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(2002–2003)

The Office of the Auditor General's study of the authorities' efforts to clean up polluted ground and sediments caused by polluting activities in bygone years

TO THE STORTING (NORWAY´S PARLIAMENT)

The Office of the Auditor General hereby submits Document no. 3:6 (2002–2003), the Office of the Auditor General´s study of the authorities´ efforts to clean up polluted grounds and sediments caused by polluting activities in bygone years.

Office of the Auditor General, 17 December 2002

For the Board of the Auditors General

Bjarne Mørk-Eidem
Auditor General

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The Ministry of the Environment

The Office of the Auditor General's study of the authorities' efforts to clean up polluted ground and sediments caused by polluting activities in bygone years

1 INTRODUCTION

Based on the Norwegian Storting's consideration of Proposition no. 111 (1988–89) to the Storting on further measures to deal with hazardous waste, the Norwegian Pollution Control Authority (SFT) presented a detailed action plan in 1992 for the cleanup of landfills with hazardous waste, polluted ground and polluted sediments (SFT report 92:32). The main objective of the plan was to reduce to a minimum by the year 2000 the risk of serious pollution problems resulting from the incorrect disposal of hazardous waste in bygone years. The level of ambition and the objectives were later changed in both 1996 and 1999. The area proved to be more extensive and complex than the authorities had previously presumed.[1] At the same time, the government announced new efforts to clean up polluted ground and sediments. The target date for completing the most serious cases and for clarifying the majority of the sites that require investigation is still the end of 2005.

The purpose of this performance audit has been to assess the authorities' endeavours with regard to the cleanup of polluted ground and sediments caused by polluting activities in bygone years.

In Proposition no. 1 (1996–97) to the Storting, the Ministry of the Environment estimated the total cost of the cleanup of polluted ground and sediments at around NOK 2–3 billion. It was estimated that the Norwegian government is directly responsible for about 10% of the pollution and the costs of cleaning it up, i.e. NOK 200–300 million. In a more recent report, the total expenses for the cleanup of polluted sediments are assessed at NOK 25 billion.[2]

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[1] Cf. Proposition no. 1 (1996–97) to the Storting The Ministry of the Environment, and Proposition no. 1 (1999–2000) to the Storting The Ministry of the Environment.

[2] *SFT rapport 1774/2000 Miljøgifter i norske fjorder* (SFT report 1774/2000 Hazardous substances in Norwegian fjords).

The accuracy of the cost estimate is extremely doubtful. Much of the cleanup work remains to be done, and the expenses incurred by the government in this area are also likely to be higher than previously assessed.[3]

The Office of the Auditor General's report from the study is attached as a printed appendix. The draft of the report was submitted to the Ministry of the Environment in a letter dated 4 July 2002. The Ministry has made a statement about the matters addressed, and comments from the Ministry have largely been taken into consideration in the compilation of the final report. The Ministry's comments on the Office of the Auditor General's evaluations are given in section 3.

[3] *SFT rapport 1774/2000 Miljøgifter i norske fjorder* (SFT report 1774/2000 Hazardous substances in Norwegian fjords).

2 SUMMARY OF THE STUDY

The Office of the Auditor General's study has been based on parliamentary documentation, reports, case files and current Acts and regulations concerning pollution. In addition, interviews have been held with the Ministry of the Environment, the Norwegian Pollution Control Authority (SFT), the Norwegian Defence Construction Service (NODCS), NSB AS (formerly the Norwegian State Railways) and the Norwegian Food Control Authority (SNT).

The Office of the Auditor General has reviewed the 151 cases of pollution from activities in bygone years that the authorities have given the highest priority and which represent the most serious sources of pollution. In the review of each case, the Office of the Auditor General has been assisted by NET AS (Norwegian Environmental Technology AS).

Professor Hans Chr. Bugge has provided advice and guidance in the compilation of the report.

