may be one of several causes of this birth defect.

The incidence of certain types of cancer that are hormone-dependent (testicular cancer and breast cancer) is rising. Some of the cancer types whose incidence has risen most from 1953–57 to

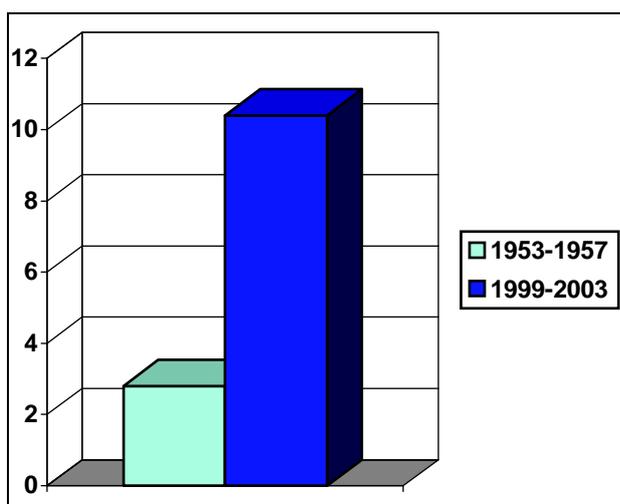


Figure 2.3 Testicular cancer in Norway (annual average of age-adjusted incidence rates per 100 000 persons)

Source: Norwegian Pollution Control Authority

### Box 2.3 Endocrine disruptors

Endocrine disruptors are chemicals that can disturb hormonal regulation in humans and animals and have adverse effects on health. These may include fetal damage, a decline in reproductive capacity, immune dysfunction or a rise in the number of cases of certain forms of cancer. Examples of industrial chemicals that may act as endocrine disruptors are PCBs, DDT, tributyl tin compounds (TBT), nonyl- and octylphenol and bisphenol A.

In the 1960s, there was a decline in the reproductive rate of seals in the Baltic Sea and North Sea, which is believed to have been related to contamination with PCBs. Studies showed a high rate of miscarriages, uterine damage and many sterile females. More recently, the levels of PCB contamination have been reduced, and the seal populations have been recovering.

There are no clearly established links between disruption of the hormonal system and exposure to chemicals in humans, but it has been suggested that for example reduced sperm quality, reproductive disorders and the increasing frequency of testicular cancer can be related to exposure to chemicals.

1999–2003 are testicular cancer (270 %), see figure 2.3, prostate cancer (219 %) and breast cancer (102 %). Norway is now the country with the highest prevalence of testicular cancer. Exposure to hazardous substances, including endocrine disruptors, is one of many suspected causal factors behind the increase in the incidence of cancer. For example, fetal exposure may be involved in the development of testicular cancer.

Allergies are a growing health problem: anyone who becomes allergic to nickel, for example, remains allergic for the rest of their life.

Reduced fertility has been documented in seals, birds and polar bears as a result of exposure to PCBs, and disruption of the development of reproductive organs and reproductive dysfunction in the dogwhelk has been shown to be a result of leaching of organotin substances from anti-fouling systems used on boats.

### 2.3 Ecological toxins are the greatest long-term threat

The greatest global threats from chemicals are posed by ecological toxins. Norway categorises hazardous chemicals as ecological toxins if they are persistent (do not break down easily) and bio-accumulative (build up in food chains and the environment). Once such substances enter a food chain, they can be transferred from one stage to the next. Thus, their use and release gradually contaminate soil, air, water, people and animals.

Ecological toxins include organic pollutants such as PCBs, certain metals such as mercury, chromium and lead, and also substances with endocrine disrupting properties.

All children born today have several hundred anthropogenic substances in their blood. These pass from mother to child during pregnancy, and children are further exposed to ecological toxins through breast milk. The presence of these substances does not represent an immediate risk, and breast milk is healthy in other ways. Nevertheless, ecological toxins can reduce children's opportunities for leading full and active lives. For example, a clear link has been shown between exposure of children to high levels of mercury and lead and their intellectual capacity and ability to learn. However, the levels measured in Norwegian children are below those that have been shown to have negative effects, and levels of known ecological toxins in breast milk have decreased in recent years. On the other hand, substances that have recently been recognised as ecological toxins have been detected, for example brominated flame retardants and PFOS.

Ecological toxins bioaccumulate in food chains. Thus, even small releases can over time result in such high concentrations that they represent an unmanageable risk and have adverse effects on



Figure 2.4 Children are exposed to ecological toxins via breast milk

Photo: Marianne Otterdahl-Jensen

people and animals. This makes it difficult to determine the levels of releases of ecological toxins that represent an acceptable risk. Nonetheless, it is possible to determine safe levels of human exposure for most known ecological toxins. Thus, it should be possible to prevent adverse effects caused by the intake of these substances by thorough control programmes for food.

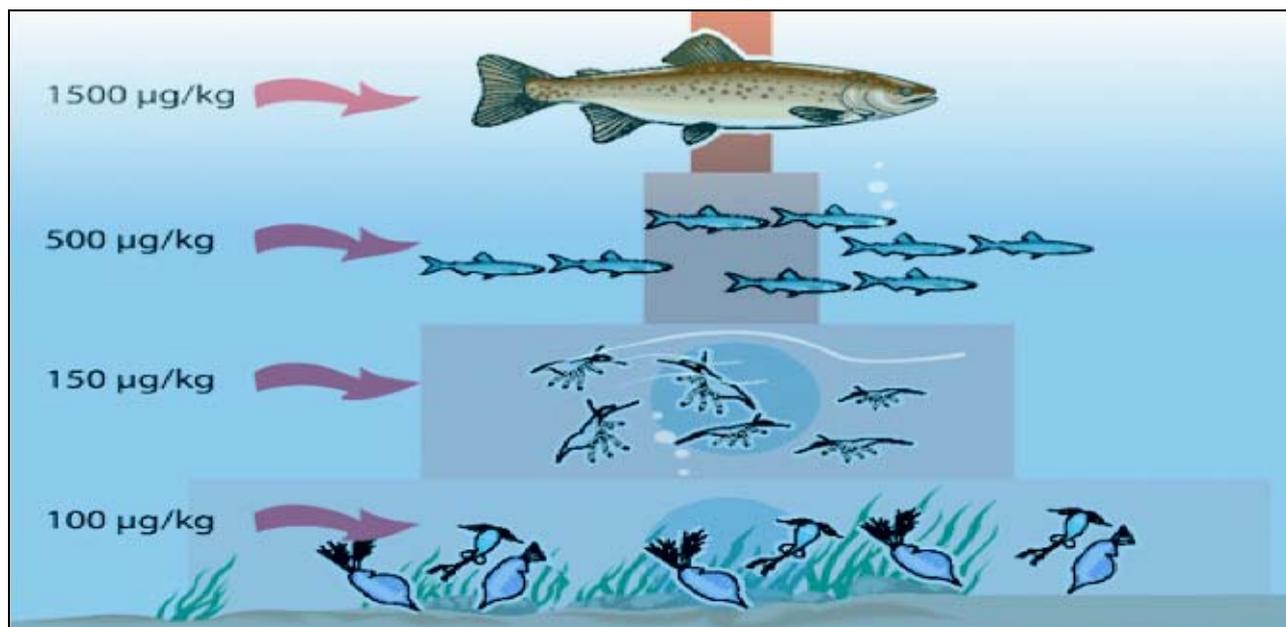
Once ecological toxins have entered the environment, it takes many years to reduce pollution levels again. Even though it is 30 years since the PCBs were prohibited, pollution levels in Norway and the Arctic are still substantial, and are only

#### Box 2.4 Children and adolescents at greatest risk

An EU project called the Policy Interpretation Network on Children's Health and Environment (PINCHE) has demonstrated that children are often particularly susceptible to environmental factors, including ecological toxins. Neurotoxicants (substances that are toxic to the nervous system) are among the greatest threats to Norwegian children.

#### Box 2.5 Pollution in the Arctic

Two thorough assessments by the Arctic Monitoring and Assessment Programme (AMAP) have documented high levels of persistent organic pollutants (POPs) and heavy metals in Arctic, which originate from industrial areas further south. AMAP's reports show a number of impacts on humans and animals.



Figur 2.5 Accumulation of organic mercury compounds in the food chain

Source: Norwegian Pollution Control Authority and Norwegian Institute for Water Research

dropping slowly. The presence of PCBs is also one of the reasons why the food safety authorities have advised people to limit their intake of fish and shellfish caught in 31 harbours and fjords in Norway.

In addition, people throughout the country are advised to limit their intake of large specimens of freshwater fish such as pike, trout and perch, because they are contaminated with mercury as a result of long-range transport to Norway and earlier releases of mercury in Norway.

## 2.4 Pollution does not stop at national borders

Ecological toxins can be transported over long distances from the source of pollution by air and ocean currents. Many developing countries and the growing economies in Asia use large quantities of ecological toxins. In developing countries, the use of hazardous substances is still causing serious local damage, and failure to control pollution is hindering growth and development and also having a global impact. Concentrations of ecological toxins are generally highest near sites where they are released, but even areas far away from the most important sources can be affected. Norway and the Arctic receive considerable inputs of long-range transboundary pollution, in addition to pollution

from the Arctic countries themselves. The Arctic is particularly vulnerable to long-range transport of ecological toxins because of the dominant air and ocean currents.

The main sources of releases of hazardous substances used to be industrial production processes. Today, releases from products are more important.

The world's chemical industry is growing, and it is one of the largest sectors in the global economy. Hazardous substances are also spread more widely through international trade in products. Most products used in Norway are imported from other countries. In many cases, importers and distributors know too little about the chemical content and possible adverse effects of their products. This applies for example to textiles containing brominated flame retardants and perfluorinated substances, and electronic products containing heavy metals and brominated flame retardants.

### Box 2.6 Mercury reaches the Arctic from Asia

Mercury releases from coal-fired power plants in Asia are the largest source of mercury deposition in the Arctic.

## 2.5 Serious gaps in our knowledge of chemicals

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We still lack basic knowledge of the health and environmental hazards associated with most substances. This makes it impossible to evaluate how great a risk they pose to health and the environment. We know even less about what impacts they are having on the natural environment, particularly about the long-term impacts of contamination of food chains by ecological toxins. In many cases, we also lack information on how substances are converted into degradation products in the environment.

### Box 2.7 Recently recognised ecological toxins

There can be a long delay between the first use of a substance and the realisation that it is dangerous to health and the environment. Perfluorooctyl sulphonate (PFOS) and perfluorooctanoic acid (PFOA) were used for a long time before it was understood that they are ecological toxins. PFOS is reprotoxic and shows no signs of biodegradation in the environment. In recent years, environmental monitoring has revealed that these substances are now present in food chains, and they have also been found in the Arctic, for example in polar bears.

### 3 Goals and principles of Norway's chemicals policy

Much has been done to reduce the health and environmental risks associated with hazardous substances, but this is not sufficient to deal with the long-term problems. Ecological toxins are accumulating in the environment and in the food we eat. Ecological toxins that are being released today, even the small quantities each of us leaves behind without stopping to think, will create major problems for our children and grandchildren. Thus, they will be a serious threat to the health of later generations, the environment and future food supplies. The potential consequences are so serious that we must maintain ambitious targets.

Hazardous substances are causing both acute and chronic injury to health and environmental damage today. Several hundred thousand employees in Norway are exposed to harmful chemicals at work, and these may be causal factors in disease. Consumers are also exposed to hazardous substances via the products they buy, and can for example develop serious allergies. The Government will minimise the risks to both health and the environment from releases of and exposure to all types of dangerous chemicals. Norway's chemicals policy and the action that is to be taken are intended to ensure a high level of protection for consumers and employees, against exposure via the environment, and for the environment.

The Government will

- appoint a committee to draw up proposals for how releases of ecological toxins can be eliminated by 2020
- determine which substances are covered by the target of eliminating emissions by 2020
- eliminate the use and releases of five recently recognised ecological toxins
- introduce the target of reducing generation of each type of hazardous waste by 2020 compared with the 2005 level.

#### 3.1 Important principles of Norway's chemicals policy

The 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. They also provide important guidelines for business and other actors.

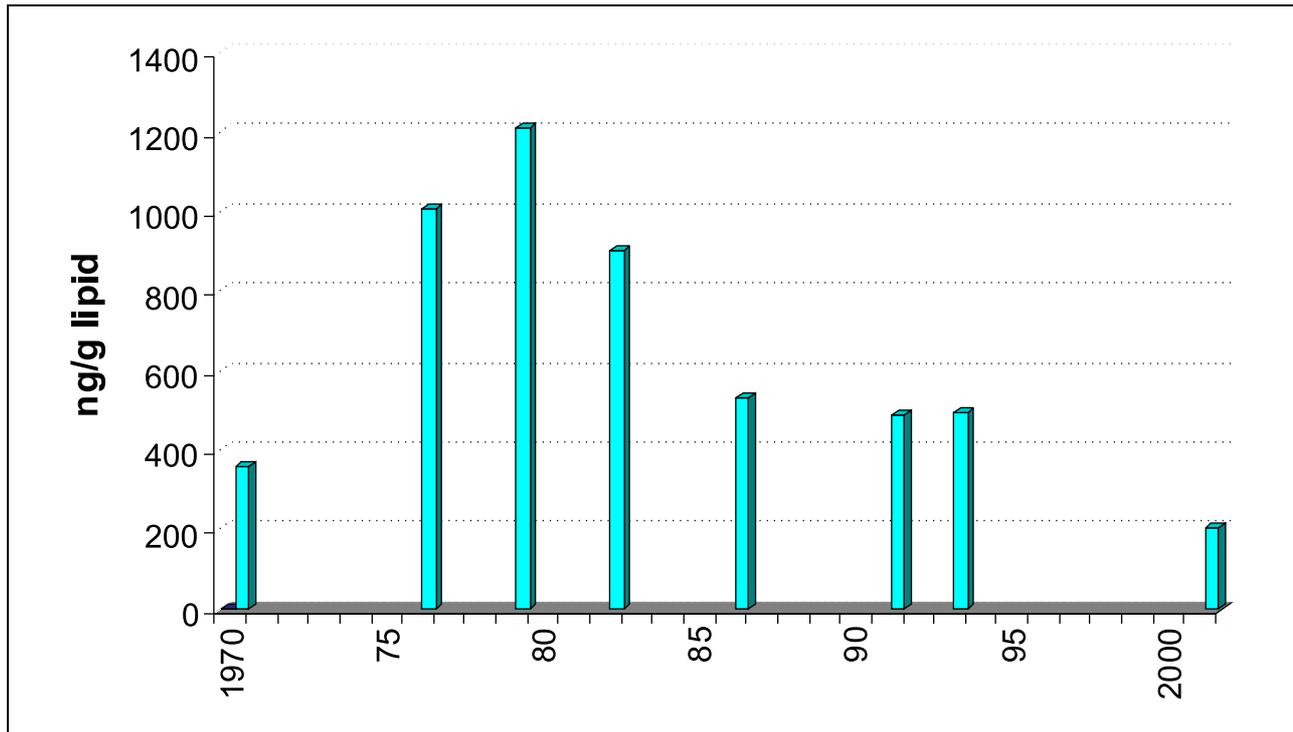
##### *Precautionary principle*

The Government will apply the precautionary principle, which means that if a threat related to haz-

#### **Box 3.1 Releases of ecological toxins reduced, but problems still exist**

Policies designed to eliminate the use of ecological toxins have given results. Exposure to known ecological toxins is lower than it used to be. Levels of contamination are lower than in the 1970s, both in the environment and in people. For example, the PCB levels measured in breast milk in Norway in the 1990s were much lower than in the late 1970s and early 1980s, see figure 3.1. Dioxin and mercury emissions from industrial sources have been greatly reduced. The offshore petroleum industry was a major source of pollution until the mid-1990s, but has since made deep cuts in its releases of chemicals.

However, ecological toxins are still being released from industrial processes and waste management, and as consumption rises, there are growing numbers of products in circulation. These may contain ecological toxins and other hazardous substances. The international trade regime limits how much individual countries can do by prohibiting products if this is not done through international cooperation.



Figur 3.1 PCBs in human breast milk in Norway in the period 1970–2002

Source: Norwegian Institute of Public Health

ardous substances is identified during efforts to achieve the goals of chemicals policy, steps must be taken to address this even in the absence of full scientific certainty.

Regulatory measures to reduce or eliminate the use and releases of hazardous substances are based on existing knowledge of their hazardous properties and their possible short- and long-term effects. This knowledge is considered in the context of the standards society has set for the protection of health and the environment. However, the knowledge we have is frequently uncertain. When a specific threat to health or the environment from chemicals is identified, the precautionary principle calls for action to be taken to reduce or eliminate this threat, even if there are uncertainties in the knowledge base. Thus, application of the precautionary principle does not mean that scientific facts are ignored, nor that we fail to make scientific risk assessments. On the contrary, it provides a guideline for the situations where we lack full scientific certainty. Since there is often uncertainty about the risks associated with chemicals, the precautionary principle is particularly relevant in chemicals policy.

#### *Risk management in the workplace*

If uncertainty about the level of occupational risk is high, this should normally give grounds for following a precautionary approach. This may for example meaning the use of conservative evaluations and estimates, such as requirements for barriers and robust solutions, or the application of principles such as reducing risk so that it is as low as reasonably practicable (ALARP). If there is insufficient information about what effects a preventive measure may have, the legislation requires further steps to be taken to avoid possible adverse effects.

#### **Box 3.2 The precautionary principle and the ozone layer**

The Montreal Protocol on Substances that Deplete the Ozone Layer was adopted in 1987 to phase out the use of ozone-depleting substances. At this stage, there was still a high degree of scientific uncertainty surrounding the causes of depletion of the ozone layer. In retrospect, adoption of the Protocol has turned out to be a crucial step in meeting the threats to the ozone layer promptly.

### *Substitution principle*

The Government considers the substitution principle to be a particularly important principle of chemicals policy. The Government expects users of hazardous substances to replace these with alternatives that entail less risk, and that use of the most dangerous substances will as a general rule be discontinued if less hazardous alternatives are available.

Application of the substitution principle means that users of hazardous substances are required to replace dangerous chemicals with other substances that represent less risk to health and the environment, including health at work.

Applying the substitution principle thus helps to support the process of taking new substances and innovative processes into use once they are commercially available. In most cases, a measure introduced to reduce impacts on health, the working environment or the external environment will also have positive effects on the other areas. Nevertheless, there may be cases where it is necessary to weigh effects in different areas against each other.

### *Polluter-pays principle*

One of the fundamental principles of the Government's chemicals policy is that the costs of pollution, including clean-up costs, must be borne by those who are responsible for the pollution.

Thus, the health and environmental costs of the use and releases of hazardous substances must be met by those responsible, so that they bear the full costs of production and marketing of the products involved. It is also important that health and environmental costs are reflected in prices, so that consumers can take them into account when deciding which products to buy.

#### **Box 3.3 Late action results in high costs**

A Nordic report, *Cost of Late Action – the Case of PCB*, estimates that the costs for the EU 25 of remediation of contaminated soil, sediments, etc contaminated with PCBs will be EUR 15–75 billion in the period 1971–2018. The study confirms that substantial environmental benefits can be achieved by preventing chemical pollution, and that society incurs large costs by postponing environmental measures.

### *Prevention is better than remediation*

The Government intends to prevent releases of hazardous substances rather than remediating damage, so that we can avoid costly clean-up operations in future. The costs of preventing damage are often moderate compared with those of remediation. This is particularly obvious in the case of ecological toxins, which are very difficult and costly to remove from the environment once they have been released. Preventive measures can do a great deal to reduce or avoid loss of life and injury to health, for example if releases of inflammable or toxic gases are prevented.

### *Emergency response system for acute pollution*

The Government intends to ensure that there is an effective and adequate emergency response system for spills of dangerous chemicals. The emergency response system is based on the a combination of resources provided by industrial enterprises themselves and a public-sector emergency response system. It is important to maintain continual efforts to optimise the system in order to minimise the impacts of any accidents on life, health and the environment.

### *Life-cycle approach*

The Government's position is that legislation and measures relating to chemicals at different stages of their life cycles should provide support for the efforts to achieve the goals laid down for hazardous substances.

The life-cycle approach means that the entire life cycle is taken into account when the impacts of a product on health and the environment are evaluated. This means that all phases of a product's life cycle must be evaluated, from raw material extraction, through manufacture, use, transport, and to the end of its life when it has been discarded as waste.

### *Right to know*

In the Government's view, everyone should be able to find information on which hazardous substances products contain, which chemicals employees are exposed to and what is released to the environment during production processes. The public is entitled to access to information on the effects that the use of chemicals and releases from production processes and products may have on health and the environment. Internationally, the right to environ-

mental information is set out in the Aarhus Convention. In Norway, people's rights in this field have been extended and strengthened through the Environmental Information Act. The Norwegian Constitution also lays down a right to environmental information. In Norway, people's right to receive information applies vis-à-vis both public authorities and public and private undertakings. The principle that people have a right to know is also set out in the Product Control Act, the Fire and Explosion Prevention Act and the regulations relating to major accident hazards.

#### Responsibility of the business sector

The Government intends to give business and industry the responsibility for documenting that products that are placed on the market only contain chemicals that are safe for health and the environment. The business sector is to be responsible for documenting that products are safe for health and the environment, and must also take steps to ensure this if it becomes apparent that products, including those discarded as waste, may pose a threat to health and the environment.

### 3.2 Goals for hazardous substances

The strategic long-term objective for Norway's chemicals policy is as follows: *Emissions and use of hazardous chemicals will not cause injury to health, harm ecosystems, or damage the productivity of the natural environment and its capacity for self-renewal. Concentrations of the most hazardous chemicals in the environment will be reduced towards background values for naturally occurring substances and close to zero concentrations for man-made synthetic substances.* This is a very ambitious goal,

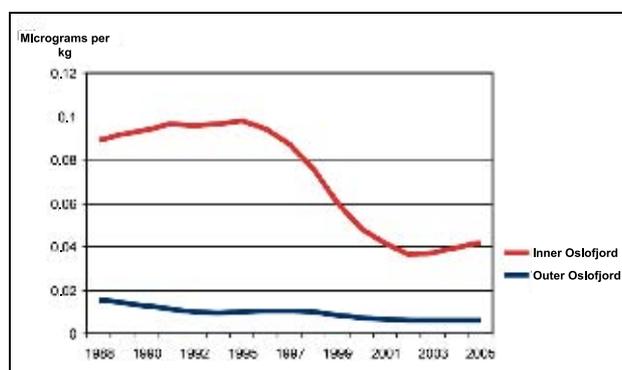


Figure 3.2 PCB concentrations in mussels from the Oslofjord

Source: Norwegian Pollution Control Authority

given that ecological toxins can persist in the environment for decades or centuries after they are released: see figure 3.2, which shows concentrations of PCBs in mussels. In the Government's view, this level of ambition is necessary because the long-term threat is so serious.

The Government has proposed a minor amendment to the strategic objective, which now includes the phrase «harm ecosystems». This is also understood to include harm to elements of ecosystems, such as individual species.

#### Target of eliminating or reducing releases of ecological toxins

Because ecological toxins accumulate in the environment, even small releases can involve an unacceptable health and environmental risk. It is therefore difficult to estimate critical loads for the environment and to find «acceptable» levels of releases of these substances. The Government's approach is instead to seek to avoid the unmanageable risk that the use and releases of ecological toxins involve. This is reflected in the national target of continually reducing releases and use of substances that pose a serious threat to health or the environment with a view to eliminating them within one generation (by the year 2020). However, some ecological toxins can be formed unintentionally during various processes, and emissions of these substances cannot be completely eliminated. In such cases, the target is to eliminate releases as much as possible. As a first step towards eliminating releases by 2020, the Government has previously adopted the target of eliminating or substantially reducing releases of priority ecological toxins at the latest by 2010. The list of substances to which this target applies is known as the Government's priority list.

The exact scope of this target, i.e. which substances it applies to, has not previously been specified. It has now decided the substances whose releases are to be eliminated within one generation are those that are included on the priority list. Thus, both targets have the same scope, which will help to reinforce efforts to achieve them and make it clear that efforts to reduce releases of the priority ecological toxins are only the first step towards complete elimination of these releases by 2020.

One complicating factor in eliminating releases of the most hazardous substances within one generation is a lack of information on the properties of most substances, both chemicals that are already on the market and new substances that are being produced in various parts of the world. Some of

### Box 3.4 National targets for hazardous substances

#### National targets:

1. Releases of certain ecological toxins (see the priority list in figure 3.4 and the criteria in box 3.5) will be eliminated or substantially reduced by 2000, 2005 or 2010.
2. Releases and use of substances that pose a serious threat to health or the environment will be continuously reduced with a view to eliminating them within one generation (by the year 2020).
3. The risk that releases and use of chemicals will cause injury to health or environmental damage will be minimised.
4. The dispersal of ecological toxins from contaminated soil will be stopped or substantially reduced. Steps to reduce the dispersal of other hazardous substances will be taken on the basis of case-by-case risk assessments.
5. Contamination of sediments with substances that are hazardous to health or the environment will not give rise to serious pollution problems.

these and their degradation products may prove to be ecological toxins, so that the target should apply to them as well. To ensure that action is taken when substances are recognised as ecological toxins, it is important that the Government has clear criteria for identifying ecological toxins that should come within the scope of the target.

Box 3.5 shows the criteria for identifying substances whose use is to be phased out by 2020. The Government has proposed an adjustment of the criteria that have been used until now. If ecological toxins are found in the environment, it will be sufficient that the levels give rise to concern; it will not be necessary to document a risk to health and the environment. This change is in accordance with the precautionary principle, and will make it possible to include substances as priority ecological toxins at an early stage.

The target of eliminating releases of ecological toxins by 2020 is a very ambitious one. This is not something the environmental authorities can achieve without efforts by all sectors and organisations that are involved. In order to ensure the par-

### Box 3.5 Criteria for identifying priority ecological toxins whose releases are to be substantially reduced by 2010 and eliminated by 2020

1. Substances that are persistent and bioaccumulative, and that either
  - a) have serious long-term health effects, or
  - b) show high ecotoxicity
2. Substances that are very persistent and very bioaccumulative (no requirement for known toxic effects)
3. Substances found in the food chain in levels that give rise to an equivalent level of concern
4. Other substances that give rise to an equivalent level of concern, such as endocrine disruptors and heavy metals.

ticipation of as many actors as possible, the Government will appoint a committee with representatives from a range of NGOs and other stakeholders to draw up proposals for ways of achieving the target.

The Government's list of priority ecological toxins includes 25 specific substances and groups of substances whose releases are to be eliminated or substantially reduced within specified time limits. The term substantial reductions means that releases are to be reduced by 50–90 % from 1995 levels. The time limits are for interim targets, since the use and releases of ecological toxins are to be phased out by 2020 in accordance with the main target. Figure 3.3 shows projected trends in overall releases of all the substances on the priority list.

Figure 3.4 shows the latest emission figures for priority ecological toxins, reductions achieved by 2004 and projected reductions up to 2010. Green background shading indicates that the projected releases are in accordance with the target, yellow that it is uncertain whether the target will be achieved, and red that it will not be achieved unless further measures are introduced.

Substantial reductions in emissions have already been achieved for about half the priority ecological toxins, and once planned measures have been implemented, the target of substantial reductions will be achieved for most of the substances on the list. Reductions have mainly been achieved by introducing strict emission limits for industry, reg-

ulating products and introducing requirements for waste management. The Government will follow trends in emissions of these substances closely to ensure that they do not increase. The most important elements in this work will be implementation of planned measures, control measures and participation in international efforts to restrict the use of these substances.

However, a number of problems remain to be solved. The projections for arsenic, brominated flame retardants, copper, chromium, musk xylenes and PAHs indicate that further measures must be introduced to achieve the required cuts in emissions. Use in products is the most important source of emissions of arsenic, brominated flame retardants, copper and musk xylenes. The most important sources of PAHs are manufacturing, fuelwood use and road traffic. Measures to achieve the targets for these substances are discussed in Chapters 7 and 9.

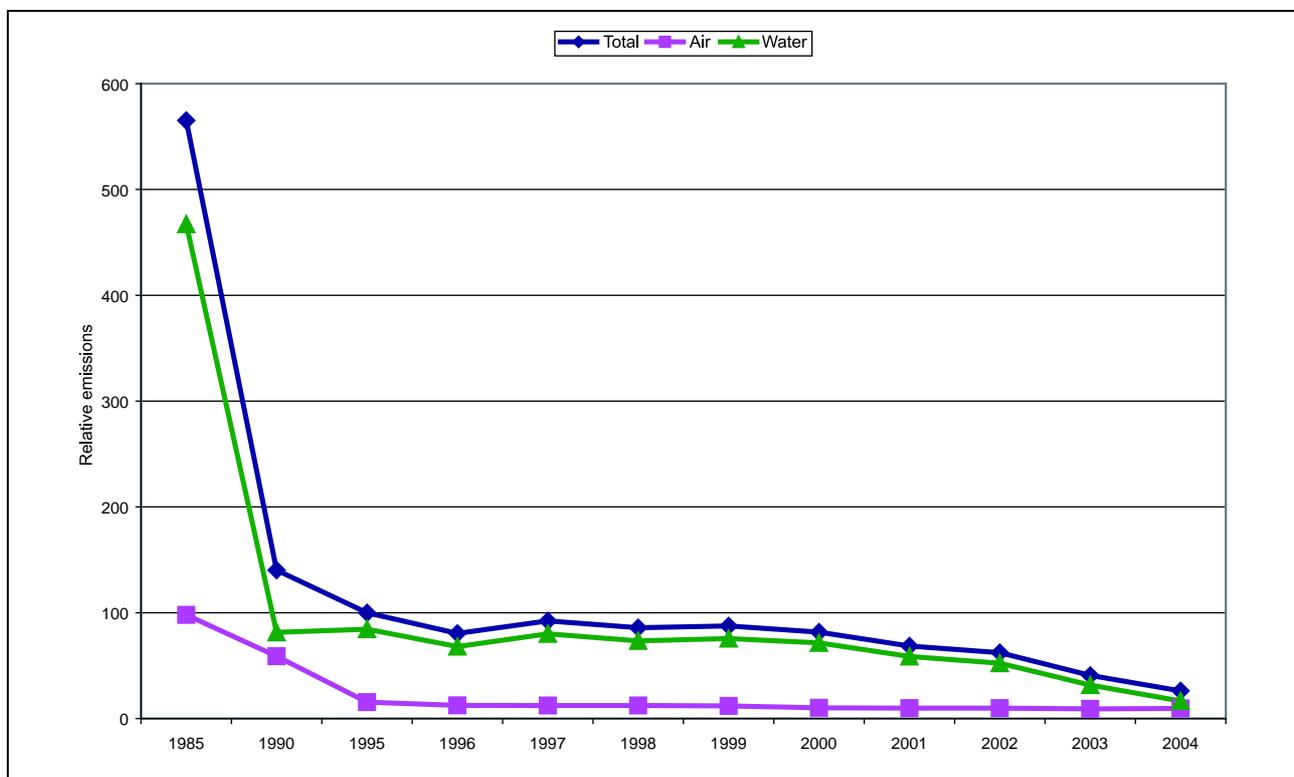
The environmental authorities will keep the question of which substances meet the criteria for ecological toxins and therefore should be included in the scope of the targets for this group under continual review. New scientific information and

changes in patterns of use may make it appropriate to include new substances or remove others from the list.

On the basis of new information and the criteria set out in box 3.5, the Norwegian Pollution Control Authority has identified five new ecological toxins. The Government therefore proposes that the target of eliminating releases within one generation should also apply to the following substances, and that they should be included on the priority list with a view to substantially reducing releases by 2010.

#### *Perfluorooctanoic acid (PFOA)*

PFOA has been detected in increasing concentrations in animals, for example polar bears. It has also been detected in low concentrations in human blood. PFOA breaks down very slowly in the environment, and elimination from the human body is very slow. Animal studies indicate that PFOA is reprotoxic. Our knowledge of the main sources of PFOA contamination of the environment is inadequate.



Figur 3.3 Index for releases of substances on the priority list. Each substance is weighted according to how dangerous it is for health and the environment. Total releases in 1995=100

Source: Norwegian Pollution Control Authority

Substance/Group	Releases 2005* (tonnes)	Reduction 1995–2004 (%)	Projected reduction (%)
<b>Releases to be eliminated by 2005</b>			<b>1995–2005</b>
Short chain chlorinated paraffins	0	96	100
Nonyl- and octylphenol and their ethoxylates	11	93	99
Pentachlorophenol	0	100	100
Certain surfactants (DTDMAC, DSDMAC, DHTMAC)	2	82	90
Polychlorinated biphenyls (PCBs)*	202	48	60
<b>Releases to be substantially reduced by 2010</b>			<b>1995–2010</b>
Arsenic (As)	31	8	30–40
Lead (Pb)	457	24	60–90
Brominated flame retardants**	Ca. 2	Large rise	Unknown
Diethylhexyl phthalate (DEHP)	Ca. 3	Ca. 80–90	Ca. 80–90
1,2-Dichloroethane (EDC)	5	86	Ca. 80
Dioxins (in g TEQ)	35	53	55–60
Hexachlorobenzene	Ca. 0.001	Ca. 99	Ca. 99
Cadmium (Cd)	1	71	65–70
Chlorinated alkyl benzenes (CABs)	0,02	75	Ca. 75
Medium chain chlorinated paraffins	3	80	>80
Copper (Cu)***	663	13	25-35
Chromium (Cr)	61	39	40–50
Mercury (Hg)	1,0	56	Ca. 60
Musk xylenes	1	44	Ca. 50
Perfluorooctyl sulphonate (PFOS)-related substances	22	Unknown	100
Polycyclic aromatic hydrocarbons (PAHs)	166	4	10–30
Tetrachloroethene (PER)	23	94	>90
Tributyl tin compounds (TBT)	0	100	100
Trichlorobenzene (TCB)	0,003	86	Ca. 70–90
Trichloroethene (TRI)	58	91	Ca. 90

Figur 3.4 Ecological toxins whose releases are to be eliminated or substantially reduced by 2000, 2005 or 2010

\* quantity in standing buildings for PCBs

\*\* consumption of brominated flame retardants

\*\*\* releases from brake blocks and ammunition not included

Source: Norwegian Pollution Control Authority

### *2,4,6 tri-tert-butylphenol*

This substance is persistent, very bioaccumulative and toxic to aquatic organisms. No data are available on its presence in the environment. It is used among other things as a lubricating agent.

### *Dodecylphenol and isomers*

This substance is persistent, bioaccumulative and very toxic to aquatic organisms. No data are available on its presence in the environment. It is used among other things as a lubricating agent and in varnishes.

### *Bisphenol A*

Bisphenol A has been detected in sludge, sediments and fish from lake Mjøsa, the Drammenselva river and inner parts of the Drammensfjord, and in sediments, mussels and cod liver from sites along the Norwegian coast.

This substance is not very persistent or bioaccumulative, but is a known endocrine disruptor. It has been shown to act as an endocrine disruptor in fish and snails, and there is concern that it may affect human reproductive capacity. Areas of use include plastic products, paints, glues and electrical and electronic equipment.

### *Decamethylcyclopentasiloxane (D5)*

D5 has been detected in the atmosphere, sewage sludge, sediments and biota. It binds to particulate matter and is highly volatile, with a high potential for long-range environmental transport. It is persistent in water and sediments and is bioaccumulative. It is a suspected carcinogen.

Areas of use for D5 include cleaning products, paints, varnishes and sealing compounds.

### *Target of reducing the risks associated with other hazardous substances*

The target for hazardous substances generally is a substantial reduction of the risk that releases and use of chemicals will cause injury to health or environmental damage. This means that risk reduction measures will be introduced where unacceptable risks are identified. This target applies to most hazardous substances. The level of risk depends on how dangerous a substance is, the quantities that are used and released and the level of exposure of people and animals.

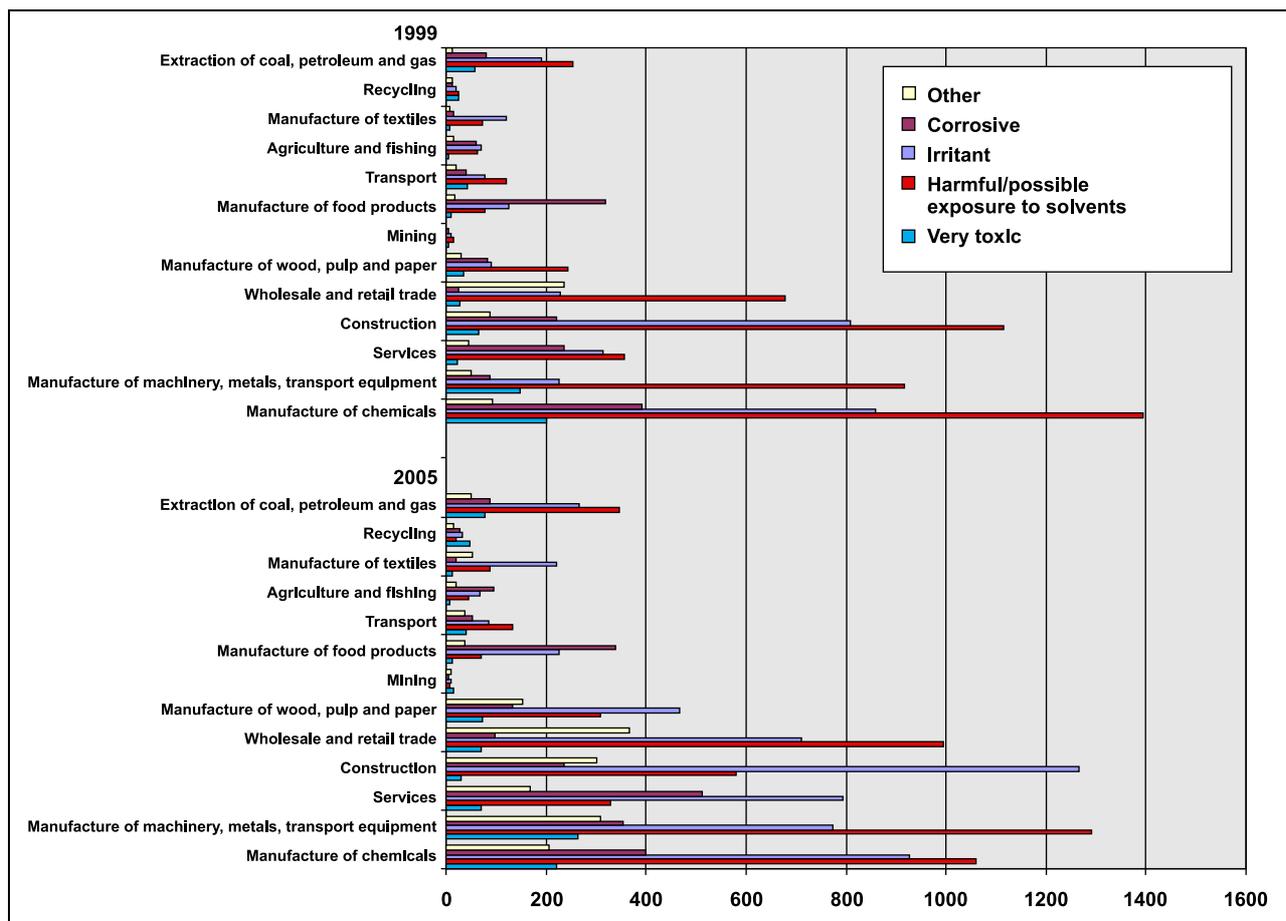
There is no precise measure of the overall level of risk from the use and releases of hazardous substances. However, the number of products in use that contain hazardous substances does give an indication of the risk. Figures from the Product Register, see figure 3.5, show that the number of such products rose from 1999 to 2005. The Government wishes to gain a better picture of the risk by taking account of volumes used and not merely the number of hazardous substances. The aim is to develop an overall risk indicator that reflects progress towards the target directly by showing trends in a way that is clear and easy to understand, and at the same time giving more detailed information on the branches of industry and product groups where hazardous substances are used.

The Government has proposed raising the level of ambition for this target, so that the target is now to *minimise* the risk of injury to health or environmental damage, rather than to reduce it substantially. This is because even if the level of risk is reduced, it may still be too high if the use and releases of hazardous substances continue to result in unacceptable injury to health or environmental damage. The change also brings the target in line with the global goal of minimising adverse effects on human health and the environment from the use and production of chemicals by 2020, which was adopted at the World Summit for Sustainable Development in Johannesburg in 2002.

### *Target for clean-up of contaminated soil*

The target for efforts to clean up soil that is already contaminated by ecological toxins is to stop or substantially reduce the dispersal of ecological toxins from such areas. Steps to reduce the dispersal of other hazardous substances will be taken on the basis of case-by-case risk assessments. Dispersal of hazardous substances means both runoff to surrounding areas and exposure of people, animals and plants in or growing on contaminated areas.

Clean-up operations have been completed at the 100 most heavily polluted sites in Norway, and the status of the roughly 500 sites in the next category has been clarified. Nevertheless, there are still several thousand sites with contaminated soil in Norway. These must be surveyed and identified, information on them must be made easily accessible to the general public, and where necessary, follow-up action must be taken. Children are particularly vulnerable to contaminated soil, and an action plan for clean-up operations in day care centres and playgrounds where the soil is contaminated is presented in Chapter 10.3.3.



Figur 3.5 Number of products containing hazardous substances declared to the Product Register in 1999 and 2005, split by branch of industry and danger category.

Source: Norwegian Pollution Control Authority

#### Target for clean-up of contaminated sediments

The Government is continuing to pursue the target that contamination of sediments with substances that are hazardous to health or the environment should not give rise to serious pollution problems.

Earlier releases of hazardous substances can be a threat to marine animals and plants. A national committee for contaminated sediments was appointed by the Ministry of the Environment in 2003, and presented a report with its recommendations in June 2006. Pilot projects, research and monitoring programmes have been carried out to increase our knowledge. Proposals for programmes of measures have been drawn up for the 17 most heavily polluted harbours and fjords all round the coast from Hammerfest to the Oslofjord.

The Government's action plan for contaminated sediments is presented in Chapter 10.2.

#### National target for hazardous waste

Hazardous waste contains substances that are hazardous to health and the environment, and is a source of releases of such chemicals. Because more and more products contain hazardous substances, the quantity of hazardous waste generated is also rising. Currently, Norway generates almost 1 million tonnes of hazardous waste a year. Most of it is dealt with in an environmentally sound manner, but there is still no information available on disposal or treatment for almost 60 000 tonnes of this waste. Some of this may be disposed of in ways that cause environmental damage.

The current national target is that practically all hazardous waste is to be dealt with in an appropriate way, so that it is either recycled or sufficient treatment capacity is provided within Norway. The Government considers that this does not sufficiently reflect the problems related to hazardous waste, and therefore proposes that the target should instead be to reduce generation of each

type of hazardous waste by 2020 compared with the 2005 level. Nevertheless, the Government's efforts to identify new types of priority hazardous waste may result in a rise in the recorded figures for generation of hazardous waste in the short term.

#### *The general zero-discharge target for the petroleum sector*

The general target is that there should be no discharges of environmentally-hazardous substances from petroleum activities. Because of the special problems related to discharges to marine waters, the level of ambition has been high, and this has been instrumental in the development of a high level of protection in the oil and gas sector. There have been substantial reductions in discharges of environmentally hazardous substances in recent years, and further reductions are expected. Discharges of environmentally hazardous substances in connection with production have been reduced by 85 % from 2000 to 2004.

The Government has introduced stricter requirements relating to discharges in the Barents Sea. According to these, operators are required to

achieve zero discharges to the sea from petroleum activities during normal operations. The exceptions to this are that drill cuttings from the top-hole section may be discharged, and that up to 5 per cent of the annual volume of produced water may be discharged during operational deviations. The Government considers it to be very important to maintain these requirements.

#### *Goals for the working environment*

Better knowledge, a stronger regulatory framework and better organisation of workplaces have made it possible to reduce worker exposure to harmful chemicals considerably. Nevertheless, exposure to chemicals is still one of the individual factors that makes the largest contribution to occupational injury and illness and work-related deaths. Figures from Statistics Norway's surveys of living conditions suggest that about 13 % of the workforce, or about 310 000 employees, are exposed to chemicals in the form of dust, gas or vapour for a large proportion (more than 50 %) of working hours, while about 7 % of the workforce, or about 170 000 employees, are exposed to substances that are irritating to the skin for a large proportion of their working hours. Estimates from the Norwegian Labour Inspection Authority indicate that about 3 % of absence due to illness in Norway is a result of exposure to chemicals. Thus, the use of hazardous substances in workplaces is an important cause of exclusion from the labour market.

The Government's goal is to prevent exposure to hazardous substances at work and in the workplace from causing illness or injury. To this end, the Government will

- take steps to obtain better information on occupational exposure to chemicals in Norway
- encourage greater awareness of health, safety and environment issues by requiring better risk management in industry and through inspection activities, campaigns directed towards particular target groups, and information
- promote a continued research effort in the field of occupational exposure to chemicals and its health effects, both on the continental shelf and in land-based workplaces
- pursue the goal of making the Norwegian petroleum industry a world leader and pioneer in the field of health, safety and the environment.



Figure 3.6 Sediments in many fjords and harbours are contaminated with ecological toxins

Photo: Marianne Otterdahl-Jensen

*Goals for reduction of the risks associated with the use of pesticides*

The agricultural and food safety authorities in Norway have for many years been working actively to reduce the use of pesticides and the risks associated with their use. The action plan for the period 1998–2002 to reduce the risks associated with the use of pesticides was evaluated in 2003. On the basis of an overall assessment of the effects of the measures set out in the action plan, it was concluded that the level of risk to both health and the environment was reduced by at least 25 % during this period. Despite this positive trend, further improvement is needed and possible. Several of the measures in the action plan are long term, and need to be continued to maintain their effects. An updated action plan was therefore adopted for the period 2004–08. It sets out goals and measures for the use of pesticides.

The action plan lays down the following goals:

- to make Norwegian agriculture less dependent on chemical pesticides
- to reduce the risk of damage to health and the environment associated with the use of pesticides by 25 % in the period 2004–08, which would give a total reduction of 50 % in the period 1998–2008.
  - levels of pesticides in food and drinking water are to be minimised and not exceed limit values
  - pesticides should not be present in groundwater and levels should not exceed limit values for drinking water
  - levels of pesticides in streams and surface water are to be minimised and not exceed values that might result in environmental damage.

## 4 A world where there is less risk from chemicals

Norway will call for and play a leading role in ensuring stricter international regulation of hazardous substances. The Government would like to see global prohibitions against the use of more of the substances it considers to be ecological toxins and will propose new substances for inclusion in appropriate international agreements. Norway will work actively towards a legally binding global instrument to reduce releases of mercury and other heavy metals. Hazardous substances will be a priority area of development cooperation policy, and efforts in this field will gradually be expanded.

The Government will

- work towards a global instrument that strictly regulates the use and releases of mercury and other heavy metals, and help to finance the international negotiations on such an instrument
- work towards strict regulation of more substances under the international agreements on persistent organic pollutants (POPs). This includes global regulation of endosulfan and hexabromocyclododecane (HBCDD)
- work towards stricter emission limits on POPs and heavy metals in the ECE area in connection with the revision of the protocols under the Convention on Long-Range Transboundary Air Pollution (LRTAP Convention)
- play a part in obtaining more information on the Arctic as a barometer of global chemical pollution and in using this knowledge actively to achieve stricter regulation of substances categorised as ecological toxins, for example by documenting their presence in the Arctic, the sources of pollution, and its effects
- play a part in making the Strategic Approach to International Chemicals Management (SAICM) an effective tool for minimising the global harmful effects of dangerous chemicals by 2020
- play a leading role in the development and adoption of a new convention on ship recycling under IMO, with a view to providing a sound international framework to reduce the use of hazardous chemicals in the construction of ships and on board ships and to ensure that hazardous waste is dealt with appropriately



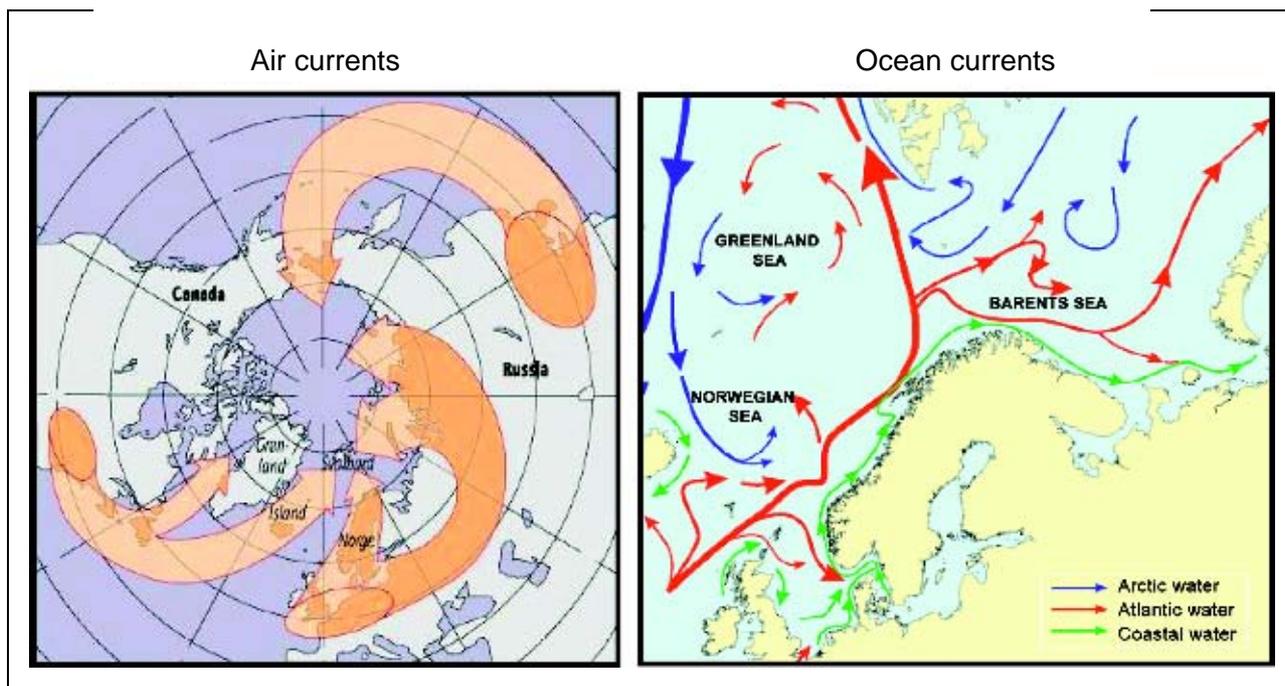
Figure 4.1 Long-range transboundary pollution affects top predators like these killer whales

Photo: John Stenersen

- work towards the introduction of the Globally Harmonized System of Classification and Labelling of Chemicals at the earliest possible date both in Norway and in other countries
- give priority to and increase funding for work on hazardous substances in development cooperation, both multilaterally and bilaterally, and assist developing countries in building up sufficient capacity to deal with dangerous chemicals and hazardous waste.

### 4.1 Dangerous chemicals are a global problem

Pollution does not stop at national borders. Air and ocean currents transport ecological toxins across borders and over long distances, particularly towards the Arctic, see figure 4.2. As a result, the pollution load is heavier in the Arctic than would be expected given its remoteness from population centres and more heavily polluted areas. This particularly affects animals at the top of food chains, the top predators such as polar bears, glaucous gulls and killer whales. Population groups whose diet includes a substantial proportion of marine mammals and seabirds are also vulnerable. There is good documentation that the Arctic is polluted



Figur 4.2 Air and ocean currents transport ecological toxins towards the Arctic

Source: Norwegian Institute for Air Research and Institute of Marine Research

by both POPs and heavy metals. And pollutants are transported far afield. For example, mercury inputs to the Norwegian environment from sources outside Norway are more than twice as high as total Norwegian releases. The proportion of long-range pollution is even higher for heavy metals such as lead and cadmium. It is thus clear that releases of these substances can only be eliminated by means of international solutions.

At present, the OECD countries account for about 75 per cent of global chemical production. Global production is expected to increase, and the OECD's share is projected to drop to 63 per cent by 2030. This means that more chemical production will be taking place in developing countries, where pollution control is less effective.

International trade in products also involves the transport of hazardous substances, so that releases of these substances may occur far away from the production site, when products are used or discarded as waste. Imports account for a large proportion of the products used in Norway. Relatively few products are produced in Norway or specifically for the Norwegian market. The international trade regime limits how much individual countries can restrict or prohibit products, making international regulation even more important.

The world community has recognised that the use and release of hazardous substances is not in accordance with sustainable development. The UN

summit in Johannesburg in 2002 therefore adopted a new goal of minimising adverse effects on human health and the environment from the use and production of chemicals by 2020.

## 4.2 New international solutions and initiatives

A number of international agreements on dangerous chemicals and hazardous waste have been adopted to deal with these global problems. The Government considers it important to ensure that these agreements reinforce each other. Norway is therefore advocating closer cooperation between the international agreements on dangerous chemicals (POPs and heavy metals) and on hazardous waste. In addition, the Government will work towards stricter global regulation of the most dangerous chemicals.

### *New global agreement on mercury?*

In the Government's view, strict global controls should be introduced on the use and releases of mercury. A number of substances are already prohibited under the global Stockholm Convention, but this only applies to persistent organic pollutants, not to metals. The Government will therefore work towards a legally binding global instrument

**Box 4.1 Children and fetuses particularly susceptible to mercury exposure**

Studies on the Faroe Islands have showed that a high dietary intake of mercury can cause fetal damage. Whale meat, which contains high levels of organic mercury compounds (methylmercury), is a normal part of the diet on the Faroe Islands, and some children were found to have learning difficulties related to damage to the nervous system. This is interpreted as being a result of exposure of fetuses to high levels of mercury.

Studies in the US have shown that one in six women of childbearing age have blood mercury levels that are high enough to cause adverse effects on fetal development.

**Box 4.2 Sheila Watt-Cloutier and her fight against POPs**

Levels of several POPs and mercury are very high in the Inuit people of Canada, Greenland and Russia. High levels of these pollutants have been found in the blood of pregnant women and in breast milk. Pollution levels in the mother's blood are a good indication of the fetal exposure, and levels in breast milk give a clear indication of exposure after birth.

Sheila Watt-Cloutier has been chair of the Inuit Circumpolar Conference (ICC) for several years. Her work focuses particularly on the special problems that long-range transport of POPs and other pollutants and climate change are causing for Arctic indigenous peoples. She received the Sophie Prize for environment and sustainable development in 2005 in recognition of her work.

on mercury. This should allow for the inclusion of other substances such as lead and cadmium, on the pattern of the Stockholm Convention. On Norway's initiative, Nordic cooperation has been established to continue work on this.

Mercury is an extremely dangerous pollutant and currently represents a threat to the environment and human health both in Norway and globally. The nervous system of fetuses and children is particularly vulnerable to mercury damage, see box 4.1. Mercury is an element and therefore not degradable. Organic mercury compounds, which form when mercury has been released into the environment, accumulate in food chains and end up on our own plates, particularly in fish. In Norway, nationwide advisories to limit the consumption of large predatory freshwater fish have been issued because of high levels of mercury. Mercury is as serious a global problem as the most dangerous POPs such as PCBs, dioxins and brominated flame retardants. The mercury pollution load in the Arctic is increasing as a result of long-range transport, and now poses a threat to health and the environment.

*Global efforts to phase out more POPs and heavy metals*

The Government is working towards expansion of the scope of the Stockholm Convention, so that more substances are covered by a global prohibi-

tion. Norway has already proposed that the Convention and the POPs Protocol under the LRTAP Convention should include one brominated flame retardant (penta-BDE) on their lists of banned substances. Very high levels of penta-BDE have been found in some samples, including fish from Lake Mjøsa in Norway. Norway will also ensure that proposals are made for the inclusion of endosulfan and HBCDD in the Convention. Endosulfan is a widely used pesticide and causes serious injuries to health in developing countries. HBCDD is a brominated flame retardant that is widely used in industrial products throughout the world, among other things in textiles and electronic products. Analyses of seabird eggs from North Norway have shown that seabirds have been exposed to rising quantities of these substances in the past 20 years. In 2006, Nordic cooperation was established on Norway's initiative to draw up proposals for the inclusion of further substances in these agreements.

In the Government's view, the provisions of the POPs and Heavy Metals Protocols under the LRTAP Convention should be made more stringent. More product groups should be regulated under the Heavy Metals Protocol, particularly products containing mercury.

### *A global strategy for dealing with dangerous chemicals*

It is unlikely that the problems associated with the use and releases of dangerous chemicals could be dealt with through measures in the environmental sector alone. Efforts will also be required in other sectors, for example, the health, working environment, development cooperation and agricultural sectors. The development of the Strategic Approach to International Chemicals Management (SAICM) and its adoption in February 2006 is part of an integrated approach to dealing with these problems. The Government will play a part in making the SAICM become an effective overall framework for activities to improve control of the use of dangerous chemicals internationally. Norway was one of the countries that took the initiative for

development of the strategy, and has contributed funding to the process through a bilateral agreement with the United Nations Environment Programme (UNEP). In addition, Norway has provided substantial funding to support activities in developing countries, see section 4.3.

### *A new convention on ship recycling*

At present, 90 per cent of all ship breaking takes place in countries in Asia, and the market is dominated by India, Bangladesh, Pakistan and China. Ships that are to be scrapped often contain hazardous waste, including dangerous POPs such as PCBs, heavy metals, TBT (an anti-fouling agent) and asbestos. At present, there are inadequate controls on these chemicals during the ship breaking process. The Government will therefore work

#### **Box 4.3 The most important international agreements on chemicals**

##### *Stockholm Convention on Persistent Organic Pollutants*

The Stockholm Convention is the most important agreement regulating POPs at global level. The Nordic countries played a leading role in its establishment. More than 130 countries have ratified the convention since it was signed in 2001, including large, important countries like India and China, see figure 4.3. It currently applies to the 12 substances and groups of substances that are considered to be most dangerous, including PCBs, DDT and dioxins. It prohibits continued use of most of these substances.

##### *Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade*

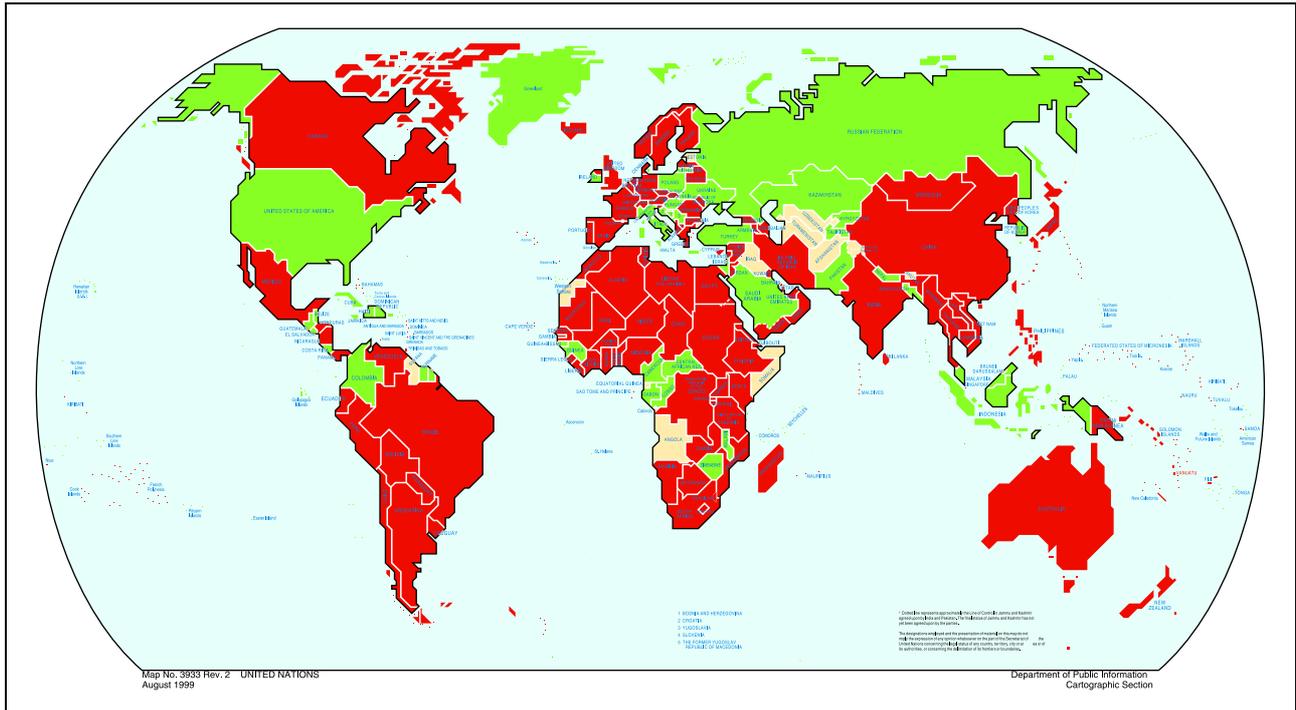
This convention was established to prevent chemical products that have been banned in industrialised countries from being dumped in developing countries. Developing countries must give prior consent to the import of dangerous substances, which are listed. The Government intends to take active steps to provide notification of substances whose use is prohibited in Norway, and supports the inclusion of as many substances as possible in the list. It is particularly important to ensure that all types of asbestos are included in the list.

##### *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. Its purpose is to minimise waste generation and ensure environmentally sound disposal of hazardous waste. The Government is working towards the inclusion of a binding target for the reduction of quantities of hazardous waste in the convention. Norway is also working actively towards the establishment of an integrated global regime for the management of waste from ships.

##### *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). The Heavy Metals Protocol requires the parties to reduce their total annual emissions of cadmium, lead and mercury to the atmosphere to 1990 levels. These agreements are important for reduction of Europe's total emissions, and therefore for reduction of long-range transport of these pollutants to Norway and the Arctic.



Figur 4.3 Countries that had signed (green) and ratified (red) the Stockholm Convention as of September 2006

Source: UNEP

towards considerably stricter international rules on controls to ensure safe and environmentally sound recycling of ships. A Norwegian draft text for a convention was presented to IMO in March 2006, and is being used as a basis for further development of the convention. It is essential that a system is developed that requires environmental considerations to be taken into account throughout the lifetime of a ship, particularly in order to reduce the use of dangerous substances in ship construction and on board ships, and to ensure sound management of recycling operations.

The draft text proposes that ship-breaking yards must be approved before they can accept ships, and that ships may only be delivered to approved facilities. It also proposes rules to prohibit or reduce the use of dangerous substances, and a requirement to maintain lists of which dangerous substances a ship contains. These are to be enforced through a system for issuing certificates and through control of ships. A reporting system for ships destined for scrapping is proposed to ensure control of where they are delivered, and requirements for recycling plans will be drawn up. The Government intends Norway to play a leading role in the work of developing a global convention, to adopted by 2009 at the latest.

#### *The Arctic as a barometer of global pollution*

The bioaccumulation of POPs and heavy metals in food chains in the Arctic is giving cause for concern. Levels of substances such as PCBs and mercury in both people and animals are alarmingly



Figure 4.4 Persistent organic pollutants accumulate in food chains. Puffin photographed in the Lofoten Islands.

Photo: John Stenersen

#### Box 4.4 Nordic strategy to deal with environmental pollutants in the Arctic

A Nordic strategy for the Arctic climate and environmental pollutants was adopted at the meeting of Nordic environment ministers in Copenhagen in March 2006. According to the strategy, the Nordic countries will work together to obtain and disseminate more information on the presence and effects of environmental pollutants in the Arctic environment, with a view to reducing global releases of such substances.

high in several parts of the region, and levels of recently detected ecological toxins are rising.

Even though there are local sources of POPs and other ecological toxins in certain parts of the Arctic, inputs from long-range transport are dominant. This is particularly true of substances whose hazardous properties have recently been recognised. Because there are few local sources of any significance, levels of these substances in the Arctic environment act as a barometer of their global transport and spread. The Government views the Arctic as a suitable area for registering the presence of new long-range pollutants and for monitoring pollution trends over time after regulation of the use of dangerous substances.

The Government will build up more knowledge about the Arctic as a barometer of global pollution, and will use this knowledge actively to achieve stricter international regulation of ecological toxins. Better documentation of levels of these substances in the Arctic and their effects will therefore be necessary.

The white paper on Norway's integrated management plan for the Barents Sea–Lofoten area (Report No. 8 (2005–2006) to the Storting) proposed an integrated system for monitoring the state of the marine environment, which is to include monitoring of POPs and other ecological toxins. The white paper also proposed the establishment of an advisory group on monitoring of the Barents Sea, headed by the Institute of Marine Research, to be responsible for coordinating environmental monitoring in this region and making the results available. This group was established in autumn 2006, and monitoring of ecological toxins will be expanded from 2007. This will make an important contribution to documentation of the

#### Box 4.5 New ecological toxins in the Arctic

PFOS and other perfluoroalkyl substances have been found in samples taken from glaucous gulls and polar bears in the Arctic. The levels of certain brominated flame retardants in sediments in the Arctic are rising. In a study carried out in 2005, these substances were found in eggs of glaucous gulls, herring gulls, common guillemots, kittiwakes and puffins in Norwegian parts of the Arctic. Brominated flame retardants are used in many different products, but releases do not generally originate from the Arctic. Both PFOS and brominated flame retardants have also been found in the blood of women from North Norway and Siberia. High levels of POPs such as PCBs and DDT have previously been found in animals and people in the Arctic. Little is known about how the total load of such substances affects people and animals over time. In humans, fetuses and young children are particularly susceptible.

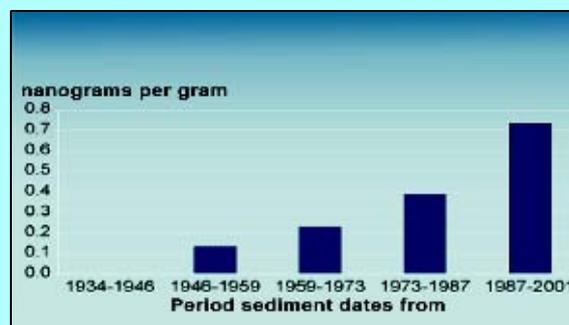


Figure 4.5 Levels of brominated flame retardants in sediment cores from Bjørnøya

Source: Norwegian Pollution Control Authority

state of the environment in the Arctic and thus to efforts to gain international acceptance of the need to reduce global emissions of these substances.

#### *UNECE Convention on the Transboundary Effects of Industrial Accidents*

Parties to this convention are required to apply preventive, preparedness and response measures to deal with industrial accidents with transboundary effects. Norway has ratified the convention, and

has undertaken to provide financial support for some of the work under the convention. The Government will give priority to this in the years ahead.

### 4.3 Environmental development cooperation as a tool for reducing releases of hazardous substances

It is important to use development cooperation as a tool for reducing releases of hazardous substances, both because it is poor people who are most severely affected by pollution and because controlling releases of hazardous substances is an essential basis for sustainable development in developing countries. Moreover, Norway has also committed itself to such efforts under international agreements. The Government will give priority to efforts to deal with hazardous substances in development cooperation, and has identified hazardous substances as a thematic priority in the Norwegian action plan for environment in development cooperation.

Chemical products account for almost 10 % of world trade. The OECD has estimated that global production of chemicals will almost double by 2020. Production is likely to grow most rapidly in developing countries. However, these countries are lagging far behind OECD countries in the control and management of chemicals. Unless the growth in production is accompanied by greater efforts to improve chemical management systems, economic growth may not result in improvements in welfare.

As a result of inadequate inspection and enforcement systems for chemicals, local enterprises can contaminate neighbouring areas and pollute water, air and soils. Poor people are hardest hit by exposure to ecological toxins through the food they eat, hazardous waste disposed of locally, industrial emissions, and the use of products, including pesticides. Chronic diseases, some caused by dangerous chemicals, are a growing problem, and according to the World Health Organization, by 2020 they may have a greater effect on public health in developing countries than infectious diseases. Children are particularly vulnerable. For example, studies from India show that most victims of poisoning are children under five years old. Dangerous chemicals are also transferred to the fetus during pregnancy and to infants through breast milk, and can cause permanent damage. In the Africa Environment Outlook for 2006, UNEP states that failure to develop regional

and national chemicals management systems will hinder development in Africa.

Inadequate controls on the use of pesticides and the content of chemicals in products, and high releases of pollutants from the expanding industrial sector in developing countries such as Asia's growing economies, make developing countries particularly vulnerable to hazardous pollutants. Developing countries must protect water resources against chemical pollution so that they do not become dependent on costly water purification technology. Integrated river basin management, and especially the protection of wetlands that function as biological purification systems, are important in this context.

Releases of hazardous substances can make the population more sceptical to industrial activities. Poor chemicals management can also prevent developing countries from gaining access to international markets for their products. For example, international requirements for food safety require systems for regulating the use of chemicals in food production and for monitoring food. Vietnam has

#### Box 4.6 Use of mercury in gold mining

The use of mercury in small-scale gold mining is a particularly high-risk activity, since children and adults often work with mercury without any protection. According to UN (UNIDO) figures, about 6 million people throughout the world (Asia, Africa and South America) are engaged in small-scale gold mining. This number is likely to rise.



Figure 4.6 Small-scale gold mining

Source: UNIDO

for instance been seeking to halt the use of dangerous pesticides because residues of pesticides in Vietnamese products were making them unsuitable for international trade. This is also a major problem in other parts of the world, such as Africa.

When ecological toxins are released, the pollution they cause is regional rather than purely local. Many of these substances, such as the POPs regulated by the Stockholm Convention, spread throughout the world once they are released. In addition, dangerous chemicals are spread through trade in products. But even in cases where releases of pollutants spread across national borders, the pollutant load is highest near the source. Measures to reduce pollution or the use of dangerous chemicals thus have positive effects both in the country where they are implemented and in a wider region, and in many cases globally.

It is a prerequisite for increased development assistance that developing countries are able to assess and set priorities for chemicals-related measures and to develop plans or other means of building up a framework and sufficient capacity for chemicals management. The Quick Start Programme under the SAICM is intended to put developing countries in a position to determine their priorities. In 2006, the Government therefore undertook to provide NOK 25 million over a five-year period to support the Quick Start Programme.

Norway's chemicals-related development assistance will focus on assistance in the field of pollution control, including hazardous waste. In addition, issues and measures in several other fields are relevant to chemicals, for example:

- health issues (acute and chronic diseases linked to chemicals)
- agricultural issues (pesticides, food safety in developing countries)
- fisheries (presence of POPs and heavy metals in fish)
- working environment issues (exposure to chemicals in the workplace, child labour)
- industry, technological developments (may in addition promote more sustainable industry)
- water resource management (water pollution, preventive measures, water purification).

The main channels for efforts related to ecological toxins will be UNEP, the World Health Organization (WHO), the United Nations Development Programme (UNDP), the International Labour Organization (ILO) and the UN Food and Agriculture Organization (FAO). The work of the Global Environment Facility (GEF) is also very important. At country level, coordination through UNDP is

essential. It is also important to support the programmes for competence and capacity building under the global chemicals conventions. These are designed to help developing countries to implement their obligations under the conventions.

The Government will increase assistance in the field of chemicals, and intends Norway to contribute to:

- competence and capacity development in the field of chemicals to put partner countries in a better position to implement their international commitments and the SAICM
- development of national legislation and effective enforcement in partner countries
- cooperation with and support for sectors that use and release ecological toxins with serious adverse effects, including clean-up measures for industries that have negative impacts on health and the environment.

The Government will continue cooperation to reduce releases of POPs and heavy metals from Russian industry and waste disposal sites, both through bilateral cooperation programmes and through projects under the auspices of the Arctic Council.

#### **4.4 New global system for classifying and labelling of dangerous chemicals**

In 2003, the UN adopted the new Globally Harmonized System of Classification and Labelling of Chemicals (GHS), which applies to all use and handling of hazardous chemicals, and lays down rules for classifying chemicals according to the physical, chemical, health and environmental hazards they present. The GHS also contains provisions on the labelling of dangerous chemicals, and provides guidance on drawing up the safety data sheets that are required to accompany such chemicals. Harmonised international rules for the transport of dangerous goods have been in existence for some years. The adoption of the GHS means that there is a uniform system for classification of chemicals both during transport and in all other contexts.

The purpose of the GHS is to ensure that information on the hazardous properties of chemicals is provided so that health and the environment can be protected through appropriate use, and at the same time to facilitate global trade in chemicals. The GHS is an important tool for increasing knowledge of the hazardous properties of chemicals and ensuring that they are handled as safely as possible

throughout the world. It can also help to reduce the extent to which hazardous substances are used in products, and to avoid their dispersal in the environment. Norway has played an important role in development of the GHS, especially the rules for classification and labelling of carcinogenic substances. This has helped to bring about a result that will maintain the level of protection already provided by current Norwegian legislation.

All countries have been urged to introduce the GHS as soon as possible, and the UN hopes it will be fully implemented throughout the world in 2008.

The Government will work towards the introduction of the GHS both in relevant Norwegian leg-

islation and internationally, and will support its introduction and effective use in developing countries. The EU will introduce the GHS in its new consolidated legislation for classification and labelling of dangerous chemicals, and the rules for safety data sheets will be incorporated into REACH. Thus, the development of the global GHS will have direct consequences for the legislation Norway introduces under the EEA Agreement.

The Government will give priority to the work of the GHS Sub-Committee on further development of the GHS, both because it will provide better protection for health and the environment worldwide, and because it will be of crucial importance for EU/EEA legislation.

## 5 Safer use of chemicals in Europe

Norway shares the EU rules on chemicals, with the exception of pesticides, which are governed by separate, more restrictive Norwegian legislation. Thus, EU chemicals legislation affects Norway directly. The EU is the world's largest producer of chemicals, releases from the EU area are transported northwards by air and ocean currents and therefore have an impact in Norway as well. Norway will therefore call for and play a leading role in efforts to provide a high level of protection for health and the environment in the development of the new EU chemicals legislation REACH (Registration, Evaluation and Authorisation of CHemicals). As this legislation is implemented, Norway will play an active part in evaluation and regulation of priority substances at European level.

The Government will

- play a part in making the new EU chemicals legislation REACH as ambitious as possible in order to protect health and the environment, including the working environment, by means of:
  - strict regulation of the most dangerous substances throughout the EEA
  - providing information on chemicals that are on the market through REACH
  - giving industry a clear responsibility for all chemicals that are on the market
- consider whether to request derogations from the provisions of REACH for Norway if this is necessary to achieve the target of eliminating releases and use of priority ecological toxins by 2020, or if the provisions of REACH will in any other way reduce the level of protection of health and the environment in Norway
- take steps to ensure that Norway evaluates about 5–15 priority substances and proposes their regulation under REACH.

### 5.1 REACH – a new European chemicals policy

Because Norway shares the EU legislation on chemicals, it has limited freedom of action to implement a more ambitious chemicals policy than the EU, particularly if this affects trade in products.

Rules on prior notification, risk assessment, the classification and labelling of chemicals, and restrictions or prohibitions on the use of some substances have been laid down in a number of EU directives and regulations. Through the development of its legislation, the EU has made a great deal of progress in regulating chemicals. Most of the derogations Norway was granted when the EEA Agreement was adopted have ceased to apply because the level of protection under EU legislation has been raised to the level Norway considers appropriate. Nevertheless, both environmental organisations and the business sector have

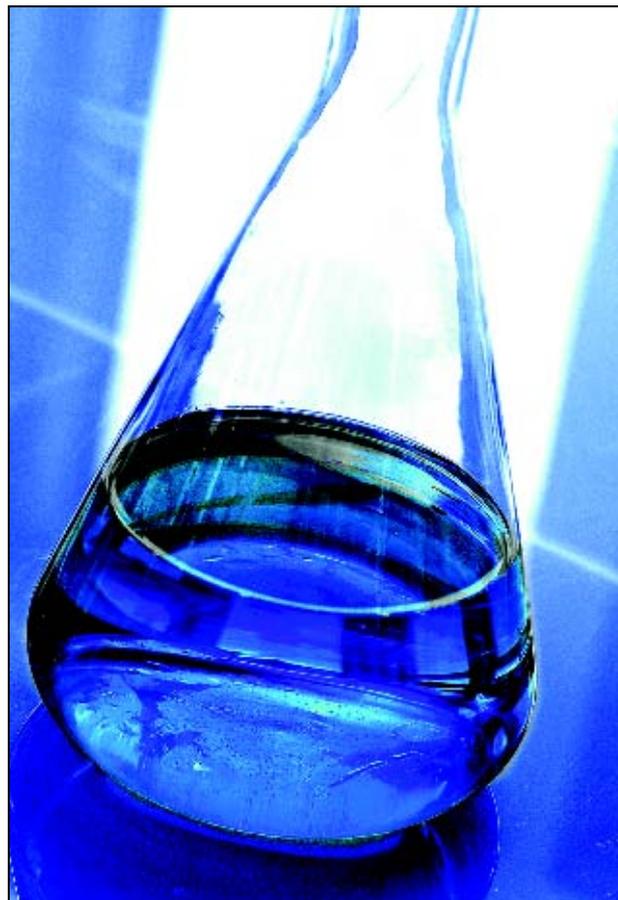


Figure 5.1 The new EU chemicals legislation is intended to give industry more responsibility for obtaining and providing information about chemicals

Photo: Marianne Otterdahl-Jensen

### Box 5.1 What is REACH?

In autumn 2003, the European Commission presented a proposal for a new regulation on the Registration, Evaluation, Authorisation and Restriction of Chemicals, abbreviated to REACH. It is intended to improve the protection of human health and the environment through the better and earlier identification of the properties of chemical substances, and to reduce the use of the most hazardous substances. It will also give industry in the EU and EFTA greater responsibility for obtaining and providing information on chemicals, preparing chemical safety reports, managing risks, and ensuring safe use of chemicals. At the same time, the competitive position of industry in the EU/EFTA is to be maintained and enhanced.

The main elements of REACH are:

- *Registration* of chemicals. This applies to substances on their own and in preparations, and in many cases to substances in articles. Manufacturers and importers are required to register all substances produced or imported in quantities higher than 1 tonne per year and to submit information on their toxicological and ecotoxicological properties and uses. A chemical safety assessment is also required for substances. More information is required for substances that are marketed in large volumes, while the requirements are less detailed for substances that are only marketed in low volumes, i.e. 1–10 tonnes. Companies must submit a registration dossier to a new independent body, the European Chemicals Agency. Substances that are already on the market are to be registered gradually over an 11-year period. Those that are marketed in large volumes or are hazardous to health or the environment are to be registered first, over a three-year period.
- *Evaluation* of all substances registered in quantities of 100 tonnes or more per year. In addition, national authorities, for example the Norwegian authorities, may suggest evaluation of other substances if they are suspected of posing a serious risk to health and/or the environment. The authorities will evaluate whether more data are needed, for example further testing, information on exposure, and whether follow-up and action is needed.
- *Authorisation* of substances of very high concern, to ensure that they are only used if the authorities have expressly approved this. Authorisation will be required for:
  - substances that are carcinogenic, mutagenic or toxic to reproduction (CMRs)
  - substances with persistent, bioaccumulative and toxic properties (PBTs) and substances that are very persistent and/or very bioaccumulative (vPvBs), endocrine disruptors, and substances that give rise to an equivalent level of concern
- The EU Commission will grant authorisation for a limited period, and will take into account whether safer alternatives exist. If authorisation is not granted for specific areas of use, these uses will be illegal throughout the EEA.
- *Restriction*: this procedure includes prohibition and restrictions on use, and is a safety net to supplement the authorisation system. The use of substances that pose a substantial risk to health and/or the environment may be banned altogether, or specific uses prohibited, if the risks associated with such use are not under adequate control. Current prohibitions and restrictions on the use of specific substances will be continued under REACH, and it will be possible to include new substances.
- Establishment of the *European Chemicals Agency*, a new independent body, which is to be based in Helsinki.

strongly criticised the legislation, particularly because it has not made it possible to assess and regulate the great majority of the substances that exist on the EU market.

A new policy is needed because the EU and EEA chemicals legislation has not reduced public

concerns about the use and releases of dangerous chemicals. At present, the responsibility for proving that there is a risk to health and/or the environment rests with the public authorities. The business sector has too little of the responsibility. Only about 70 substances have been dealt with

under the risk assessment programme that was established in 1993, which demonstrates the lack of progress under current legislation. The use and releases of chemicals are being permitted today even though the long-term impacts of most substances are not known. Stricter legislation can thus provide major benefits by giving better protection of the environment, consumers and workers.

Discussions on the REACH regulation in the EU's political bodies have involved a tug-of-war between health and environmental concerns and business interests. During the first reading in autumn 2005, compromises were adopted by the Council and the European Parliament, resulting in even weaker requirements for the registration of substances that are only marketed in small quantities. At the same time, the Parliament adopted a number of ambitious elements that are in line with Norway's positions, such as steps to strengthen the authorisation system. These included a provision that authorisation may not be granted if less harm-

ful alternatives exist (obligatory substitution). The Parliament also wished to introduce a general duty of care in the legislation. During the second reading in autumn 2006, the European Parliament and the Council reached agreement on these issues, making it possible for REACH to be adopted by the end of the year and to enter into force in summer 2007.

#### *What changes will REACH introduce?*

Some EU acts of legislation, which are also part of current Norwegian legislation, will be repealed when the REACH legislation enters into force, so that extensive amendments to Norwegian legislation will be required. This will apply to the regulations concerning:

- notification of new substances
- evaluation and control of the risks of existing substances
- restrictions on the marketing and use of dangerous substances and preparations
- compilation and distribution of safety data sheets for dangerous chemicals.

The first and second of these will be replaced by REACH, while the third and fourth will be incorporated into the new legislation.

Separate legislation on the classification and labelling of chemicals will be retained. The EU will introduce the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) in its new consolidated legislation for classification and labelling of dangerous chemicals. However, certain adaptations will be made to bring these rules into line with REACH by giving industry a clearer responsibility for classification and labelling of chemicals. The existing working environment leg-

#### **Box 5.2 Application of the precautionary principle in Europe**

The EU supports application of the precautionary principle internationally. On the basis of the 1992 Maastricht Treaty and further elaboration in the 2000 Treaty of Nice, the precautionary principle has become an important element of EU legislation.

In 2000, the European Commission published a communication establishing guidelines for applying the precautionary principle, after identifying a need for input to the international debate on the precautionary principle and to the debate on how it should be applied within the EU. The Commission pointed out that the precautionary principle is particularly relevant to the management of risk where there is an element of scientific uncertainty. It also noted that measures based on the precautionary principle must meet criteria of non-discrimination and proportionality, that the potential benefits and costs of taking action must be examined, and that measures should be reviewed periodically after attempts to reduce the scientific uncertainty that was the basis for regulation or action. The EU will use the same guidelines when evaluating any Norwegian regulatory measures based on the precautionary principle.



Figure 5.2 Under the EEA Agreement, Norway shares the EU legislation on chemicals

isolation will continue to apply. Substances used in cosmetics and food packaging are to be registered with the European Chemicals Agency, but the chemical safety reports for such substances will only be required to include an environmental hazard assessment. The authorisation and restriction procedures will apply to PBT substances in cosmetics and food packaging, which is a clear improvement over today's situation. Pesticides are already regulated by other legislation, and will not come within the scope of REACH.

The Government presumes that REACH will also apply to the petroleum industry on the Norwegian continental shelf, in the same way as other acts of legislation that are currently in force, for example the regulations on prior notification of new substances, classification and labelling of dangerous chemicals, and safety data sheets.

#### *Why does the Government consider REACH to be important?*

The Government has been advocating reversal of the burden of proof in chemicals legislation, so that industry rather than the authorities is made responsible for demonstrating that the chemicals used are safe. The proposed new EU chemicals legislation is an important step in the right direction, since it gives industry the responsibility for documenting the safety of the chemicals that they place on the market. Documentation is to be a condition for market access – «no data, no market».

Long-range transport of pollution carries ecological toxins to Norway and the Arctic. Regulatory measures in the EU are therefore of direct importance for pollution levels in Norway.

Norway has been advocating the highest possible protection level for health and the environment. Norway has sent comments at several stages during the preparation of the draft legislation, and the Government has several times urged the EU to ensure that REACH is as ambitious as possible in order to protect health and the environment, including the working environment. Norway considers the opportunity to take part in the activities of the new European Chemicals Agency that is being established in Helsinki to be particularly important. We have found it very useful to take part in cooperation with EU experts because this provides opportunities for the exchange of information and expert opinions on hazardous substances. Participation in the European Chemicals Agency will be an important means of continuing such cooperation under the REACH legislation.

The most important input the Government has provided during the development of REACH can be summarised as follows:

#### **1. Substances of very high concern must be strictly regulated within the EEA**

- *REACH must become an instrument for eliminating the use of the substances of very high concern, not for administering their continued use.*
- *Authorisation to use substances of very high concern should not normally be granted if safer alternatives exist on the market (the substitution principle).*
- *In cases where use of substances of very high concern is authorised, users of the products in question should be given clear information about this, for example by means of labelling.*

In the Government's view, both the EU and Norway should have ambitious goals for eliminating the use and releases of substances of very high concern, and the burden of proof should be reversed in chemicals legislation, so that industry is made responsible for documenting that chemical products are safe to use. Norway therefore considers that the authorisation procedure must be a tool for achieving these goals. Strict requirements relating to substitution are necessary to avoid authorisation being given for continued use of substances of very high concern if safer alternatives exist. The Government views the substitution principle as an essential part of the basis for this legislation, and has communicated this view to the EU on several occasions.

#### **2. REACH must ensure the provision of information on all chemicals on the market**

- *Basic information must be provided for all substances.*
- *More information should be required for substances that are suspected of meeting the criteria for being «of very high concern», the substances that are most hazardous to health, and other substances whose use is expected to involve a high level of risk.*

In the Government's view, REACH should be used to deal with the problems related to the general lack of knowledge about chemicals. This means that there must not be exemptions from requirements to provide adequate information for large numbers of chemicals. However, it is also important to give highest priority to obtaining adequate

information on the most hazardous substances and substances whose use is likely to involve a high level of risk on the basis of current knowledge.