2.1 Goal attainment and reporting

The environmental protection authorities have surveyed and registered a total of 3,390 sites with polluted ground. The surveys show that many of the sites are situated near the coast, where a river and/or a fjord are the main recipient. This particularly applies to the sites that are most severely polluted. SFT has ranked the sites in relation to the impacts on the surrounding environment with regard to vulnerability, user interests and the potential for the spread of pollution. The sites are divided into five ranks. Those ranked as the most serious need immediate investigation or action, and these have been allocated rank 1 or rank 2*. For these sites there is reliable information concerning the disposal of hazardous waste or leakages of hazardous chemicals. The sites with well-founded suspicion of hazardous waste and/or hazardous chemicals in the ground are placed in rank 2. Rank 3 contains the sites that are less polluted but where studies are required in the event of altered use of land or recipient. For sites allocated rank 4, no basis has been found to show that hazardous waste has been deposited there or that any leakage of hazardous chemicals has occurred that will have a significant impact on the surroundings. As of September 2001, 151 sites have been allocated rank 1 or rank 2* by SFT.

The Office of the Auditor General's review of the cases has revealed examples that will presumably be impossible to complete before the end of 2005. This means that there is a risk that the current objective of the environmental protection authorities will not be fulfilled. Among other things, the study shows that there are still landfills that are in active use and landfills that will be monitored for a considerable time in the future (up to 30 years). The study also reveals that 24 sites have been investigated since 1992.[4] The fact that cases have been investigated for ten years may indicate that they are complicated, either with regard to who is responsible or to the remedial measures that are required. Taking into consideration the amount of time it has taken so far to complete cases, questions can be raised as to whether it will be possible to complete the most serious cases by the end of 2005.

According to the Norwegian Pollution Control Authority (SFT), a site that includes a landfill in active use can be registered as completed in the landfill database if the operation of the landfill takes place under safe conditions and if there is no uncontrolled run-off. At 34 of the 63 completed sites, no or limited measures have been taken. In this context, it must be pointed out that a site will constitute a potential pollution risk as long as the pollution at the site has not been properly cleaned up or it is a landfill in operation, and that the site will require monitoring by the environmental protection authorities even though the case is registered as completed.

The environmental protection authorities define "completed" as the administrative procedures being completed because measures have been taken in accordance with the requirements from SFT, entailing that the role of the environmental protection authorities has been terminated. According to the Ministry, it is a normal procedure for SFT to have a final report from the project and to assess whether the status is satisfactory before they consider their processing of the case to be concluded. The Office of the Auditor General's study has revealed examples of cases that have been registered as "completed" in the landfill database, but where the authorities' requirements with regard to cleanup have not been fulfilled. Nonetheless, completed sites are reported to the Storting as if the pollution problems have been solved.

A cleanup of the sites where there is a risk of pollution has been planned since the beginning of the 1990s. In the period 1989–1991, the Geological Survey of Norway (NGU), on commission from SFT, conducted a

[4] Two of the cases with the status "under study" in 1992 have been completed, but have now been reopened.

nationwide survey of landfills and industrial sites polluted by hazardous waste. As many as 2,452 such sites were registered, and the existence of hazardous waste was proven or suspected at 1,742 of these sites. As of 1999, the number of registered sites had increased to 3,390. There are still polluted areas that have not been surveyed, particularly with regard to polluted sediments. The Ministry of the Environment uses areas with warnings against the consumption of fish and shellfish as indicators of sediment pollution. In this connection it is important to point out that the coast from and including Hordaland to and including Nord-Trøndelag has yet to be covered in the survey that forms the basis for the introduction of warnings against the consumption of fish and shellfish. It is expected that the number of such areas will increase as a result of this survey. This means that the number of reported areas with polluted sediments will also rise. Furthermore, there is reason to presume that many new sites with polluted ground will be registered. In the nationwide survey that was conducted in 1989–1991, several industries and business sectors were omitted. Survey work still remains to be done in these areas.

The nationwide survey did not cover separate field studies or other sampling that would normally be necessary before it can be confirmed which environmental problems exist at each site. Some uncertainty is therefore associated with the actual level of pollution at each site.

2.2 The use of policy instruments

The Norwegian Pollution Control Act is based on the principle that the party responsible for the pollution must pay the costs of the cleanup operations. The responsible party is not entitled to financial support from the government when environmental measures are imposed. However this does not prevent the government from covering remaining cleanup costs to enable the "correct" level of environmental quality to be achieved.

As a result of the principle that the polluter must pay, the environmental protection authorities stress that it is a political choice as to whether the Norwegian government will help by making a contribution in some cases. The consequence must be that if the authorities do not see that they can order a responsible polluter to undertake a cleanup, either because the party is not known or cannot pay, the government must finance the cleanup. In the period 1991–2000, the Ministry of the Environment has spent NOK 174.6 million on surveying, monitoring and cleaning up pollution from activities in bygone years, and NOK 106.8 million on shipwrecks, amounting to a total of NOK 281.4 million. During 1991-2000, a total of NOK 289.4 million has been allocated for these purposes.

The environmental protection authorities consider that the most important policy instrument in the efforts to clean up polluted ground and sediments is the issuing of orders pursuant to the Norwegian Pollution Control Act. However, these orders are not always complied with, or it may take a long time before they are complied with. The Act allows for the use of coercive fines. The environmental protection authorities can initiate the implementation of the order and afterwards demand that the expenses be covered by the party responsible for the pollution. The Office of the Auditor General's study shows that in these cases the environmental protection authorities have been restrained in their use of the policy instruments specified in the Norwegian Pollution Control Act.

2.3 The authorities' allocation of responsibility

The study shows that the Ministry of the Environment coordinates the use of policy instruments for cleanup efforts to only a small extent. There has been only a limited dialogue between the environmental protection authorities and state owners of polluted ground. This has resulted in a lack of coordination and in uncertainty as to the goals and implementation, and the environmental protection authorities have only rarely acted as a professional instigator in this area. In general, it is the objectives and prioritisations of the sectors themselves that decide how far they have progressed with the cleanup efforts. The performance monitoring system – which is supposed to form the basis for assessing whether the total efforts are satisfactory in relation to the applicable goals and obligations and whether the allocation among the sectors and sources is cost-effective – has not yet been fully developed. Lack of coordination and supervisory control mean that the sectors work in very different ways with regard to resolving the cases of pollution from activities in bygone years.

3 THE MINISTRY OF THE ENVIRONMENT´S COMMENTS

In its letter of 2 October 2002, the Ministry of the Environment has made comments on the Office of the Auditor General's report.

The Ministry agrees that since 1992 the authorities have repeatedly changed the objectives as to when serious pollution cases from activities in bygone years should be completed. However, all of the changes that have been made with regard to objectives and level of ambition have been submitted to the Storting, cf. Proposition no. 1 (1996–1997) to the Storting and Proposition no. 1 (1999–2000) to the Storting. In its consideration of these reports, the Storting has not made any comments on the changes that have been made.

The Ministry has stated that the objective of cleaning up the hundred most serious cases of polluted ground by 2005 is extremely ambitious. Many cases involving polluted ground can be difficult to resolve, often because it is difficult to assign responsibility and because remedial measures are very expensive. However, the allocation of considerable resources is planned in the Norwegian Pollution Control Authority (SFT) for the period up to 2005 to clarify and solve problems associated with these cases. The Ministry therefore aims to achieve the objective of cleaning up the hundred most serious cases of polluted ground by 2005. In this connection, the Ministry refers to the fact that the objective of cleaning up these hundred cases by 2005 applies only to polluted ground and not to polluted sediments. In Report no. 12 (2001–2002) to the Storting on protecting the riches of the seas, a strategy was presented for the ongoing efforts to clean up polluted sediments with separate objectives for this area. These objectives have a quite different time perspective from the work on polluted ground.[5]

Furthermore, the Ministry states that SFT's landfill database was originally intended as an internal administrative tool. The features of the database have reflected this purpose, and the environmental protection authorities have previously not given enough priority to updating the data in the base so that it could also serve as information for the general public. However, a completely new database system was set up this summer for this purpose. In connection with this, a thorough review of the system was conducted, and

[5] In section 3.5.4 of Report no. 12 (2001–2002) to the Storting on protecting the riches of the sea, it is stated that in the *long term* the concentrations of hazardous substances in all areas shall be reduced to zero, cf. the strategic goal, but how much the concentrations of hazardous substances should be reduced in the *short term* will inevitably vary from area to area.

the necessary adjustments were carried out. The Ministry agrees that it is unfortunate that the previous ranking of sites has not been changed underway as new knowledge about the individual site has been accumulated. However, this way of ranking cases has been changed in SFT's new ground pollution system, which is now more dynamic and more easily accessible.