### **3. Industry must be made clearly responsible for all chemicals on the market**

- *A general duty of care should be introduced in the new legislation, to make clear the fundamental responsibility of industry for substances and products on the market.*

In the Government's view, a general duty of care should be laid down in REACH in addition to the more specific requirements it sets out. This should be formulated in such a way that it also reflects the substitution principle, thus clarifying the fundamental responsibility of industry for ensuring the safety of all chemical substances. This is particularly important since the obligatory information requirements are less stringent for low-volume substances. Another important point for Norway is that it should not be necessary to amend the Product Control Act to make the duty of care less stringent as regards chemicals.

#### *Final procedures and the EEA Agreement*

REACH will raise the level of protection for health and the environment in Norway by reducing the exposure of people and the environment to hazardous substances from products and processes, and thus reducing health and environmental damage. Reduction of long-range transport of pollution from the EU to Norway will also be important. These benefits will be felt particularly as a result of the generation of more basic knowledge about chemicals through REACH. Impact assessments in the EU and Norway have shown that the benefits of the proposed REACH legislation for health and the environment will far outweigh the costs for the business sector.

During the second reading of the proposed legislation, Norway focused on influencing the result to ensure a high level of protection for health and the environment. At the time of writing, it seems likely that REACH will be adopted by the EU before the end of 2006. Once this has happened, Norway will assess whether there is a need to request derogations through adaptations to the EEA Agreement. This may be appropriate if form of regulation for substances of very high concern is such that it will prevent Norway from achieving its own targets, or if it will be difficult to maintain the current statutory duty of care as regards substances and products.

#### *Opportunities for Norway to influence developments*

The Government considers that a high level of protection throughout the EEA is in the interests of the Norwegian business sector. The Norwegian authorities should make full use of the opportunities offered by REACH. Under REACH, national authorities may evaluate priority substances and put forward proposals for regulation or authorisation. This means that Norway can make an active contribution to regulation at European level of the substances it has identified as priority ecological toxins. The Government intends Norway to be involved in evaluation, risk assessment and proposals for regulation of priority substances throughout the 11-year implementation period, so that 5–15 substances are under consideration at any time. The main focus should be on substances that are on the Government's priority list and included in the target of continually reducing releases and use of substances that pose a serious threat to health or the environment with a view to eliminating them within one generation. This will require considerable expansion of Norway's efforts.

## 6 Greater efforts to build up knowledge about chemicals

Although we are aware of the impacts some chemicals may have on health and the environment, our knowledge of most substances is very limited. In order to choose alternatives that have the least negative impact on health and the environment, we all need information on which substances and options are least harmful to our health and environmentally favourable. The Government intends to develop a knowledge-based management regime for chemicals, and will therefore support a substantial increase in research on and monitoring of ecological toxins and other hazardous substances. The Government wishes Norway to play a leading role in efforts to prevent the dispersal of hazardous substances and damage caused by such substances. An essential basis for this is research and monitoring results that can be used as a basis for developing regulatory measures at national and international level. In the Government's view it is also necessary to take a coherent and clearly targeted approach to improving the dissemination of information on sources of pollution and the risks to and impacts on health and the environment.

The Government will

- strengthen research on hazardous substances and promote cross-sectoral research more actively
- develop an integrated survey and monitoring programme for ecological toxins by 2009
- work towards use of the REACH legislation to obtain basic information on as many substances as possible
- build up knowledge of ecological toxins in the Arctic
- survey the use of nanomaterials and evaluate how existing legislation chemicals and their use and release can be used to ensure protection of health and the environment in connection with the use and release of nanomaterials
- build up a Norwegian environmental specimen bank of ecological toxins for research and monitoring purposes.

### 6.1 What challenges are we facing?

Before we can deal with risks, we must know what they are. We must also be able to document both levels and trends for dangerous substances in the environment before we can determine what action needs to be taken. However, we have limited information on the hazardous properties and effects of most substances, and not only for little-used substances. We lack adequate information on 65 % of all substances that are produced in or imported to Norway in amounts of more than one tonne every year, and have no information on 21 % of them. The new REACH legislation will play an important role in remedying this situation.

In order to gain support for international regulation of chemicals, we must be able to document the probability that they pose risks to health and the environment. The international conventions that restrict the use of persistent organic pollutants (POPs) and heavy metals require documentation before regulation of new substances can be consid-

#### Box 6.1 Combined impacts of ecological toxins

Very little is known about the combined impacts of different ecological toxins, which may either reinforce or weaken each other's effects. International research on this issue has been intensified, but is very difficult because of the large number of chemicals and the complicated principles involved. Heavy metals can for example reinforce the impacts of exposure to other chemicals. One study\*, which was presented at the DIOXIN2006 symposium in Oslo, has shown that co-exposure to PCBs or PDBE and methylmercury can enhance developmental neurotoxic effects. This may explain why neuropsychological defects in children are found to vary in severity from one area to another.

\* Fischer C, Fredriksson A, Eriksson P; Proc. DIOXIN2006, Oslo, Norway

### Box 6.2 Hazardous substances in the blood of pregnant women

Analyses have shown that blood plasma from pregnant women contains a number of hazardous substances that are used in ordinary consumer products, such as brominated flame retardants and perfluoroalkyl substances. The levels found were not particularly high, and the results do not indicate that the women or the fetuses were exposed to an acute health risk. The effects of these substances on health have not been completely clarified, but the mere fact that they are present and accumulating in people gives grounds for concern.

ered. Even if the precautionary principle is used actively, a lack of information about the properties of substances, where they are present, transport routes and effects will limit progress and make it more difficult to regulate chemicals at both national and international level. There is insufficient documentation for many substances today, even substances that we suspect of having very serious effects and would like to see regulated at global level. There are also gaps in our knowledge of hazardous substances in products and of less dangerous alternatives.

The lack of basic information on large numbers of substances is cause for concern. These substances are found in a wide range of ordinary consumer products and enter the environment by different routes. We need to obtain information on their spread in the environment, where they are present and what effects they have on natural ecosystems and human and animal health. It is also important to identify mechanisms of action for the most commonly found substances, and how serious their health impacts are. To build up this knowledge will require more industry involvement in testing and risk assessments. This means that industry will have to allocate more resources to these processes.

It is particularly important to learn more about the effects of long-term exposure and about total exposure of people and animals to ecological toxins. There is special concern about possible health effects in future generations, since various substances are transferred to the fetus through the umbilical cord and to infants through breast milk.

Internationally, there is a lack of quantitative measurements of ecological toxins in the environment, animals and people. This applies both to known ecological toxins and to substances that have more recently been recognised as sharing similar properties. Contributions from Norway are therefore important. For example, monitoring of recently recognised ecological toxins in the Arctic by the Norwegian Pollution Control Authority and the Norwegian Polar Institute has been instrumental in raising awareness at international level of the properties of these substances and their long-range transport potential.

The Arctic Monitoring and Assessment Programme (AMAP), which has a Norwegian secretariat, is playing an important role in assessing the extent of pollution by POPs and heavy metals in the Arctic. Considerable weight has been given to AMAP's results in the EU's work on persistent, bioaccumulative and toxic substances (PBT) and in similar work within the framework of the OSPAR Convention. The white paper on Norway's integrated management plan for the Barents Sea–Lofoten area (Report No. 8 (2005–2006) to the Storting) proposed an integrated system for monitoring the state of the marine environment, which is to include monitoring of POPs and other ecological toxins. This will provide important information on the spread of these substances.

There is a pressing need to carry out environmental screening of a larger number of chemicals in order to build up information on little-known substances. This means systematic collection of samples to obtain basic information on the presence and concentrations of «new» substances that are not included in the ordinary monitoring programmes. There is often little or no international data on these substances, so that data from Norway is very important internationally, as has been shown by the screening done through AMAP.

## 6.2 Initiatives to build up knowledge

*REACH will involve a concerted effort by industry to build up knowledge*

Extensive testing of chemicals is needed to reveal whether they have properties that make them hazardous to health or the environment. Until now, the legislation has not required much industry testing of chemicals that are already in use. The new REACH legislation will make very important changes to this situation, and industry will have to provide large amounts of basic information on chemicals to meet the new requirements.



Figure 6.1 The research vessel Lance in the Wahlbergfjorden, Svalbard

Source: Norwegian Polar Institute

See Chapter 5 for further details on the REACH legislation. It is important that methods of testing and evaluating chemicals without animal testing are developed and taken into use.

#### *Focus on research*

The Government will strengthen research on hazardous substances, both by expanding research activities in this field and by building up the research institutions and public bodies that are involved in evaluating documentation and information on hazardous substances.

To ensure that progress nationally and internationally in evaluating measures relating to hazardous substances is as rapid as possible, the Government will establish a research initiative that will give priority to building up knowledge about:

- metabolism of hazardous substances in organisms and effects on animals and humans
- sources, presence, releases and effects of ecological toxins throughout the food production chain from farm to fork
- the damage caused by hazardous substances, including cancer, birth defects and reproductive problems, genetic damage, and damage to the immune and nervous systems
- health and environmental effects of long-term low-dose exposure and the effects of combined exposure to several substances
- bioavailability of particulate-bound ecological toxins and their transport in the food chain
- inputs, deposition and effects of long-range pollutants and possible synergies between chemical pollution and climate change, especially in the Arctic

- substances recently recognised as ecological toxins, for example halogenated compounds
- environmental problems related to medicines, metabolites of medicines and cosmetic products
- health and environmental issues associated with nanotechnology and impacts of expanding its use
- risk to people of acute poisoning on exposure to hazardous substances.

In addition, the initiative will be designed to develop and improve analytical methods for new hazardous substances, and to improve knowledge of the content of hazardous substances in finished goods and alternatives to the use of such substances in products.

#### **Box 6.3 The Zeppelin station at Ny-Ålesund in Svalbard**

The station is located at an altitude of 474 metres on the Zeppelin mountain, overlooking the settlement of Ny-Ålesund in Svalbard. Measurements at the station began in September 1989. The station is part of Norway's monitoring network for long-range air pollutants, and the results are also reported to international networks. The station is important because it is located far away from sources of pollution, and the results document inputs of pollutants to the Arctic and where they originate. The monitoring programme includes measurements of 11 metals and six groups of persistent organic compounds in air.

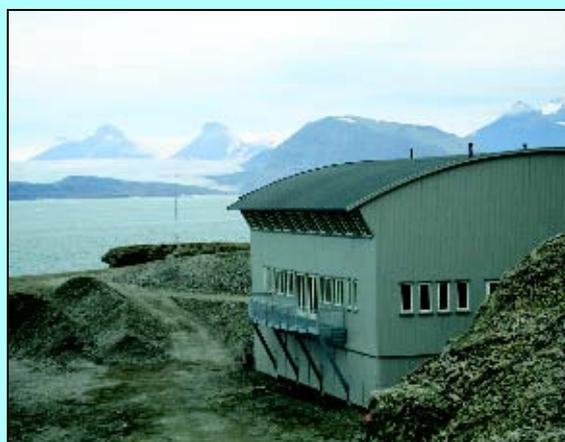


Figure 6.2 The Zeppelin station

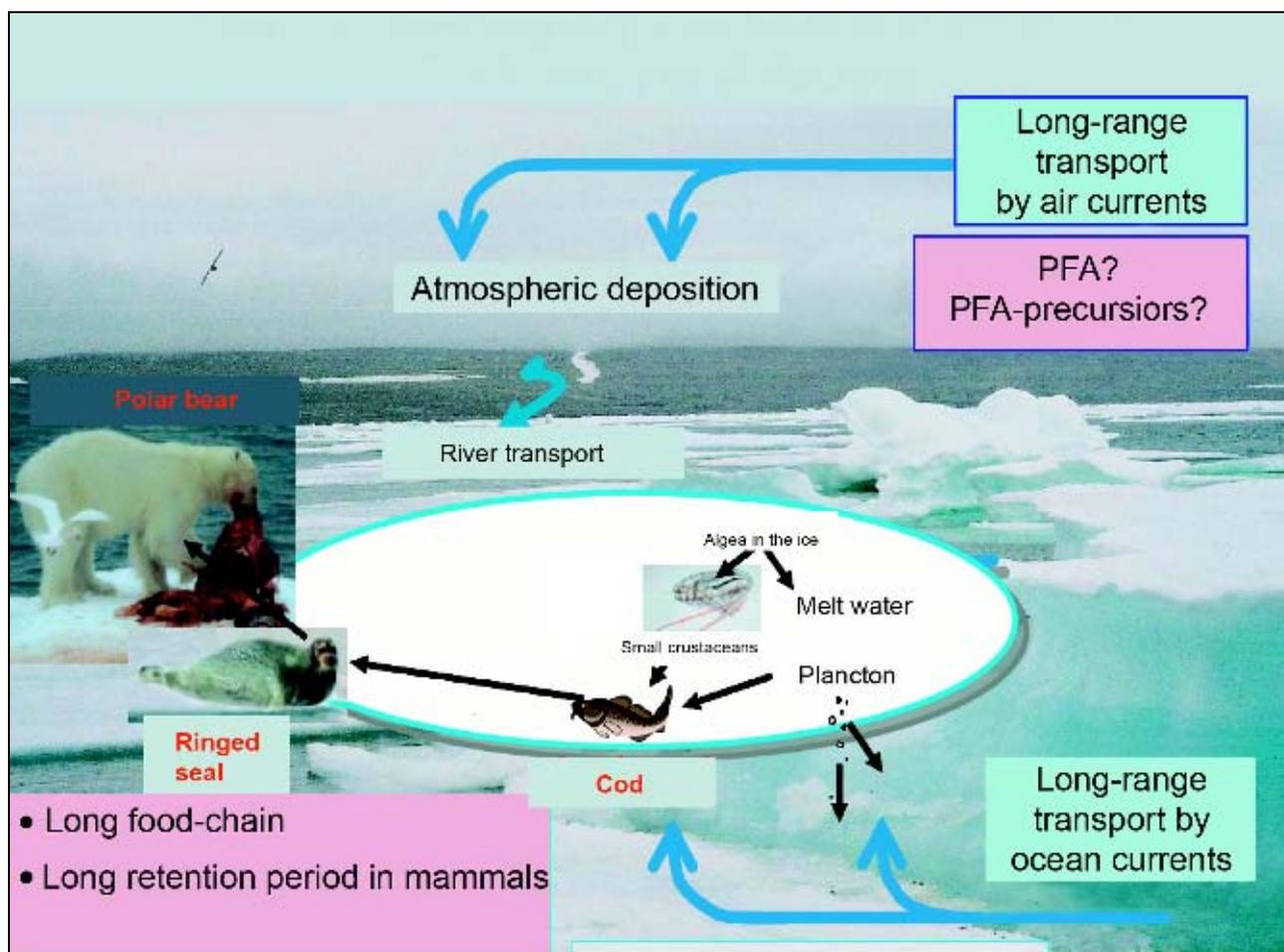
Source: Norwegian Institute for Air Research

There is a pressing need for cross-sectoral research on chemicals, and the Government intends to encourage cooperation in this field. For example, we need to know more about the health outcomes of exposure to chemicals, and epidemiological surveys are needed that link information on exposure and on health effects. For example, data from working environment studies, where levels of exposure to hazardous chemicals are often higher than elsewhere, can provide useful and much-needed information on critical exposure levels and health outcomes in people. In addition, more data is needed on other forms of human exposure to chemicals via the environment. Cooperation between different disciplines and between experts in different sectors will be very valuable in further research on chemicals.

### *The Arctic as a barometer of global chemical pollution*

Better information on ecological toxins in the Arctic will be of strategic importance in international efforts to reduce emissions of these substances. The Government will therefore give priority to building up knowledge of the presence and dispersal of such substances in the Arctic, the importance of climatic conditions for their transport, and the accumulation and degradation of ecological toxins in the Arctic. The development of models to describe the transport, uptake and metabolism of these substances in food chains will be an important element of this work.

Climate change is expected to result in major changes in transport and dispersal patterns and in patterns of exposure to ecological toxins. Projected changes include higher precipitation, stronger winds, more leaching and runoff, and higher temperatures, and the overall results will be greater



Figur 6.3 Transport of perfluoroalkyl acids and their accumulation in Arctic food chains

Source: Derek Muir, National Water Research Institute, Canada

exposure of people and the environment to ecological toxins and different patterns of exposure.

Data from the Arctic are very useful because there is broad international agreement that substances that are found in this region, far away from sources of pollution, constitute a serious problem. Because local emissions are low, the Arctic is a suitable area for registering long-range transport of ecological toxins and following trends over time. A combination of several physical, chemical and biological factors and a cold climate results in high levels of ecological toxins in species at the top of food chains both in mainland Norway and in the Arctic. For example, results obtained from monitoring of brominated flame retardants in the Norwegian Arctic have been used in international efforts to restrict the use of these substances.

Figure 6.3 illustrates the fact that pollutants may follow a variety of routes, and shows that more knowledge is needed. Perfluoroalkyl acids such as perfluorooctanoic acid (PFOA) may be released to the environment when they are produced or from products that contain these substances. Their presence in the environment may be a result of long-range transport of perfluoroalkyl acids themselves or of substances that break down into perfluoroalkyl acids. We have not yet identified the main sources of perfluoroalkyl acids in the environment.

### *Nanomaterials*

Nanomaterials contain particles of extremely small dimensions (less than 100 nanometres). Large investments are being made in the development and use of materials and products based on nanotechnologies. On the basis of current knowledge, there is no reason to believe that nanoparticles pose special health or environmental problems. However, there is great uncertainty associated with nanotechnologies. For example, little is known about possible effects on the health of workers in nanotechnology-based industries.

The development of nanotechnologies is expected to result in rising exposure of people and the environment to nanoparticles. The properties of chemical substances in the nanophase may be different from those they show in bulk. There is therefore a rapidly growing need for knowledge of the potential health and environmental effects of such materials; for instance, we need to know whether they may be persistent or bioaccumulative, and how they may interact with biological systems. It is important to meet this need adequately at an early stage of the development and implementation of nanotechnologies. The Government will

therefore step up research on health and environmental effects of nanomaterials.

The Government will survey the extent to which nanomaterials are being used and evaluate how the legislation governing the use and releases of chemicals can be used to ensure protection of health and the environment during the use and release of nanomaterials.

### *Environmental monitoring*

The focus of the environmental monitoring programme is on the occurrence of known and recently recognised ecological toxins and related problems, environmental trends, and identifying the need for control measures and other action. The Government intends to obtain more knowledge of the occurrence of persistent, bioaccumulative and toxic substances in the environment, and will by 2009 develop an expanded, integrated monitoring programme, including screening, for such substances.

The Government wishes Norway to play a leading role in following up international commitments and recommendations in this field. The Government will take steps to ensure that there is adequate documentation of the situation in Norwegian territory, including documentation of ecological toxin pollution in Arctic areas. This process will also make use of existing infrastructure. The integrated monitoring system for the marine environment proposed in the white paper on Norway's integrated management plan for the Barents Sea-Lofoten area (Report No. 8 (2005–2006) to the Storting) will be important in this connection. Under the EU Water Framework Directive, a list of 33 priority hazardous substances has been established, and steps are to be taken to reduce releases of these substances. The Government will therefore enhance the monitoring of several of these substances, particularly in connection with implementation of the directive.

In Norway, the Norwegian Pollution Control Authority has the main responsibility for overall information on hazardous substances generally and on inputs, dispersal and levels in the environment, and for deciding which parameters and methods are to be used in monitoring programmes. Other agencies and users also have a responsibility for obtaining information on how their own use of chemicals influences health and the environment.

It is important to ensure good coordination of monitoring programmes and communication of the results. Steps to ensure this will be considered

in drawing up the integrated monitoring programme for ecological toxins.

Monitoring of pesticide residues in the environment has shown that many of the substances in the programme are present in streams and rivers. There is only limited information on pesticide residues in ground water in Norway. However, such residues are a problem in many countries in Europe. A survey of pesticide residues in Norway's most important aquifers should therefore be conducted. Furthermore, testing for pesticide residues should be expanded to include all substances that may be environmentally harmful, including pesticides used at low dosage rates and degradation products. A greater emphasis on monitoring of pesticide residues will also be important in Norway's implementation of the Water Framework Directive.

The Norwegian Agricultural Environmental Programme, JOVA, monitors the transport of particles and nutrients, and also pesticides, in agriculturally dominated catchments in Norway, and provides data that can be used in modelling. Expansion of the programme to include measurement sites on different types of land where pollution of soils and ground water would have serious consequences for people and the environment should be considered. This would make it possible to use the measurement sites as part of a network for terrestrial monitoring of ecological toxins that can be traced back to Norwegian sources such as agriculture. To obtain background levels of hazardous substances, results from the measuring stations used in the terrestrial environmental monitoring programme TOV and the programme for monitoring of small catchment areas should also be taken into account.

#### *Expansion of environmental screening programmes*

Short-term, intensive screening programmes and analyses are also needed to detect ecological toxins that are not included in the environmental monitoring system described above. The Government will intensify screening of ecological toxins. The numbers of substances, media (sediment, water, living organisms) and localities sampled will all be increased. Both environmental samples and human samples (blood, breast milk) will be included. This will make it possible to gain a much better picture of human and environmental pollution levels. Background stations in the Arctic are important in this context.

#### *National surveillance of the working environment and health*

There is currently no adequate overview of data and documentation on the working environment and occupational illness and injury. The Government is seeking to remedy this, and therefore established the Department of National Surveillance of the Working Environment and Health at the National Institute of Occupational Health in 2006. The department's tasks include collecting, processing and disseminating relevant information on occupational exposure to chemicals, time trends and health effects.

#### *Establishment of a good environmental specimen bank*

An environmental specimen bank is a collection of samples that are systematically collected over several years at the same sites at the same time of year and stored frozen. When samples have been systematically collected from different sites in this way, it is possible, for example in the event of problems involving new substances, to retrieve samples from the specimen bank and quickly establish time trends and thus follow developments over time. The Norwegian Pollution Control Authority has started a pilot project in which biological samples from mussels and fish are being stored in an environmental specimen bank.

The Government will consider expanding and further developing this specimen bank so that it can provide a satisfactory solution for research and

#### **Box 6.4 The Norwegian Mother and Child Cohort Study**

This study is being run by the health authorities, and involves the collection of biomaterial (blood and urine) from mothers, fathers and children in a biobank. The target sample size is 100 000 births, and sampling is continuing for eight years up to 2007. This and other research biobanks can be expanded to include other biomaterial (for example breast milk), and can provide an important basis for an environmental specimen bank. A certain quantity of biomaterial is needed to gain the full benefit of analyses of large numbers of environmental samples in connection with monitoring population exposure.

monitoring of ecological toxins. If the specimen bank is to be a good tool for satisfying future knowledge needs, it will have to be expanded and developed a good deal, so that it also includes sediment samples, precipitation, birds' eggs and human tissue from a variety of sites. Collection of more samples from the Arctic will be given priority.

The development of an environmental specimen bank will be considered, taking into account the proposal for a marine environmental specimen bank in the white paper on Norway's integrated management plan for the Barents Sea–Lofoten area, the Norwegian Mother and Child Cohort Study, and the marine biobank Marbank that has already been established in Tromsø.

## 7 Clean wealth creation

The Government will seek to ensure that all wealth creation in Norway takes place in ways that do not pollute the environment or the industrial base with hazardous substances, including ecological toxins. The Government's policy is that businesses should take responsibility for ensuring that production processes and products do not constitute a risk to health and the environment. In future, economic activity in Norway should take place without releases of ecological toxins, and such releases are to be eliminated as far as possible by 2020. The industrial sector will be required to meet strict standards, and industries themselves will be expected to take whatever steps are necessary to achieve the goal of eliminating emissions. The Government will seek to work more closely with relevant branches of industry and the social partners in its efforts to achieve its objectives. The Gov-



Figure 7.1 A clean environment enhances wealth creation

Photo: Marianne Otterdahl-Jensen

ernment also intends to apply stricter requirements to other economic activities such as farming, forestry, aquaculture and transport in order to reduce and eliminate releases of ecological toxins.

### 7.1 Wealth creation based on a clean environment

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A large proportion of wealth creation in Norway is heavily dependent on a clean environment. An unpolluted environment is essential to fishing, fish farming, agriculture, the food processing industry, tourism and all outdoor activities. In the long term, therefore, there is no conflict between environmental considerations and wealth creation. On the contrary, a clean environment enhances wealth creation, and economic activities are more likely to gain public support if they do not pollute the environment. Moreover, strict environmental standards have sparked growth in some sectors, for example the production of technology for controlling emissions. The authorities will need to use policy instruments to encourage environmental efforts and bring about a shift towards environmentally sound products and technology. The market, too, is driving the development of «greener» technology through the growing demand for environmentally friendly goods and services. In the long term, the sustainability of businesses will depend on public confidence that products do not contain chemicals that present unacceptable risks to health or the environment.

### 7.2 Reducing releases from land-based industry

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The Government will:

- set strict environmental standards that will help to reduce releases of ecological toxins from industrial processes and promote the development of cleaner technology
- ensure that there are no releases of priority ecological toxins from production processes after 2008 unless warranted by special circumstances

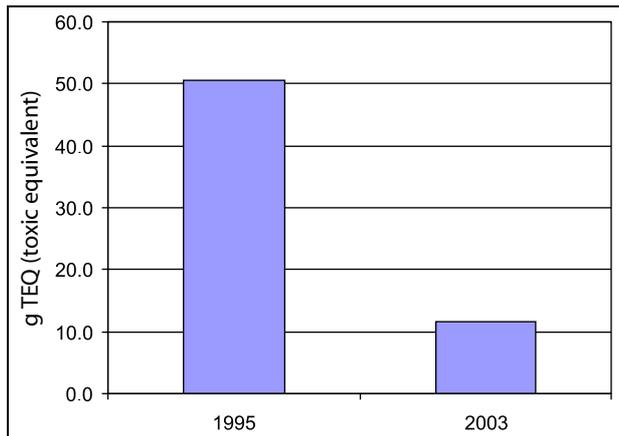


Figure 7.2 Reduction in dioxin emissions from manufacturing industries 1995–2003

Source: Federation of Norwegian Industries

- call on the industrial sector to formulate plans by 2010 showing how releases of ecological toxins are to be eliminated as far as possible by 2020
- lay down specific requirements for industries that have particular problems related to releases of hazardous substances (such as the

Table 7.1 Norway's industrial emissions of ecological toxins in 2004, in tonnes and as a percentage of total emissions

	Industrial emissions (tonnes)	Industrial emissions (% of total)
1,2-Dichloroethane (EDC)	5	100
Dioxins (in g TEQ)**	35	41
Hexachlorobenzene (HCB)**	approx. 0.001***	*
Cadmium (Cd)**	1.4	44
Chlorinated alkyl benzenes (CABs, expressed as EOC)	0.02	100
Mercury (Hg)**	1.1	32
Polycyclic aromatic hydrocarbons (PAHs)**	166	46
Trichlorobenzene (TCB)**	approx. 0.003***	*

\* No data available, but the distribution of emissions by source is probably similar to that of dioxins.

\*\* Relatively high level of uncertainty in the emissions data gives a relatively high level of uncertainty in the calculations of percentages.

\*\*\* Rough estimate, with very high level of uncertainty.

Source: Norwegian Pollution Control Authority

shipbuilding industry) while collaborating on training programmes with organisations in the relevant industries.

Releases of hazardous substances from industrial enterprises have been reduced substantially in recent years (see figure 7.2). This has come about through a combination of the requirements laid down by the authorities in discharge permits, market demands and efforts by the industries themselves. Yet major challenges still remain. Table 7.1 shows that the industrial sector accounts for substantial releases of certain ecological toxins. Moreover, the list of substances identified as ecological toxins keeps growing. In recent years, there have been releases of ecological toxins without the authorities being aware of this because too little was known about the properties of the chemicals when requirements and permits were drawn up. In addition, there are releases from smaller, non-industrial sources such as hospitals.

Ecological toxins are carried far and wide by winds and sea currents. Direct discharges also cause considerable problems locally and require major clean-up efforts. The need to clean up fjords



Figure 7.3

Photo: Marianne Otterdahl-Jensen

### **Box 7.1 Emissions of ecological toxins have a range of causes**

Emissions of ecological toxins from industrial activities are generated from the materials and auxiliary substances used.. Ecological toxins may be unintentional by-products of industrial processes, or they may originate from the raw materials used in these processes. PAHs and dioxins are just two examples of ecological toxins that are unintentional by-products of industrial processes. Trace amounts of heavy metals that may occur naturally in trees are released in the course of industrial wood processing. Processes in the metals industry are a source of similar emissions.

where industrial activities were previously located is a case in point.

There are still substantial emissions of ecological toxins, indicating that we must continue to apply a strict policy to polluting industries. Manufacturing of metals and chemicals and the pulp and paper industry still account for a substantial share of Norway's domestic emissions of a number of the priority ecological toxins. In future, we must also focus more on the many smaller sources of pollution and fugitive emissions that, taken together, may be causing just as much harm to health and the environment. Gaps in our knowledge pose a particular problem in efforts to eliminate releases of ecological toxins, and gathering and disseminating information and extending inspection and enforcement to new target groups will therefore be key elements of these efforts. The level of knowledge about hazardous substances varies widely in small enterprises, and they often need a considerable amount of follow-up.

Before a discharge permit is issued pursuant to the Pollution Control Act, the negative impact of the activity in question on health and pollution must be assessed and the benefits of the activity weighed up against the drawbacks. For some substances, emissions may be so small that requiring further measures to reduce them would involve disproportionate costs.

### *Policy instruments and measures to reduce emissions*

To deal with the remaining environmental problems posed by industrial emissions, the Government will continue to apply strict controls to industry. More stringent requirements will be introduced in keeping with advances in knowledge and the available technology. At the same time, the Government will encourage the application of new, sustainable technologies. The Government is working systematically to eliminate industrial releases of priority ecological toxins as far as possible in financial and technological terms. This effort is taking place at both national and international levels.

From now on, the Government has determined that enterprises will only be permitted to release priority ecological toxins if this follows specifically from emission limits set out in their discharge permits. This means that enterprises must have a good overview of their emissions of ecological toxins and obtain estimates of such emissions, including emissions originating from naturally-occurring ecological toxins in the raw materials they use. New discharge permits will make it clear that enterprises are responsible for investigating and evaluating their own handling of chemicals. After 2008, emissions of priority ecological toxins will only be permitted if warranted by special circumstances. Emissions limits will also be imposed in order to ensure that air and water quality are good in surrounding areas and to keep soil and sediments unpolluted. If releases of ecological toxins are due to the use of auxiliary substances, the authorities will encourage enterprises to find replacement substances so that these releases can be eliminated.

If ecological toxins are only present in very low concentrations, it is often not technically or financially feasible to remove them completely. It may thus be difficult to eliminate releases of these substances completely unless they come from auxiliary substances that can be replaced with other, less hazardous, chemicals. Consideration of what is technically and financially feasible will be part of the assessment when deciding whether special circumstances warrant permitting limited releases of priority ecological toxins from an industrial enterprise.

The Government expects the industrial sector to take responsibility for active efforts to continually reduce releases of priority ecological toxins. Further reductions will require both technological advances and further optimisation of existing processes. To make it possible to evaluate whether

enough progress is being made to ensure that releases are eliminated or minimised by 2020, the Government will require the industrial sector to draw up plans by 2010 outlining how reductions in emissions are to be achieved. This will raise awareness of the challenges that need to be dealt with before 2020. It will also give industry the incentive and the responsibility for adapting constructively to new requirements, for example by making use of existing environmental technology and developing new technology.

When enterprises that may generate large emissions of hazardous substances apply for discharge permits, emission limits will be determined on the basis of case-by-case assessments. As a general rule, strict limits will be set for emissions of ecological toxins, regardless of the recipient of the release. Most enterprises in this category are subject to the EU Directive concerning integrated pollution prevention and control (the IPPC Directive). This directive seeks to raise environmental standards in Europe by requiring that conditions in permits are based on use of the best available techniques (BAT) (see box 7.2). The directive has been implemented in Norwegian legislation and establishes requirements for listed industrial activities that may generate large emissions of hazardous substances. This directive is particularly important for the development of suitable standards for industries that release priority ecological toxins. The Norwegian authorities will take active part in international efforts to reduce and eliminate releases of environmentally hazardous substances, and will work to see that the requirement that permits are based on BAT is seen as a dynamic concept and that requirements are continually updated. The directive is currently being reviewed to assess the need for revision. Norway will follow this work closely and will provide input to the process. Among other things, the possibility of expanding the scope of the directive to include other industries such as aquaculture will be considered. This is a step the Norwegian Government would welcome, while emphasising that the IPPC Directive is only a minimum; the Norwegian authorities will impose stricter standards than those considered to be BAT wherever warranted by national or local considerations.

The new EU chemicals legislation REACH (Registration, Evaluation and Authorisation of Chemicals) will not directly affect the emission limits imposed on the industrial sector, but will nevertheless have a major impact on industrial emissions. REACH requires risk assessment by industry and evaluation by the authorities, and these

requirements will also apply to emissions from production processes. In addition, the registration of chemical substances by manufacturers and importers under the REACH regulation will provide more information for the industries that use these substances.

The Government intends to add new provisions to the Pollution Regulations setting out requirements that will apply to specific industries and processes. These will apply to a large number of enterprises and will replace around 600 individual discharge permits. They will also introduce explicit environmental requirements for enterprises that are not currently subject to specific regulatory measures. Over time, provisions setting out environmental requirements for further industries will be added, thus establishing good, predictable framework conditions for small and medium-sized industrial enterprises. These provisions will also make the licensing system under the Pollution Control Act substantially simpler and more efficient for enterprises and authorities alike. Among other things, shipyards that carry out surface treatment of ships and offshore installations, which currently contribute substantially to the spread of ecological toxins, will be regulated by the new provisions. The provisions will be a tool for continuing reduction of emissions as additional industries are included, and the Government will assess on an ongoing basis the requirements that should apply to new industries. The Government will also collaborate with certain industries (such as shipyards)

#### **Box 7.2 Best available techniques (BAT)**

One of the fundamental principles of the IPPC Directive is that conditions in permits are to be based on the best available techniques (BAT). Guidelines have been issued in the form of BAT Reference Documents (BREFs) describing techniques considered to be BAT in a number of industries. At present, not all emissions originating from raw materials, such as the heavy metals (including mercury) released by the ferroalloy industry and secondary steel production, are addressed in BREFs. The conditions set by the Norwegian authorities in discharge permits require the use of BAT and techniques that minimise releases of hazardous substances. Norway is also seeking to have the emissions mentioned above included in BREFs.

### Box 7.3 Regelhjelp.no

Regelhjelp.no is a website set up to help enterprises obtain information on the rules that apply to them and how to comply with them. It provides regulatory information on the following areas:

- The working environment
- Fire and explosives protection
- Animal protection and welfare
- Electrical systems and equipment
- Consumer services
- Pollution
- Industrial protection
- Food safety
- Plant health
- Product safety

It also presents coordinated information on internal control pursuant to health, safety and environmental legislation and the Act relating to food production and food safety, etc.

and with industry organisations in fields where there are challenges in reducing releases of hazardous chemicals.

The Government will continue to give priority to communicating information on rules and regulations to businesses, as exemplified by the Regelhjelp.no website presented in box 7.3.

## 7.3 The oil and gas industry

The Government will:

- conduct an overall review of status and progress towards the zero-discharge targets, and on this basis assess the need for further measures
- introduce a unilateral ban on PFOS in fire fighting foams in the offshore sector
- survey discharges, inputs and levels of environmentally hazardous substances and other pollutants in the Norwegian coastal current and on this basis assess the need for further controls on releases from various sources, including the offshore sector
- promote the development of good models for integrated chemicals management in the offshore sector, taking account of the impact of the use of chemicals on health, safety and the environment.

### Box 7.4 General zero-discharge targets for the oil and gas industry on the Norwegian continental shelf

#### *Environmentally hazardous substances*

- Zero discharges or minimal discharges of naturally-occurring environmentally hazardous substances that are also priority substances (as defined in national target 1 for ecological toxins) (see figure 3.4).
- Zero discharges of chemical additives that are black-category (use and discharges prohibited as a general rule) or red-category substances (high priority given to their replacement with less hazardous substances). These categories are used by the Norwegian Pollution Control Authority, and further details are given in the Activities Regulations.

#### *Other substances*

Zero discharges or minimal discharges of the following if they might cause environmental damage:

- oil (components that are not environmentally hazardous)
- yellow category substances (not defined as belonging to the black or red categories and not on the OSPAR List of substances/preparations used and discharged offshore which are considered to pose little or no risk to the environment (PLONOR))
- drill cuttings
- other substances that may cause environmental damage

Oil and gas activities result in discharges of oil and chemicals to the environment both because chemicals are used in field development, drilling and production and because oil and other naturally occurring chemicals are discharged with produced water from the oil reservoirs. Discharges of hazardous substances by the oil and gas industry were relatively high in the 1990s, but have been reduced substantially since the zero-discharge targets were introduced (see figure 7.4). A major effort mounted to achieve these targets has yielded good results, though there is still a great deal of uncertainty

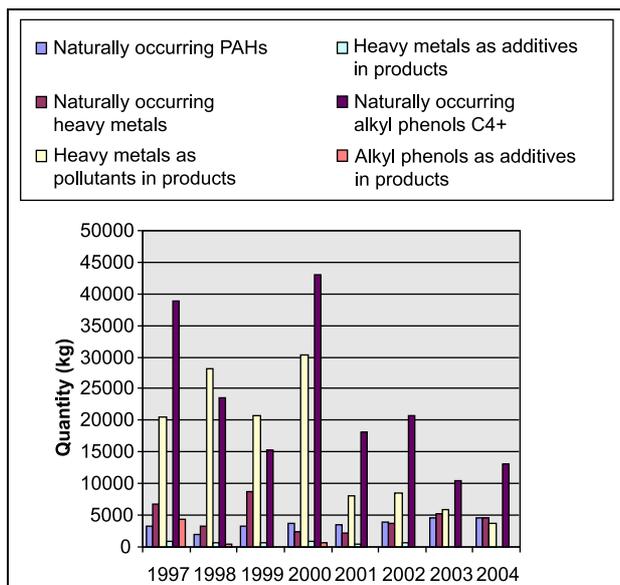


Figure 7.4 Discharges of environmentally hazardous substances by the petroleum industry 1997–2004.

Source: Norwegian Pollution Control Authority

regarding the long-term effects of discharges of produced water.

The main reason why the authorities established zero-discharge targets for the offshore petroleum industry was that large and increasing quantities of oil and chemicals were being discharged to the sea and further increases were expected, chiefly due to the steady growth in the quantity of produced water from the oil fields. The zero-discharge targets are a precautionary measure formulated to ensure that discharges of oil and hazardous substances to the sea do not cause unacceptable damage to health or the environment.

The zero-discharge targets mean that as a general rule, no oil or environmentally hazardous sub-

#### Box 7.5 What is produced water?

Produced water is water extracted from oil wells together with the oil. This water occurs naturally in the oil reservoirs and contains other substances occurring naturally in the reservoirs as well as chemicals introduced as part of the production process. Produced water contains quantities (varying from one oil field to another) of oil and environmentally hazardous substances such as PAHs and heavy metals.

stances, whether chemicals during the production process or occurring naturally (see box 7.4), may be discharged. They are based on the precautionary principle, and both new and existing installations were required to achieve them by the end of 2005. In other words, from 1 January 2006, all offshore operations are required to meet the zero-discharge targets. The requirements that apply to the Barents Sea–Lofoten area are even stricter than those that apply to the rest of the continental shelf. In this area, no discharges to the sea are permitted during normal operations (see box 7.6). In Recommendation S. No.225 (2005–2006) the Storting states that «the existing zero-discharge regime for the Barents Sea–Lofoten area must also apply as far as possible to onshore facilities.»

It is planned to conduct an extensive review of status and progress towards the zero-discharge targets, and on this basis assess the need for further measures in the next white paper on the Government's environmental policy and the state of the environment in 2007.

A preliminary assessment of the progress that has been made shows a reduction of around 85 % in releases of chemical additives from production processes from 2000 to 2004. For technical and safety reasons, however, discharges of certain of these substances to the sea will continue after 2005. These will chiefly be certain hydraulic fluids, emulsion breakers and pipe dope. Efforts to find alternatives to these substances as well will continue, how-

#### Box 7.6 Special requirements for oil and gas activities in the Barents Sea

The following applies to discharges during normal operations:

- No discharges of drill cuttings or drilling mud. Drill cuttings from the top hole section may normally be discharged provided that they do not contain substances with unacceptable properties, and that they are only discharged in areas where assessments indicate that damage to vulnerable components of the environment is unlikely.
- No discharges of produced water. A maximum of 5 % of the produced water may be discharged during operational deviations provided that it is treated before discharge.
- No discharges to the sea in connection with well testing.

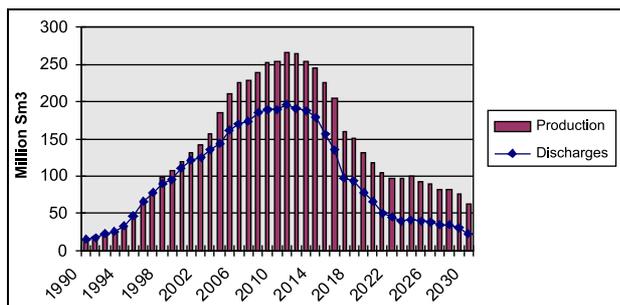


Figure 7.5 Historical and projected figures for production and discharges of produced water on the Norwegian continental shelf

Source: Norwegian Petroleum Directorate

ever (see box 7.7 and the requirements of the Product Control Act and the health, safety and environment regulations). No increase in the use of environmentally hazardous substances to boost production on older fields will be permitted if it involves the discharge of such chemicals. The reduction in releases is noted with satisfaction, and shows that the official targets, combined with the industry's ability to use more environmentally sound technology, can almost eliminate discharges to the sea.

The target for naturally-occurring environmentally hazardous substances has not been met to the same degree. Produced water contains residues of oil and chemicals – both chemicals added as part of the production process and naturally-occurring chemicals. The oil and gas industry has taken significant steps in recent years to reduce discharges of produced water and meet the zero-discharge target, and has made investments of approximately NOK 5 billion to this end. As a result, the amount of oil per litre of water discharged to the sea has been reduced. However, the total quantity of produced water has risen during the same period, so that there has as yet been no net reduction in the total discharges of oil and naturally-occurring substances with produced water on the Norwegian continental shelf. The rise in discharges to the sea must be viewed in the context of the evolution of Norway's offshore oil industry. Many of the oil fields are now mature, and in accordance with the principles of sound management of petroleum resources, one of the objectives is to maintain production and improve the recovery factor. On many oil fields, this leads to an increase in production of produced water. According to projections from the Petroleum Directorate, the quantity of produced water will rise until 2011 and then begin falling again in 2012 (see figure 7.5). High oil prices may

extend the lifetime of these oil fields, and thus also the quantities of chemicals used and the volume of produced water discharged to the sea. Projections of oil and water production and discharges of environmentally hazardous substances from the oil and gas fields will be incorporated into the review of status and progress towards the zero-discharge targets.