The Ministry also points out that SFT, in connection with its annual reporting to the Ministry concerning the progress of the cleanup efforts, has routinely reviewed each case and thereby assured the quality of the information. This information has formed the basis for the reporting to the Storting on the progress of the work. The weaknesses of the database have thus been taken into account, and the necessary adjustments have been made to ensure correct reporting.

The Ministry agrees that there is great uncertainty associated with the calculation of the costs of the implementation of cleanup procedures in polluted ground and sediments. The Norwegian government's costs depend on both the level of activity and the possibility of being able to order a responsible polluter to pay for the cleanup. In addition, the government's expenses and the progress of the work are determined through the Storting's ordinary budget deliberations. The Ministry also refers to section 3.5.3 of Report no. 12 (2001–2002) to the Storting on protecting the riches of the sea, where the challenges involved in the cleanup of polluted sediments are specifically discussed. Here it is pointed out that calculations imply that it will cost anywhere from several billion to tens of billions of Norwegian kroner to clean up the polluted sediments along the entire Norwegian coast, depending on how clean the sediments are required to be. The Ministry states that the estimates are extremely uncertain, not least because we do not currently have an adequate basis for determining which measures will have to be implemented in individual areas. A long-term perspective is also being used as a basis for these efforts in other countries, and experience shows that the costs are considerable and extremely uncertain.

The Ministry gives high priority to ensuring adequate progress in the cleanup operations, and orders imposed pursuant to the Norwegian Pollution Control Act are of major importance in this work. The environmental protection authorities are responsible for imposing orders pursuant to the Norwegian Pollution Control Act concerning such factors as studies, cleanup and monitoring. However it is the owner of the problem – the party responsible for the pollution – that is responsible for implementing the order. The Norwegian Pollution Control Authority (SFT) issues these orders, while the Ministry of the Environment is the appeals body and takes the final decision in such cases. There can be many reasons why in some cases time can elapse

before the order made by SFT is actually implemented – reasons of economic, technical and legal nature. For example, a dispute about the responsibility for the problem may arise. The use of coercive measures is therefore continuously assessed in each case. However, the Ministry recognises that there may be a need in the future to employ coercive measures to a greater degree to ensure adequate progress in the work.

In the area of polluted ground and sediments, other ministries administer key policy instruments to only a small extent, apart from making budget resources available. The Ministry therefore points out that their coordinating role is of less significance in this area.

4 THE OFFICE OF THE AUDITOR GENERAL'S OBSERVATIONS

The Office of the Auditor General notes that the Ministry of the Environment agrees that attaining the goal of cleaning up the hundred most serious cases by 2005 represents a challenge. This includes all of the rank 1 and rank 2* cases in SFT's landfill database that were not completed when the goal was set in 1999. The Ministry points out that this objective only applies to polluted ground and not to polluted sediments. The Office of the Auditor General's study shows that the hundred most serious cases in the landfill database include 20–25 cases of polluted sediments. On this basis, the Office of the Auditor General questions whether it is misleading to set the cleanup of the hundred most serious cases by 2005 as an objective.

The study shows that some of the most severely polluted sites have been registered as completed even though no or limited cleanup measures have been initiated. A site can constitute a potential pollution risk as long as the pollution at that site is not properly cleaned up, or if there is a landfill in operation there. The Office of the Auditor General questions whether it is appropriate that sites that will still require monitoring from the environmental protection authorities are registered as completed.

In addition, the study also shows that the reporting does not always reflect the actual state of the most severely polluted areas. For example, instances have been disclosed of cases that have been registered as "completed" in the landfill database and reported as if the pollution problems have been solved, but where the authorities' requirements with regard to cleanup have not been carried out. The Office of the Auditor General questions this type of reporting practice and the environmental protection authorities' monitoring of their own requirements with regard to cleaning up polluted areas.

The Ministry emphasises that the new ground pollution system is more dynamic and more easily accessible than the old database. The Office of the Auditor General wishes to point out that the basic data is still the same. In cases where some of the sites have been omitted or incorrectly ranked in the survey, questions are raised as to whether the new database will give a more complete and correct picture.

5 THE MINISTRY OF THE ENVIRONMENT'S RESPONSE

The Ministry of the Environment replies in the letter of 2 December 2002:

"I refer to the letter from the Office of the Auditor General dated 13 November 2002 enclosing the document to the Storting on the above matter.

To begin with, I would like to emphasise that the efforts to clean up polluted ground and sediments caused by polluting activities in bygone years are given high priority by the government. In the Report to the Storting on protecting the riches of the sea – Report no. 12 (2001–2002) to the Storting – a comprehensive strategy was for the first time presented for the ongoing work of cleaning up polluted sediments. The report presents specific goals and an ambitious schedule for these efforts. To ensure progress, I have requested that the efforts of the Norwegian Pollution Control Authority (SFT) to clean up polluted sediments shall be organised as a special project. The future strategy is based on three parallel courses of action:

• Preventing the dispersal of hazardous substances from high-risk areas.
• Ensuring that comprehensive action is taken regionally through the compilation of action plans in each county.
• Acquiring increased knowledge through pilot projects, research, monitoring and the establishment of a national council.

The Office of the Auditor General's studies were originally intended to apply to both polluted ground and polluted sediments, whereas the report that has now been submitted mainly concerns the efforts to clean up polluted ground. Presumably, this is because there were no clear goals for the public administration's efforts to clean up polluted sediments until the Report to the Storting on protecting the riches of the sea was presented.

The Office of the Auditor General's comments mainly focus on SFT's database for ground pollution. Until recently, this database was intended as an internal tool for SFT, which was also reflected in its content. The data has not been updated in a manner that has made it suitable as a source of information for the general public. The database had weaknesses, but a routine review of each ground pollution case was made in connection with the annual reporting to the Storting on goal attainment in this area.

The proposal for the fiscal budget for 2000 was based on the assumption that information about where polluted ground is located must be made more readily accessible to the inhabitants of each municipality, to developers and

to others who have financial interests in real property. In keeping with this, SFT has made a new, improved system for registering ground pollution, and in the spring of 2002 the new ground pollution database was made available to the general public on the Internet.

SFT has already taken the weaknesses in the old database into account. A new, improved system has been made for registering ground pollution, and new administrative procedures have been implemented in SFT, e.g. with requirements for updating the database and conditions for when a case can be registered as completed. This is to ensure that SFT has orderly procedures for completing cases – both in its own files and in the ground pollution database.

In connection with the establishment of the new ground pollution database, SFT has put considerable work into the quality assurance of data. New information has been obtained which has provided a basis for changing or discarding previous basic data.

Proposition no. 1 (1999–2000) to the Storting and Report no. 8 (1999–2000) to the Storting established new goals for the efforts to clean up pollution caused by polluting activities in bygone years. A distinction is made here between polluted ground and polluted sediments. The goal of cleaning up the hundred worst cases by 2005 applies to the cases of polluted ground – not to the marine sediments.

The reason why the Office of the Auditor General has identified 20–25 cases of polluted sediments among the cases of highest priority in the ground pollution database is that seaside landfills that extend into the sea or that pollute the sediments are included in the goal for polluted ground. SFT had also included some sites that only have polluted sediments in the database. These have been removed and will now be included in the monitoring of polluted sediments in line with the strategy incorporated in the Report to the Storting on protecting the riches of the sea.

The Office of the Auditor General also points out that some sites that will still require monitoring by the environmental protection authorities have been registered as “completed”. Reference is made here to the level of ambition for the hundred cases with highest priority that were included in Proposition no. 1 (1999–2000) to the Storting: “A realistic expectation now is that the environmental problems at these sites will be solved by 2005. The goal of the requirements set by SFT is that the pollution shall be removed, cleaned up or safeguarded in such a way that there is no longer a risk of the spread of hazardous pollution, and that the pollution is not in conflict with the current use of the land.”

When a case has been registered as “completed” it means that there is no risk of pollution with the current land use. Changes in the land use may give rise to a need for new measures, and “completed” cases will therefore also be monitored by SFT. The new database has otherwise discarded the statistical ranking from the old system, thereby providing the opportunity to register changes in degree of impact and to correct the degree of risk on the basis of new information.

It is my opinion that the measures implemented in SFT and the responses that have been given here satisfy the points made by the Office of the Auditor General – and that we now have the systems and procedures required to monitor the goals and plans that have been devised for this area.”