The offshore sector and land-based petroleum industry have contributed substantially to discharges of perfluorooctyl sulphonate (PFOS). PFOS is an ecological toxin that has been used in fire fighting foams, and releases have occurred during testing of fire-fighting systems. There are other chemicals available for this purpose which are considered acceptable from a safety point of view. PFOS is in the process of being phased out in new systems, and the quantity of PFOS in offshore installations has been reduced by more than half through voluntary substitution. Large quantities still remain, however – the equivalent of approximately 2.5 tonnes, or around one-third of the all the PFOS found in Norway.

Discharges of environmentally hazardous substances and other pollutants from inshore petroleum installations and onshore facilities, as well as from other land-based industry, can enter the Norwegian coastal current and add to its pollution load. Discharges in these areas affect more vulnerable parts of the ecosystem than discharges further out to sea, such as spawning grounds and nursery areas for fish larvae and fry. Discharges of environmentally hazardous substances and other pollutants that end up in the coastal current are also likely to be carried north and end up in even more vulnerable areas in the Arctic. To assess the environmental risk associated with this type of pollution, the Government will take steps to register discharges, inputs and levels of pollution in the Nor-

#### Box 7.7 Regulatory framework for health, safety and the environment in Norway's offshore industry

There is a single regulatory framework for health, safety and the environment for Norway's petroleum industry, which is administered jointly by the Petroleum Safety Authority Norway, the Norwegian Pollution Control Authority and the Norwegian Board of Health. The regulations address safety, the working environment, health, the external environment and financial matters.

wegian coastal current, and how much originates from the offshore industry.

A single regulatory framework for health, safety and the environment has been established for the offshore industry (see box 7.7), and requires an integrated approach to health, safety and environmental issues. Cooperation between the supervisory authorities is used to ensure that the overall result is the greatest possible reduction of risks to health and the environment, including the working environment. A white paper on health, safety and the environment in the petroleum industry (Report No. 12 (2005–2006) to the Storting) includes a broad discussion of the health risks associated with the use of chemicals, and outlines a range of measures to reduce these risks.

#### 7.4 Reducing releases from the construction industry

The Government will:

- ensure that the construction industry eliminates the use and releases of ecological toxins
- work together with the construction industry to develop more environmentally sound alternatives.

The construction industry is a large industry with a high level of activity, and puts pressure on the environment through its use of substances and products containing hazardous substances and through the generation of substantial quantities of waste. The national targets, including those relating to priority ecological toxins (see Chapter 3), apply to releases from the construction industry.

The active involvement of the construction industry will be essential in meeting the targets relating to chemicals. The Government will invite the industry to make proposals for how it can make an active contribution toward meeting the national targets that apply to chemicals. The Government will also cooperate with the construction industry in disseminating information on the substitution process. This collaboration effort will further use life-cycle assessments as a basis for identifying suitable areas for the development and use of more environmentally sound alternatives through appropriate choices of materials, methods and technology.

#### 7.5 Releases from hospitals

The Government will:

- review all releases to the environment from hospitals
- consider whether specific conditions relating to releases from hospital activities should be included in discharge permits pursuant to the Pollution Control Act.

Hospitals use large quantities of medicines and cleaning agents. There are many cases in which these substances have escaped to the environment through the sewerage system. In theory, the release of chemicals or pharmaceutical waste from hospitals is subject to the prohibition against pollution established in the Pollution Control Act, but no specific requirements have been set for hospitals so far, nor have limit values been established for discharges of pharmaceutical waste to the sewerage system. Medicines are known to contain environmentally hazardous substances, but little is known about the properties and environmental risks associated with these chemicals.

New provisions on waste water recently added to the Pollution Regulations give municipal authorities clearer authorisation to lay down conditions relating to discharges to the sewerage system so that high standards can be maintained for sewage sludge quality and operations at waste water treatment plants. The Government wishes the municipalities to make use of these powers to lay down requirements relating to discharges from enterprises so that sewage sludge produced at their waste water treatment plants is of good quality.

#### Box 7.8 Environmental management systems in hospitals

As part of the Green Government project, all central government agencies were required to have introduced a simple environmental management system as part of their overall management system by the end of 2005. Environmental management is a tool to help companies and organisations improve their environmental performance. Some health institutions, such as Innlandet Hospital Trust in Kongsvinger and St. Olav's Hospital in Trondheim, have also achieved third-party certification, for example under ISO 14001. By achieving certification, these hospitals have demonstrated their systematic efforts to reduce their impact on the environment and to continually improve their environmental performance.

The Government will consider stricter regulation of discharges of pharmaceutical residues waste to sewerage systems (see Chapter 10.5).

The Government will direct the environmental authorities to survey all releases to the environment from hospitals. This will provide a basis for assessing whether to regulate releases from hospitals through individual permits or through regulations pursuant to the Pollution Control Act.

## 7.6 Farming and forestry

The Government will:

- take steps to achieve the goal that 15 % of food produced and consumed in Norway should be organic by 2015
- take steps to reduce the use of agricultural pesticides and reduce the risk of injury to health and environmental damage posed by pesticides
- ensure that the systems for the management and use of mineral and organic fertiliser are optimal and consistent with current knowledge at all times. Efforts will continue to keep levels of cadmium in phosphorus fertiliser low.
- contribute to research and development on the links between mercury runoff and various types of forestry practices.

Pesticides and organic and mineral fertilisers are the chief sources of hazardous substances from the agricultural sector.

*Action plan to reduce the risks associated with the use of pesticides*

The agricultural and food safety authorities in Norway have been working actively to reduce the use

### Box 7.9 DDT pollution

In 2003, the food and agriculture authorities together with the Norwegian Pollution Control Authority completed an extensive project in which landfills containing DDT sludge in forest nurseries were cleaned up. Sludge containing DDT at a large number of nurseries was dug up and disposed of properly. It was documented at some nurseries that there was no danger of pollution spreading from the contaminated sludge under current land-use regimes.

### Box 7.10 Action plan for agriculture (2004–2008)

The action plan lays down the following goals:

- to make Norwegian agriculture less dependent on chemical pesticides
- to reduce the risk of damage to health and the environment associated with the use of pesticides by 25 % in the period 2004–2008, which would give a total reduction of 50 % in the period 1998–2008.
  - levels of pesticides in food and drinking water are to be minimised and not exceed limit values
  - pesticides should not be present in groundwater and levels should not exceed limit values for drinking water
  - levels of pesticides in streams and other surface water are to be minimised and not exceed values that might result in environmental damage.

of pesticides and the risks associated with their use. The action plan for the period 1998–2002 to reduce the risks associated with the use of pesticides was evaluated in 2003. On the basis of an overall assessment of the effects of the measures set out in the action plan, the evaluation group concluded that the level of risk to both health and the environment was reduced by at least 25 % during



Figure 7.6 Pesticide residues are still found in the aquatic environment

Photo: Marianne Otterdahl-Jensen

this period. Despite this positive trend, further improvement is both needed and possible. Among other things, pesticide residues are still found in the aquatic environment. Several of the measures in the action plan are long term, and need to be continued to maintain their effects. An updated action plan was therefore adopted for the period 2004–2008 (see box 7.10). It sets out goals and measures for the use of pesticides. The Government will continue to pay close attention to this area.

#### *Indicators for pesticides*

A risk indicator has been developed to describe trends in the health and environmental risks associated with the use of pesticides over time. Each substance or preparation is given points on the basis of its intrinsic properties and the calculated risk level. Combining these points with annual quantities of each preparation used yields an overall expression of the risk to health and the environment.

#### *Taxation system for pesticides*

An environmental tax on pesticides was introduced in 1988. In 1999, the system was changed from a flat-rate tax levied as a percentage of the sales value to a tax differentiated according to the hazardous properties of the pesticides. There are several tax classes based on the level of health and environmental risk. The tax rate for each preparation is calculated on the basis of its tax class and normalised application rate. In addition to this change, the general tax rate has been raised several times in recent years. The taxation system introduced in 1999 has helped to shift the use of pesticides towards preparations with a lower risk profile.



Figure 7.7 Sludge from waste water treatment plants is used as a fertiliser and soil conditioner

Photo: Marianne Otterdahl-Jensen

#### *Fertiliser and soil conditioner*

Sludge from waste water treatment plants is used as an agricultural fertiliser and soil conditioner. Approximately 112 000 tonnes of sludge was used for various purposes in Norway in 2004, and around 51 500 tonnes of this was used in agriculture.

Maximum permitted limits have been established for levels of heavy metals in sewage sludge to be used as a soil conditioner. The producer or seller of the product must take reasonable steps to limit the content of organic ecological toxins, pesticides, antibiotics/chemotherapy drugs or other organic substances that are not naturally present and prevent their presence in quantities that could render use of the product harmful to health or the environment. Producers of sewage sludge are required to report the quantities of product produced and sold, its composition and how it is used. This information is to be filed with the Norwegian Food Safety Authority through the KOSTRA system for reporting local government information. The use of sewage sludge is to be reported to the recipient municipality. As described in Chapter 10.5, the Government will consider measures and requirements relating to waste water and sewage sludge.

#### *Organic fertiliser based on waste/sewage sludge – the need for knowledge*

A greater research effort is needed to improve knowledge of the presence and content of ecological toxins in sewage sludge, including the impacts these substances may have on health or the environment, and any measures that should be implemented. The Scientific Committee for Food Safety has been asked to carry out a risk assessment on the use of sewage and on the environmentally hazardous substances it may contain.

#### *Mineral fertiliser*

More knowledge is needed of the best possible application of mineral fertilisers in order to reduce the environmental impacts of their use. Mineral fertilisers can contain cadmium. There is no reason to believe that they have any unintentional content of other environmentally hazardous substances. Efforts will continue to keep the cadmium content in phosphorus fertiliser low and not above established limit values. The EU Commission is developing common rules so that a limit value can be established for the cadmium content of fertiliser to apply

to all countries in Europe. The rules will be based on a general risk assessment of cadmium, which is expected to be completed by the end of 2006.

### *Organic food*

The Government's goal is for organic food to account for 15 % of the food produced and consumed in Norway by 2015, and it has initiated inter-ministerial cooperation to achieve this aim. Many organic farming methods developed to reduce the use and discharge of hazardous substances can also be utilised in conventional farming operations.

### *Forestry*

Most of the atmospheric mercury deposited in forested areas is sequestered in the humus layer. Faster decomposition of organic matter mobilises the mercury and increases runoff. Studies undertaken in the Nordic countries and Canada show a clear connection between logging operations involving clear-cutting and disturbance of the soil and mercury runoff to water. There may be a considerable potential for mercury runoff from the humus layer in forests, and this should be further investigated in Norway. The Government will support research on the relationship between mercury runoff and various types of forestry operations in Norway.

## **7.7 Aquaculture**

The Government will:

- encourage the use of alternative treatments with less environmental impact and disease prevention strategies in order to reduce the quantities of medicines released by fish farming operations
- monitor the consumption of antibiotics in the farming of new marine species and the potential environmental impact of the use of hazardous substances
- assess the most suitable instruments, including prohibitions or taxes, for reducing the quantity of copper released from antifouling agents used on net cages.

Aquaculture is a large and growing industry in Norway. In 1995, around 220 000 tonnes of farmed salmon and trout was produced, but by 2005 this had risen to around 600 000 tonnes. Aquaculture operations have been established all along Norway's coastline from Vest-Agder in the south to

Finnmark in the north, with the greatest output coming from Nordland and Hordaland counties. These facilities are a source of copper discharges from antifouling agents and of releases of medicines.

The Government will assess the most suitable instruments, including prohibitions or taxes, for reducing the quantity of copper released from antifouling agents. The purpose of new instruments will be to encourage greater use of other methods, more frequent washing and so on, and to encourage the development and use of replacement products. Antifouling agents are one of the two main sources of copper discharged to water in Norway. The quantity released from antifouling agents has remained stable at around 200 tonnes per year in recent years. Although discharges from net-washing operations have been regulated since the summer of 2005 and alternatives to the use of copper-based anti-fouling agents are being developed, discharges of copper are expected to increase. Substantial reductions in copper discharges will not be achieved without additional measures.

Medicines used in fish farming are to some extent released to the marine environment where they can affect organisms living in the wild. Consumption of antibiotics has been reduced by around 98 % since 1987 – from 50 000 to around 1 000 kg per year (see figure 7.9). But the Government considers it important to continue to monitor consumption and encourage the industry to improve disease prevention methods, particularly for new commercial species.

Although wrasses are being used to some extent for biological salmon louse control, this pest is really held in check by the relatively heavy usage of a few types of delousing agents. Delousing agents can have local environmental impacts, including harm done to crustaceans in the upper



Figure 7.8 Salmon and trout farm in Austevoll

Photo: Inge Røskeland

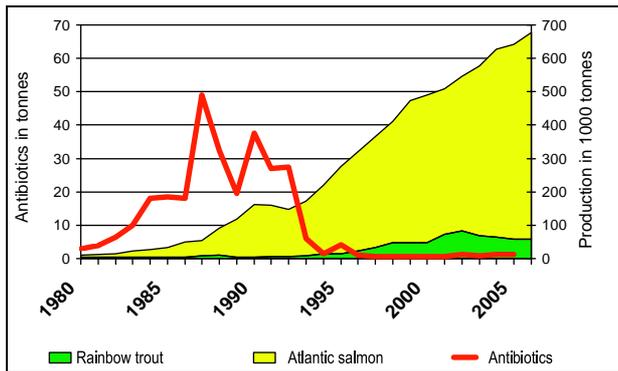


Figure 7.9 Antibiotics in fish farming 1980–2005

Source: Directorate of Fisheries and Norwegian Food Safety Authority

water layers around fish farms. These medicines do not bioaccumulate – instead they break down within a short time in the large volumes of water in which they are used. Delousing medicines will continue to be used to prevent salmon lice from affecting the health of farmed salmon and wild salmon alike, but greater use of wrasses in biological louse control would be a good way to reduce the use of chemicals.

The Government will provide a framework for a precautionary approach to management of the aquaculture industry in keeping with current knowledge and will continue to regulate the industry strictly. It is particularly important to continue monitoring consumption of antibiotics, particularly in the farming of marine species. The Government further intends to reduce the risk of resistance to antibiotics by promoting preventive measures instead of an increase in the use of antibiotics.

Salmon and trout production is expected to rise, and farming of marine fish and molluscs and sea ranching are on the rise as well. The Govern-

#### Box 7.11 Norwegians can generally eat more fish

The Scientific Committee for Food Safety has conducted an assessment of the nutritional benefits of eating fish and other seafood compared to the risk of consuming pollutants and other undesirable substances that fish and other marine species may contain. An overall assessment of nutritional and toxicological factors produces the conclusion that Norwegians can generally eat more fish and that the fish consumed should include both lean fish and fatty fish.

ment intends to ensure that further growth in aquaculture continues to produce clean food and reduces the overall environmental pressure from the industry.

### 7.8 Reduced releases from defence activities and civilian shooting ranges

The Government will:

- lay down conditions in discharge permits issued to military and civilian shooting ranges to minimise releases of heavy metals. Requirements to collect ammunition will be introduced where possible. New releases of priority ecological toxins from shooting ranges are to be eliminated by 2020
- tighten controls on the military use of white phosphorus by restricting its use to areas where complete combustion is certain to take place, thus ensuring that no white phosphorus is left in the environment.

Shooting at military and civilian shooting ranges releases large quantities of heavy metals into the environment. Releases from shooting by the Norwegian Armed Forces and Home Guard are calculated at around 150 tonnes of lead, 16 tonnes of antimony, 35 tonnes of copper and 6 tonnes of zinc. Civilian shooting releases around 38 tonnes of lead, 5 tonnes of antimony, 18 tonnes of copper and 2 tonnes of zinc. These metals are chiefly deposited in soil berms at the ranges and can lead to local runoff of heavy metals. Since lead shot was banned from shooting ranges in 2002, lead releases have been dropping, chiefly at the civilian ranges. The defence forces will phase lead and antimony out of their small arms ammunition by 2009.

To minimise ongoing releases, the Government will consider the requirements to be applied to the construction of soil berms at shooting ranges and to the control of heavy metal runoff. There are to be no further releases of priority heavy metals (lead, antimony and copper) after 2020.

White phosphorus is used by the military to lay smoke-screens during exercises on various artillery ranges. White phosphorus is an acutely toxic inorganic substance. As long as a normal air supply is present, white phosphorus will continue to burn until completely consumed, in which case it has no environmental impact to speak of. However, if rounds containing white phosphorus land in places where the air supply is restricted, such as in lakes

or swamps, it may not undergo complete combustion. In this case, it will remain toxic for many years and pose a serious toxic hazard for animals in the area. The defence forces currently have a self-imposed prohibition against using white phosphorus. The Government intends to tighten controls on the military use of white phosphorus by restricting its use to areas where complete combustion is certain to take place, thus ensuring that no white phosphorus is left in the environment. What is to be done with the white phosphorus already released to the environment will be discussed in more detail in Chapter 10.3.

## 7.9 Market potential for Norwegian industry, and economic policy instruments

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The Government will:

- help secure a head start and new market opportunities for Norwegian industry when the environmental technology markets expand
- consider stepping up the application of environmental taxes on hazardous substances, for example on releases of copper
- consider which instruments are most suitable for reducing the use and releases of triclosan.

### *The environment as a growth industry*

Stricter international rules on releases of hazardous substances, greater environmental awareness on the part of consumers and enterprises, and other factors have created considerable market potential in new environmentally sound technology. The OECD estimates the world market for environmental technology at NOK 4 trillion per year. Annual growth in this market is 5–20 %, higher than many other technology markets.

One of the Government's objectives is to ensure that Norway is at the forefront in environmental technology. There are many good examples of Norwegian companies that are at the leading edge in this area, including in the development of technologies to reduce releases of hazardous substances. This has provided economic growth and created jobs in Norway. Environmentally sound technology is promoted through regulatory measures and through research and development. The Norwegian Pollution Control Authority has also established a project to promote the development, use and export of environmental technology, with the construction industry as one of the priority areas.

### *Increased use of environmental taxes on hazardous substances*

Economic policy instruments can be one good alternative to direct regulation as a means of preventing environmentally harmful activity. Economic instruments such as environmental taxes provide a direct signal to producers and consumers of the environmental cost of pollution. Environmental costs included in the prices of polluting forms of production and products can influence choices of products and services. Economic instruments also provide incentives for manufacturers to choose cleaner technologies and systems/equipment for controlling emissions, to use more environmentally sound raw materials and to produce more environmentally sound products. Economic instruments will also provide incentives for continuing to develop environmentally sound technology and reduce emissions below statutory requirements.

Environmental taxes have for example been introduced on pesticides. The taxation system has helped to shift consumption towards preparations that pose less risk (see Chapter 7.6).

Environmental taxes provide incentives for taking effective steps to reduce emissions across a broad range of enterprises, such that enterprises where the costs of reducing emissions are lowest make the greatest relative cuts in their emissions, thus reducing pollution at the lowest possible cost. Another effect of environmental taxes is that the environmental costs involved in production translate into higher prices for products and services, thus influencing consumers to make environmentally sounder choices.

The Government will step up the use of environmental taxes on hazardous substances and will conduct assessments of appropriate candidates for taxation. The Government proposes to assess new instruments targeting copper, which may include environmental taxes (see sections 7.7 and 9.3.5), and triclosan (see section 9.3.4).

## 7.10 Transport

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The Government will:

- assess by 2008 the need for national measures to reduce releases of PAHs from transport
- take part in efforts to ensure the safe transport of hazardous substances
- strengthen the emergency response capability for dealing with accidents involving environmentally hazardous substances and dangerous

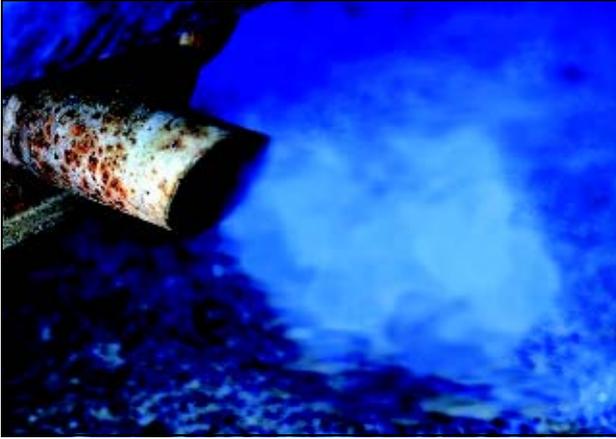


Figure 7.10 Vehicle exhaust contains hazardous substances

Photo: Marianne Otterdahl-Jensen

goods being moved by road, rail, sea or air transport

- step up efforts to introduce packaging for hazardous substances that is safe for industrial and consumer purposes
- work towards the entry into force of the International Convention on the Control of Harmful Anti-fouling Systems, and seek to ensure that the shipping industry
  - adheres as far as possible in practice to IMO's existing guidelines on the recycling of ships
  - implements IMO's revised regulations on chemicals.

#### Releases from road traffic

Hazardous substances released by motor vehicles come chiefly from exhaust gases and from wearing parts such as brake linings and tyres. Substances in exhaust emissions include mercury, copper, benzene, PAHs, arsenic and chromium.

Emissions standards for new vehicles are established internationally and have been tightened up over the past 10–15 years. These standards deal chiefly with emissions of NO<sub>x</sub> and particulate matter, but will also reduce emissions of hazardous substances in exhaust. It takes a fairly long time to replace the entire fleet of motor vehicles, so it will be some time before the new standards have much effect.

Implementation of EU legislation that requires new emission measurements will lead to better information on concentrations of PAHs. Measurements will start in 2007 and will reveal whether it will be necessary to implement national measures.

The health impact of hazardous substances released by wear on asphalt, brake linings and

#### Box 7.12 Brominated flame retardants in tunnels

Insulation materials in tunnels may contain brominated flame retardants. It is important to determine whether this is the case when replacing materials in tunnels because waste materials may be classified as hazardous waste if they are found to contain brominated flame retardants. They may also be found in adjoining concrete materials and in seepage water.

tyres is greatest in urban areas. High concentrations of PAHs in asphalt have been found in some places. Tyres contain heavy metals (lead, copper, zinc) and organic ecological toxins such as octylphenol and PAHs. The EU decided in June 2005 to restrict the maximum concentration of PAHs in the HA oils used in tyres. This applies to new tyres of all types and will enter into force on 1 January 2010. The Government intends to further clarify the impact of road traffic on health and the environment and will consider whether to introduce further measures on the basis of its findings.

#### Transport of dangerous goods

Transport of dangerous goods is a potential source of major spills of hazardous substances, and there is a risk of theft and misuse of dangerous goods. Broad new security provisions on the transport of dangerous goods have been implemented at national and international levels. To maintain a level of risk acceptable to society, priority will be given to such policy instruments as collaboration with other authorities and important user groups, legislative action, publicity and information, training and inspection and enforcement.

The Directorate for Civil Protection and Emergency Planning has issued guidelines on how to implement the security measures together with a model security plan for enterprises involved in transport of dangerous goods. These guidelines will also be of use to other enterprises that handle dangerous chemicals.

Whenever dangerous goods are handled at sea-ports, railway facilities or other cargo handling terminals, there is always the risk that an accident may happen. The Government intends to prepare a systematic overview of the risks associated with the transport of dangerous goods and identify any

needs for preventive or emergency planning measures to reduce these risks to an acceptable level. Among other things, the Government will:

- consider whether accident data and information on the quantities of dangerous goods transported on different roads and by different means of transport can be utilised in assessing overall risk reduction measures
- review all administrative agencies and legislation relevant to the transport of dangerous goods in Norway from the perspective of overall civil protection, and ensure that transport of dangerous goods takes place in a way that maintains the highest possible level of civil protection across all transport sectors. This work will be based on the results of a research project on risk levels and the roles played by various actors involved in the transport of dangerous goods, which is part of the research programme Risk and Safety in Transport (RISIT)
- take steps to improve the emergency services' expertise and ability to respond effectively to accidents involving dangerous goods, for example by facilitating exercises.

#### *Releases from shipping*

Shipping represents a potential for acute releases of dangerous or polluting substances. Moreover, ships discharge a number of pollutants to sea and air in the course of normal operations. When it comes to acute releases, the Government intends to continue the work on maritime safety and the oil spill response system presented in a recent white paper on the subject (Report No. 14 (2004–2005) to the Storting).

Shipping is regulated by international conventions within the framework of the International Maritime Organization (IMO). Discharges from tank cleaning or de-ballasting operations on board oil and chemical tankers are regulated by Annex I and II respectively of the MARPOL Convention. These annexes have recently been revised, and strict new amendments enter into force on 1 January 2007.

The revised annexes apply substantially tougher rules to discharges of chemicals in particular. The overriding principle is that no chemicals may be transported in bulk by chemical tankers unless the chemicals have first been classified with regard to safety and the environment. The new regulatory provisions only permit the release of cargo residues that are considered to present little environmental hazard. The Government will see to it

that the new regulations are implemented promptly.

Organotin compounds (especially TBT) do considerable damage to the aquatic environment. On 5 October 2001, IMO therefore adopted the International Convention on the Control of Harmful Anti-fouling Systems on Ships (the Anti-Fouling Convention). The convention prohibits the application of organotin compounds in anti-fouling systems to any ship from 1 January 2003, and it prohibits the presence of such compounds on ships from 1 January 2008. The Government will work towards the entry into force of the convention.

## **7.11 Acute pollution – prevention and emergency response measures**

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The Government will:

- improve the regulatory framework to ensure that any acute and uncontrollable releases of chemicals do not pose an unacceptable risk to third parties or to the environment
- give priority to the effort to establish an effective emergency response system to limit damage to life, health and the environment in the event of acute releases of chemicals
- take steps to strengthen collaboration between all agencies involved in emergency response efforts in order to promote effective responses to accidents involving hazardous substances
- see to it that guidelines are established for the proper and effective utilisation of Civil Defence resources by emergency services in the event of major chemical accidents.

### **7.11.1 Prevention of acute pollution and accidents**

#### *Enterprises that handle hazardous substances*

Society must require preventive measures to be taken during the handling of hazardous substances so that they do not pose unacceptable risks to life, health or the environment. Such measures must apply both to incidents that may occur in the normal course of operations and to deliberate undesirable actions. The Directorate for Civil Protection and Emergency Planning will incorporate security provisions in its revision of provisions relating to preventive measures in enterprises that handle hazardous substances.

The Fire and Explosion Prevention Act regulates preventive and emergency response measures in connection with the handling of flammable substances, explosive substances, substances

under pressure, and the transport of dangerous goods by road or rail. One of its main objectives is to set requirements for preventive measures with a view to safeguarding third parties against the adverse consequences of accidents involving the hazardous substances regulated by the Act. At present, the Act provides the legal authority for provisions regulating the storage of sulphur dioxide gas, but not for provisions regulating the storage of sulphuric acid. A spill of a large quantity of sulphuric acid can create a cloud of sulphuric acid vapour on contact with water, as happened in Helsingborg in Sweden in May 2005. The Government therefore intends to expand the definition of hazardous substances in the Fire and Explosion Prevention Act to include substances that undergo dangerous reactions with other substances, and will soon submit a bill to this end. This will provide a stronger legislative basis for reducing risks to third-party life and health.

#### *Major-accident hazards – the Seveso Directive*

The EU's Seveso Directive lays down special requirements for enterprises using or producing chemicals that are considered particularly dangerous and where accidents could cause major injury to persons or major damage to property or the environment. The directive names specific chemicals and groups of chemicals, and it requires operators to provide notification and reports to the competent authorities. Norway has implemented the requirements of this directive in its Regulations relating to major-accident hazards. The purpose of these regulations is to prevent major accidents and limit the damage caused by any such accidents that do occur. The Directorate for Civil Protection and Emergency Planning has been given the responsibility for coordinating the authorities' actions to follow up the major-accident hazard regulations, and a secretariat has been established for this purpose. Several major accidents at industrial establishments in other countries that come within the scope of the Seveso Directive have prompted the Government to review experience gained in other countries and see how it applies to Norway.

#### **7.11.2 Response to acute pollution**

Effective communication of information on hazardous substances, their properties and danger zones to emergency response personnel is essential in limiting loss of life and damage to health and the environment. This is why it is important for the authorities involved – the Directorate for Civil Pro-

tection and Emergency Planning, the Norwegian Pollution Control Authority and the Norwegian National Coastal Administration – to make a joint evaluation of effective ways of achieving this for all types of incidents.

It is essential that all who are involved in dealing with accidents involving chemicals have the expertise and equipment necessary to make the right decisions and take appropriate action. The Norwegian Civil Defence is a very important resource in the event of a major incident involving spills of chemicals beyond the capacity of the emergency services. The Government will see to it that good guidelines are developed for the emergency services on how to utilise Civil Defence resources properly and effectively when dealing with major accidents involving chemicals.

#### *The Government response to acute pollution*

The Pollution Control Act assigns primary responsibility for the emergency response to acute pollution to the enterprises that handle such chemicals. Secondary responsibility for the emergency response system lies with the local authorities. The Act requires the state to provide for the necessary emergency response system to deal with major incidents of acute pollution that are not covered by private or municipal emergency response systems. The Norwegian National Coastal Administration is responsible for the state emergency response system for acute pollution. Response capabilities are dimensioned on the basis of environmental risk and emergency response analyses. As in other emergency planning segments, they are not based on worst case scenarios or multiple simultaneous incidents. The state's emergency response to acute pollution is largely based on coordination with other authorities, organisations and institutions. It is mainly designed to deal with major oil spills from shipping. State emergency response supplies and equipment is stored in 15 depots along the coast and in Svalbard. The Norwegian National Coastal Administration also has four small oil spill response vessels and one surveillance airplane. Oil spill response equipment is also carried aboard a number of Coast Guard vessels.

The state's first line of response to accidents involving chemicals is to provide technical advice. A nationwide emergency response network consisting of expert organisations and institutions has been organised to provide assistance in connection with incidents that occur during land transport of dangerous goods. This national network is also linked up to a European emergency response net-

work covering 14 countries. And the Norwegian National Coastal Administration's 24-hour emergency response line ensures that in the event of an accident involving chemicals, assistance from experts from the chemical industry and relevant institutions is quickly available at the scene of the accident.

The role of the Norwegian National Coastal Administration is to ensure that action is taken by the polluter, by the local authority or by the appropriate state agency to deal with acute oil or chemical pollution, and that the steps taken are sufficient to prevent and limit environmental damage.

Analysis of shipping along the Norwegian coast in general, and the transport of chemicals along the coast and in Norwegian ports in particular, indicates that up until 2015, the general environmental risk will increase with the growing volume of oil transport by sea. The risk to the environment from the transport of chemicals by sea through Norwegian waters is considered to be small. There are some geographical areas where risks from the transport of chemicals by sea are somewhat higher, and special accident prevention measures such as vessel traffic service centres and special rules for navigation and passage have been implemented in these areas.

#### *Industry response to acute chemical pollution*

Enterprises that handle hazardous substances are required to establish their own emergency response systems in compliance with provisions of the Pollution Control Act, the Fire and Explosion Prevention Act and the Civil Defence Act. The major-accident hazard regulations also lay down specific requirements for emergency response systems in industrial enterprises. The authorities responsible for administration of the legislation mentioned above are also the supervisory authorities for these requirements. Emergency response systems and contingency plans must focus on limiting harmful impacts on humans, the environment and property and must be possible to implement immediately in the event of an accident. Plans must be reviewed and updated regularly, and enterprises are required to hold exercises, both on their own and in collaboration with the external public emergency response agencies. The 10 largest chemical-handling enterprises in Norway have together with the Rescue Coordination Centre in

South Norway, the 335th Air Wing and the Norwegian Industrial Safety and Security Organisation established a joint arrangement for mutual assistance in the event of accidents.

#### *Intermunicipal acute pollution control committees*

The public-sector emergency response to accidents involving dangerous goods and chemicals is based on the local fire departments providing the front-line response. Most fire departments are fully competent to deal with the most common flammable substances, but many hazardous substances require special equipment and procedures. The municipal emergency response system is organised in 34 regions administered by intermunicipal acute pollution control committees. This intermunicipal system is dimensioned to deal with acute spills of chemicals of the sort that can occur in connection with ordinary activity in the region in cases where no private-sector emergency response system has been established for this purpose. In most of the regions, the host fire departments are relied on for the specialist expertise and equipment for dealing with accidents involving dangerous goods or substances.

#### *Responsibility of local, regional and national authorities for external emergency response planning*

The EU's Seveso II Directive requires the competent authorities to prepare local and regional external emergency plans providing for the necessary measures in the event of accidents, and that they are tested and exercises are held. Norwegian enterprises to which the major-accident hazard regulations apply must comply with the same requirements. Enterprises subject to reporting requirements are to provide the public authorities with the information they need to prepare external emergency plans.

The Government expects all those involved in this work (including the public health authorities) to have established emergency response plans and to hold exercises so that they are prepared to deal with any incidents. The Government will strengthen cooperation between all actors, both public and private, to ensure the best possible response to accidents involving chemicals.

## 8 A safe working environment

The Government's objective is to promote an inclusive working life where due account is taken of both mental and physical aspects of worker health.

The Government will therefore establish a framework that provides workers with effective protection against the harmful effects of chemicals in the workplace. To achieve this, knowledge about the harmful properties of chemicals must be developed and disseminated. Furthermore, individual enterprises must take chemical health hazards seriously; they must carry out systematic surveys and risk assessments of relevant chemical health hazards and implement appropriate preventive measures.

### 8.1 The extent and health effects of occupational exposure to chemicals in Norway

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Figures from Statistics Norway's survey of living conditions from 2003 suggest that 13 % of the workforce, or about 310 000 employees, are exposed to harmful substances in the form of dust, gas or vapour for a large proportion (more than 50 %) of their working hours, and about 7 % of the workforce, or about 170 000 employees, are exposed to substances that are irritating to the skin for a large proportion of their working hours. In addition, many workers are exposed to chemicals for less than 50 per cent of their working hours. In 1998, the Norwegian Labour Inspection Authority estimated that 3 % of absence due to illness in Norway was a result of exposure to chemicals. It was also calculated that absence due to illness and exclusion from the labour market as a result of exposure to chemicals were reducing wealth creation in Norway by around NOK 3.5 billion per year. Hospitalisation costs linked to this problem were calculated at NOK 54 million per year. Besides being an important cause of exclusion from the labour market, exposure to chemicals often affects the health of workers in ways that reduce their quality of life substantially. On a general basis, it can be stated that a substantial proportion of the health injuries in the Norwegian population that are directly

related to chemicals are a result of occupational exposure.

According to a report issued by the National Institute of Occupational Health in 2005, international scientific research indicates that approximately 15 % of all cases of asthma, chronic obstructive lung disease (COLD) and lung cancer in men can be linked to the working environment. In Norway, the Norwegian Labour Inspection Authority estimates that 700–800 persons die every year of cancer or COLD caused by exposure to chemicals at work. Respiratory complaints are the third most common cause of absence due to illness and exclusion from the labour market, after musculoskeletal disorders and mental illness, and the Labour Inspection Authority estimates that at least 20 % of these respiratory complaints are occupational diseases linked to airborne pollution in the workplace. Contact eczema is the most common occupational skin ailment. Both respiratory complaints and skin complaints take a long time to develop, are often chronic, and they can appear after exposure has discontinued. Other respiratory diseases such as chronic bronchitis, allergic reactions like asthma, and diseases of the lungs are reported regularly. Reported cases of contact eczema and allergic eczema are also common. Permanent damage to the central nervous system caused by occupational exposure to organic solvents is still being reported at a rate of up to 100 cases per year.

In addition to respiratory and skin complaints, cancer and damage to the central nervous system, occupational exposure to chemicals can cause reproductive problems and acute toxicity in very rare cases.

Figures from the Product Register show that it has registered approximately 15 000 chemical products that are classified as hazardous to health and/or the environment, and another 10 000 products that may contain hazardous substances. There has been an increase in the number of sensitising and carcinogenic substances being registered, but this may be partly due to better registration and partly to the increase in the number of substances classified by the authorities, rather than to a real increase in the use of chemicals. Most of the chemicals in the register are substances with sensitising



Figure 8.1 Occupational exposure to chemicals during hot work

Source: Ministry of Labour and Social Inclusion

ing, corrosive or irritating properties or solvents that can damage the central nervous system. Cosmetic products, such as those used in the hair-dressing industry, are exempt from this registration scheme.

Exposure to chemicals occurs in all the main occupational sectors in connection with the use of products such as cleaning agents, lubricants/cutting fluids, metal dust/vapour, mineral dust, fibres, organic/inorganic/biological dust, organic solvents, organic and inorganic gases, pesticides, plastic chemicals and monomeric/polymeric compounds and additives used in paint, varnish, glue, insulation and insulating foam. Some industries have greater problems than others, however, and workers in high-risk industries may be exposed to several chemicals simultaneously. A level of exposure considered safe when a single substance is involved is not necessarily safe in the context of simultaneous exposure to other substances. There is little knowledge currently available on the health impacts of this type of simultaneous exposure.

Secondary exposure to chemicals can also occur in the workplace. For example, there are many substances which, when heated, break down and give off complex mixes of chemical vapours which may be highly reactive, irritating, sensitising or hazardous in other ways. This may take place in connection with heating or hot processes in such places as engineering works, foundries and smelting works.

Welding, thermal cutting, thermal coating, carbon-arc cutting, brazing, grinding and other types of hot work may produce toxic substances of possibly unknown structure that can irritate and have a sensitising effect on the respiratory system. This is one of the problems confronting the petroleum industry, which will have to dismantle a number of installations in the foreseeable future. This issue is being dealt with in cooperation between the Petroleum Safety Authority, the Norwegian Labour Inspection Authority and the Norwegian Maritime Directorate, and was discussed in the white paper on health, safety and the environment in the petroleum industry (Report No. 12 (2005–2006) to the Storting).

The occupational exposure database (EXPO) maintained by the National Institute of Occupational Health registers data on some of the workplace exposure measurements taken in Norway, and can with certain reservations identify trends in occupational exposure to chemicals. This institute is Norway's national research institute for occupational health and the working environment. Its activities include research, training and dissemination. The institute's main objective is to compile and disseminate knowledge on the connections between work and health. One of the most important priorities for the institute is occupational chemical/biological exposure and its impact on health. Over 120 000 samples from approximately 5000 enterprises taken from 1984 to the present are stored in the EXPO database. Figure 8.2 shows a

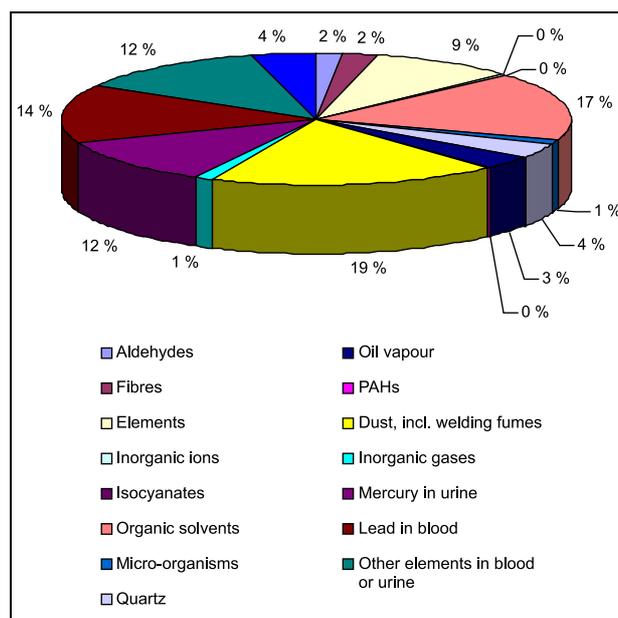


Figure 8.2 Exposure measurements in the EXPO database

Source: Ministry of Labour and Social Inclusion

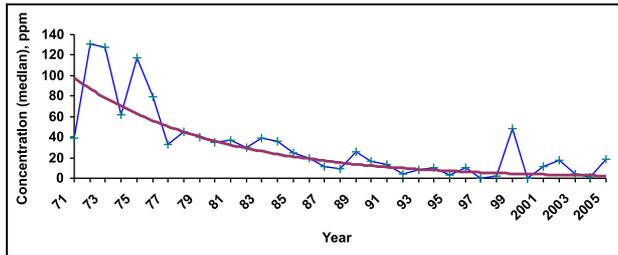


Figure 8.3 Trend in concentrations of styrene in the working atmosphere in Norway's polyester industry from 1971 to 2006. The red line is a smoothed trend line.

Source: Ministry of Labour and Social Inclusion

summary of the types of chemicals for which exposure measurements have been taken at Norwegian workplaces over the past 20 years.

Despite the quantities of data stored in the EXPO database, little of the information on levels of exposure to chemicals at Norwegian workplaces has been collated and our present knowledge is limited. Moreover, there are uncertainties regarding the data on which the assessment of chemical exposure and its impact on health are based.

Better knowledge, a stronger regulatory framework and better organisation of workplaces have made it possible to reduce worker exposure to harmful chemicals considerably. And not only have levels of exposure been reduced, the number of people exposed to chemicals has been reduced as the proportion of the workforce working under conditions that involve exposure has been reduced.

As an example of a declining trend in exposure, figure 8.3 shows that levels of exposure to styrene in the polyester industry have been reduced substantially from 1971 to the present. This has been brought about through a concerted effort by the industry itself and by the working environment authorities. Figure 8.4 shows a typical exposure situation in the smelting industry, which clearly shows why workers in this industry may be exposed to higher levels of PAHs than the general population, who are only exposed to lower levels released to the atmosphere.

A sound principle of preventive work is to focus on the measures that are likely to have the greatest preventive effects. And preventing injury to health from exposure to chemicals will have a considerable impact in the working environment, which is where most demonstrable injuries occur.

The development of a disease today is often caused by exposure that took place long ago. The

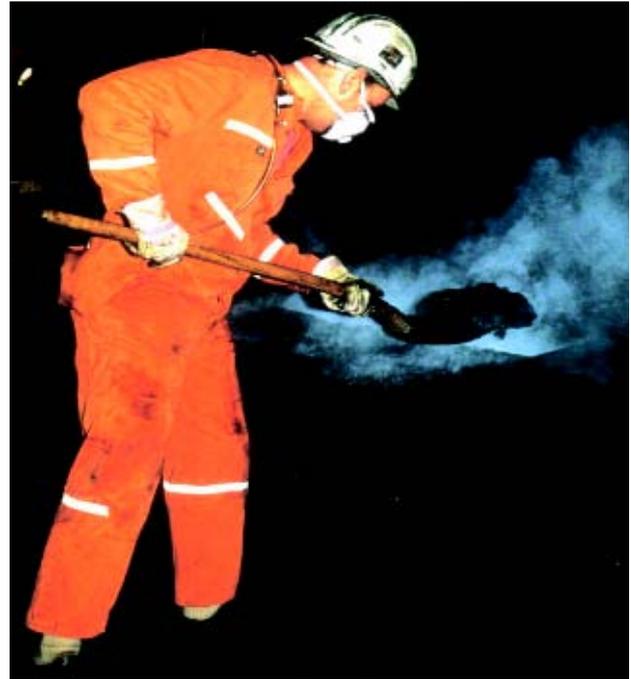


Figure 8.4 Exposure to PAHs in the smelting industry

Source: Ministry of Labour and Social Inclusion

onset of cancer, for example, may come as many as 30 years after the period in which exposure took place. This means that symptoms diagnosed today are not necessarily linked to current levels of exposure. It is just as likely that they are the outcome of previous levels of exposure. One example of a disease with a delayed onset is the type of lung cancer linked to exposure to asbestos, where new cases continued to appear long after asbestos was banned. In many cases it is difficult to establish clear connections between exposure to substances at a specific workplace and the impact of the exposure on health if there is a long delay between exposure and illness, particularly if a worker is no longer employed in the workplace where exposure occurred.