6 THE OFFICE OF THE AUDITOR GENERAL'S STATEMENT

The Office of the Auditor General notes that the Ministry of the Environment now believes it has initiated measures that will adequately ensure that systems and procedures for monitoring the goals and plans that have been devised for this area achieve their purpose.

The Ministry stresses that the goal of cleaning up the most severely polluted cases by 2005 applies to sites with polluted ground and not to polluted sediments. The Office of the Auditor General notes that seaside landfills that extend into the sea or that pollute the sediments are included in the goals for polluted ground. The Ministry also states that some sites that only have polluted sediments have now been removed from the ground pollution database and that these cases will be included in the monitoring of polluted sediments based on the strategy presented in Report no. 12 (2001–2002) to the Storting on protecting the riches of the sea.

The Office of the Auditor General has noted that the Norwegian Pollution Control Authority (SFT) has already taken the weaknesses in the current system into account and has made a new, improved system for registering ground pollution with new administrative procedures, e.g. the requirement concerning updating the database and conditions for when a case can be registered as completed.

The Ministry also states that if a case has been registered as "completed", this means that there is no risk of pollution with the current land use, but that changes in the land use may give rise to a need for new measures. The Office of the Auditor General ascertains that "completed" cases are monitored in this way by SFT so that measures can be implemented if the risk of pollution should change.

The Office of the Auditor General's study shows that in this type of case the environmental protection authorities have so far been restrained in their use of the coercive measures specified in the Norwegian Pollution Control Act. The Office of the Auditor General has observed with satisfaction that the Ministry notes that there may be a need to employ coercive measures to a greater extent to ensure adequate progress in the cleanup efforts.

The matter will be submitted to the Storting.

Approved at the Office of the Auditor General's meeting of 17 December 2002

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APPENDIX

The authorities' efforts to clean up polluted ground and sediments caused by polluting activities in bygone years

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1 Introduction

1.1 Background

1.1.1 Polluting activities in bygone years as a source of pollution

Considerable amounts of hazardous waste have been deposited over the years in landfills without the necessary safeguarding or monitoring. Hazardous waste and hazardous substances also enter the environment through leaks and discharges from industrial operations. The polluted areas are sources of a long-term dispersal of hazardous substances in the ground and ground water and may entail serious pollution of watersheds and the sea. In some areas, the pollutants may constitute a direct health risk or render affected areas unusable for a desired use in the future.[1]

Discharges of environmental toxins and other hazardous chemicals into the earth, air and water come from the production of raw materials and finished products in industry, from the use of products in households, in business and industry and in the transport and communications sector, and from polluting activities in bygone years, inappropriate disposal of waste and closed mines.

In some fjords, the content of hazardous substances in marine organisms is so high that eating fish and shellfish from these waters may entail a health risk. High concentrations of hazardous substances have also been measured in organisms that live in fresh water. Throughout the country the content of mercury in perch more than 25 cm long and in pike is so high that the authorities have issued a special warning to pregnant women against eating these fish.[2]

Hazardous chemicals can cause damage to reproductive capacity, immunological defences, the nervous system and other internal organs in humans and animals. In addition, they may be carcinogenic and cause allergies.[3] The most dangerous chemicals, such as PCBs and dioxins, can cause serious damage even in low concentrations. Many of these chemicals

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1 *SFT rapport 92:32 Deponier med spesialavfall, forurenset grunn og forurensede sedimenter. Handlingsplan for opprydning.* (SFT report 92:32 Landfills with hazardous waste, polluted ground and polluted sediments. Action plan for cleanup).

2 Proposition no. 1 (1998–99) to the Storting for the Ministry of the Environment, p. 49.

3 Proposition no. 1 (1998–99) to the Storting for the Ministry of the Environment, p. 49.

decompose extremely slowly and accumulate in food chains. This constitutes a serious threat to biological diversity, the food supply and the health of future generations.[4]

The efforts to clean up polluted ground and sediments caused by polluting activities in bygone years were a priority target area for the environmental protection authorities in 1992. This report will take a closer look at the authorities' efforts to clean up polluted ground, but the cleanup of polluted sediments will also be discussed. Pollution of fresh water, however, is not covered by this audit.