### 8.1.1 Chemicals in the petroleum industry

A recent white paper on health, safety and the environment in the petroleum industry (Report No. 12 (2005–2006) to the Storting) gave an account of exposure to chemicals in the petroleum industry. During the drafting of this white paper, a joint working group was appointed to assess past and present exposure to chemicals in the petroleum industry. The group concluded that the working environment on the continental shelf is safe, though it identified a number of problems related

to current work with chemicals. However, the group also noted that from the start of petroleum activities in 1966 until around 1980, too little was known about the risks associated with the use of and exposure to chemicals, and their impact on health. The group also concluded on the basis of current knowledge that it is reasonable to conclude that certain groups of employees may have been exposed to high concentrations of chemicals, and that this may have had long-term effects. An initiative has therefore been taken to survey historical exposure levels as far as possible.

According to Summary Report phase 6 (2005) on the Petroleum Safety Authority project Trends in Risk Levels – Norwegian Continental Shelf, many companies are not meeting their obligation to perform risk assessments of their use of chemicals, they use an unnecessarily wide range of chemicals that represent considerable health hazards, and they are doing little to phase out hazardous substances.

## 8.2 Protecting workers against hazardous substances

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Chapter 3.1 presents a number of key principles of Norway's chemicals policy, among others that prevention is better than remediation, that the business sector has a responsibility for the use of chemicals, that the substitution principle should be applied to phase out hazardous substances, and that consumers and employees are entitled to relevant information on chemicals.

These key principles are also reflected in Norway's approach to protecting workers from hazardous chemicals.

Employers are responsible for safeguarding their employees from harmful exposure to chemicals and for ensuring compliance with the legislation. The Working Environment Act requires workplaces to be organised in such a way that employees are protected against accidents, injury to health or appreciable discomfort when handling chemical or biological materials. Employers are required to assess risk factors in the working environment and to take steps to reduce risk. Employees are required to take part in the organisation, implementation and promotion of systematic health, safety and environmental work. This includes using prescribed safety equipment, exercising caution and otherwise taking steps to prevent accidents and injury to health.

One well-established principle when it comes to the working environment is that worker protection

should chiefly be based on the elimination of sources of exposure.

It follows from the requirements of the Working Environment Act relating to risk analysis and risk-reduction measures that employers must evaluate opportunities for substitution. This means that chemicals that may constitute a health hazard are not to be used if they can be replaced with non-hazardous or less hazardous chemicals, or with processes that are less hazardous for the employees. In addition, exposure times must be reduced to a minimum and the number of employees exposed must be kept to a minimum. Protective equipment should be used only if exposure cannot be prevented by other means.

Exposure to chemicals is regulated through indicative limit values for contamination of the working atmosphere. These norms are defined such that exposure for a full work week over a 40-year period will not cause any injury to health. Limits established to prevent injury to health from exposure to some constituents of air pollution are often based on lifetime exposure, i.e. 24 hours a day for 70 years. This reflects the fact that the general population also includes extremely sensitive individuals such as children, the elderly and the infirm, who also need to be protected.

Exposure near a source of pollution, as in the workplace, usually entails much higher levels of exposure than those encountered by the general population after pollutants have been dispersed and diluted in the external environment. On the other hand, the number of people who may be exposed to chemicals is higher in the general population than in the workforce, and it is not just human health that is at stake, but also the environment in general. In simple terms, in the external environment, many people and other forms of life are exposed to relatively low levels of pollution, whereas in the working environment, relatively few people are exposed to higher levels of pollution. These differences have engendered differences in chemicals policy and regulatory frameworks between these two sectors. For example, limit values applicable to the external environment are established by experts on a purely scientific basis, often based on extrapolations from animal studies or biological test systems. But such limit values are not widely used. As regards the working environment, however, experts provide a scientific basis for indicative limit values in relation to critical doses for humans, after which the Norwegian Labour Inspection Authority determines these values in dialogue with the social partners. In practice, this means that limit values recommended for

exposure to pollutants in air for the general population are lower than the indicative limit values that apply in the workplace. But one fundamental principle must hold: all use of chemicals in the workplace must be based on knowledge of their impacts on health and the environment, and on compliance with the legislation.

### **8.3 Finding a balance between working environment, health and environmental considerations**

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Measures to limit the use and impact of hazardous substances will have benefits in the form of lower exposure and emissions levels in a number of areas.

In general, important synergy effects can be achieved between measures implemented in the working environment and in the external environment provided that a balance is achieved between the two sectors in priorities and the input of resources.

In most aspects of chemicals management, any measures implemented may have a positive impact on the working environment, on health and on the external environment. For example, improving knowledge of the intrinsic hazardous properties of chemicals would be valuable in all three areas. As a case in point, substances with environmentally hazardous properties are not merely an environmental risk, they are also a risk to human health via the working environment or the external environment. This often applies to substances with reprotoxic and mutagenic properties. Since levels of exposure in the working environment are generally higher than they are in the external environment, the effects on health of occupational exposure to chemicals are easier to identify. Thus, there is considerable potential for transferring knowledge gained in a working environment context to the environmental sector. For example, PFOS, which has been shown to be persistent, bioaccumulative and toxic, was first found in the blood of workers at 3M in Canada, and 3M accordingly stopped using it in its products. Without this warning, levels of PFOS in the environment would probably have been much higher today than they actually are.

On the other hand, measures implemented in one of these fields may come into conflict with concerns in the other. There have been examples of targeted environmental measures that have actually increased the risk of harmful exposure of employees. In other cases, employee safeguards

have led to higher releases of hazardous substances to the environment. An effective chemicals management regime requires good coordination and the incorporation of health and environmental data into risk assessments and measures. The Government will give priority to ensuring that impacts on the working environment, health and the external environment are all included in assessments of regulatory measures concerning chemicals.

Any prohibition or restriction applied to specific substances is likely to result in their replacement with other chemicals with similar performance characteristics, but with different impacts on health and the environment. In such cases, working environment and environmental considerations may conflict with each other, and additional measures may be necessary to resolve the situation. For example, persistent compounds might be replaced with more easily degradable compounds for environmental reasons without any consideration of the impact an alternative compound could have on the health of workers in close proximity to the source of pollution. Similarly, compounds that are an occupational risk may be replaced with compounds that are an environmental risk.

If regulation of a substance because of concerns in one area may reduce levels of protection in other areas, appropriate regulation in the other areas should be considered in advance in order to maintain a high level of protection in all three areas: public health, occupational health and the environment. In cases where it is impossible to reconcile these interests by means of normal measures and mechanisms, it will be necessary to assess the socio-economic benefits of the various measures and set priorities among them. In any case, the requirement of the Working Environment Act for a sound working environment and the prohibition against pollution in the Pollution Control Act provide guidelines for these assessments.

Companies involved in clean-up, take-back and collection of hazardous substances and products are a rapidly growing and necessary branch, like those involved in sorting of waste at source and waste treatment. However, all such activities entail occupational exposure of workers to the discarded substances from which the environment is to be protected. The Government will therefore provide a framework for such operations that safeguards worker health, public health and the environment. Workers involved in clean-up operations also risk exposure to hazardous substances for years after such substances have been banned. Risk assessments must therefore be carried out before new environmental clean-up operations are started,

which include impacts on worker health and a review of possible measures for protecting worker health. A practical example of what can be done is technical modifications to vehicles used for kerbside collection of sorted waste in order to minimise the risk of harmful occupational exposure to bio-aerosols.

Good documentation of possible health hazards to workers from alternative chemicals and new pollutants that may be generated after technological changes must be obtained, and must include assessments of critical doses for humans. It is important to take an overall approach to both prohibition and substitution, which means that health, safety and environmental considerations are weighed against each other and evaluated on the basis of impact assessments. This process must involve cooperation between industrial actors and supervisory authorities in relevant sectors. Cooperation and coordination mechanisms in chemicals policy are discussed further in Chapter 11.

Measures to ensure that information about chemicals is generally available will also help to improve chemicals management with respect to the working environment, to health and to the external environment. A greater awareness of routes of exposure and the effects of exposure would also be likely to improve understanding of the risk-reduction measures that are necessary in various areas. The Government has identified a need for cross-sectoral research in Chapter 6.

#### 8.4 Measures and follow-up

The Government has made it clear that it expects enterprises to apply risk management tools to their use of chemicals. Moreover, the Government will:

- give priority to inspection and control of what enterprises are doing to prevent injury to health from exposure to chemicals in the workplace, both in mainland industry and in the offshore oil industry
- make provision for medical follow-up of groups concerned about the effects of past exposure to chemicals in the petroleum industry
- give priority to improving knowledge on chemicals by maintaining the R&D effort in this field
- give priority to the development and better utilisation of the existing body of data through monitoring and improved methods of collecting and collating data.

Between 2003 and 2006, the Norwegian Labour Inspection Authority conducted a national campaign against hazardous exposure to chemicals. The goal of this campaign was to improve awareness of chemicals use in enterprises by encouraging them to survey the health hazards and assess the risks posed by the chemicals in their own working environments. This was intended to provide a basis for enterprises to draw up plans for reducing the risk of health injury. Employees also need better knowledge of the work operations they perform so that they can do more to ensure their own safety. The campaign focused on a few industries in which chemicals are widely used, encompassing over 10 000 enterprises and 110 000 employees:

- Motor vehicle repair
- Manufacture, maintenance and repair of machinery, metal goods, etc.
- Reinforced thermoset plastics (boats, fibreglass tanks, etc.)
- Publishing and printing.

An evaluation of the campaign was concluded in November 2006.

In the petroleum industry the focus is on integrating the chemical working environment into the overall risk management regime and achieving a better balance between the various health, safety and environmental considerations associated with the use of chemicals.

In 2006 and 2007, the Petroleum Safety Authority, in collaboration with the social partners, is conducting a project that will lay the groundwork for a historical risk assessment and for setting priorities for future chemical research efforts. This includes a survey of problem areas and gaps in knowledge. The Standing Committee on Labour and Social Affairs has pointed out the importance of ensuring that groups who are now concerned about the effects of past exposure to chemical health hazards in the petroleum industry are followed up by medical professionals (Recommendation S. No.197 (2005–2006)). The Government is encouraging follow-up in the form of examinations by occupational health specialists. The working environment authorities have taken the initiative to formulate joint guidelines for such patient examinations at all the occupational health departments at regional hospitals and to establish measures for coordinating this effort. Among other things, this will provide a better basis for evaluating any applications for occupational injury compensation that may be forthcoming.

The Government intends to maintain the research effort in the field of health, safety and

environment in the petroleum industry, and has pointed to the need to learn more about exposure to chemicals. The industry will also be required to meet strict requirements relating to knowledge development, the development of risk indicators and monitoring and inspection of the chemical working environment.

The Government will take steps to raise awareness of chemical health hazards in the workplace. It has previously been noted, for example by the Office of the Auditor General (in Document No. 3:9 (2001–2002) and the Storting's follow-up document) that the authorities do not have an adequate overview of the use of chemicals that represent health risks in the workplace, and that compliance with the provisions of the Working Environment Act relating to the replacement of chemicals that are hazardous to health is not satisfactory. Therefore, the Government has signalled its determination to strengthen the knowledge base by establishing the Department of National Surveillance of the Working Environment and Health at the National Institute of Occupational Health in 2006, and by establishing a department for documentation and analysis at the central office of the Norwegian Labour Inspection Authority in Trondheim.

To improve documentation on the sales and use of dangerous chemicals, the Government will consider the possibility of expanding the duty to declare chemicals to the Product Register to include some chemical substances and products that are not regulated by the provisions of the Chemical Labelling Regulations. Examples of such substances are cosmetics and solvents. For further discussion of this proposal, see Chapter 9.9.

Data from exposure measurements for chemical/biological/physical factors registered by the

enterprises that monitor and record such information is the property of the individual enterprise. This data is used to some extent in documenting the enterprises' own risk assessments, but is not generally accessible at present for the purpose of compiling information on exposure levels and trends at a level higher than the individual enterprise. As a result, the information available to authorities and decision-makers on national exposure trends in Norwegian workplaces is very limited. Moreover, a large number of new chemicals and altered industrial processes are introduced every year. In consequence, the pollution situation is continually changing, and «new» problems associated with chemical, biological and physical exposure factors are emerging all the time. This creates a pressing need to collect and organise information in this field. To ensure better data capture, exposure data from enterprises should be available in a suitable format. A move is being considered to develop a system based on existing law which would provide for the systematic transfer of exposure data from the enterprises to the Norwegian Labour Inspection Authority and the Petroleum Safety Authority, and on to the National Institute of Occupational Health for entry into the EXPO database. There is also a need for systematic exposure surveys in selected, relevant industries for the purpose of obtaining representative measurement data on selected pollutants in Norwegian workplaces. Registering data of this type in the EXPO database would provide a basis for studying trends in exposure levels over time, improve the knowledge base and form part of the basis for the work of the Department of National Surveillance of the Working Environment and Health.

## 9 Safe consumer products

In the future, one of the main challenges will be to ensure that all the products we use are safe both for our health and for the environment. To achieve this, chemicals must be produced and used in ways that present the least possible risk to health and the environment. Products must not contain chemicals that will turn up in our food and accumulate in our bodies, in our children or in future generations. The products we use must not pollute the environment, neither locally nor globally. A concerted effort will be necessary to develop alternatives to hazardous substances and put them to use, and to achieve the goal of a non-toxic future with safe products.

The Government will eliminate the use of the most hazardous ecological toxins, place stricter controls on the most dangerous substances and improve the flow of information on hazardous substances. This will safeguard our right to the information we need to choose products containing few or no hazardous substances and products whose production does not have negative impacts on health or the environment.

### 9.1 Challenges related to products

Consumers have an impact on the environment through their behaviour – for example, through the products they buy. If we are to succeed in maintaining a reasonable standard of living coupled with an environmentally sound consumption pattern that does not pollute the environment, we must all contribute. And in order to do this, consumers must be given access to sufficient information to offer them a real opportunity to avoid products containing hazardous substances.

Chemicals are used in all kinds of products to enhance their properties. Hazardous substances are thus found in textiles, furniture, toys, hobby supplies – all the ordinary products we use in our daily lives. In recent years, the proportion of releases of ecological toxins and other hazardous substances originating from products has been rising relative to that from traditional sources of pollution such as manufacturing and combustion plants. Thus, the main challenge today arises from hazardous substances released during the use of products

#### Box 9.1 Products and releases

For a number of substances such as perfluorinated compounds, short and medium chain chloroparaffins and musk xylenes, products are the only source of releases in Norway. Products are also the chief source of releases of a number of heavy metals such as lead, arsenic, copper and chromium.

or generated when they are discarded as waste, rather than during production processes.



Figure 9.1 Hazardous substances are found in many of the products around us

Photo: Marianne Otterdahl-Jensen

### Box 9.2 Biocides

Biocides are substances that are used to combat harmful organisms. Within the EEA, there is an authorisation system dealing specifically with biocidal products. Examples of products falling within the scope of biocide legislation include wood preservatives, rodenticides, insect repellents and antifouling products for boats. Many biocides and biocidal products have properties that give cause for serious concern in terms of health and the environment. The biocidal product legislation has established common rules for authorising active substances (biocides) and biocidal products containing these active substances for marketing in all EU and EFTA countries.

Authorisation of active substances and biocidal products is based on thorough assessments and will therefore help to raise the standard of protection of human health and the outdoor environment.

Hazardous chemicals from consumer products are dispersed particularly widely and effectively, and they are refound in nature, in our homes, in house dust, in the food we eat and in our blood. They are released when products are manufactured, used or discarded as waste. It will therefore not be possible to achieve the national target of eliminating the use and release of substances that pose a serious threat to health or the environment by 2020 if ecological toxins continue to be used in common consumer products.

Children, like adults, are exposed to hazardous substances in products. They are also a particularly vulnerable group because they are still developing and are therefore even more susceptible to the harmful effects of hazardous substances. Some substances can cause permanent damage or serious illnesses later in the life of an individual who has been exposed to high concentrations of these substances in childhood or before birth. Allergies in particular are a growing problem; the onset of allergy in most people with allergies takes place in childhood.

Little is known about what products contain. The growing proportion of imports, especially from non-EU countries, adds to the problem of obtaining adequate information. Inspections show that many

### Box 9.3 Current product regulations

The Regulations relating to restrictions on the use of chemicals and other products hazardous to health and the environment (the Product Regulations) govern the use of a wide range of substances. Examples of controls relating to specific consumer products include a ban on phthalates in toys for children below the age of three, a ban on the use of certain substances in textiles and leather goods, and a prohibition against body jewellery, spectacles, jewellery, etc. that contain nickel.

importers and dealers do not know which substances their products contain, and in consequence, products containing hazardous substances are being marketed without buyers or sellers being aware of this. Small and medium-sized enterprises that use products containing hazardous substances also need to know more about the products they use.

Trade in products contributes substantially to wealth creation in Norway. Trade restrictions normally add to the cost of doing business, and these costs are even greater if more environmentally sound alternatives are not commercially available. Products are now traded in international markets, and any Norwegian prohibitions or other measures must be harmonised with Norway's international commitments in the areas of product and trade regulation.

The authorisation procedure under REACH may prove to be an effective means of eliminating the use of the most dangerous substances – both those that pose the greatest health hazards, and ecological toxins (see discussion of REACH in Chapter 5).

## 9.2 Eliminating the use of ecological toxins in consumer products

The Government will:

- consider introducing a comprehensive prohibition against ecological toxins in products intended for private consumers.

To reduce the spread of ecological toxins from products and to ensure the safety of products in the

consumer market, the Government will focus particularly on eliminating the use of ecological toxins in consumer products.

The Government is therefore considering a comprehensive ban on ecological toxins in ordinary consumer products, which would do much to eliminate the use of these substances and their release from products, and also help to reduce pollution from products when they are discarded or find their way into the waste water system. A very important point, in the Government's view, is that a general prohibition of this kind would reverse the principle followed in the current legislation, which regulates specific areas of use. Thus, certain ecological toxins would be prohibited in consumer products in general, but specific exemptions would be made where no adequate alternatives are avail-

able or where it is certain that the use of these substances poses no risk to health or the environment. When exemptions are being considered, other factors that will be given weight are whether barriers to trade can be introduced and what they would cost. Moreover, by introducing a general prohibition against these substances, the authorities can ensure that the ban covers areas of use they are unaware of at the time and any new areas of use that arise. This means that the burden of proving that no satisfactory alternatives are available will be on the manufacturers and importers.

Other control measures are also being considered for substances that for various reasons are not most appropriately dealt with by means of prohibitions.

Table 9.1 Ecological toxins that may be prohibited in consumer products

Substance/ecological toxin	Examples of products and areas of use
Cadmium and cadmium compounds	Various plastic products and paints
Lead and lead compounds	Various plastic products and fishing gear
Arsenic and arsenic compounds	Electrical and electronic (EE) equipment, various plastic products
Diethylhexyl phthalate (DEHP), Decabromodiphenyl ether (deca-BDE)	Plasticisers for plastic, rubber, paint, glue, insulation foam Textiles, transport machinery (cars, trains, aircraft), furniture, paints, glues and insulation foam, EE equipment, insulation and various plastic products
Medium chain chlorinated paraffins (MCCPs)	Insulation materials, leather waterproofing, soft plastics, paint, rubber and polyester
Tetrabromobisphenol A (TBBPA)	Various plastic components in EE equipment, insulation products, paints and glues
Hexabromocyclododecane (HBCDD)	Plastic goods, upholstery and interior textiles, insulation materials, paint, glue and insulation foam, EE equipment, transport machinery
Nitro musk compounds (musk xylenes og musk ketones)	Fragrances in cleaning products, car wax, floor and furniture polishes
Perfluorooctyl sulphonate (PFOS)	Textiles
Cationic surfactants (DODMAC/DSD- MAC, DTDMAC, DHTMAC)	Boat and car care products, floor polish, cleaning products
Bisphenol A	Polycarbonate plastic («plastic» glass), electrical equipment, paint, glue and various plastic products
Mercury and mercury compounds	EE equipment, plastic products, dental amalgam
Perfluorooctanoic acid (PFOA)	Textiles, waterproofing, floor polish, paints
Pentachlorophenol	Painted products
Triclosan	Textiles, detergents and cleaning products, plastic products and paint
Tributyl tin and triphenyl tin (TBT and TPT)	Treated wood products, textiles, painted products (chiefly antifouling agents)

The Government's aim is for a wide-ranging prohibition to include substances whose toxic, persistent and bioaccumulative properties are reasonably well-documented, and whose presence in the environment in appreciable concentrations is equally well-established. So far, 21 substances are considered relevant for prohibition in consumer products in addition to substances that are already adequately regulated by the Product Regulations (see table 9.1). Most of these substances are on the Government's priority list. Further substances may be considered for inclusion in the prohibition. Prohibition would apply to a number of products that contain the substances in question.

Many of the substances in question are already banned in cosmetic products. The Government will also consider further prohibitions against certain substances in cosmetics and hair care products on environmental grounds.

#### Box 9.4 Which products contain ecological toxins?

Ecological toxins that may be prohibited are found in quite ordinary consumer products such as:

- Plastic products – toys, waterproof clothing, floor coverings
- Building materials – insulation, moisture-resistant wallboard, ceiling panels, pipes
- Paints and glues
- Textiles
- Car care products
- Cosmetic products



Figure 9.2

Source: Norwegian Pollution Control Authority

Any Norwegian regulation of the use of ecological toxins in consumer products will have a major impact on trade in these products. Regulatory measures will have to be consistent with Norway's international obligations regarding product control and trade. Under the EEA Agreement, Norwegian and EU chemicals legislation is harmonised. This means that as a general rule, the same requirements apply in both Norway and the EU, but there is some room for national regulation of a number of specific substances and areas of use. Norway has most room for manoeuvre in areas where the legislation is not fully harmonised. It is more difficult for Norway to lay down stricter rules than the EU for substances and areas of use that are specifically regulated in fully harmonised regulations and directives, although there are possibilities for doing so.

The Government is focusing on consumer products because consumers are generally less knowledgeable than professional and industrial users of products, and because pollutants from consumer products become more widely dispersed in the environment than other pollutants. Consumers also have a poorer basis for choosing more environmentally sound products than do professional users, and are less able to apply safety measures to protect themselves. Some of the same problems apply to products sold to professional users, however, so the Government will consider whether there is a need for a corresponding prohibition against ecological toxins in products aimed at the professional market.

### 9.3 Action to be taken against certain hazardous substances

In addition to a wide-ranging prohibition against ecological toxins in consumer products, the Government will introduce regulatory measures to eliminate the use of certain substances completely. These measures are described below.

#### 9.3.1 Mercury – still found in products

The Government will:

- consider the introduction of a ban on the use of mercury in products, and advocate the phasing out of mercury in products in the EU and EFTA countries.

Mercury is one of the most dangerous ecological toxins and represents a threat to human health and the environment. Because of mercury pollution,

### Box 9.5 Mercury in thermometers

The production, import, export and placing on the market of thermometers containing mercury have been prohibited since 1 October 1998. To prevent mercury thermometers sold prior to this date from ending up in ordinary household waste, the Norwegian Pollution Control Authority conducted a nationwide campaign to collect discarded thermometers. Approximately 110 000 thermometers were collected and properly dealt with. This means that one out of approximately every 14 households in Norway delivered one thermometer. Altogether, these thermometers held around 220 kg of mercury.

the food authorities still advise against excessive intake of such fish as trout and char. Although mercury is already prohibited in many products, it is still used in dental amalgam, light sources and measuring equipment. Mercury releases from products account for approximately 20 % (206 kg) of Norway's total releases of mercury. In order to achieve the target of reducing mercury releases substantially by 2010, the Government will introduce a general ban on mercury in products, with the exception of a few very important applications, and certain types of electrical and electronic equipment. The aim is to introduce this prohibition in the spring of 2007. A ban on mercury in Norway

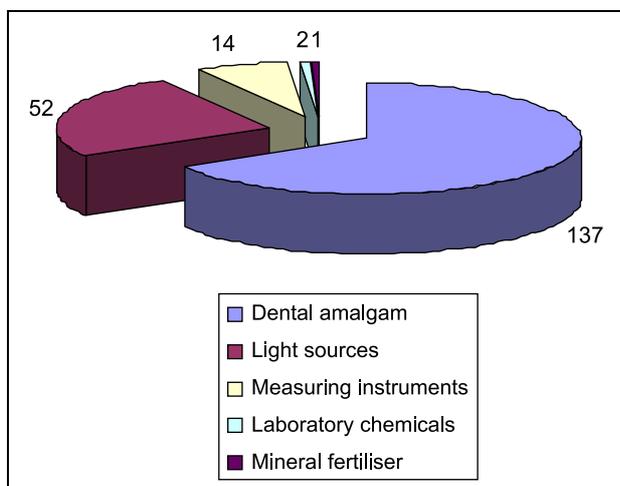


Figure 9.3 Mercury releases from products in 2004 (in kg)

Source: Norwegian Pollution Control Authority

would strengthen Norway's influence on EU efforts in this field and give weight to Norway's international advocacy of a global instrument on mercury. Good alternatives are available for the products that would be affected by the ban, and significant costs to business and industry are unlikely.

The primary impact of a Norwegian ban on mercury in products would be to speed up the process of phasing out mercury in dental amalgam. Strict guidelines issued by the health authorities on the materials used in tooth fillings have already reduced the use of mercury amalgam substantially, but prohibiting it would ensure that this reduction continues and accelerate the process. However, the time lag between use and release means that amalgam will continue to be a significant source of mercury releases for some time.

### 9.3.2 PFOS – a persistent ecological toxin in clothing and fire fighting foam

The Government will:

- ban PFOS in fire fighting foams, impregnation agents and textiles in Norway in 2007, and advocate the widest possible scope for the EU regulatory framework.

It is only within the past few years that PFOS has been identified as an ecological toxin. It is a very serious pollutant, and Sweden has called for its inclusion in the global Stockholm Convention on Persistent Organic Pollutants (POPs). PFOS shows no signs of biodegradation in the environ-

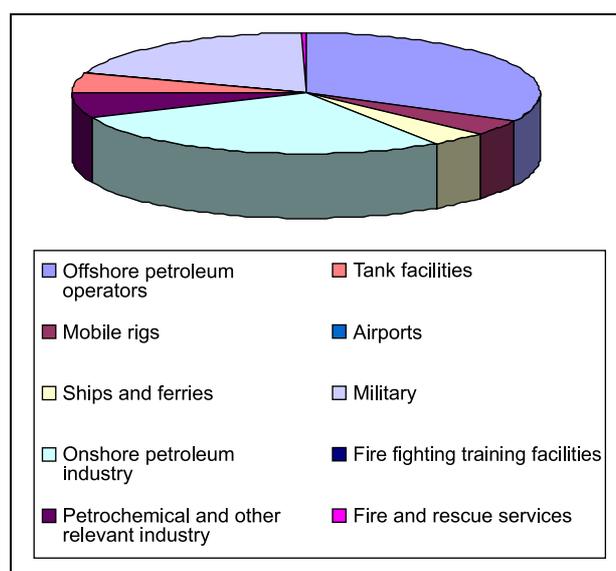


Figure 9.4 Amounts of PFOS in fire fighting foams in various industries in Norway in 2006

Source: Norwegian Pollution Control Authority

ment, and it can affect reproductive capacity and cause fetal injury. It is therefore a grave long-term threat to both health and the environment. PFOS has been found in the environment in Europe, in Norway and in the Arctic, and rising levels are being found in human blood as well.

The Government intends to ban the use of PFOS in fire fighting foams, impregnating agents and textiles. These sectors account for nearly all use of PFOS in Norway. The main area of use in Norway is in fire fighting foams in the offshore industry (see Chapter 7.3). The Government will also advocate the widest possible scope for the forthcoming prohibition in the EU and is actively supporting a Swedish proposal to include PFOS in the international agreements on POPs. PFOS has already largely been eliminated from textiles and impregnating agents, so further costs to the industry are likely to be small. However, there will be costs involved in replacing the remaining stocks of fire fighting foam that contain PFOS.

A number of substances break down to form PFOS, and the Government will review how they can be regulated. The Government also wishes to improve knowledge of other perfluoroalkyl substances (PFAS) and find out whether they are just as dangerous as PFOS.

### 9.3.3 Brominated flame retardants – useful, but also a risk

The Government will:

- consider strict regulation of deca-BDE in Norway
- actively support the efforts of Denmark and the European Parliament to reinstate the ban on deca-BDE in electrical and electronic equipment in the EU
- review whether to ban HBCDD (hexabromocyclododecane) and TBBPA (tetrabromobisphenol A), and call for the inclusion of HBCDD in the international agreements on POPs.

Brominated flame retardants are a group of chemicals that inhibit combustion. They are extensively used in electrical and electronic equipment, textiles and plastics in transport equipment, building materials, paints and insulation foams. However, many brominated flame retardants are also serious ecological toxins that accumulate in the food chain and can cause damage to the liver and nervous system. Concentrations of brominated flame retardants in the environment are rising, including in the Arctic. The Government will therefore seek to

#### Box 9.6 Several types of brominated flame retardants

There are many types of brominated flame retardants. Those considered to present the greatest risk are:

- polybrominated diphenyl ethers (PBDEs) which include penta-, octa- and decabrominated diphenyl ethers (penta-, octa- and deca-BDE)
- polybrominated biphenyls (PBBs)
- tetrabromobisphenol A (TBBPA)
- hexabromocyclododecane (HBCDD)

eliminate the use and release of several brominated flame retardants by working towards stricter regulation at national and European level.

#### *Stricter regulation of deca-BDE*

Decabrominated diphenyl ether (deca-BDE) is very persistent, has been detected high up in the food chain, and may have chronic impacts on health. In all probability, it can be converted into even more dangerous flame retardants (pentabrominated diphenyl ether, or penta-BDE). There are repeated indications of its continuing spread. Deca-BDE has for example been detected in polar bears and glaucous gulls in the Arctic. In Norway it has been found in moss, marine and freshwater sediments, and leachate from landfills.

This is the background for a unilateral Norwegian proposal to ban the use of deca-BDE, except in the transport sector. A public consultation on the proposal was held in the spring of 2005, and the Government is now considering whether to introduce the this prohibition.

Under the EEA Agreement, Norway has implemented EU directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (the RoHS Directive). This directive originally prohibited the use of deca-BDE in electrical equipment, but the EU Commission has subsequently decided to exempt deca-BDE from the ban. This decision has a clear negative signal effect in environmental terms, and is a step backwards in the development of the RoHS directive. Norway has been working actively to prevent the introduction of this exemption. The Danish Government and the European Parliament have launched legal challenges against the EU Commission with a view to having this deci-

### Box 9.7 TBBPA in blood

TBBPA is the most widely used brominated flame retardant in Norway, and is used in electrical and electronic equipment and in other products. These products are largely imported to Norway. A study of the general population of Norway has shown the presence of TBBPA in human blood. No TBBPA was detected in Norwegian samples from 1977 or 1981, but rising levels were found in the period 1986 to 1999. In a study from 2005, TBBPA was found in 40 % of blood samples from pregnant Norwegian women in Bodø, but not in the blood of pregnant women from Taimyr, Russia. TBBPA has also been found in samples of breast milk in Norway and other countries.

sion annulled, so that deca-BDE can again be included in the prohibition. Norway will submit an intervention in the case in support of Denmark and the European Parliament, and will continue its active efforts to gain support for its views.

#### *Stricter regulation of HBCDD and TBBPA*

It has been documented that hexabromocyclododecane (HBCDD) and tetrabromobisphenol A (TBBPA) have serious environmental effects. They are very toxic to aquatic organisms, persist in the environment, and may have long-term environmental impacts. HBCDD is very bioaccumulative, and has been found in the Arctic far from sources of pollution, showing that HBCDD is transported over long distances.

To eliminate the use and release of these ecological toxins, the Government intends to consider prohibitions against both HBCDD and TBBPA. A total prohibition against the production, import, export and use would eliminate the use of the substances themselves and of products containing them. However, for some areas of use there are still uncertainties regarding the availability of alternatives and the costs and consequences of a prohibition. Therefore, it is necessary to review the consequences and assess the need for exemptions. The Government intends to propose the inclusion of HBCDD in the POPs Protocol under the Convention on Long-range Transboundary Air Pollution and in the global Stockholm Convention.

### 9.3.4 Triclosan contributes to resistance to antibiotics

The Government will:

- consider the most suitable measures for reducing the use and release of triclosan.

The antibacterial triclosan is suspected of contributing to a rise in antibiotics resistance in bacteria. Triclosan is also extremely toxic to aquatic organisms. It may have long-term environmental effects because it accumulates in living organisms and is not readily degradable in the environment. It is used in products that are sold in large quantities, including toothpaste (to control dental plaque), cosmetics (as a preservative), antimicrobial agents used in health care, and textiles.

At the request of the health authorities, the Norwegian Scientific Committee for Food Safety carried out a risk assessment of triclosan. Its report, presented on 31 January 2005<sup>1</sup> concluded that the use of triclosan in cosmetics represents a public health risk because it may contribute to the development of resistance to clinically important antimicrobial agents. The report also documented that the current regulation of the use of triclosan in cosmetic products in EEA legislation is not strict enough in view of toxicological risk assessments. In the light of this, the Norwegian health authorities have advocated further reviews in the EU. The Commission's Scientific Steering Committee is now reviewing the material submitted by the Norwegian Scientific Committee for Food Safety. The Norwegian environmental authorities have previously gained approval in the EU for the classification of triclosan as an environmentally hazardous substance.

The Norwegian authorities have asked the cosmetics industry in Norway to stop using triclosan. An alternative antiplaque has been incorporated into some toothpastes, and the use of triclosan has subsequently been cut by half. The Government takes the view, on the basis of both health and environmental considerations, that the use and release of triclosan should be reduced even further, and it will consider the most appropriate ways of achieving this.

<sup>1</sup> Risk assessment on the use of triclosan in cosmetics /I: Development of antimicrobial resistance in bacteria/panel on Biological Hazards/04406-10 final

### Box 9.8 Arsenic, musk xylenes and chromium

For certain substances, further measures are needed to meet emission targets.

#### *Arsenic*

The main source of releases of arsenic and chromium today is timber impregnated with CCA preservatives. Norway's annual releases of arsenic are expected to be reduced by about 30–40 % in the period 1995–2010. Releases of arsenic and chromium from CCA timber will continue to decline because the use of this type of timber has been greatly restricted since 2003, and the use of arsenic and chromium in wood preservatives has been totally banned in the EU and EFTA countries since 1 September 2006 under the EU Biocidal Product Directive. However, pollutants will continue to leach from existing structures built of CCA timber for a long time to come. Releases of arsenic from lead shot came to an end when lead shot was prohibited as of 2005.

#### *Musk xylenes*

Musk xylenes and musk ketones are found in products, and are released when these products are used. Releases from products take place either directly to the environment or indirectly through municipal waste water systems. National releases of musk xylenes were reduced by about 44 % in the period 1995–2004. In 2004, releases totalled 0.4 tonnes.

#### *Chromium*

Annual releases of chromium in Norway are expected to be reduced by about 40–50 % in the period 1995–2010. A decline in the use of blasting sand/abrasive is also expected to bring further reductions in releases of chromium.

A general ban on arsenic and musk xylenes in consumer products is under consideration (see Chapter 9.2). The Government will also consider other policy instruments.

### 9.3.5 Eliminating the use of copper in homes and for recreational purposes

The Government will:

- consider introducing a tax or a prohibition to reduce releases of copper from antifouling agents and treated wood.

Copper is a naturally occurring metal and does not accumulate in the food chain. On the contrary, it is an essential element for both plants and animals, but some copper compounds are very toxic to aquatic organisms. Copper can thus represent a risk to the environment, particularly in aquatic environments with little organic material, such as some lakes and the open sea.

Copper is a constituent of many products, either as metallic copper or in copper compounds. Products containing metallic copper, such as brass candlesticks, are little problem in terms of pollution, but the copper compounds found in such products as wood preservatives and antifouling agents for boats are a source of releases to the envi-

ronment. Regulation of copper by means of prohibition or taxes would limit sales and restrict trade in these products.

The chief sources of copper releases in Norway are products, especially antifouling agents for boats, antifouling agents used on fish farming cages, and increasingly wood preservatives. Releases from products accounted for about 80 % of Norway's releases of copper in 2003. Norwegian releases of copper declined by 13 % in the period 1995 to 2004.

To reduce releases of copper to the environment, the Government will consider taxing or prohibiting the use of copper in treated wood and antifouling agents. Copper-free preservatives have been developed to replace copper-based preservatives. However, adequate alternatives have not been developed for antifouling agents for pleasure craft. The Government will propose a policy instrument which over time will encourage the development of copper-free alternatives. For a discussion of copper releases from fish farming cages, see Chapter 7.7.

## 9.4 Cosmetic and body care products and pharmaceuticals

The Government will:

- consider imposing restrictions pursuant to the Product Control Act on cosmetic products that represent particular environmental risks
- create a register of allergic reactions to cosmetic products at the National Institute of Public Health
- include cosmetic products in the Product Information Bank (PIB)
- promote increased eco-labelling of cosmetics
- promote Nordic cooperation to improve knowledge of the occurrence of chemicals from

### Box 9.9 Phthalates and parabens

*Phthalates* are a numerous group of chemically related substances that are manufactured in large quantities and used in many different products. Certain phthalates are suspected of being endocrine disruptors. The phthalates DEHP, BBP and DBP are classified as reprotoxic, having been found to harm reproductive capacity and cause fetal damage. BBP and DBP are additionally classified as dangerous for the environment.

Phthalates are chiefly used as plasticisers, especially in PVC. The prohibition against a number of phthalates used in children's toys and in products for small children will be tightened up in 2007. The phthalates DEHP, BBP and DBP have already been banned in cosmetic products.

*Parabens* is the name of a group of chemically related substances used as preservatives to prevent the growth of bacteria. They are mainly used in cosmetic products and medicines, but also in cleaning products. Their acute toxicity is very low, but butylparaben and propylparaben are suspected of being endocrine disruptors based on their negative effects on male reproductive organs in animal tests. The use of parabens in cosmetic products is regulated, but the Norwegian Scientific Committee for Food Safety takes the view that further data on the long-chain parabens (propylparaben and butylparaben) is necessary to determine whether they are adequately regulated.

pharmaceuticals and cosmetics in the environment, and on the environmental properties of these chemicals.

Medicines and cosmetic products are of major economic importance. Their use also entails releases of a number of hazardous substances via waste water into lakes, fjords and the sea. However, we currently know too little about the adverse environmental impacts these releases may have.

Among consumers, allergic reactions to specific chemical ingredients in cosmetics have attracted a great deal of attention. The chemicals used in pharmaceuticals and cosmetics are thoroughly tested and evaluated with respect to their health effects, including sensitising effects. In 2006, the health authorities were planning a new system for reporting side-effects of cosmetics, similar to that already in place for medicines and food, in an effort to further reduce health problems related to the use of these products. A new Act relating to cosmetic products and body care products entered into force on 1 January 2006. This provides the legal authority to introduce a duty for

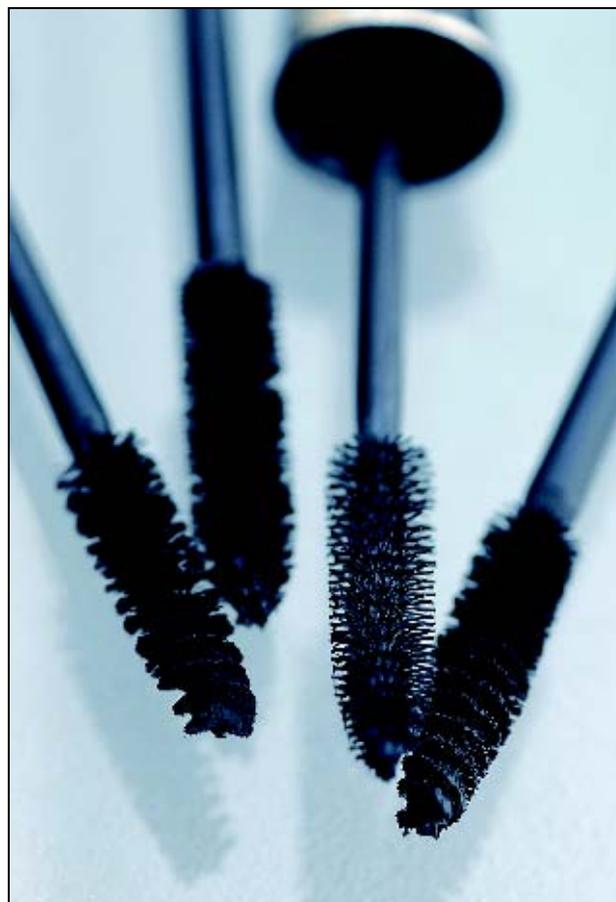


Figure 9.5

Photo: Marianne Otterdahl-Jensen

health care personnel who observe side-effects that may be caused by cosmetic products to report this. The Government intends to introduce this duty from 1 January 2007.

Legislation on cosmetic products is fully harmonised in the EEA, and Norway is therefore obliged under the EEA Agreement to implement the EU Cosmetics Directive. Norway's regulations on cosmetic products therefore require ingredients to be listed on the packaging of all cosmetic products, in accordance with the provisions of the Directive.

Since 2003, the cosmetics industry has been required to submit information on the known environmental effects of the ingredients it uses to the EU Commission. Yet few substances used for the purpose of cosmetics have been tested to determine their environmental properties. Moreover, the EU requires environmental risk assessments for pharmaceutical substances that have been put on the market after 1995, but the guidelines for carrying out these assessments were not in place until May 2006.

All cosmetics on the market have long been subject to the requirement that they must not pose any risk to health during normal use. But since this means that only substances present in sufficient quantities to pose a health hazard during normal use are taken into consideration, some substances may be used in cosmetic products even though

they are classified as hazardous either to health or to the environment.

Studies have been carried out of the presence in the environment of selected substances used in medicines and cosmetic products (and other products). A number of pharmaceutical substances and several of the substances used in cosmetic products (including triclosan), were found in low concentrations in sewage sludge, seawater and ocean sediments. The substances detected are widely used in other products as well, so the pollution may come from several sources. The Government will consider restrictions on cosmetic products that represent a particular environmental risk. Among other things, it will assess whether the use of parabens and phthalates in cosmetic products should be regulated on the basis of environmental considerations. In the event that restrictions are imposed, the costs for the industry and the impact on trade in these products will be taken into consideration.

The Government will work towards a broad survey of the environmental effects of cosmetic products and medicines in cooperation with the other Nordic countries. This would add to our

#### **Box 9.10 Swedish studies of the environmental risks associated with cosmetic products and medicines**

Following a study in 2004, Sweden's health authorities concluded that they were unable to identify any serious environmental risk from cosmetics or pharmaceuticals, and they found that the costs of expanding the scope of the register of cosmetic and hygienic products would have outweighed the benefits.\* Another reason for advising against an expansion of the register was that this would act as a barrier to trade. The volume of releases to the environment of substances used in cosmetic products is probably around twice as high in Sweden as in Norway.

\* Swedish Medical Products Agency report Miljpåverkan från läkemedel samt kosmetiska och hygieniska produkter [The environmental effects of medicines and cosmetic and hygienic products]: 24 August 2004

#### **Box 9.11 Veterinary medicines and environmental assessment**

- Requirements for environmental assessments have been in force for many years.
- Applications for marketing authorisation must include an expert report/environmental impact assessment in compliance with guidelines for phase I assessment.
- The properties and area of use of a medicine determine whether the manufacturer must proceed to phase II, which involves specific documentation of environmental fate and toxicity data. Extensive documentation is for example required for medicines used to treat fish.
- A manufacturer must also propose measures to limit any adverse environmental impacts.
- Environmental impacts are included in the final risk-benefit assessment that provides a basis for authorising or refusing a medicine. Marketing authorisation may be refused if a medicine has unacceptable environmental impacts.
- Relevant guidelines are found at: <http://www.emea.europa.eu/index/indexv1.htm>



Figure 9.6 Allergic reaction reported after use of a hair colouring product by a hairdresser

Source: Danish National Allergy Research Centre

knowledge of the presence in the environment of chemicals that are used in these products and of their environmental properties, and it would put us in a better position to assess the effects of important ecological toxins in common recipients. A survey would thus help to fill the gaps in our knowledge and be useful in shaping national policy to ensure a high level of protection for both health and the environment.

The Government will encourage the cosmetics industry to seek ecolabelling for its products – either the Nordic Swan or the EU flower. Closer collaboration with the Norwegian Association of Cosmetics, Toiletries and Fragrance Suppliers will heighten the focus on environmentally hazardous substances in cosmetic products. Through closer cooperation with the Association and Ecolabelling Norway, the Government will seek to raise awareness of the duty laid down in the Product Control Act to apply the substitution principle to all use of hazardous chemicals, and it will review measures designed to increase the proportion of ecolabelled cosmetic products.

The Government intends to make information on the ingredients in cosmetic products more widely available by requiring the registration of ingredients in the Product Information Bank (see Chapter 9.9.3). This will make it easier for consumers to choose appropriate products based on their needs as well as on environmental considerations.

The Norwegian Food Safety Authority, in cooperation with the National Institute of Public Health, will establish a system for reporting side-effects of cosmetics. The Institute of Public Health will maintain a register of allergic reactions to cosmetic products, which will be a valuable resource in the effort to build up our knowledge of sensitising substances in cosmetics.

The Government would like to emphasise the need for more intensive monitoring of medicines in the environment and to improve our understanding of the risks and the relationship between our use of medicines and their presence in the environment. The Government therefore intends to improve knowledge of the environmental properties of chemicals used in medicines.

## 9.5 Safer food

To deal with challenges in the field of food safety, the Government will step up its efforts by:

- identifying which hazardous substances we should focus on in the time ahead, and ascertaining where these substances are found
- expanding existing environmental monitoring programmes to include undesirable substances in the parts of the food chain that affect food safety, by establishing close cooperation between the food authorities and the environmental authorities
- strengthening the monitoring of undesirable substances in wild fish and shellfish.

The Government's food policy is based on the premise that food should not only be safe, it should be experienced as safe.

Responsibility for food policy is shared between the Ministry of Fisheries and Coastal Affairs, the Ministry of Health and Care Services and the Ministry of Agriculture and Food. The Norwegian Food Safety Authority is a subordinate agency of the Ministry of Agriculture and Food, and plays a central role in the implementation of food policy by taking part in the development of the legislation and by providing advisory, supervisory and monitoring services along the whole chain of food production, including sale to the consumer.

### **Box 9.12 People are concerned about ecological toxins**

The Norwegian Food Safety Authority's annual market survey (conducted by the market research institute MMI) of public attitudes to and awareness of food safety shows that ecological toxins are what worry people most in connection with food. In 2006, the survey showed that 42 % of the population had concerns about ecological toxins in food.

To ensure a high level of food safety, it is essential to have an overview of all substances that may be found in the food chain in concentrations that represent an unacceptable health risk. Continuous efforts are being made at national and international level to reduce or eliminate releases of many of these substances. New substances are continually being added to the list of possible risk factors, while the use of substances that are already known to be risk factors is resulting in releases to the environment and their spread to the food chain. It is important to identify the substances of most significance to food safety so that we can deal with them in the best way possible.

Current monitoring programmes in the food sector focus on aquaculture and livestock production and on undesirable substances for which the EU has established limit values. There are gaps in our knowledge of undesirable substances in wild fish and shellfish and of substances for which limit values have not yet been established.

It is important to be able to identify a substance as a potential risk in food before it is present in quantities that make it a health problem. This requires close cooperation between the environmental authorities and the food authorities.

Many raw materials and foodstuffs contain nutrients that are beneficial to public health, but also contain pollutants and other undesirable substances in such quantities that they raise safety issues. It is therefore important to ensure that overall assessments are made, so that recommendations to the public have a sound scientific basis, and so that the nutritional benefits of foodstuffs are considered in relation to the health risks that their consumption may entail.

## **9.6 Public health work**

The Government will:

- reinforce efforts to prevent injury to health from chemicals – both chemicals that cause acute injury and those that cause injury through long-term exposure.

To prevent injury to health and damage to the environment we must have adequate knowledge about the effects of chemicals on health and the environment. Building up this type of knowledge is one important aspect of public health work. It is important for consumers to have easy access to information on the properties of substances and on their presence in various products. This puts consumers in a better position to choose the products that represent the lowest risk, helps them to avoid health risks, and enables them to participate in efforts to prevent hazardous substances from being released into the environment. To prevent injury to health caused by chemicals, the Government will give priority to building up knowledge of possible health effects.

## **9.7 Fuelwood use and emissions of hazardous substances**

The Government will:

- consider measures to reduce emissions of PAHs and other ecological toxins from fuelwood use
- provide better information on good wood firing practices

Wood-fired stoves produce emissions of a number of substances, several of which are hazardous to health or the environment. Emissions include PAHs, cadmium, arsenic and dioxins, all of which are priority ecological toxins. According to the Norwegian Emission Inventory for 2003, emissions

### **Box 9.13 Polycyclic aromatic hydrocarbons**

Polycyclic aromatic hydrocarbons (PAHs) are a large group of chemical compounds, some of which are reprotoxic and carcinogenic. PAHs are produced by any incomplete combustion of organic material. Wood-fired stoves are a major source of emissions of PAHs.

from fuelwood heat were the second largest source of dioxin emissions. Wood heat also accounts for slightly less than one-third of Norway's PAH emissions.

The trend in emissions of PAHs will depend, among other things, on how much fuelwood people burn to heat their homes and on how quickly old wood-fired stoves are replaced with modern, clean-burning stoves or pellet stoves. Statistics Norway has calculated that emissions of particulate matter in Oslo would be reduced by 270 tonnes if all old stoves were replaced with modern stoves. This would also lead to a large reduction in emissions of PAHs. A number of municipalities now pay small grants to people who buy new wood stoves, but this represents only a small proportion of the total sales of wood stoves. Wood pellets also produce lower emissions of particulates and associated ecological toxins such as PAHs. To reduce emissions from wood-burning stoves, the Government will review measures to speed up the replacement of wood-burning stoves and encourage the installation of equipment to control emissions.

Studies carried out by Statistics Norway indicate that up to 15 % of total fuelwood consumption in Oslo consists of board and other building materials. Although a large proportion of respondents state that they use only clean wood, it is realistic to assume that materials with traces of paint are also



Figure 9.7 Fuelwood use is a major source of PAH emissions

Photo: Marianne Otterdahl-Jensen

being burned. Combustion of contaminated materials produces hazardous substances, most of which are released straight into the environment. The Government will provide better information on good wood firing practices.

### 9.8 Expanded duty to provide information and to apply the substitution principle

The Government will:

- consider amendments to the provisions of the Product Control Act so that there are clearer requirements for importers and distributors of products containing hazardous substances to obtain and provide information about their products
- consider expanding the duty to apply the substitution principle to apply to importers and distributors as well.

#### *Expanded duty to provide information*

The duty to provide information on the content of hazardous substances in products is not set out clearly enough in the legislation relating to pollution. The Product Control Act has few provisions that require active steps to provide information.

The Government takes the view that information on health and environmental properties should accompany products so that each successive link in the supply chain is able to take informed decisions. The Government therefore intends to introduce a duty to take more active steps to provide information throughout the supply chain, either in the form of an amendment to the Product Control Act or through regulations.

Manufacturers and importers are currently required under the Product Control Act to obtain information on possible adverse health and environmental effects of their products. However, it has proved difficult to enforce this requirement. On the basis of the existing duty of care, the Government therefore proposes an amendment requiring manufacturers and importers to take active steps to provide such information. The requirements should be formulated in such a way as to ensure that the next link in the supply chain receives the information it needs to make decisions in accordance with other rules, such as those for waste management (see Chapter 10.4). The Government further proposes that manufacturers or importers must be able to document that studies have been undertaken to obtain the information.

Such requirements would prevent products containing constituents that are prohibited in Norway, such as CCA-treated timber (wood materials treated with copper, chromium and arsenic) from entering the Norwegian market and limit their distribution and use. They would also encourage more active efforts to replace hazardous substances with less hazardous alternatives.

#### *Expanded duty to apply the substitution principle*

The duty to apply the substitution principle, as laid down in the Product Control Act, entails a duty to replace hazardous substances with less hazardous alternatives where it is technically and financially feasible to do so. In other words, this is a dynamic process in which enterprises are expected to switch to substances with less impact on health and the environment as they become available, as long as this does not involve unreasonable cost or inconvenience. At present, this duty applies only to enterprises that use chemicals – usually manufacturers. Distributors of chemicals are not currently required to consider alternatives.

In the Government's view, it is inappropriate that the duty to apply the substitution principle does not apply to distributors, and it will therefore consider a proposal to include them in the scope of this duty under the Product Control Act. The purpose would be to promote a more dynamic substitution process in which distributors would be required to evaluate the types of products they place on the market. Some harmful products should not be placed on the market at all, and importers and other distributors are often in the best position to determine which product should be offered instead on the basis of health or environmental considerations. At present, importers may find it difficult to get their customers to switch to products with less health or environmental impact because they are costlier and because their competitors offer other cheaper but less environmentally sound products that outcompete them.

If the scope of the duty to apply the substitution principle is widened to include other groups in addition to users of chemicals, it will also acquire a new dimension. If distributors are included, it will in practice also become a duty to provide a framework to help others to switch to alternative products when appropriate.

The Norwegian Pollution Control Authority's inspection and enforcement activities reveal that importers and distributors know too little about the

current legislation. The Government will therefore reinforce efforts to promote the substitution principle by informing importers and distributors that they are expected to apply the substitution principle and consider alternatives to products that contain hazardous substances.

### **9.9 Improving the flow of information on hazardous substances**

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Consumers are entitled to information on hazardous substances in products, both so that they can protect themselves and so that they can make more environmentally sound choices for their own sake and that of their families and the environment. Vulnerable groups such as children and people with allergies have a particular need for information on how they or their parents can choose products that represent less of a hazard to their health.

The problem is that consumers have only limited knowledge of chemicals and do not know enough to be able to choose less hazardous products. The range of available products is enormous, and current classification and labelling requirements for manufactured goods are inadequate.

All ingredients are listed on the labels of cosmetic products. The problem for consumers is to identify which substances may be environmentally hazardous or suspected of having adverse effects on health.

The EU's REACH legislation will improve the flow of information on chemicals substantially. Information on chemicals is to be transmitted along the supply chain by means of improved safety data sheets, and much of the information will be provided by the industry itself. The authorities, especially the Norwegian Pollution Control Authority, which has been designated as the competent authority in respect of REACH, will play an important role as a contact point and will provide support for small and medium-sized enterprises as they prepare to meet their obligations under REACH.

Nonetheless, consumers cannot be expected to be fully oriented regarding the content of hazardous substances, or to make use of such information as chemical names of substances, trade names and so forth.

The Government will improve the flow of information on hazardous substances in products in order to help consumers make informed choices.

### 9.9.1 Strengthening importers' and retailers' knowledge of chemicals

The Government will:

- raise awareness of the right to product-specific information laid down in the Environmental Information Act and the Product Control Act
- improve importers' and retailers' knowledge of hazardous substances and relevant legislation by means of specially designed courses held in collaboration with industry organisations.

The right to environmental information was laid down in the Norwegian Constitution as early as 1992. To further reinforce this right, the Act relating to the right to environmental information and public participation in decision-making processes relating to the environment, or Environmental Information Act, was adopted, and entered into force on 1 January 2004. It is intended to make it easier for the public to contribute to the protection of the environment, protect themselves against injury to health and environmental damage and to influence public and private decision-makers in environmental issues.

This Act gives all citizens a right to information from public authorities and from public and private undertakings on matters of significance for the environment. It also requires the public authorities to take active steps to make information on environmental issues and the state of the environment

accessible to the general public. This will enable the public to follow developments and trends in various environmental problems locally and globally.

When the Environmental Information Act entered into force, the Appeals Board for Environmental Information was established to hear appeals against refusals to disclose information by private undertakings. Many of the cases heard by the Appeals Board have involved the right to obtain information on the content of hazardous substances in various consumer products. This shows that the Act is being invoked and is particularly important in this area.

Rules dealing with the right to product-specific information are set out in the Product Control Act, and entitle anyone to obtain information on products that can cause injury to health or environmental damage directly at any point in a supply chain. The consumer is entitled to information on the content of hazardous substances in a product, and to information on how to prevent harmful effects.

The Government intends to raise awareness of the right to product-specific information as laid down in the Environmental Information Act and the Product Control Act. The emphasis will particularly be on improving environmental information to consumers to put them in a better position to take environmentally sound decisions. Small enterprises such as many of those in the retail sector often know too little about the legislation, and the Government will therefore provide information targeted specifically towards these actors. The Government is in the process of evaluating the Environmental Information Act, and will afterwards consider possible initiatives and measures to make these rights and obligations even better known, f.ex. by publishing guidance documents. These efforts will take place in cooperation with industry, consumer and environmental organisations.

Inspection and enforcement of the legislation on hazardous substances has revealed that importers and retailers in particular know too little about the content of hazardous substances in the products they import and sell. Competence-building is therefore particularly important in these branches. Improving knowledge of hazardous substances in these firms will also make it easier for consumers to obtain information when they ask for it. To this end, the Government and the Federation of Norwegian Commercial and Service Enterprises have taken steps to establish closer cooperation. A joint project involving the Federation and the Norwegian Pollution Control Authority is to facilitate training to build up expertise in relevant branches

#### Box 9.14 State of the Environment Norway – [www.miljostatus.no](http://www.miljostatus.no)

*Miljøstatus i Norge* (State of the Environment Norway) is a website that presents the latest information on the state of the environment and environmental trends. Chemicals are one of the main topics. Most thematic pages on this website have links to relevant legislation, international agreements, national targets and supplementary information, and to other relevant websites. Some of the information is also provided in English.

The information on *Miljøstatus i Norge* is provided by the environmental directorates on behalf of the Ministry of the Environment. The contents of the website are updated regularly, and all quality assurance of the information and all data is carried out at least twice a year.

and provide key purchasing personnel with the knowledge they need to improve compliance with the legislation and make environmentally sound choices on their own initiative. One important part of this training will deal with obligations under the EU's new REACH legislation.

### 9.9.2 Improving product labelling

The Government will:

- advocate the introduction of common mandatory European labelling rules for articles containing environmentally hazardous substances
- consider options for labelling or other information instruments for products designed for children or for surroundings where children play or spend time
- strengthen the official ecolabelling schemes, including through information activities and funding for the establishment of environmental criteria
- encourage more manufacturers to seek ecolabelling for their products

#### Box 9.15 Classification and labelling of hazardous substances

Legislation on the classification and labelling of substances according to health, environmental, fire and explosion hazard is an important tool for reducing and preventing health injury and environmental damage caused by chemicals. The legislation categorises chemicals according to how dangerous they are and prescribes how they are to be labelled. The classification and labelling of a substance can also affect sales. In practice, substances labelled «toxic» or «very toxic» may not be sold to ordinary consumers. Labelling is combined with safety advice phrases (e.g. «Keep out of reach of children») and warning phrases (e.g. «Harmful if swallowed») on the packaging. The purpose of this system is to give users – both employees and ordinary consumers – information on the dangerous properties and possible harmful effects of chemicals and enable them to take the necessary precautions. The rules apply to chemical substances and products (such as cleaning products), but not to articles (such as furniture and textiles).

- play a constructive role in improving the information provided on chemicals in environmental products, based on manufacturers' responsibility for drawing up such declarations.

Labelling of articles that contain hazardous substances is not mandatory at present, making it difficult for consumers to find out what products contain. Unilateral Norwegian requirements for labelling of products containing hazardous sub-

#### Box 9.16 Organic agricultural products

Organic farming gives high priority to environmental considerations, and one of its tenets is to base production on local, renewable resources. The use of artificial fertilisers and synthetic pesticides is not allowed. Organic production comes within the scope of the EEA Agreement. Norway has implemented the EU legislation in this area in its regulations relating to organic production and the labelling of organic agricultural products and foodstuffs. Only agricultural products that meet the requirements set out in the regulation may be labelled with the designation «organic».

Debio owns the Norwegian «Ø» logo (Norway's organic label). Producers and enterprises that fulfil the official organic production requirements may use the Ø logo. The Ø logo confirms that production has been inspected and approved pursuant to the regulations relating to organic production. There is also an EU logo for organic products.



Figure 9.8 Debio logo for organic agricultural products

stances would apply to only a small proportion of the products sold in this country. Products are distributed throughout the world through imports and exports, and international measures are therefore needed to reach users in many countries.

#### *Compulsory labelling of articles*

It will take time to achieve the goal that ordinary consumer products on the Norwegian market should not contain ecological toxins, so that all products are free from these substances. Under the new EU chemicals legislation, REACH, authorisation will be required for substances of very high concern, which include the most dangerous ecological toxins and the substances that are most hazardous to health. The Government will advocate mandatory labelling for products that contain substances that have received authorisation under

REACH to ensure that consumers know if a product contains particularly dangerous substances. Children are a particularly vulnerable group. The Government will therefore review options for labelling or other ways of identifying the presence of hazardous substances in products designed for children or for use in playgrounds and other places where children play or spend time.

The Government will also review measures and instruments that can give users and consumers more information on products that end up as hazardous waste or electrical and electronic waste. A broad range of relevant information measures will be considered (see Chapter 10.4).

#### *Voluntary labelling: official labelling schemes*

The Government views voluntary labelling under the official ecolabelling schemes as an important way of giving consumers a chance to choose the most environmentally sound products. Ecolabelling is also an important way of promoting environmental measures along the entire supply chain from the extraction of raw materials, through production to the final disposal of products as waste, and can thus help to reduce pollution beyond Norway's borders. Hazardous substances are important in this context, and the Government views the official ecolabelling schemes as an important supplement to statutory requirements.

Ecolabelling Norway, which administers the Nordic Swan labelling scheme, is working with a number of product types that have considerable environmental impact as a result of their content of hazardous substances. These include paints, car care products, industrial cleaners and lubricants. One consideration when choosing product types for ecolabelling is whether there is any potential for improvement that could be highlighted by ecolabelling. Areas where the content of hazardous substances in products is a problem will continue to receive priority.

It is important to develop environmental criteria for more of the products consumers come into contact with. Government funding for the ecolabelling scheme and rising consumer demand for ecolabelled products will provide incentives to introduce more ecolabelled products. Businesses also have a responsibility for seeking ecolabelling for their products and for marketing more ecolabelled products.

The Government will consider an initiative to promote ecolabelling of certain product groups that currently contain hazardous substances, such as travel goods of plastic and leather, plastic

#### **Box 9.17 The Flower and the Swan**

There are currently two official ecolabelling schemes in the Norwegian market, the Nordic Swan and the EU Flower. The Swan is an ecolabelling scheme established jointly by Norway, Finland, Sweden, Iceland and Denmark. Its purpose is to give consumers advice so that they can choose the products that put least pressure on the environment. In order for a product to be approved, the manufacturer must submit documentation that it meets requirements in a number of areas, including raw materials, releases during production, energy use, hazardous substances, packaging and product quality and function. Requirements relating to chemicals have been established for all product groups, usually based on the precautionary principle. The development of environmental criteria for the Swan and Flower labels is a transparent process involving cooperation with experts and manufacturers.



Figure 9.9 The EU Flower and the Nordic Swan

kitchen utensils and hobby products. The Government will also, in cooperation with Ecolabelling Norway, take the initiative for information campaigns that will among other things highlight the fact that ecolabelled products have a lower content of hazardous chemicals.

#### *Environmental product declarations*

Detailed and verified environmental product information is becoming increasingly important internationally, and a growing number of Norwegian manufacturers are finding that their international customers set high environmental standards.

The Norwegian business sector has taken part in projects at the national and Nordic level on the development of environmental product declarations. The Swedish Environmental Management Council established a programme in 1997 for the certification of environmental product declarations, and the Federation of Norwegian Business and Industry established a similar scheme in 1999 for approval and registration of environmental product declarations in keeping with a standard format. In 2002, the Federation of Norwegian Business and Industry and the Federation of Norwegian Construction Industries established the EPD Foundation Norway.

Environmental product declarations have been drawn up for various types of products, including furniture, building materials, energy, packaging

and paper. The focus now is on how information on chemicals and ecological toxins can best be presented in the declarations.

The Government welcomes the initiative taken by the business sector to develop environmental product declarations, and considers it particularly important that this will improve the availability of environmental information on products. The initiative can also provide valuable input to the work on ecolabelling of consumer products and work in the field of public procurement. The Government will seek cooperation on improving the provision of information on chemicals in environmental product declarations, using the responsibility of the business sectors to draw up such declarations as a basis.

#### **9.9.3 Further developing channels of information**

The Government will:

- consider expanding the scope of the duty to declare products to the Product Register to include all products for which safety data sheets are mandatory and cosmetic products, or other ways of improving access to product-specific information
- improve the Product Information Bank
- consider a mandatory requirement to make safety data sheets available through a public database
- ensure that the Product Information Bank clearly indicates which products and substances are ecolabelled, for example with the Nordic Swan or the EU Flower
- consider the establishment of a consumer website run jointly by the environmental, health and consumer authorities, and focus particularly on giving parents of small children the information they need to make life as non-toxic as possible for their children.

#### *The Product Register*

The Product Register runs the authorities' central register of substances and chemical products that are on the market in Norway. All firms that import, distribute or manufacture chemicals for which labelling is mandatory in quantities exceeding 100 kg per year have a duty to declare them to the Product Register. The register currently contains information on 25 000 products, and this is rising by around 500 products a year. The information registered includes the complete chemical composition of each product, the sales volume and areas

#### **Box 9.18 International promotion of environmental product declarations**

An environmental product declaration (EPD) is based on a life-cycle assessment of environmental impacts, from the extraction of raw materials through production and use to disposal. Environmental product declarations are based on international standards and provide a concise summary of the environmental profile of a component, a finished product or a service. Standardised methods ensure that environmental information on products within a single product category is comparable, irrespective of the region or country they come from. Declarations must be independently verified and must follow the ISO 14025 standard. The standard has been translated into Norwegian. For more information see [www.epd-norge.no](http://www.epd-norge.no)

of use. To improve documentation on the sales and use of hazardous substances, the Government will as a first step consider whether to expand the scope of the duty to declare products to include all products for which safety data sheets are mandatory. One effect of this would be to improve information on solvents. The Government will also consider adding cosmetic products to the list of products that must be declared. Declarations should also include the product's number in the Norwegian Customs Tariff, so that information in the Product Register can be linked with Statistics Norway's trade statistics. In the longer term, the possibility of using customs tariff numbers as the basis for declarations can be considered. Broadening the scope of data collection by the Product Register in this way would be useful for monitoring purposes and for users such as the supervisory authorities, and it would facilitate the flow of information to the general public, for example through the Product Information Bank (see proposal below). However, it would also require legislative changes and clarification of administrative and economic consequences, so further review will be necessary. The Government will consider the advantages and disadvantages of expanding the scope of the duty to declare products and of other ways of improving the availability of product-specific information, so that it can be made more easily accessible to consumers.

#### *The Product Information Bank*

The Product Information Bank is a database designed to make health and environmental information about chemicals more accessible. At present, it is primarily used as a central register for storing and distributing safety data sheets. The intention is to make it easier to choose the right product for a specific purpose and provide sufficient information to avoid health or environmental problems.

#### **Box 9.19 A good start**

The Good Start project has so far sent information to 500 000 new parents on how to choose products that have been produced taking health and environmental concerns into account. The Good Start project is being continued and expanded to provide advice for day-care personnel, children and parents.



Figure 9.10 The Product Information Bank is intended to make health and environmental information on chemicals more easily accessible

Photo: Scanpix

There is no obligation to register product information in this database. Efforts to increase awareness of the database and build up its content have been in progress for some years, but the results have not been satisfactory.

The Government wishes to improve consumer access to product information. To do this, it intends to reorganise the Product Information Bank so that product information, including information on cosmetic products, is available on the website, and will consider whether changes in the legislation are necessary to achieve this. It will also consider making it compulsory to make safety data sheets available through the Product Information Bank or on another database, and whether other requirements are needed to ensure that information is available on as many products as possible. It will also be important to make sure that Swan-labelled products are clearly identified in the Product Information Bank. The identification of substances in solid processed articles is another matter for consideration in the longer term.

#### *Consumer website*

The Government would like to see cooperation between the environmental, health and consumer authorities on consumer products. The establishment of an independent body or forum for such cooperation should be considered. The Government will also assess whether there is a need for a dedicated consumer website with a particular focus on health and environmental issues of relevance to children and families, including hazardous substances, and how this could be established.

#### 9.9.4 Improving information on the health effects of chemicals

The Government will:

- reinforce efforts to prevent health injuries from low-intensity exposure by:
  - intensifying and systematising efforts to provide documentation on chemicals that can cause health injuries through low-intensity exposure
  - raising awareness of health injury caused by prolonged low-intensity exposure
  - building up expertise on combined effects, i.e. the effect on health of simultaneous exposure to several chemicals
  - strengthening cooperation between environmental medicine research institutions
- strengthen the National Poison Centre at the Directorate for Health and Social Affairs and its telephone hotline as a public channel for information and advice for dealing with acute poisoning, by:
  - considering the provision of a statutory basis for its activities
  - ensuring that the National Poison Centre is given information on the composition of all chemical products on the Norwegian market, by making it compulsory for suppliers to provide this information or by other means
  - building up documentation activities at the National Poison Centre and taking steps to ensure that documentation on poisoning and its treatment is included in the Norwegian Electronic Health Library .

#### *Chronic effects and low-intensity exposure*

The National Poison Centre provides advice in connection with acute poisoning, while other institutions – primarily the National Institute of Public Health and the National Institute of Occupational Health – deal with low-intensity exposure and chronic effects. Occupational exposure often involves much higher levels of exposure than those experienced by the general population. The health effects of occupational exposure are often serious (cancer, for example), but it is usually very difficult to link a specific case of illness to a specific case of exposure. This means that different approaches and expertise are often needed in dealing with acute and chronic exposure and the ensuing illnesses. The division of labour in this area between the National Poison Centre, the National Institute of Public Health and the National Institute

of Occupational Health works well. However, one of the Government's goals is to ensure that public access to information on chemicals is improved and made easier. The best tools for achieving this are greater expertise and more systematic information. Improvements are needed for both acute and chronic exposure.

#### *Acute poisoning – the National Poison Centre*

All EU and EFTA countries have national poison information centres. These centres have been established to assist the authorities in providing information and advice on acute exposure and the risk of poisoning for all types of chemicals and products (including medicines). In Norway, the centre was reorganised as a department of the Directorate for Health and Social Affairs in 2002. It fielded approximately 40 000 calls in 2005, around two-thirds of which were from the general public. It also handled other calls, chiefly from health-care institutions and emergency services and agencies. The National Poison Centre collaborates with its counterparts in other countries, especially the Nordic countries.

The Government will consider the provision of a statutory basis for the National Poison Centre's activities. It is also important to ensure that this centre has access to information on the chemical composition of all chemical products on the Nordic market, for example by making it compulsory for suppliers to provide this information. Documentation is to be strengthened with knowledge-based assessments of acute toxicity and steps to be taken in the event of poisoning. There is a particular need to raise the level of medical expertise at the centre. The Government will take steps to have documentation on toxicity and treatment included in the Norwegian Electronic Health Library, which is a new Norwegian website for up-to-date information for all health care personnel. The Government will also strengthen the chemical health preparedness for chemical accidents and terrorism and clarify the role of the National Poison Centre.

#### 9.10 Environmentally responsible public sector procurement

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The Government will:

- draw up a plan of action for corporate social responsibility in public procurement. Among other things, special measures relating to the procurement of products that contain ecological toxins

In 2004, the public sector procured goods and services (2004) worth a total of NOK 256 billion, and the central government accounted for around NOK 100 billion of this. The public sector is a major customer and carries enough weight to influence the market for products containing hazardous substances. The Public Procurement Act requires public authorities to take life-cycle costs and environmental impacts into account when planning new investments.

The public sector must set an example as a responsible consumer and ensure that the products and services it procures meet high environmental standards. As a major consumer, it has a particularly important part to play in avoiding products that contain ecological toxins. By requesting environmental information and display-

ing environmental awareness in its procurement decisions, the public sector can also encourage the development of products and technology with a lower content of hazardous substances. For a number of product groups such as computer equipment, textiles and health and skin care products, public sector demand can strongly influence the availability of alternatives in the market. This will in turn benefit private consumers and society in general. Thus, the public administration can play an important role in promoting a non-toxic way of life. The Government will draw up a plan of action for corporate social responsibility in public procurement. Special measures relating to the procurement of products that contain ecological toxins will be assessed.

## 10 A non-toxic environment

The Government will take steps to deal with pollution along Norway's coastline and in its fjords, and to re-establish a clean environment in areas that are contaminated by earlier releases of pollutants. Action will be taken to prevent pollution that has previously been released into soil or water from spreading further or being taken up by plants, animals or people. As a general rule, ecological toxins are to be removed from circulation. This means that materials containing ecological toxins should not be recycled or re-used. Waste and residual products that contain ecological toxins must be managed soundly, and ecological toxins are to be taken out of circulation and removed from product life cycles. The Government will:

- implement a new action plan for remediation of contaminated sediments
- implement a new action plan for remediation of contaminated soil in day-care centres and playgrounds
- ensure that the necessary measures are carried out by 2012
  - at sites where pollution from contaminated soil is spreading to priority areas for remediation of contaminated sediments
  - at sites where pollution represents a risk to human health
  - at sites on Svalbard with contaminated soil
- consider introducing a requirement for enterprises, before closing operations or relocating, to document that there is no risk to health or the environment from contaminated soil on the site, and to take remedial action in the event that contaminated soil represents an unacceptable risk
- identify new priority types of hazardous waste and increase the proportion of hazardous waste collected from consumers; this includes reviewing measures and instruments to give users/consumers more information on products that end up as hazardous waste
- consider stricter regulation of releases of priority ecological toxins and pharmaceutical waste to sewer systems, and by 2012 assess whether it is necessary to apply stricter requirements to releases of ecological toxins from sewerage systems

- consider introducing new limit values for concentrations of priority ecological toxins in fertiliser products.

### 10.1 Contaminated sediments

#### *The problems*

Norway's fjords and coastline include some of its most spectacular and distinctive scenery. They provide an important basis for value creation in the fishing, aquaculture and tourist industries, and are widely used for recreational activities. It is essential to keep the seabed uncontaminated by ecological toxins and other hazardous substances in order

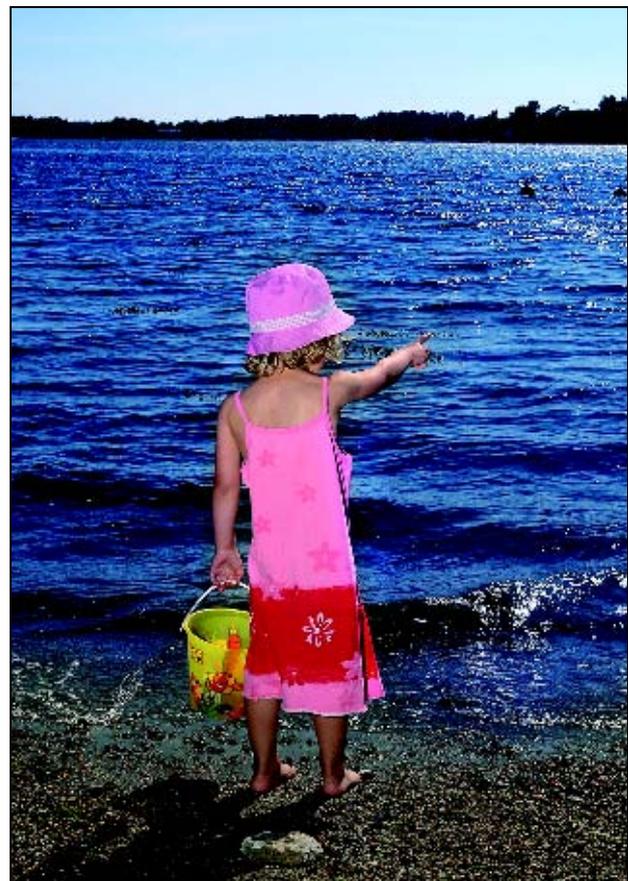


Figure 10.1 Sediments in many harbours and fjords are contaminated with ecological toxins

Photo: Marianne Otterdahl-Jensen



Figure 10.2 Areas where consumption advisories were in force, August 2006

Source: Matportalen.no

to maintain a rich flora and fauna, with fish and shellfish that are fit to be eaten and sold, and so that areas can be developed without the added costs of clean-up operations.

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.

On Svalbard, too, there are sediments in the vicinity of past and present settlements and mining sites that are contaminated with ecological toxins. Inputs from some sites may be substantial, so the Governor of Svalbard is giving priority to efforts to identify the sources and eliminate further inputs of ecological toxins to Svalbard's coastal waters.

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 31 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 (see figure 10.2).

Remediation of contaminated sediments is costly and time-consuming. The aim of the measures to be implemented is to remove pollutants from circulation and from the ecosystem, leaving a cleaner seabed and a healthier environment for plants, fish, shellfish, seabirds and marine mammals. In the long term, this will make it possible to rescind consumption advisories and will mean that fish and shellfish can be eaten and sold without any risk to human health.

Since the 1970s, Norway has invested approximately NOK 45 billion in sewage treatment. Industrial releases of organic material have also been greatly reduced during the same period. Most rivers and fjords are now clean enough to swim and fish in, their waters are clear enough to see the bottom, and there are fewer algal blooms. However, sediments are still polluted, and the Government is supporting a major drive to clean up this pollution so that restoration of the coastal waters can be completed.

The Government presented an overall strategy for remediation of contaminated sediments in a white paper called *Protecting the Riches of the Seas* (Report No. 12 (2001–2002) to the Storting). The first phase of its implementation focused on building up knowledge and developing plans for remediation. Valuable experience and knowledge has been gained from some clean-up projects and pilot projects. A national committee for contaminated sediments was appointed by the Ministry of the Environment in October 2003 with representatives from a broad range of institutions, and has presented advice and recommendations on the clean-up process. The Government is now initiating a nationwide remediation initiative and here presents an action plan for its first phase.

## 10.2 Action plan for contaminated sediments

There are many areas where contaminated sediments should be cleaned up, and the costs are high. The resources available for the process from various bodies are limited, making it necessary to set priorities. Programmes of measures at county level have recently been drawn up for the 17 highest-priority areas.

The programmes of measures apply only to the most heavily polluted parts of the fjords and to the onshore sources of pollution. Their purpose is to take an integrated approach to onshore sources of pollution and contaminated sediments and to identify the measures necessary to achieve the environ-

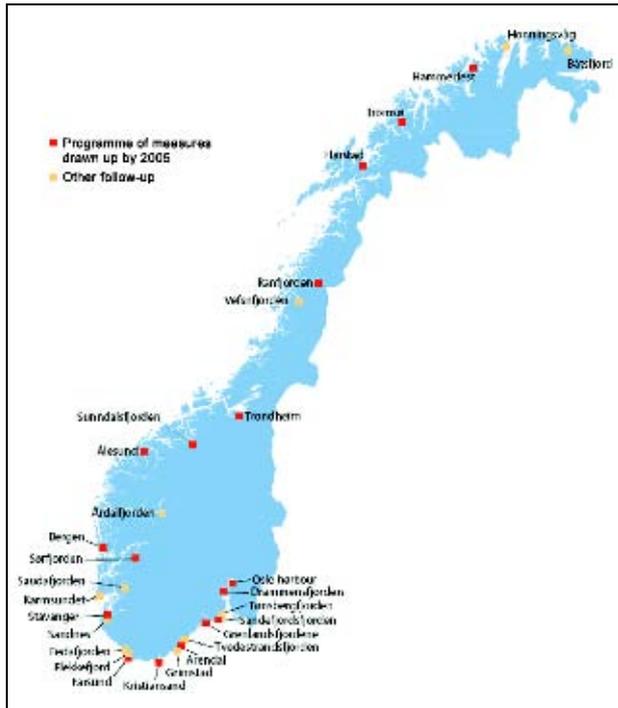


Figure 10.3 Contaminated sediments: areas covered by programmes of measures

Source: Norwegian Pollution Control Authority

mental objectives that have been established for the areas in question. As far as possible, they also identify the costs associated with these measures and who should be responsible for funding them. The programmes of measures have been drawn up by the offices of the county governors in collaboration with relevant actors (municipalities, industrial enterprises, organisations). Figure 10.3 shows the areas for which programmes of measures have been drawn up. Plans for other areas where there are contaminated sediments will be drawn up by 2009 as part of the water management planning process. Water management plans are drawn up in accordance with the EU Water Framework Directive.

Priorities for remediation are needed to ensure that the available resources are devoted to the areas where the best results can be obtained. Good results require satisfactory information on the pollution situation in the area in question and control of current sources of pollution.

It is essential to link remediation projects to relevant development projects in order to attract local backers who can provide some funding and keep the projects moving forward. For example, the National Coastal Administration is responsible for dredging shipping lanes and fishing ports. Environmental dredging operations, which involve

removal of contaminated sediments, are carried out as part of this work. The costs can be reduced by linking the conditions set by the county governors for environmental dredging in projects of this nature to the overall action plan for contaminated sediments. A good example of this approach is the agreement that has been reached between interested parties to split the cost of the remediation project for the Oslo harbour basin. The Government is therefore giving first priority to areas where there is an urgent need for clean-up operations because of the severity of the contamination, and where there are also plans for other developments. Hammerfest, Harstad, Farsund, Kristiansund and Oslo are in this category.

There are other areas where there is also an urgent need to deal with severe pollution, and information on the pollution situation and the control over current sources of pollution are good enough for sediment remediation to be considered. However, further action must be taken in these areas to eliminate the sources of pollution, and further planning is required before clean-up operations can start. Remediation in these areas – Bergen, the Grenland area, Sandefjord and Drammen – will therefore be carried out in the second phase of the action plan.

Plans for the third category of areas vary. In some areas, further assessment of the spread of pollution from contaminated sediments is necessary. In others, such assessment will only be possible after thorough investigations of onshore pollution sources and action to bring them under control. Finally, recent investigations in certain areas show definite improvements in the pollution situation. Monitoring should be continued in these areas before remediation is considered.

The Government will therefore divide implementation of the 17 programmes of measures into three phases (see table 10.1).

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.

#### *Costs and how they are to be covered*

The costs of remediation depend on the scope of the measures and the solutions chosen, and in most cases, there is no complete overview for the areas covered by programmes of measures. However, on the basis of estimates in the programmes

Table 10.1 Programmes of measures divided into three groups

<i>Phase 1</i>	
Hammerfest	Planned developments will bring pollution sources under control and involve some clean-up on land
Harstad	Dredging of port planned
Farsund	Development of residential area near small area of contaminated sediments
Kristiansand	A number of measures completed. To be continued in new areas
Oslo	Remediation in connection with road construction, the «Fjord City» development, and reorganisation of port facilities
<i>Phase 2</i>	
Bergen	Inputs from major pollution sources continuing. Further dispersal of pollution from sediments in specific parts of the fjord to be halted.
Grenland	Heavily polluted, thorough documentation available
Sandefjord	May be dispersal from sediment in part of the fjord. Completed measures must be followed up
Drammen	Risk of dispersal of pollution from certain areas.
<i>Phase 3</i>	
Tromsø	Further study needed of possible measures to deal with pollution sources and small hot-spot
Ranfjorden	Identification of land-based sources and decisions on measures. Monitoring shows improvement of pollution levels in water
Trondheim	Measures implemented, but investigations needed in other areas of the fjord
Sunndalsfjorden	Monitoring in progress, situation improving
Ålesund	Identification of land-based sources and decisions on measures. Sediment remediation must be considered in the long term
Sørfjorden	Further study of measures to deal with pollution sources and small hot-spots needed
Stavanger	Further study of measures to deal with pollution sources and small hot-spots needed
Arendal	Monitoring shows improvement in pollution levels. Further assessment required if there are plans for land-use changes

of measures, the total costs are expected to be in the range NOK 800 million to NOK 2 billion. It should be noted that these figures are very uncertain.

As a general rule, the polluter-pays principle applies to remediation. Under the Pollution Control Act, polluters may be ordered to arrange for investigations and clean-up, but in some cases it is impossible to identify who is responsible for pollution, or a firm no longer exists or is unable to pay, or it would not be reasonable to hold those responsible liable for the full costs. Some Government funding will therefore also be contributed for investigation and remediation of contaminated sediments. Indeed, the state itself may be responsible for the pollution in some cases. Wherever possible, the costs will be split, particularly where there are many sources of pollution or where it is difficult to establish clear divisions of responsibility. Never-

theless, the Government expects that in most cases where it is necessary to take action, it will be possible to order those responsible for the pollution to conduct investigations and, if necessary, clean-up operations. Any remediation orders will be based on cost-benefit analyses.