1.1.2 The authorities' goals for cleaning up pollution from activities in bygone years

The consideration of Proposition no. 111 (1988–89) to the Storting on further measures to deal with hazardous waste formed the basis for the detailed action plan for cleaning up landfills with hazardous waste, polluted ground and polluted sediments, which the Norwegian Pollution Control Authority (SFT) issued in 1992. The prime objective in this plan was that the risk of encountering serious pollution problems resulting from the inappropriate disposal of hazardous waste in bygone years should be reduced to a minimum by the year 2000.

According to this plan, the cleanup measures were supposed to lead to the removal or reduction of the pollutants to a satisfactory level. Starting with this level of ambition, the environmental protection authorities estimated that the cost ceiling for the cleanup would amount to somewhere between NOK 2 and 3 billion, of which NOK 1 billion would be borne by the Norwegian government. It was also pointed out that the government would have to expect to pay for the costs of the studies and measures in advance at sites where it could take time to clarify the final responsibility for the cleanup.

Proposition no. 1 (1996–97) to the Storting included a description of the status of the cleanup efforts in relation to the plan from 1992. It was reported that in many cases, targets had not been met. According to the Ministry of the Environment, the main reasons for this were that the number of cases had turned out to be much greater than previously assumed, that time-consuming disputes had arisen about who was the polluter and was therefore financially responsible for the cleanup and that the implementation of measures generally took longer than planned. Furthermore, it had turned out that

[4] Proposition no. 1 (1999–2000) to the Storting for the Ministry of the Environment, p. 51.

satisfactory cleanup methods did not always exist, but that these had to be developed through research and development work. Thus, in most cases the delays relative to the original schedule required postponement of the deadlines until the close of 2005 and required the assignment of different priorities to the various sites. The level of ambition had to be lowered somewhat relative to previous objectives.

In Proposition no. 1 (1999–2000), the Norwegian government announced a new effort to clean up polluted ground and sediments, which concentrated on the following five main target areas and/or goals:[5]

1 One of the goals is to complete the most serious cases during 2005.[6]
2 An attempt should be made to clarify the state of the environment at the majority of the sites that require studies by the end of 2005.[7]
3 Polluted ground, which first becomes a problem when it is dug up, should be dealt with locally, and an effort should be launched with the aim of simplifying the administrative procedures and increasing local responsibility.
4 A plan shall be devised for marine sediments, and studies shall be launched simultaneously in certain priority areas.
5 Information about the location of polluted ground shall be made more accessible for the inhabitants of the individual municipalities, developers and others who have economic interests in real estate.

The close of 2005 is still the deadline for completion of the most serious cases and the majority of sites that require studies shall be clarified by then. Proposition no. 1 (1999–2000) to the Storting refers to Report no. 8 (1999–2000) to the Storting on the Government's Environmental Policy and the State of the Environment, where the following national performance targets are formulated: " Pollution of ground, water and sediments caused by earlier activities, inappropriate disposal of waste, etc., shall not entail a risk of serious pollution problems "

5 Proposition no. 1 (1999–2000) to the Storting for the Ministry of the Environment, p. 58.
6 According to the Ministry of the Environment, this goal pertains to polluted ground, cf. letter of 21 June 2001 from the Ministry of the Environment to the Office of the Auditor General.
7 According to the Ministry of the Environment, this goal pertains to polluted ground, cf. letter of 21 June 2001 from the Ministry of the Environment to the Office of the Auditor General.

1.2 Objectives and research questions

The objective of this audit is to shed light on the authorities' efforts to clean up polluted ground and sediments caused by polluting activities in bygone years. It is desirable to help ensure that this form of pollution is cleaned up within the deadlines and in a way that the Storting has specified in its resolutions.

The following two main research questions are addressed in the study:

1 Has the cleanup of polluted ground and sediments caused by polluting activities in bygone years been executed in the way that was required in the targets for the area?

   This research question takes its point of departure in the specific, ambitious targets set for the area by the environmental protection authorities in the early 1990s. Goal attainment for the targets in effect at any given time has been one of the objects of study. Current objectives are given the highest priority. Furthermore, the quality of the Norwegian Pollution Control Authority's basic data has been examined, i.e. whether the Norwegian Pollution Control Authority's database with a list of sites with polluted ground is complete and consistent with regard to the use of categories. Possible reasons for the failure to meet targets and any cases that may exist where the quality of the basic data is unsatisfactory have also been studied more closely.