#### *Continued efforts to reduce pollution from ports, shipyards and marinas*

In addition to the areas discussed above, which are mostly large areas where there are complex pollution problems and many different polluters, there are large numbers of small areas where pollution in sediments can be traced back to only one or a small number of firms.

In 2006, the Norwegian Pollution Control Authority will order a number of large public ports to report on the extent of dispersal of hazardous

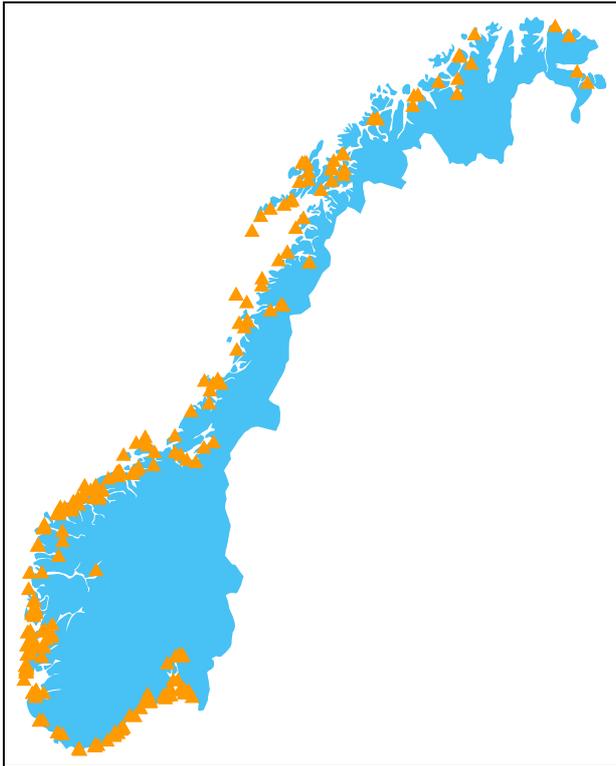


Figure 10.4 Sites of shipyards along the Norwegian coast

Source: Norwegian Pollution Control Authority

substances from the ports to the surrounding waters and sediments. The ports in question are Oslo, Drammen, Sandefjord, Grenland, Arendal, Kristiansand, Stavanger, Bergen, Ålesund, Trondheim, Harstad, Tromsø and Hammerfest. Their investigations are to be completed and their reports filed by the end of 2007. Similar reports may also be required from the major industrial ports. The Government intends all necessary measures to stop the dispersal of ecological toxins to be completed within 10 years (cf. Report No. 12 to the Storting (2001–2002) Protecting the Riches of the Seas). The person responsible for the pollution under the Pollution Control Act will be ordered to cover the costs of these measures as far as possible and provided this is considered to be reasonable. Some sort of cost-sharing scheme is likely to be established for the ports, with the state also contributing funds. The Government intends to require the other commercial ports to carry out similar investigations within the ten years.

The Government is taking steps to ensure that measures to deal with contaminated sediments in marinas are coordinated with other remediation projects in the vicinity. The county governors will be responsible for this.

Investigations carried out by the Norwegian Pollution Control Authority show that there are high levels of tributyltin (TBT) pollution in sediments at many sites near shipyards, including those that have been shut down. TBT was used as an antifouling agent for many years.

In the course of 2007, the Government intends to initiate investigations of sediments outside shipyards (closed and operational) within and outside the areas covered by the programmes of measures. Sites with a high pollution potential and/or where data show that sediments are heavily polluted will be given priority. The results of these investigations will be used to decide whether further studies or action are required on land or under water. Sediment pollution levels at the highest-priority sites are to be investigated and the necessary measures identified by 2010.

#### *Advisory measures*

The national committee for contaminated sediments was appointed by the Ministry of the Environment in 2003, and its term of office ended on 30 June 2006. This was intended to coincide with the first phase of the implementation of the strategy for remediation of contaminated sediments. The committee focused mainly on knowledge-building, advising the Norwegian Pollution Control Authority on the development of various types of decision-making tools, and ensuring that strategies and action plans had sufficient legitimacy. Advice and input from scientists and experts will be needed in future as well, as work on contaminated sediments progresses, and the environmental authorities will find appropriate ways of ensuring that such exchanges continue.

## 10.3 Contaminated soil

### 10.3.1 The problems

Pollutants released from industrial and other activities in the past have contaminated 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 ecological toxins that end up in soil. They remain in the same place for a long time, slowly leaching into the surroundings.

Clean-up operations at polluted sites have been in progress for several decades. The environmental authorities have recently organised necessary

**Box 10.1 How dangerous are contaminated sediments?**

Contaminated sediments consist chiefly of sand, silt and clay. Concentrations of ecological toxins such as lead, mercury, PCBs and TBT in sediments are usually well below the limits below which products are not classified as hazardous waste (see graphs). The content of organic material (dead plant biomass, old sewage residues, etc.) often gives sediments a dark colour as well as a foul odour when brought to the surface. Only rarely are the concentrations of hazardous substances so high that there is any direct, acute risk to people in connection with activities such as swimming. The main reasons for taking steps to clean up contaminated sediments are to improve living conditions for marine organisms, and in a longer perspective, to improve food safety.

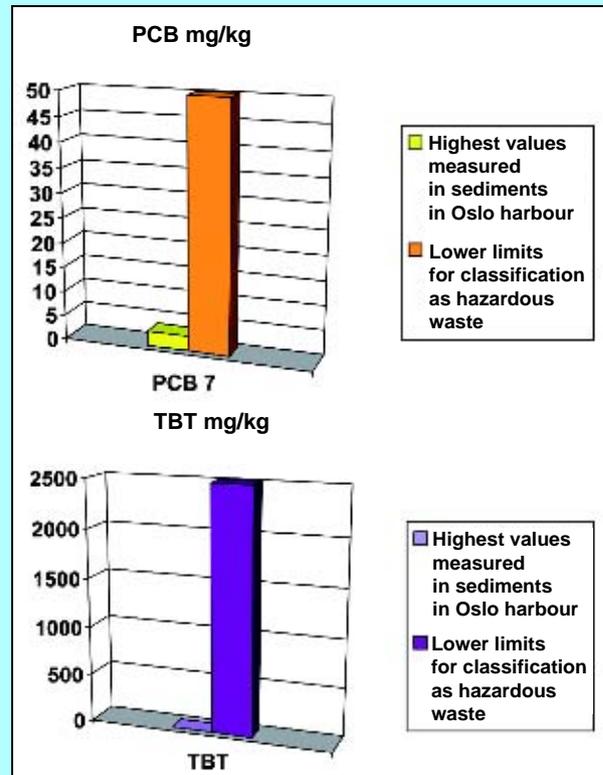


Figure 10.5 Concentrations of some environmental toxins in sediments in Oslo's harbour basin, compared with the lower limits for classification of products as hazardous waste.

Source: Norwegian Pollution Control Authority

remediation at approximately 100 sites and surveys at a further 500 priority sites with contaminated soil. Investigations and remediation at the 100 highest-priority sites have involved costs of around NOK 1 billion since 1990.

Nevertheless, there are still several thousand sites where the soil is known or believed to be contaminated. At most of these sites, current land use probably means there is little risk to health or the environment. But there are still many sites where further action is required because pollution may 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.

Construction and excavation in urban areas often leaves a surplus of contaminated soil that is removed from the sites. Steps must be taken to ensure the proper handling and deposition of this soil.

### 10.3.2 Intensifying surveys and remediation

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 ecological toxins. 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

### Box 10.2 Sediment remediation

Contaminated sediments cannot be dredged up without causing some resuspension of the particles, and thus of pollutants. This is true regardless of the dredging method used and how the sediments are subsequently disposed of. So far, the most widely used method of dealing with contaminated sediments has therefore been in situ capping, which involves leaving them in place and covering them with clean material. This seals the pollutants in place so they are no longer available for uptake by marine flora or fauna.

This method is not feasible everywhere, however. The seabed may be exposed to strong currents or turbulence from shipping traffic, or it may be too steep or the water too shallow for capping. Dredging or excavation of sediments may be necessary close to port facilities and elsewhere along the shoreline, either to provide sufficient depth for shipping or in connection with construction. In such cases, capping of contaminated sediments is not possible. The alternative is to remove them and place them elsewhere where it is possible to prevent further dispersal or leaching of pollutants. This may involve disposal on land or under water.

At present, there are no technological solutions available for large-scale in situ remedia-

tion of sediments, nor are existing methods of destruction, such as incineration, suitable for contaminated sediments.

The enormous quantities of material involved pose a major challenge when it comes to the deposition of contaminated marine sediments. For example, one-half to one million cubic metres of contaminated sediment will be dredged up during the remediation of the Oslo harbour basin in 2006 and 2007. This translates into 50 000 to 100 000 truckloads or 2500 to 5000 barge loads. Landfill capacity is limited, so it would be difficult to use landfilling as the main solution for all remediation projects. Various other issues also have to be considered when depositing sediments on land, such as management and treatment of seepage, physical, chemical and biological stability, potential odour problems, biological treatment options, transport, and conflicts between local and national interests. Efforts should be made to develop technology for separating sediments and dealing with (small) fractions containing higher concentrations of ecological toxins separately, preferably using biological methods (bioremediation). This could reduce the area needed for treatment, enable reclamation of residual products and keep costs down.

where pollution can pose a human health risk. This is a priority area on Svalbard, too, where the Governor will be responsible for identification of sites where ecological toxins are leaching from contaminated soil to the sea, and for any necessary follow-up action.

The Government expects that in most cases where it is necessary to take action, it will be possible to order investigations and, if necessary, remediation of contaminated soil. Any remediation orders will be based on cost-benefit analyses.

The Government will draw up a more complete overview of sites where the soil is believed to be contaminated by the end of 2009. This will require surveys of the remaining industries with the greatest pollution potential and substances that have not previously been surveyed. Relevant branches will include nurseries and greenhouses (pesticides), shipyards, galvanising shops, small and medium-sized mines, fire-training areas and petrol stations.

Establishments where it is likely that new priority substances such as brominated flame retardants, phthalates, PFOS-related compounds, and chlorinated paraffins will be found in the soil must also be surveyed. A complete survey of heavy metal runoff from civilian and military shooting ranges is to be completed by the end of 2007.

To ensure sound management of contaminated soil from construction and excavation, the Government will consider developing a suitable system for handling and disposing of this type of material. This would improve control of types of excavated material that are currently disposed of outside established channels. The Government will also consider whether a product standard should be drawn up for clean soil and fill materials, including requirements for documentation of the concentrations of hazardous substances. Requiring compliance with a standard would prevent uncontrolled

use of contaminated soil, for example in day care centres, which has in fact happened.

To minimise the risks associated with contaminated soil at former industrial sites, the Government will consider introducing a requirement for enterprises, before closing operations or relocating, to document that there is no risk to health or the environment from contaminated soil on the site, and to take remedial action in the event that contaminated soil represents an unacceptable risk. Such requirements have already been imposed in specific cases by the pollution authorities.

### 10.3.3 Action plan for remediation of contaminated soil in day care centres and playgrounds

Pollution from past industrial and other activities has contaminated soil in many places in Norway.

Clean-up operations at polluted sites like these have been in progress for several decades. Efforts so far have focused on the most heavily polluted sites. The Government now intends to take this a step further in a special effort to protect children. The purpose of this effort is to reduce the exposure of Norwegian children to ecological toxins and enable parents to feel confident that their children's health is not at risk when they are at day care centres or playgrounds.

#### *The problems*

There are around 40 000 playgrounds in Norway, including those at approximately 6000 day care centres. Samples taken in the largest towns and the most heavily polluted industrial communities where there is widespread soil pollution show elevated concentrations of lead, PAHs and arsenic in soil from many day care centres and other playgrounds. Sources of pollution include industry, road traffic, general urban activity and contaminated soil and fill. Elevated concentrations of PCBs and mercury have also been found at some sites. Levels of ecological toxins in soil from day care centres are generally similar to those in soil from other parts of the town or district.

In addition, all day care centres and playgrounds where there is playground equipment made of CCA-treated wood (wood treated with a preservative consisting of copper, chromium and arsenic compounds) have arsenic pollution in the soil around the equipment. Existing data indicate that outside industrial areas and the largest towns, it is normally only soil around playground equip-



Figure 10.6

Photo: Marianne Otterdahl-Jensen

ment made of CCA-treated wood that is contaminated. However, better documentation is needed.

It is unlikely that concentrations high enough to represent an acute health hazard for children will be found, but the environmental authorities wish to reduce overall lifetime exposure levels. The Government has therefore drawn up an action plan for remediation of contaminated soil in day care centres and playgrounds.

#### *When and where are investigations and remediation to take place?*

1. *Investigations of soil in day care centres and outdoor play areas that are particularly exposed to pollution will be performed in the 10 largest towns and five large industrial districts in Norway by the end of 2008.*

Around one-third of Norway's population live in the 10 largest towns and five large industrial districts (see figure 10.8). It is likely that most of the outdoor play areas with contaminated soil, other than those where arsenic has leached from playground equipment, are in these areas. Plans are therefore being made to test soil for contamination at day



Figure 10.7 Investigations have revealed that soil in many day care centres in the largest towns is contaminated

Photo: Kristin Kink Rannem

care centres and outdoor play areas that are particularly exposed to pollution in the 10 largest towns and the five large industrial districts by the end of 2008. This will involve around 2000 day care centres and 40–50 outdoor play areas that are exposed to pollution. A number of other day care centres that are not considered to be exposed to pollution will be used as reference sites.

*2. Remediation measures shown to be necessary by the investigations are to be completed by the summer of 2010.*

The investigations will be followed up by necessary remediation and other measures by the summer of 2010. Before issuing any remediation orders, the pollution control authorities will assess whether the measures are in reasonable proportion to the damage and nuisance caused by the pollution. This will include an assessment of the financial capacity of the day care centre in question. This will ensure policy coherence, since the Government's day care policy includes capping day care centre fees, securing full day care coverage and reducing the exposure of Norwegian children to ecological toxins.

*3. A plan for the rest of Norway's day care centres and playgrounds is to be drawn up by the summer of 2010.*

A plan for dealing with the rest of Norway's day care centres and playgrounds will be drawn up, incorporating the lessons learned from the investigations carried out during the first phase. This plan is to be completed by the summer of 2010.

Many municipalities have already started investigations and clean-up operations in day care centres on their own initiative. This is a very welcome development, and municipalities other than the 15 involved in the first phase that wish to carry out investigations of their day care centres before the summer of 2010 will be encouraged to do so.

*What is to be done?*

Soil where levels of contamination caused by general urban and industrial activities exceed limits established on the basis of new quality criteria for soil in day care centres and playgrounds will be replaced with clean soil or covered with sheet mulch and clean soil. Grass or other ground cover will be sown wherever appropriate.

The National Institute of Public Health, with assistance from the Norwegian Pollution Control Authority, is in the process of formulating quality criteria for soil in day care centres and playgrounds. These will take into account whether children will only come into contact with ecological toxins through normal play, digging, dirty hands, ingesting soil and so forth, or whether there are additional paths of exposure such as water from local wells, or fruit, berries or vegetables grown within the area belonging to the day care centre.

Soil contaminated by arsenic from treated wood onsite is to be removed and replaced with clean soil. At the same time, CCA-treated wood in sandpit frames is to be removed and replaced with non-

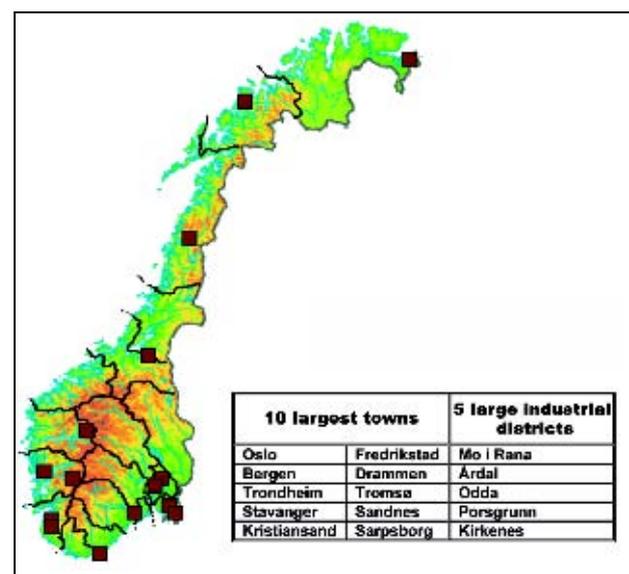


Figure 10.8 The 10 largest towns and five large industrial districts involved in the first phase of the action plan

Source: Norwegian Pollution Control Authority

CCA wood. Remaining CCA wood is to be replaced as soon as possible; meanwhile, CCA wood is to be treated often (at least every other year) with stain to keep arsenic leaching to a minimum.

Sandpit framing materials are considered to be the chief source of arsenic in terms of both children's direct exposure and leaching to the soil. It is considered that ordering all CCA wood, aside from sandpit materials, to be replaced at the same time would be disproportionately expensive, given the pollution and exposure risks.

To avoid further contamination of soil at day care centres and playgrounds, the soil at all sites where new day care centres are planned is to be checked for pollution before construction begins. Documentation will be required for all soil delivered to new or existing day care centres showing that it is free from pollution. Frequent treatment of any remaining CCA wood with stain is also important.

#### *Who will be responsible for investigations and remediation?*

As a general rule, it is the person or entity responsible (polluter, property owner) who is responsible for ensuring that there is no contaminated soil in day care centres, playgrounds or similar areas that can cause health or environmental damage. However, many sites are affected by historical pollution or by fugitive emissions (from traffic, fires, etc.). It has been calculated that the overall costs of the investigation and remediation programme outlined above will be in excess of NOK 200 million for the period 2007–2010.

In cases where it would be unreasonable for various reasons to make the person or entity responsible bear the full costs, some Government funding may be contributed.

A number of municipalities have already begun surveys and investigations of contaminated soil in day care centres. In Bergen, remediation has been carried out at day care centres and heavily contaminated playgrounds in the city centre (44 sites). In Oslo, investigations have been conducted at the city's 750–800 day care centres, and a remediation programme is in progress. Other municipalities have also conducted or are initiating investigations. This is a very welcome development, and it is important not to discourage municipalities that are showing such enthusiasm in investigating and cleaning up day care centres. However, it is necessary to ensure that investigations and necessary remediation measures are carried out promptly and maintain adequate quality. The Norwegian Pol-

lution Control Authority will therefore, in cooperation with the parties concerned, ensure that the action plan is implemented.

## 10.4 Reducing hazardous waste generation

Waste is classified as hazardous if the content of hazardous substances exceeds specified levels. Because a growing number of products contain hazardous substances, the quantity of hazardous waste generated from such products is also rising. To reduce health and environmental risks from hazardous waste, the Government therefore aims to reduce the quantity of hazardous waste generated and ensure that as much as possible of the waste is collected and dealt with properly.

At present there are a few landfill facilities for hazardous waste in Norway, in addition to 100 municipal landfills and 30–40 landfills at industrial enterprises. Hazardous waste has also been deposited at some of the two latter types of sites over the years. There is therefore a risk of releases of ecological toxins to air, water and soil from these sites. Pollution is probably most likely to be released from the older landfill sites.

Nearly 1 million tonnes of hazardous waste is generated in Norway every year, and no information is available on disposal or treatment for about 60 000 tonnes of this, which is classified as disposed of outside the proper channels. Most of this waste is probably dealt with in an environmentally sound manner, but some of it may end up in the environment. Because the substances in hazardous waste may cause serious health injury and environmental damage, the Government will intensify its efforts to ensure that hazardous waste is

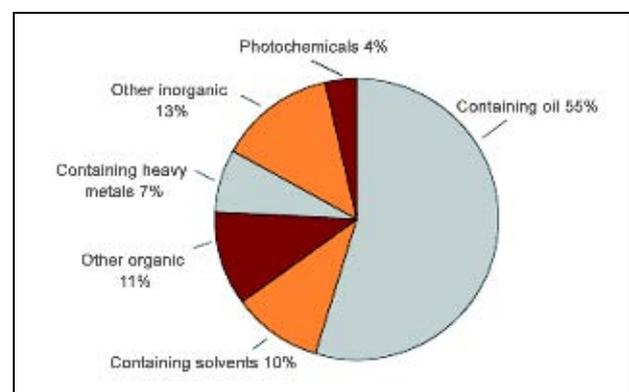


Figure 10.9 Hazardous waste dealt with outside the proper channels

Source: Statistics Norway

### Box 10.3 Collection of PCBs

All new use of PCBs has been prohibited since 1980. The total quantity of PCBs in use when the prohibition entered into force was about 1136 tonnes. An estimated 155 tonnes (14 %) is still in service, and 981 tonnes (86 %) has been taken out of use in the course of the past 26 years. Of this, an estimated 560 tonnes has been collected and disposed of properly and 421 tonnes disposed of outside the proper channels. This gives a collection rate of just under 60 % for the entire period.

The quantity of PCBs that has been released from discarded products and building waste disposed of outside the proper channels is not known, but there is substantial pollution from these sources. In some cases, the environmental effects are pronounced, and consumption advisories have been issued in some fjords because levels of PCBs in marine organisms are so high that they may not be safe to eat.

dealt with properly, especially waste containing ecological toxins. The Government's target is to reduce generation of each type of hazardous waste by 2020 compared with the 2005 level. Nevertheless, the Government's efforts to identify new types of priority hazardous waste may result in a rise in the recorded figures for generation of hazardous waste in the short term.

One reason why hazardous waste is disposed of improperly is that definitions of what constitutes hazardous waste are unclear for some types of waste. It can also be difficult for the individual consumer to determine which products are to be treated as hazardous waste when they are discarded. The Government will therefore review ways of making information on what is considered to be hazardous waste or waste electrical and electronic equipment more easily available to users and consumers. The aim is to ensure more effective collection of these products, and a wide range of possible measures and instruments will be assessed, such as labelling and other types of information.



Figure 10.10 Hazardous waste

Photo: Marianne Otterdahl-Jensen

## 10.5 Waste water and sewage sludge

The use of ecological toxins in products and industrial processes leads to their release via sewerage systems, which transport waste water from households, industry and facilities such as hospitals, waste disposal sites and petrol stations, and surface runoff from impermeable surfaces such as roads, car parks and roofs.

The objective of Norwegian waste water management policy is to remove ecological toxins at source before they are discharged into sewer systems. This has reduced releases of ecological toxins to sewerage systems, but has not eliminated them. Ecological toxins are still being detected in waste water (see table 10.2), but there is a substantial degree of uncertainty in the figures.

Sewage sludge has a high content of organic matter and nutrients and is therefore a useful resource as a fertiliser and soil conditioner. Approximately 112 000 tonnes of sludge was used in various ways in Norway in 2004. The main uses

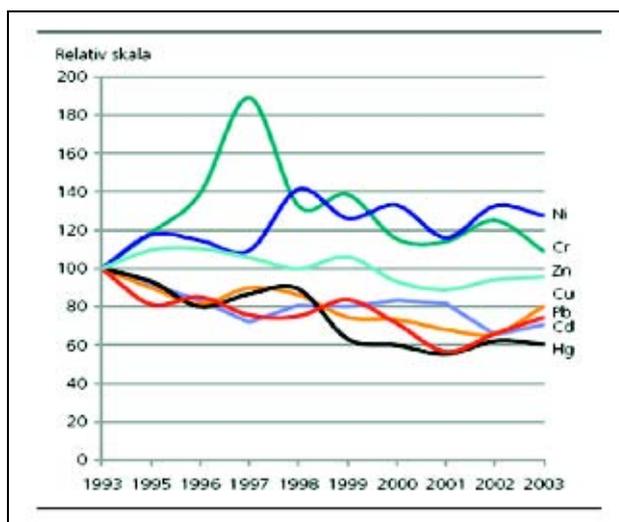


Figure 10.11 Average content of heavy metals in sewage sludge in Norway, 1993–2003

Source: Statistics Norway, SESAM database (Norwegian Pollution Control Authority), KOSTRA reporting system

are as fertiliser and soil conditioner in agriculture, in parks and green spaces, and in landfill capping. However, sewage sludge may contain ecological toxins from discharges to the sewer system.

With the closer focus on food safety, better knowledge of the effects of using sewage sludge is needed. The risks involved are uncertain, and are partly related to how the sludge is used. The Scientific Committee for Food Safety is therefore carrying out risk assessments of ecological toxins in sewage sludge. The results will be important in setting priorities for further measures to improve the quality of sewage sludge and how it is used. Monitoring programmes and risk assessments will be

conducted to provide the necessary basis for decision making (see Chapter 6).

In order to achieve the national target of eliminating releases of ecological toxins by 2020, the Government will step up its efforts to eliminate releases of such substances from sewerage systems. The main focus will be on eliminating releases at source, in other words reducing inputs to sewerage systems from products and processes.

In cases where it is difficult to eliminate releases at source, treatment at waste water treatment plants is a suitable alternative, although this is costly and technically difficult. At present, there is no established treatment technology that is capable of removing heavy metals, organic ecological toxins or pharmaceutical residues from municipal waste water and that is both reliable and financially viable. The Government will take steps to build up knowledge of the presence of pharmaceutical residues in waste water and facilitate efforts to develop technology for removing pharmaceutical residues and ecological toxins from waste water. The Government will consider whether stricter requirements should be introduced for discharges from sewerage systems by 2012 in its effort to eliminate discharges of ecological toxins and pharmaceutical residues to coastal and inland waters. It will also be necessary to assess whether focusing on reducing releases at source through discharge permits and product control measures will still provide the greatest benefits, or whether more effective treatment should be required at some waste water treatment plants.

The production, handling and use of sewage sludge is governed by the regulations relating to fertiliser products of organic origin. These set max-

Table 10.2 Releases of ecological toxins with municipal waste water (not including sewage sludge) in Norway in 2005. Figures based on measurements and estimates.

Organic compounds			Heavy metals		
Substance	Unit	Releases in 2005	Substance	Unit	Releases in 2005
Phthalates (DEHP)	tonnes	1.5	Arsenic	tonnes	1.5
Nonylphenol	kg	850	Lead	tonnes	1.8
PAHs	kg	80	Cadmium	kg	80
Brominated flame retardants	kg	65	Chromium	tonnes	2.3
PCB <sup>1</sup>	kg	1	Copper	tonnes	21
			Mercury	kg	80
			Nickel	tonnes	6.6
			Zinc	tonnes	42

<sup>1</sup> Estimated on the basis of concentrations of PCBs in sewage sludge

imum limits for the content of heavy metals in sewage sludge. They also limit the quantity of sewage sludge that may be applied per unit area of agricultural land. However, they do not lay down any specific requirements regarding the content of ecological toxins.

To ensure that sewage sludge is used safely, the Government will consider introducing maximum limits for the content of organic ecological toxins. Limit values for the content of priority ecological toxins would help to ensure that continued use of sewage sludge is safe.

## 11 More effective chemicals administration

The Government intends to ensure that the management regime for chemicals is organised in such a way that health, working environment and external environment concerns are integrated into the system in the best possible way.

Rules that are intended to improve health, environmental and safety standards must be complied with if they are to give results. Inspection and enforcement measures must be extensive enough to be a good tool for ensuring compliance with the legislation. There must be a real risk of incurring sanctions in cases of non-compliance. The Government will strengthen control and enforcement of the legislation to reduce releases of pollutants and reduce the number of products on the market that do not comply with the legislation. This will give greater assurance of health, environmental and consumer safety, and in addition raise awareness of the legislation and provide greater equality before the law. Publication of the results of inspection and control will also be used to improve the information provided to consumers before they purchase products.



Figure 11.1

Photo: Marianne Otterdahl-Jensen

### 11.1 Organisation of the chemicals administration

The Government will:

- consider whether there is a need to strengthen cooperation and coordination between different agencies in order to ensure that effective and consistent health and environmental assessments and risk reduction measures are used in the administration of medicines and cosmetics
- consider whether administrative agencies should cooperate more closely on monitoring the dispersal of plant protection products and biocides in the environment. This will include consideration of the appropriateness of such cooperation
- evaluate the consequences of giving one agency the overall responsibility for the legislation on classification and labelling of chemicals with respect to health and environmental hazards

- merge the Product Register and the Norwegian Pollution Control Authority and establish an advisory committee for the Product Register
- strengthen cooperation on international issues of relevance to hazardous substances.

#### *General considerations*

In the current chemicals administration, the division of responsibilities depends partly on areas of use (for example, the Ministry of Agriculture and Food is responsible for pesticides, while the Ministry of Health and Care Services is responsible for medicines), partly on the interests to be protected (for example, the Ministry of Labour and Social Inclusion is responsible for instruments for protecting worker health, and the Ministry of the Environment for policy instruments for protecting consumer health), and partly according to the proper-

ties of the chemicals themselves (for example, chemicals in cosmetics are the responsibility of the Ministry of the Environment if they are environmentally hazardous, but come under the Ministry of Health and Care Services if they are hazardous to health). The Ministry of Justice and the Police is responsible for instruments relating to chemicals that are under pressure or are a fire or explosion hazard, and particularly the safety of third parties. This ministry is also responsible for the legislation on the transport of dangerous goods (including chemicals) by road and rail. The Ministry of Fisheries and Coastal Affairs is responsible for the state emergency response system for acute pollution. The Ministry of the Environment is responsible for regulatory measures relating to direct releases of hazardous substances, including releases from shipping.

This means that in special cases, assessments of the risks associated with particular chemicals may be carried out by different agencies depending on whether they pose risks to ordinary consumers, patients, workers, agricultural workers, employers or the natural environment. Because of the way responsibilities are split, the same substances may also be regulated differently in different products, and in some cases, health and environmental considerations are not taken fully into account. There is only limited expertise on the effects of the use of chemicals on health and the external environment, and this is split between several administrative agencies.

There have already been several reviews of the way the chemicals administration is organised. In 2001, Statskonsult carried out an analysis of the division of responsibilities and cooperation between agencies involved in chemicals management, and proposed ways of improving coordination. As a result, cooperation has been established on joint regulations, such as the Chemicals Labelling Regulations.

In addition, a cooperation forum on chemicals has been established, where the Ministry of the Environment, the Ministry of Labour and Social Inclusion, the Ministry of Health and Care Services, the Ministry of Justice and the Ministry of Agriculture and Food and their subordinate agencies are all represented. The forum was established in response to an investigation by the Office of the Auditor General of the authorities' monitoring and control of hazardous chemicals, which concluded that it was necessary to strengthen coordination between the ministries and other agencies with responsibilities in this area. The Government

will evaluate whether cooperation between the relevant ministries and directorates can be made even better and more effective.

The chemicals agencies also cooperate on participation and development of legislation in international forums such as EU expert and working groups. In addition to the development of legislation in the EU/EEA, the Norwegian authorities have to follow up various international agreements and programmes on hazardous chemicals to which Norway is a party. In the Government's view, close contact between the different ministries and directorates on international efforts is particularly important. This ensures that Norway provides well-founded input and puts forward consistent views in initiatives for the development of effective rules in various forums. The agencies already cooperate on participation in various international forums and the views presented there. However, the Government believes that even better results can be achieved through closer cooperation, and will therefore strengthen cooperation on international issues relating to hazardous substances. This will require coordinated and broad-based efforts within Norway.

With the introduction of the new EU chemicals legislation, REACH, there will be an even greater need for consistent and coordinated management of chemicals in Norway.

The Strategic Approach to International Chemicals Management (SAICM) is an integrated approach to dealing with problems associated with chemicals in all sectors (including health, the working environment, food and agriculture), and will provide an effective overall framework for activities to improve control of the use of dangerous chemicals internationally. Under the SAICM, each country is expected to establish a national coordination forum. Norway's cooperation forum on chemicals currently fulfils this function, and when the Government reviews the forum, it will particularly consider how Norway can best fulfil its international commitments.

### *Specific fields*

At present, the Ministry of the Environment is responsible for all regulation relating to both health and environmental effects of chemicals where no separate regulatory measures have been laid down. Medicines, cosmetics, plant protection products and chemicals for occupational use are some types of uses or products that are separately regulated.

### *Cosmetics*

Currently, the health authorities are responsible for ensuring that cosmetics do not have adverse effects on consumer health, while the environmental authorities are responsible for preventing environmental damage from the same products. The Norwegian Labour Inspection Authority is responsible for inspection and enforcement measures to prevent harmful exposure of hairdressers and other workers to cosmetic products they use for occupational purposes.

Norway's key legislation for ensuring that cosmetic products do not represent a health risk for people or animals is the Cosmetics Act with appurtenant regulations. The Norwegian Food Safety Authority administers this legislation, which implements the EU Cosmetics Directive in Norwegian law. In addition to regulating the products that come within the scope of the Cosmetics Directive, the Norwegian Cosmetics Act also includes provisions on body care products for animals, tattooing products and other products intended for injection into the skin for cosmetic purposes, and external healthcare preparations that are used to prevent, alleviate or treat health problems that are not caused by disease. The cosmetics legislation thus applies to a wide range of products that are used in direct contact with the body for hygienic and health-related purposes. Under this legislation, it is prohibited to place any products that may represent a risk to human or animal health on the market.

The Product Control Act and appurtenant regulations, which are administered by the Norwegian Pollution Control Authority and the Directorate for Civil Protection and Emergency Planning, apply to all products that may result in injury to health or environmental disturbance. The Product Control Act provides the legal authority to prohibit or require the labelling of such products. However, since the legislation administered by the health authorities contains provisions designed to prevent direct injury to health from cosmetics, the environmental authorities are only responsible for preventing environmental damage from cosmetic products. Many chemicals have effects on both health and the environment. In certain cases, it can therefore be difficult to distinguish clearly between the health and environmental effects of cosmetic products. In some cases, a constituent of a cosmetic product may have adverse environmental effects, but is not harmful to a person using the product. Occupational exposure to cosmetic products can also cause problems. Exposure levels for hair-

dressers and other occupational groups who use such products in the course of their work are generally higher than for the general public. Thus, products that are not harmful to the ordinary consumer may be harmful when used for occupational purposes. In response to many cases of health problems among hairdressers as a result of exposure to hairdressing products, the Norwegian Labour Inspection Authority has carried out several inspection campaigns targeting hairdressing salons.

At European level, the directives that govern classification and labelling and risk assessment incorporate provisions on environmental considerations. These directives have been implemented in Norwegian legislation in the form of regulations under the Product Control Act. The EU legislation also deals with the health effects of chemicals. Protection of the environment will be improved with the new EU chemicals legislation, REACH. This is because it will require the registration of substances that are also used in cosmetic products, and manufacturers and importers will have to obtain information on environmentally hazardous substances and the risks associated with their use. The new legislation will thus directly affect which substances may be used in cosmetic products. The system of classification and labelling of health and environmental properties, which is being continued under REACH, is of crucial importance for communicating risks to consumers. However, cosmetic products are not labelled pursuant to this legislation, since the Cosmetics Directive is applicable.

Cosmetic products may contain substances that are also found in other consumer products, such as paints and cleaning products. Assessment of both health and environmental effects of other consumer products is the responsibility of the environmental authorities. Agencies in the health sector are also involved in evaluation of health effects. Risk assessments are carried out by the Norwegian Scientific Committee for Food Safety, while the overall evaluation of health and environmental considerations is carried out by the environmental authorities.

In the Government's view, the regulation of hazardous substances in different product groups should be more uniform. This must primarily be achieved by influencing the development of EU legislation in these areas. To ensure that Norway can pursue an active European policy and influence the development of common European rules so that they incorporate health and environmental considerations as fully as possible, the Govern-

ment considers it important to carry out uniform national evaluations of the health and environmental effects of substances that are used both in cosmetic products and in other consumer products. The positions Norway puts forward in different EU forums should be closely coordinated and agreed. Following these principles will make it more likely that provisions introduced on the grounds of a substance's adverse health effects are as similar as possible, whether they apply to cosmetic products or to other consumer products.

There is already close cooperation between the competent authorities, but further steps should be considered to ensure that both health and environmental considerations are incorporated in the best possible way work on cosmetics. The subordinate agencies of the Ministry of the Environment, the Ministry of Health and Care Services and the Ministry of Labour and Social Inclusion (the Norwegian Pollution Control Authority, the Norwegian Food Safety Authority, the Norwegian Medicines Agency and the Norwegian Labour Inspection Authority) are starting to evaluate possible measures to ensure that assessments of hazardous substances in cosmetic products and in other consumer products are as consistent as possible. Cosmetic products also include health care products, and the evaluation will include other health care products, such as medicines and medical equipment. Ways of improving inspection and enforcement of the legislation will also be considered.

### *Medicines*

Environmentally hazardous substances in medicines can spread to the environment in various ways, for example through municipal waste water systems. Studies have shown that a number of substances from medicines are present in the environment. The main source is probably the normal use of medicines by people and animals. The Norwegian Medicines Agency is responsible for authorisation of medicines in accordance with the regulations. Legislation on medicinal products has been incorporated into the EEA Agreement, so that Norway participates fully in European cooperation in this field, and Norwegian legislation has been harmonised with EU legislation. However, the Norwegian Pollution Control Authority is responsible for monitoring the state of the environment. This means that the health and environmental effects of substances that are found both in medicines and in other products are evaluated by different agencies. At present, there is little coordination of these processes.

The Government will consider whether there is a need to strengthen cooperation and coordination between different agencies in order to ensure that effective and consistent health and environmental assessments and risk reduction measures are used in the administration of medicines.

### *Biocidal products and plant protection products*

In Norway, the main responsibility for legislation on the authorisation of biocidal products and plant protection products, two groups of products that in some cases contain the same active substances, lies with the Norwegian Pollution Control Authority and the Norwegian Food Safety Authority respectively. Under the regulations relating to biocidal products, substances must be evaluated with respect to effects on the working environment, health and the external environment, and the regulations were therefore laid down by the environmental and the working environment authorities pursuant both to the Product Control Act and to the Working Environment Act. The Ministry of Agriculture and Food has sole responsibility for the legislation on plant protection products.

Requirements for the documentation to be submitted for biocidal products and plant protection products are comprehensive and very similar, and similar expertise is also needed for management of these two product groups. Plant protection products and biocidal products can only be authorised if they do not cause unacceptable harm to people, livestock, animals and plants, biodiversity, or the environment otherwise.

The new regulatory and administrative framework for food production and food safety in Norway is based on an overall, risk-based farm-to-fork approach covering all factors relevant to food production. The Norwegian Food Safety Authority is the competent authority for processing of applications for authorisation of plant protection products. Risk assessments for these products are the responsibility of the Norwegian Scientific Committee for Food Safety, which is a subordinate agency of the Ministry of Health and Care Services, while the Norwegian Food Safety Authority is responsible for risk management.

The administrative procedures for biocidal products are somewhat different from those for plant protection products. The EU runs a review programme for active substances, and the Norwegian Pollution Control Authority is taking part in this. All final decisions on authorisation of active substances are taken by the EU. When the directive was implemented in Norwegian regulations,

appropriate arrangements were agreed for cooperation between the relevant directorates. The working environment authorities (National Institute of Occupational Health) and the health authorities (Norwegian Institute of Public Health) are now involved in reviews of active substances.

Norway has been granted a derogation from implementation of the EU directive on plant protection products, but work done by the EU on these products is used as part of the basis for Norwegian evaluations, and the Norwegian Food Safety Authority follows the EU's work closely. These differences mean that Norway's work on biocidal products is currently more closely linked to EU rules, obligations and time limits than its work on plant protection products.

Administrative responsibility for assessment of biocidal products and plant protection products in the EU lies with the Directorates-General for Environment and for Health and Consumer Protection (DG Sanco), respectively. However, DG Environment is developing a thematic strategy on the sustainable use of pesticides. It is important for Norway to coordinate its participation in relevant forums in this field, and to benefit from international knowledge development in all areas relevant to chemicals management. The goal should be to ensure responsible use of plant protection products and biocidal products, so that food is safe to eat and unnecessary harmful exposure of people and the environment is prevented.

Cooperation between the Norwegian Food Safety Authority and the Norwegian Pollution Control Authority is well organised. However, they should cooperate more closely on monitoring the spread of all types of pesticides to the environment and on learning more about the risks associated with their use and the relationship between the use and release of these products and their presence in the environment. The Government therefore intends to strengthen cooperation and build up knowledge in this area; see also Chapter 6 on building up knowledge about chemicals.

### *The EU chemicals legislation*

Norway will advocate a high level of protection for health and the environment in the development of EU chemicals legislation, and will play an active role in all relevant forums where decisions on chemicals management are made.

Chemicals legislation comes within the scope of the EEA Agreement, so that harmonisation of Norwegian legislation is generally required. Much of the framework for Norwegian chemicals legisla-

tion is thus determined in the EU, and this poses a special challenge to the development of effective chemicals management in Norway. Norway's opportunities for influencing developments in this area lie in participation in EU expert groups and committees. To make its voice heard in the EU, Norway needs a high level of expertise, sound scientific arguments and agreed Norwegian positions. The same applies in negotiations on other international legislation.

Under the EEA Agreement, Norway shares EU chemicals legislation for all areas except plant protection products. New comprehensive chemicals legislation, the REACH regulation, is in the process of being adopted by the EU (see Chapter 5 for further details). One reason why a new policy is needed is that the current legislation permits the use and release of chemicals even though information on the long-term impacts on health and the environment is lacking for most substances. The current legislation has proved to be ineffective in providing information on the health and environmental effects of chemicals, and in identifying the risks associated with their use, handling and release. Stricter legislation can provide substantial benefits by providing better protection for the environment, consumers and workers.

The current basic chemicals legislation in the EU includes legislation on existing and new substances, on the classification and labelling of dangerous substances (the directives relating to substances and preparations), and on safety data sheets. Administrative responsibility for the Norwegian legislation implementing the EU rules is split between several bodies. The Norwegian Pollution Control Authority, the Norwegian Labour Inspection Authority, the Petroleum Safety Authority Norway and the Directorate for Civil Protection and Emergency Planning all have powers under the legislation on classification and labelling of chemicals. The Norwegian Pollution Control Authority and the Norwegian Labour Inspection Authority are responsible for the legislation on new substances and safety data sheets. The relevant regulations are laid down by the Ministry of the Environment and the Ministry of Labour and Social Inclusion.

REACH will replace the legislation on existing and new substances and on safety data sheets. The legislation on classification and labelling will probably be retained separately, but will be closely linked to a number of provisions in REACH. This legislation determines how substances are to be classified according to their hazardous properties and how they are to be labelled when they form

constituents of chemical products. The classification of a substance also determines how it may be used. The adoption of REACH will probably not entail changes in the working environment legislation, or in legislation applying to fire and explosion hazards. Environmental assessments of cosmetic products will come within the scope of REACH, but the Cosmetics Directive, which is intended to prevent injury to health caused by cosmetic products, will not be affected (see above).

REACH will give industry a clearer responsibility for obtaining information on and classifying chemicals, while the authorities will have more responsibility for laying down the underlying requirements for testing and risk assessment, for quality assurance and evaluation of data, and for taking steps to restrict and phase out the most dangerous substances. The EU considers it important to ensure effective management of the new legislation at Community level. The European Chemicals Agency is therefore being set up to manage the registration, evaluation, authorisation and restriction processes and to coordinate a network of competent authorities, one to be designated by each member state.

With the introduction of REACH, it will be even more important to improve the efficiency of chemicals management in Norway. REACH will be part of the basis for chemicals management, since identification of the hazardous properties of chemicals and the risks associated with their use and identification of substances with unacceptable properties will all take place within the framework of REACH. This is work of fundamental importance that will be used as a basis for implementing measures in different administrative fields.

The Norwegian Pollution Control Authority has been designated as Norway's competent authority and responsible for implementing REACH at national level. The classification and labelling directives will be retained as separate legislation, but will be closely linked to the provisions of REACH. The classification and labelling rules will also be amended in accordance with the new Globally Harmonized System of Classification and Labelling of Chemicals (GHS), see Chapter 4. The Government will assess the consequences of transferring responsibility for the health and environmental aspects of these directives to the competent authority for administering REACH in Norway, so that one Norwegian authority has sole responsibility for all the basic chemicals legislation. This would be similar to the system that already exists in Sweden and Denmark. Transferring the respon-

sibility for classification of physico-chemical hazards will not be considered.

For Norway, the main elements of work on the basic chemicals legislation involve working directly with the EU in working groups and in the new European Chemicals Agency, implementing national legislation, interpreting the legislation, and inspection and enforcement. The Norwegian Pollution Control Authority is responsible for coordinating Norway's implementation of the current EU chemicals legislation, and cooperates extensively with other relevant authorities that are involved in the process and responsible for inspection and enforcement within their areas of responsibility.

In 2001, an interministerial group reviewed the distribution of responsibilities and cooperation between agencies involved in chemicals management, and recommended closer consideration of whether to give one agency sole responsibility for the rules on classification and labelling. The consequences of this will be evaluated in a project involving the relevant authorities and as part of the preparations for the introduction of REACH. To ensure that the project provides a sound basis for any decisions to transfer responsibilities, it will include a review of current roles, responsibilities and tasks in this field and the consequences and advantages of reorganisation. This work will not affect the inspection and enforcement activities of the different agencies. Each agency will continue to be responsible for ensuring compliance with the legislation within its own sphere of responsibility, as is the case today.

#### *The Product Register*

Under REACH, there will be comprehensive requirements for registration of chemicals with the European Chemicals Agency. To avoid double registration and ensure efficient use of data, Norway will evaluate the rules for declaration to the Product Register in connection with the introduction of REACH. However, the Product Register holds information on the chemical composition of products, which will not be included in registration under REACH, and which is important in chemicals management. It will be important to simplify routines and ensure good communication between the Product Register and the European Chemicals Agency register. The current levels of security and data quality must be maintained. It will therefore be appropriate to integrate the Product Register into the Norwegian Pollution Control Authority when REACH is introduced, to ensure that national

requirements are maintained and that data are used effectively.

The expertise available in the Product Register and the Norwegian Pollution Control Authority can be more fully used if the two agencies are merged. Integrating the Product Register's expertise in registering and systematising data with the Norwegian Pollution Control Authority's expertise in evaluating the health and environmental risks associated with chemicals will provide a better basis for comprehensive analyses and for providing the general public with information on chemicals. This will provide a better basis for efforts by all users of chemicals. The authorities will encourage wider use of interdisciplinary analyses in joint projects.

The Product Register plays an important role in the implementation of the EU Biocidal Products Directive in Norway, among other things because all such products must be declared to the Product Register. Registration and authorisation of biocidal products can be made more effective by merging the Product Register and the Norwegian Pollution Control Authority.

The Product Register is also an important instrument for the working environment authorities. It plays a crucial role in ensuring that supervisory authorities and workers receive necessary information on hazardous substances that are used in business and industry. When the two agencies are merged, it will therefore be important to ensure that the Product Register does not give less priority to substances that are primarily a problem during occupational use. Steps will therefore be taken to maintain the focus on these substances.

The merger will give the Product Register better access to the wide range of expertise available within the Norwegian Pollution Control Authority. It will also put the authorities in a better position to assist occupational groups who are at risk from chemicals. The important cooperation between the Product Register and other bodies (particularly those that used to be represented on the board of the Product Register) must also be continued. After the merger, the Product Register will have a prominent position in the Norwegian Pollution Control Authority, so that both industry and the authorities will recognise where to find the expertise they need. The Government will establish an advisory committee for the Product Register, with representatives of the authorities and other parties concerned. The committee will be responsible for safeguarding user interests and continuing the important cooperation between the Product Register and other bodies. The Product Register has drawn up a proposal for the mandate and composi-

tion of the advisory committee, which is now being considered. In addition, formal cooperation agreements will be drawn up in certain areas to deal with the areas of responsibility of the working environment and other relevant authorities. Furthermore new routines will be drawn up to ensure a satisfactory flow of information between administrative agencies and between the authorities and the social partners.

## 11.2 Strengthening the inspection and enforcement regime

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The Government will

- control compliance with all new legislation within the sphere of responsibility of the environmental authorities within two years of its entry into force
- intensify inspection and enforcement, giving special priority to
  - strengthening controls in areas where there are unilateral Norwegian rules
  - carrying out more inspection campaigns for selected product groups
  - intensifying inspection of small and medium-sized enterprises that release hazardous substances to the environment
  - increasing the number of inspection campaigns targeting small and medium-sized enterprises where workers are exposed to harmful substances
  - intensifying controls of imported products from countries without rules corresponding to EU/EEA legislation
  - playing an active role in efforts to strengthen international inspection and enforcement activities
  - strengthening border controls in cooperation with the customs authorities and further strengthening cooperation with other supervisory authorities and the Norwegian Consumer Council
- carry out special inspections of compliance with requirements relating to the use and releases of chemicals and with requirements relating to handling of chemicals in the event of accidents at small and medium-sized enterprises
- carry out special inspections of enterprises that use hazardous substances as auxiliary materials in production and that generally have little knowledge of the effects of chemicals in the event of accidents

- in the working environment field, give priority to inspection of steps taken by enterprises to prevent injury to health from occupational exposure to chemicals, both onshore and in the petroleum industry offshore
- focus particularly on importers and distributors of chemical products and articles, and apply stricter sanctions if they are found to have breached the law
- strengthen inspection of enterprises where hazardous chemicals are present in such quantities that they may cause major accidents.

### 11.2.1 Current status

Several supervisory authorities are involved in inspection and enforcement relating to chemicals. Releases of hazardous substances to the environment and chemicals in products are the responsibility of the Norwegian Pollution Control Authority and the offices of the county governors unless otherwise determined by special legislation. Special legislation has been adopted for medicines, cosmetic products and pesticides, and for chemicals used for occupational purposes. The Norwegian Labour Inspection Authority is the competent authority when chemicals that are hazardous to health are used in the working environment, and the Petroleum Safety Authority Norway, is both a working environment authority and the safety authority on the Norwegian continental shelf and for certain onshore petroleum installations and pipeline systems. The Norwegian Food Safety Authority, the Norwegian Medicines Agency and the Norwegian Board of Health Supervision are the competent authorities for medicines, cosmetic products for people and animals, medical equipment, drinking water and chemical residues in food. The Food Safety Authority is also responsible for pesticides, veterinary products, feedingstuffs, fertilisers and food packaging. The purpose of the Food Act is both to ensure that food is safe and wholesome and to promote health concerns, and both elements are for example relevant in the case of pesticides. The Food Safety Authority, the Medicines Agency and the Board of Health Supervision are responsible only for the safety of other product categories with respect to health. See section 11.1 for more details.

The responsibilities of the Directorate for Civil Protection and Emergency Planning include all handling of chemicals that represent a fire or explosion hazard, with a particular focus on safety for the surroundings and third persons. The Directorate is also the competent authority for all trans-

port of dangerous goods by road and rail. Furthermore, it is responsible for cross-sectoral coordination focusing on major accidents and emergencies for which the public sector is responsible for maintaining an emergency response. The Norwegian Industrial Safety and Security Organisation is responsible for inspection of emergency response systems in enterprises that have more than 40 employees and handle dangerous chemicals.

Cooperation between the supervisory authorities that are responsible for administration of the regulations relating to systematic health, environmental and safety activities in enterprises (Norwegian Pollution Control Authority, Norwegian Labour Inspection Authority, Directorate for Civil Protection and Emergency Planning, Norwegian Industrial Safety and Security Organisation and Petroleum Safety Authority Norway) has been formalised. There is also close cooperation between these agencies and others that are not competent authorities under these regulations, such as the Norwegian Food Safety Authority and the Norwegian Medicines Agency.

Inspection and enforcement activities have proved to be an effective instrument. For products in particular, contravention of the legislation is often not revealed until the authorities carry out controls.

#### *Inspection and enforcement by the Norwegian Pollution Control Authority and the offices of the county governors*

The Pollution Control Authority and the offices of the county governors target imports and sales of products and chemicals, production activities, measures to prevent the spread of pollution from polluted soil and sediments, and various types of waste management. In recent years, priority has been given to inspection of smaller enterprises that do not have discharge permits under the Pollution Control Act, for examples importers and distributors of articles, engineering firms, construction firms and firms that collect and treat hazardous waste. An effective inspection and enforcement system should be risk-based, so that the focus when planning activities and setting priorities is on the areas where there is most risk of health or environmental damage. One goal in all the areas mentioned above is to prevent releases and dispersal of those hazardous substances for which the authorities have set official targets, either for the reduction of releases or for phasing out their use.

A systematic, risk-based inspection and enforcement regime has helped to reduce releases

of hazardous substances. However, experience indicates that firms still lack information on and risk assessments for the chemicals and auxiliary substances they use. Firms that hold discharge permits from the Norwegian Pollution Control Authority are inspected regularly. They are divided into four control classes, and the frequency of inspections is determined by the level of the risk of pollution.

The introduction of further requirements in regulations pursuant to the Pollution Control Act will further increase the need for inspection and enforcement activities: for more information, see Chapter 7.2.

The Norwegian Pollution Control Authority is also the supervisory authority for the Product Control Act and appurtenant regulations. Inspections in recent years have particularly revealed breaches of the legislation on the content of hazardous substances in articles. They have also shown that many importers of chemicals are not familiar with the legislation and do not comply with the requirements for declaration to the Product Register, or do not label chemicals satisfactorily. In 2005, inspections of importers of chemicals resulted in eight products being withdrawn from the market. Non-compliance with the legislation is particularly widespread among small and medium-sized enterprises.

Nationwide inspection campaigns have proved to be a very useful tool for reaching many of the firms that import, market and use articles containing hazardous substances and firms that collect and handle hazardous waste. The Pollution Control Authority has been responsible for planning, implementing and reporting on these campaigns,



Figure 11.2 Measuring the heavy metal content of impregnated timber

Source: Norwegian Pollution Control Authority

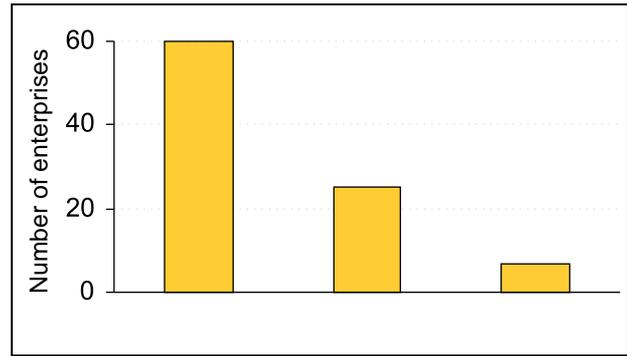


Figure 11.3 Repeated inspection campaigns to prevent imports and sales of CCA-treated timber have resulted in much better compliance with the legislation

Source: Norwegian Pollution Control Authority

while the offices of the county governors have carried out most of the inspections and followed up the results locally. Such campaigns are repeated annually or every few years. Some have already been repeated, so that it is possible to look at trends over time. For example, nationwide campaigns against CCA-treated timber were carried out in 2003 and 2004, involving about 650 inspections in all. The campaigns included notification of inspection, inspections, analyses and information to the industry and the media. As a result of the focus on the problem and the close dialogue with the large firms in this industry, the campaigns removed illegal CCA-impregnated timber from the market.

Systematic inspection and enforcement activities over a long period generally reduce the sales and use of products containing the prohibited substances that have been targeted. This has for example happened after inspection campaigns over several years targeting products containing PCBs, impregnated products containing chromium and arsenic, and products intended for small children that contain phthalates.

#### *Inspection and enforcement by the Norwegian Labour Inspection Authority*

The primary objectives of the Labour Inspection Authority are to prevent injury to health and promote an inclusive working life. The Authority's inspection activities are risk-based, focusing on those risk factors in the working environment that involve the greatest risk of injury to health and exclusion from the labour market. Hazardous

### Box 11.1 Inspection campaigns to eliminate PCB releases

Inspections of the PCB content of ballasts in old light fittings and discarded insulating double-glazed windows are an important means of preventing PCB releases. As a general rule, ballasts containing PCBs should not have been in use after 1 January 2005, or at the latest 1 January 2008 if certain conditions were met. Plans for phasing out their use should have been in place before the deadline. An inspection campaign in 2005 showed that only half of the firms inspected had complied with these requirements. One in four firms had taken no steps to phase out the use of ballasts containing PCBs. Moreover, one quarter of the glaziers inspected were not complying with the rules for dealing with discarded windows, and a third of them were operating as «free riders» in the take-back scheme. The first inspection campaign was in 2004, and it is being repeated every year until 2007. Projections indicate that the high level of demolition, renovation and construction activities in Norway will continue in the next few years. This means that products containing PCBs will be phased out rapidly. Experience indicates that some of the waste containing PCBs will not be dealt with through approved channels.



Figure 11.4 Rix has been trained to sniff out objects containing PCBs

Source: Norwegian Pollution Control Authority

The environmental authorities are therefore carrying out systematic inspection campaigns, providing more information and applying stricter sanctions. Experience shows that firms that are already complying with the legislation wish the authorities to step up their inspection and enforcement activities to maintain equal conditions of competition. The inspection campaigns have resulted in the collection of larger quantities of products containing PCBs.

exposure to chemicals is one of the Authority's priorities.

The working environment authorities have two functions as regards chemicals. One is to ensure that employers meet their obligations to protect employees against harmful exposure to chemicals. The other is to follow up the legislation on classification and labelling and on safety data sheets for chemicals used for occupational purposes. The chemicals legislation for which the Labour Inspection Authority is responsible has largely also been made applicable within the Petroleum Safety Authority's area of authority.

Employers have the primary responsibility for protecting workers against harmful exposure to chemicals and for compliance with the legislation. The Labour Inspection Authority's role as regards chemicals, wherever they are used for occupational purposes, is to oversee compliance with the relevant parts of the working environment legislation. The Authority supervises all activities that

may result in harmful exposure to chemicals in the working environment, including production, use, storage and destruction.

Between 2003 and 2006, the Labour Inspection Authority conducted a national inspection campaign against hazardous exposure to chemicals, focusing on selected industries.

So far, the results show that 75 % of the firms are not systematic in their approach to chemicals and their use, and have not carried out risk assessments of exposure to chemicals in the workplace. Of the firms that have carried out risk assessments, well under half have included objective measurements of exposure. Results are poorest in small and medium-sized enterprises. Recently, the Labour Inspection Authority has also given priority to chemicals management in branches such as hairdressing, sewage treatment and health care, where workers are exposed to chemicals, and found that 15 % of the firms that had carried out an

evaluation had also held staff training and drawn up training plans for handling of chemicals.

The Labour Inspection Authority is responsible for coordinating inspection and enforcement in the health, safety and environment field for all land-based industry except onshore facilities in the petroleum industry. This responsibility applies to the supervisory authorities under the health, safety and environment regulations, i.e. the Labour Inspection Authority itself, the Norwegian Pollution Control Authority, the Norwegian Industrial Safety and Security Organisation, the Directorate for Civil Protection and Emergency Planning and the Norwegian Radiation Protection Authority. In addition, it applies to the Norwegian Board of Health as the supervisory authority for the Gene Technology Act. Coordination is intended to ensure that all the agencies act effectively and consistently, prevent contradictory decisions or decisions that an overall assessment suggests would have undesirable effects, and avoid unnecessary double reporting.

The Labour Inspection Authority is responsible for coordination at both central and local level, including guidelines on inspection and enforcement, joint training of staff, an inspection database, inspection campaigns, a joint website and a joint working group on legislation.

Since the Working Environment Act defines substances that are hazardous to health very broadly, the Labour Inspection Authority also cooperates with the Norwegian Food Safety Authority (including the veterinary authorities) on control of the use of such substances by the aquaculture industry and in pesticides and in cosmetics used by hairdressers, with the Norwegian Medicines Agency as regards exposure to medicines, for example chemotherapy drugs, and with the health authorities as regards for example exposure to acrylates in connection with dental treatment.

#### *Inspection and enforcement by the Petroleum Safety Authority Norway*

Chemicals are an important area of responsibility for the Petroleum Safety Authority, and one that is given high priority. The Authority is responsible for coordinating inspection and enforcement in the offshore petroleum industry, and has developed complete health, safety and environment legislation together with the Norwegian Pollution Control Authority and the Norwegian Board of Health. Experience of carrying out joint inspections of integrated chemicals management with the Norwegian Pollution Control Authority has been positive.

As the safety authority, the Petroleum Safety Authority is responsible for enforcing technical and safety management requirements designed to prevent releases of chemicals, including oil and gas, to the external environment, and uses substantial resources on this task. The Petroleum Safety Authority is also responsible for ensuring compliance with the regulations relating to major accident hazards on the Norwegian continental shelf and for certain onshore petroleum installations and pipelines. See also Chapter 7.3 and Chapter 8.

#### *Inspection and enforcement by the Norwegian Food Safety Authority*

The work of the Norwegian Food Safety Authority is based on the principle that an inspection and enforcement system should be effective and clearly targeted. The Authority runs an extensive inspection and enforcement regime under the Food Act, the Prevention of Cruelty to Animals Act, the Act relating to veterinary surgeons and other veterinary personnel, and the Cosmetics Act. This involves a wide variety of activities. For example, the Authority inspects the use of medicines for animals by veterinary personnel. Product-related inspection and enforcement activities deal with the presence and regulated use of chemical substances in food, drinking water, packaging for food, fodder and cosmetic products. There are also checks on use and sales. Other activities target production. For a number of products, inspection and enforcement activities focus on labelling and the use of substances as constituents in products, and also to some extent on whether correct information is provided during marketing. Control of possible microbial contamination is important for example with respect to cosmetic products. In 2005 Norway introduced provisions to improve animal welfare in its cosmetics legislation. As a result, the Norwegian Food Safety Authority is now responsible for ensuring that goods that have been tested on animals are not placed on the market if alternative test methods are available. In addition to cosmetic products that are regulated by EU legislation, the Norwegian Cosmetics Act also applies to skin injection products for cosmetic purposes, products to alleviate health problems that are not caused by disease, and body care products for animals. Regulations have been drawn up relating to these products, and the Food Safety Authority is responsible for their enforcement as well.

The Food Safety Authority also runs monitoring programmes for plant protection products, food packaging, foreign substances (including res-

icides of medicines), additives and cosmetic products.

#### *Inspection and enforcement by the Directorate for Civil Protection and Emergency Planning*

Establishments that are required by the regulations relating to major-accident hazards to produce safety reports (85 in all) are inspected annually by one of the five supervisory authorities for the regulations. This alone represents a minimum of one to one and a half man-years of work. The responsibilities of the Directorate for Civil Protection and Emergency Planning include chemicals that represent a fire or explosion hazard and the transport of dangerous goods, and inspection and enforcement activities and preventive work in this field account for about 35 man-years. In addition, the municipal fire services carry out inspections.

The Directorate uses substantial resources in inspection and enforcement relating to enterprises that use hazardous chemicals, by means of inspection, preventive work such as information and advice, and reviews and surveys and development of legislation work. The Directorate gives very high priority to supervision of preventive measures by firms related to the safety of surrounding areas and third parties. This work also has indirect and direct environmental benefits. Another area of growing importance is how controls on land use in areas around such firms are enforced, both by enterprises themselves and by municipalities through their zoning plans. In addition, the Directorate for Civil Protection and Emergency Planning has put considerable effort into surveying transport patterns for dangerous chemicals, in order to put society in a better position to deal with the safety, preparedness and environmental challenges associated with such transport. The Directorate also cooperates extensively with other authorities (the police, the public road authorities and the customs authorities) to ensure that there is satisfactory management and control of transport of dangerous chemicals.

#### *Inspection and enforcement by the Norwegian Industrial Safety and Security Organisation*

The Norwegian Industrial Safety and Security Organisation provides guidelines on the organisation of industrial enterprises' own emergency response systems for chemicals. These apply to enterprises that have carried out a risk analysis and determined that they need an emergency response system. In all, 187 large industrial enterprises are

required to maintain emergency response systems to deal with accidents involving dangerous chemicals. Emergency response capabilities must be appropriately dimensioned on the basis of the risks identified. Systems include personnel who have received training and taken part in exercises, and the appropriate equipment to deal with incidents on-site at the enterprise. The internal emergency response is coordinated with the local public-sector systems and must comply fully with statutory requirements for the emergency response to acute pollution laid down by other authorities. The Industrial Safety and Security Organisation uses about seven man-years on inspection and enforcement relating to the emergency response systems that particular enterprises are required to maintain under the Civil Defence Act.

Large industrial enterprises are focusing more on the emergency response for dealing with chemical pollution. The Norwegian Industrial Safety and Security Organisation has established a training scheme for chemical diving in this connection system. However, the Organisation considers that inspection and enforcement activities targeting small and medium-sized enterprises should be expanded.

#### **11.2.2 Expanding the inspection and enforcement regime**

Chemicals-related inspection and enforcement involves a number of different agencies, which are responsible for different types of activities and enterprises. Cases of non-compliance with the legislation on hazardous substances are frequently revealed. An effective inspection and enforcement regime is needed to ensure safe, legal handling of chemicals and prevent illegal releases and accidents, thus protecting health and the environment. Highest priority must be given to ensuring compliance with the legislation of greatest importance for health, safety and the environment.

#### *A complete, systematic, risk- and goal-based inspection and enforcement regime*

Inspection and enforcement activities will continue to focus on releases of and exposure to hazardous substances from land-based and offshore production, waste, contaminated soil and sediments and, not least, products. The many small sources of pollution that spread hazardous substances to the external environment and the working environment will continue to receive priority.

To ensure general compliance with new legislation, controls at all stages of the chain of distribution are important. The Government therefore intends to control compliance with all new legislation within the sphere of responsibility of the environmental authorities within two years of its entry into force.

The introduction of the new EU chemicals legislation REACH will entail major new tasks. The Norwegian Pollution Control Authority, as Norway's competent authority, will play an important part in cooperation on REACH and this will require additional resources. It will be necessary to establish appropriate routines for inspection and enforcement that take account of both national and international requirements and goals. The Pollution Control Authority will also play a central coordinating role vis-à-vis the future European Forum for Exchange of Information on Enforcement that is to be established under REACH. The Government will also play an active part in activities planned under the Strategic Approach to International Chemicals Management (SAICM) and the international conventions on hazardous chemicals and hazardous waste in order to strengthen inspection and enforcement.

Inspection campaigns have been found to give satisfactory results, and these activities should therefore be continued and expanded. The close cooperation that has been established between the county governors' offices and the Norwegian Pollution Control Authority will be further developed, as will cooperation between the supervisory authorities for the regulations relating to systematic health, safety and environmental activities in enterprises. One goal for inspection and enforcement relating to products and chemicals is to ensure more systematic and risk-based follow-up of importers, in order to ensure learning and compliance with the legislation where this is needed most. This can be achieved within the framework of a coordinated inspection and enforcement regime.

The Government will systematically seek to integrate the county governors' offices more closely into the inspection and enforcement regime for products, substances and preparations, as has been done under the Pollution Control Act up till now. This has required careful consideration of the division of responsibilities according to the type of legislation involved, the expertise available and the firms to be controlled. In the light of this, and to improve the efficiency of inspection and enforcement, the authority of the county governors' offices will from the beginning of 2007 be



Figure 11.5 The customs authority plays an important role in controlling compliance with the chemicals legislation

Photo: Marianne Otterdahl-Jensen

extended so that they can also control compliance with the provisions of the Product Control Act and relevant regulations laid down by the environmental authorities. The county governors' offices will thus be able to carry out all inspection and enforcement activities for individual firms.

Experience has shown that it is particularly small and medium-sized enterprises, including importers and distributors, that fail to comply with the legislation. An important task is therefore to ensure that these actors make more systematic efforts to comply with the environmental legislation. If this does not happen, the authorities will intensify advice and supervision. The main focus will be on actors at the first stage in the chain of distribution, such as importers and manufacturers, in order to prevent further use and spread of dangerous chemicals and products. In future, the inspection and enforcement regime for products and chemicals will be even more systematic and risk based, and inspections will be carried out regularly, as has been done for firms that hold discharge permits under the Pollution Control Act. Firms will be followed up closely and systemati-

cally, to ensure that they build up considerably more knowledge of the legislation and improve levels of compliance. The Norwegian Customs and Excise Authority has a great deal of information on importers, the types of products and quantities imported, and countries of origin, and is therefore an important partner in this context. This type of information is very important when determining which firms should be inspected.

A joint supervisory group has already been established to coordinate the work of the supervisory authorities in the field of health, environment and safety (Norwegian Pollution Control Authority, Norwegian Labour Inspection Authority, Directorate for Civil Protection and Emergency Planning and Petroleum Safety Authority Norway), and the Norwegian Board of Health Supervision and the Norwegian Food Safety Authority also participate regularly at its meetings. The group's tasks are to coordinate procedures and inspection and

enforcement activities, and a joint inspection database is a key element in this cooperation. The group is headed by the Norwegian Labour Inspection Authority. The Government intends to continue the close cooperation that has been established between these agencies at national level, for example with joint inspection campaigns at regional and national level. To make the inspection and enforcement system more effective and clearly goal-based, steps will be taken to draw other relevant administrative agencies and institutions in the chemicals field into this work. This will involve the establishment of cooperation with other bodies such as the Consumer Council of Norway, Statistics Norway and the Norwegian Customs and Excise Authority. Cooperation with the customs authority is particularly important as a means of stopping exports and imports of prohibited chemicals as quickly as possible. In this context, close cooperation and, if appropriate, joint action with supervisory and customs authorities in other countries is also important.

The Government wishes to establish suitable indicators of the effectiveness of different types of inspection and enforcement. A good deal of work has been done on this internationally, but no good solution has been found. It is difficult to separate the effects of inspection and enforcement activities from those of other instruments that are used at the same time. To measure what effect inspection has in smaller firms, the Norwegian Pollution Control Authority and the county governors' offices will carry out repeated inspection campaigns at regular intervals over several years. This will make it possible to see whether compliance with the legislation improves over time. If it does not, this will be an indication that inspection and enforcement by the authorities, including the advice they provide, are inadequate, and that these activities should be expanded. Repeated inspection campaigns to prevent imports and sales of CCA-treated timber (see figure 11.3) have resulted in a much higher level of compliance with the legislation. Inspections of compliance with the regulations relating to major-accident hazards have been repeated at the same establishments for the past three years, and this has given the supervisory authorities a clear picture of the level of compliance and how this is changing. There has been a considerable improvement in the extent to which firms comply with the principle of the right to information by providing information to the public.

#### **Box 11.2 Cooperation on the regulations relating to major-accident hazards**

Cooperation between the supervisory authorities for the regulations relating to major-accident hazards (Directorate for Civil Protection and Emergency Planning, Norwegian Pollution Control Authority, Norwegian Labour Inspection Authority, Norwegian Industrial Safety and Security Organisation and Petroleum Safety Authority) is organised through a coordination group headed by the Directorate for Civil Protection and Emergency Planning, which also provides the secretariat. The group deals with administrative procedures in all cases under these regulations. It also agrees on how responsibility for inspections is to be split and compiles the results of inspections as a basis for making decisions on the following year's inspections. Annual meetings are used to update supervisory personnel in the various agencies and to exchange experience. This form of cooperation between authorities is unique in Europe, and EU authorities have shown a great deal of interest in it. Cooperation has simplified the situation for both authorities and the business sector, and helps to ensure equal treatment of all firms.

### *Product-related inspection and enforcement*

The Government will further develop inspection and enforcement activities as a means of reducing illegal and irresponsible use of hazardous substances where compliance with the legislation is particularly important for public health and the environment. Stricter regulation of chemicals and products intended for use by ordinary consumers will increase the need for inspection and control further. In the Government's view, inspection campaigns targeting specific product groups are particularly effective, and campaigns targeting these categories of articles will therefore be carried out:

- electrical and electronic equipment
- toys
- plastics
- textiles
- products containing PCBs
- building materials.

Cooperation between the relevant authorities is important in this context. There is already cooperation between the Norwegian Pollution Control Authority and the Directorate for Civil Protection and Emergency Planning as regards electrical and electronic equipment and products containing PCBs, and this will be continued.

The Government will also intensify controls of chemicals in consumer products. Moreover, inspection of importers of chemicals will be intensified, focusing on topics such as classification and labelling, declaration to the Product Register and the use of illegal substances and products. Inspection and enforcement by the environmental authorities will focus particularly on importers of consumer products.

Inspection and enforcement by the Norwegian Labour Inspection Authority in this field targets producers, importers and distributors of chemicals. Establishments that produce, import and/or place chemicals that carry warning labelling on the market in quantities exceeding 100 kg per year are required to declare them to the Product Register. The inspection and enforcement regime for producers, importers and distributors of chemicals for occupational use will be systematic and risk based, and will include written reporting by firms, on-site inspections and audits, and also activities such as unannounced inspections and inspection campaigns.

The relevant supervisory authorities will be required to cooperate and coordinate their activities in order to optimise the use of resources and performance.

Furthermore, the Government will ensure that consumers are provided with more information in connection with controls of consumer products. A single web portal is planned for all the supervisory authorities to make information on dangerous products that have been found in the EU and Norway more accessible. Information on illegal consumer products that are on the market and other information that can help consumers to make environmentally sound choices will be available here.

The Government will also intensify inspection and enforcement in areas where Norway has different rules from the EU. In these areas, there is even less reason to be confident that products imported to Norway comply with the legislation. In addition, there are special problems with respect to products imported from outside the EU, and inspection and enforcement should target these products in particular.

### *Inspection and enforcement related to industrial processes*

The Government intends the inspection and enforcement regime to contribute to implementation of its chemicals policy. For enterprises that hold discharge permits, important issues will be compliance with the duty to apply the substitution principle and the duty of care, the content of hazardous substances in raw materials and production chemicals, the handling of hazardous substances, safety data sheets, the delivery of hazardous waste and satisfactory internal control systems.

For enterprises that do not hold discharge permits, the Government will ensure that inspection and enforcement focus particularly on compliance with the requirement to maintain an internal control system, the use of prohibited and dangerous substances, handling and delivery of hazardous waste by small enterprises, municipal and private facilities for hazardous waste and final disposal of hazardous waste. Such activities are generally organised in the form of national and regional inspection campaigns in cooperation between the Norwegian Pollution Control Authority and the county governors' offices. The pollution control authorities will follow up the work done in 2006, which has focused on municipal and private facilities for hazardous waste, the use of chemicals and handling of hazardous waste in smaller manufacturing firms and repair shops, delivery and handling of discarded windows containing PCBs, steps to phase out light fittings containing PCBs, and shipyards.

One of the tasks of the Directorate for Civil Protection and Emergency Planning within inspection and enforcement is to promote systematic, integrated health, environmental and safety activities at major-accident hazard establishments so that they maintain adequate safety standards.

Another of the Directorate's tasks is to ensure that industrial establishments that handle dangerous substances give priority to security measures to ensure that such substances are not accessible for use by persons with malicious intent. The Directorate will focus particularly on establishments where releases of dangerous substances could have major impacts on the surrounding population, and especially those where there is insufficient security and safety awareness.

The Government will continue its systematic efforts vis-à-vis the industrial sector by laying down requirements for firms to obtain information, carry out risk assessment and apply the substitution principle to process chemicals. Moreover, inspections carried out by the county governors' offices as part of a system of inspection campaigns organised by the Norwegian Pollution Control Authority will be continued and further developed, and cooperation will be expanded to include other supervisory authorities.

#### *Greater emphasis on international cooperation on inspection and enforcement*

Norway imports a large proportion of the chemicals and products it uses, and conditions on the Norwegian chemical market therefore reflect those on the international market. Norway's chemicals legislation is largely harmonised with EU legislation. As discussed earlier, it will be important to strengthen international cooperation on inspection and enforcement under the new EU chemicals legislation, REACH. Norway is also bound by international conventions that make it necessary to have a common understanding of the legislation.

Norway is already playing an active part in Nordic and European cooperation on inspection and enforcement. For example, Norway is a member of the Chemical Legislation European Enforcement Network (CLEEN), an informal organisation that organises and carries out European enforcement projects. The aim is to control compliance with EU/EEA legislation on hazardous substances. Some of the topics that have been dealt with in recent years are enforcement of the legislation on classification and labelling of chemical substances and products, safety data sheets, the cadmium content of products, the use of ozone-depleting sub-

stances, the content of azo colorants in products, and sales of chemicals via the Internet.

The European Union Network for the Implementation and Enforcement of Environmental Law is an informal network for the whole EEA, which focuses particularly on implementation of the Directive concerning integrated pollution prevention and control (the IPPC Directive) and the directives on waste management. Norway participates in the IMPEL Network on an equal footing with EU member states, and thus has the opportunity to influence European inspection and enforcement efforts and obtain information on developments in inspection and enforcement systems relating to pollution in EU member states, and their priorities. The Government will therefore give priority to this work.

The Directorate for Civil Protection and Emergency Planning is taking part in cooperation under the auspices of the EU on information exchange and development and harmonisation of inspection and enforcement activities relating to major accident hazard establishments.

The chemicals legislation is complicated, and expert knowledge is needed to ensure proper enforcement. The Government will therefore facilitate competence building at all administrative levels. It is important to establish appropriate working methods for a future inspection and enforcement regime, that will satisfy both national and international requirements and goals. In addition, it is important to ensure that interpretation and enforcement are as uniform as possible in the different EU and EFTA countries. The Government therefore wishes the Norwegian authorities to play an active role in the Nordic and European inspection and enforcement networks.

#### **11.2.3 Stricter sanctions for non-compliance**

If inspections reveal breaches of the legislation, it is important to give a clear message that the situation must be rectified. This is necessary to ensure compliance with requirements that are introduced. However, in serious cases involving releases of hazardous substances, it is not enough to make a firm aware of its duty to put matters right. Sanctions are needed, and there must be a price for breaches of rules that have been laid down to protect health and the environment.

The supervisory authorities reveal a large number of cases of non-compliance every year. Most of these are minor contraventions, and are quickly corrected by the firms in question. The normal sanction in these cases is for the supervisory



Figure 11.6 The Government will intensify controls of consumer products

Source: Norwegian Pollution Control Authority

authority to issue an order, which may be supplemented by a coercive fine that is effective from a specified time limit and until the situation has been rectified. A coercive fine may also be payable each time contravention takes place. Coercive fines are intended to put further pressure on firms to rectify the situation by a specified time limit. The amount of the fine is large enough that it does not pay to allow the illegal situation to continue, and in certain cases it may be as high as several million NOK. In most cases, firms do take action once they have been notified that a coercive fine will be imposed. The Government considers this to be a very effective instrument, which will be widely used in future as well.

The most serious cases are reported to the police. This is primarily considered in cases where there has been serious contravention of an act, regulations or a permit, unacceptable conduct on the part of the firm, or a serious environmental impact or the possibility of one. It is also a suitable

response if the same firm is repeatedly found to have breached the law. Penalties are a strong deterrent, and the practice followed by the pollution control authorities is in accordance with the recommendations of the National Authority for Investigation and Prosecution of Economic and Environmental Crime in Norway. Once firms involved in waste management, polluting activities or production are aware that contravention will be reported, the level of compliance improves. However, relatively few cases involving products have been reported to the police so far. It is therefore important that the police and prosecuting authority also become more familiar with the legislation on products and chemicals. As regards explosives, there has been a large increase in the number of cases reported to the police by the Directorate for Civil Protection and Emergency Planning because the rules on safe storage have been contravened.

It is important to improve compliance with the legislation in order to reduce sales and use of illegal hazardous substances. Now that repeated inspection campaigns have been carried out in a number of sectors, the Government intends that stricter sanctions will be applied if firms persist in non-compliance with provisions of particular importance for avoiding adverse impacts on health and the environment. Both coercive fines and reporting to the police will therefore be more widely used. Administrative sanctions in the form of fines may also be considered to be an effective instrument in the future.

In addition to these sanctions, the working environment authorities can order operations at an establishment to be stopped if the firm fails to comply with orders issued pursuant to the Working Environment Act within the specified time limit, or if there is an immediate risk to workers' life and health. The pollution control authorities also have the power to order an establishment to stop part or

Table 11.1 Control of producers, importers and distributors of chemicals for occupational use by the Norwegian Labour Inspection Authority, 1999–2005.

Year/action or sanction	1999	2000	2001	2002	2003	2004
1. Inspection	164	121	97	89	99	97
2. Notification of order	152	113	74	66	69	56
3. Notification of coercive fine	20	11	7	11	38	22
4. Collection of coercive fine	2	1	1	1	0	0
5. Marketing of product stopped	1	0	0	0	0	0
6. Case reported to police	2	1	2	3	1	0

Source: Ministry of Labour and Social Inclusion

### Box 11.3 Case law

As a result of serious breaches of the Pollution Control Act in recent years, more cases have been brought before the courts, and more severe penalties have been imposed. In one case, the Supreme Court imposed immediate prison sentences on two business executives for serious environmental crime. They were found guilty of releasing an estimated 40 000 tonnes of waste water contaminated with metals. The Supreme Court noted that it is important to impose more severe sanctions in response to environmental crime, as a general deterrent.

all of its operations if its releases of pollutants are higher than specified in its discharge permit. Closure of operations can have major consequences for a firm, and is often felt to be a more serious step than being reported to the police. It is therefore only used in special cases. The Fire and Explosion Prevention Act also authorises the closure of operations if there has been an accident or a risk of a serious accident. In the past two years, higher fines have been imposed after serious breaches of provisions in the fire and explosion legislation relating to the safety of third parties.

Table 11.1 shows an overview of product-related inspection and enforcement by the Norwe-

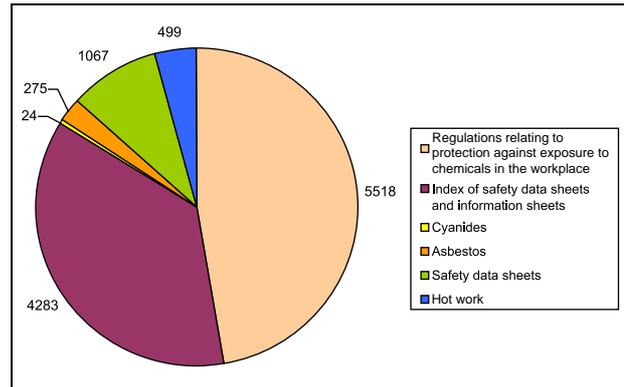


Figure 11.7 Sanctions implemented against employers by the Norwegian Labour Inspection Authority for breaches of chemicals legislation in the period 1995–2005.

Source: Ministry of Labour and Social Inclusion

gian Labour Inspection Authority in the period 1999–2005. This targets warning labelling, safety data sheets and declaration of chemicals for occupational use to the Product Register. Most cases of non-compliance involve breaches of the rules on safety data sheets. Figure 11.7 shows sanctions implemented against employers by the Norwegian Labour Inspection Authority for breaches of the chemicals legislation in the period 1995–2005. It shows the large total number of cases where sanctions were imposed, and indicates how they are split between different areas.

## 12 Economic and administrative consequences

The proposals in this white paper will add to knowledge of and information on chemicals, which will be of benefit to all users of chemicals during production, in the working environment, and in everyday life. Consumers will gain through a higher level of protection for health and the environment, primarily because the products they buy will contain fewer hazardous substances. Firms will benefit from a lower level of risk for their employees, and because of greater public confidence. It is difficult to measure benefits of these types in monetary terms, but they will nevertheless bring about improvements in welfare.

Costs will rise for certain firms as a result of the proposal for a unilateral Norwegian ban on the sale and use of some priority ecological toxins. However, these costs will be relatively small if safer alternatives exist. If they do not, the negative impacts of applying various policy instruments on the firms in question must be weighed up against their benefits in terms of better protection of health and the environment.

The economic consequences of each proposal to introduce a tax or other form of regulation will be calculated, and it is a requirement that measures to achieve the goals are cost-effective. Measures will only be implemented if the benefits to society of the measures are greater than the costs.

The action plan for contaminated sediments will require a substantial increase in resources allocated for this purpose. Remediation operations will result in a cleaner environment, lower health risks and better opportunities for economic activity based on a clean environment. In many cases, actors such as ports are not responsible for the pollution. Nor do ports have the financial resources to pay for remediation of contaminated sediments. Some Government funding will therefore also be needed for investigations and remediation of contaminated sediments and harbours. This principle has previously been set out in the white paper *Protecting the Riches of the Seas* (Report No. 12 (2001–2002) to the Storting) and the most recent white paper on the Government's environmental policy and the state of the environment in Norway

(Report No. 21 (2004–2005) to the Storting). The Government therefore emphasised in its policy platform that the costs of cleaning up contaminated sediments in harbours and other areas are to be split between the polluters and the state.

As described in the action plan for remediation of contaminated soil in day care centres and playgrounds, it is as a general rule the person or entity responsible (polluter, property owner, day care centre owner) who must arrange for the necessary remediation measures. In cases where it would be unreasonable to make the person or entity responsible bear the full costs, some Government funding may nevertheless be contributed. In the budget proposal for 2007, the Government has allocated NOK 10 million to this work.

If a requirement to register cosmetic products in the Product Register is introduced, this may result in higher costs for the cosmetics industry and the Product Register. At the same time, this step would improve information on the contents of cosmetic products, making it easier for distributors and users to avoid products that may entail a risk to health or the environment. The benefits and costs will be further studied before a decision is made to widen the scope of the duty to declare products to the Product Register.

Proposals that involve a higher level of activity on the part of the environmental authorities will involve greater administrative costs in some areas. This applies to the proposal for greater Norwegian activity under the new EU chemicals legislation, REACH, and also the proposal to expand the environmental authorities' inspection and enforcement regime. However, the latter will not involve indirect costs for other administrative sectors; in fact, it is more likely to provide benefits in other inspection and enforcement areas as well. Expanding the inspection and enforcement regime may result in a heavier case load and more use of resources by the police and justice system in this area.

The budgetary consequences of the proposed measures will be clarified in the budget process and included in the usual way in the ministries' annual budget proposals. Follow-up and implemen-

tation of measures in the years to come will depend on economic developments and the budget situation. The Government will evaluate the measures proposed here in relation to other priorities in the ordinary budget processes.

The Ministry of the Environment

r e c o m m e n d :

that the recommendation from the Ministry of the Environment concerning «Working together towards a non-toxic environment and a safer future – Norway’s chemicals policy», dated 15 December 2006, should be submitted to the Storting.

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