2 Do the environmental protection authorities make sure that those who are responsible ensure that polluted ground and sediments are cleaned up?

   The environmental protection authorities' role as an instigator, co-ordinator and authority with primary responsibility for the cleanup of polluted sites caused by polluting activities in bygone years has been studied. Under this research question, the policy instruments employed by the environmental protection authorities to induce the public and private sectors to survey and clean up these pollutants have also been studied.

2 Methods and implementation

The Office of the Auditor General's study of the authorities' efforts to clean up polluted ground and sediments caused by polluting activities in bygone years was implemented in two phases. The preliminary analysis was implemented in the period from October 1999 to April 2000. In this phase Storting documents, policy documents from the Ministry of the Environment and reports from The Norwegian Pollution Control Authority (SFT) were reviewed. In addition, questions requiring a written response were sent to the Ministry of the Environment in this phase. In February 2000, a site visit was also made to hazardous waste landfills in Horten. In connection with this site visit a meeting was held with the East Norway Local Naval Defence District (ØSD) and Borre municipality.

The main analysis phase was implemented during the period from March 2001 to April 2002. The research questions have been elucidated by a review of Storting documents, reports and dossiers and through interviews.

In the study, it has been decided to take a closer look at two state owners of polluted sites: the Norwegian Armed Forces and NSB (formerly the Norwegian State Railways). Whereas the Norwegian Armed Forces are a sector, NSB BA is a government-owned public company organised according to a separate Act within the transport and communications sector and is therefore a part of the transport and communications sector. The reason for selecting the Norwegian Armed Forces and NSB is that both of them are important state owners of polluted sites, and the Ministry of Defence and the Ministry of Transport and Communications were the first two ministries to submit their environmental action plans. This occurred in connection with the budget for 1999. Thus, these two ministries have the longest experience with the use of sectoral environmental action plans.

Professor Doctor of Law Hans Chr. Bugge has provided advice and guidance in connection with the quality assurance of this report.

2.1 Analysis of documents

The analysis of documents initially consisted of a review of key budget propositions and reports to the Storting from the Ministry of the Environment and appurtenant Standing Committee recommendations and Storting resolutions. A review was also conducted of relevant technical reports and guidelines from the Norwegian Pollution Control Authority (SFT). Other technical reports were also analysed: mainly reports from the

Geological Survey of Norway (NGU), which contain the survey of hazardous waste in landfills and polluted ground that was conducted in the period 1989–1991. Relevant reports from the Norwegian Institute for Water Research (NIVA), the Centre for Soil and Environmental Research and the Norwegian Food Control Authority (SNT) were also reviewed.

Thereafter, the environmental action plans for the Ministry of Defence and the Ministry of Transport and Communications, plus the annual status reports from the Norwegian Defence Construction Service (NODCS) were reviewed. On the basis of the introductory analysis of documents, follow-up questions were submitted to the Ministry of the Environment, SFT, NODCS and NSB, and these were answered in writing.

2.2 Review of individual cases

A printout of the Norwegian Pollution Control Authority's landfill database of the most serious ground pollutants, i.e. the rank 1 and rank 2* cases, as per August 2001[8] was used as a point of departure for the 151 cases that were reviewed individually. The purpose of the review was to survey and describe the sites with polluted ground that the environmental protection authorities have given the highest priority, and which are the most serious sources of pollution.

The dossiers at the Norwegian Pollution Control Authority have been reviewed for 84 out of a total of 151 cases. Thereafter, interviews have been conducted with the professional staff in order to add updated information and to review the remaining 67 cases. The review of the most serious cases and the interviews with the professional staff took place in September and October 2001. On the basis of this information, an analysis checklist was prepared, which has been used as a basis for the examples and tables that are used in this report.

In the review of the individual cases, Roger M. Konieczny from NET AS [9] has participated and provided professional guidance and quality assurance.

2.3 Interviews

Interviews were conducted with representatives of the Ministry of the Environment, the Norwegian Pollution Control Authority (SFT), the Norwegian Defence Construction Service (NODCS), NSB BA and the

[8] E-mail of 29 August 2001 from SFT to the Office of the Auditor General.
[9] Norwegian Environmental Technology AS.

Norwegian Food Control Authority (SNT). All of the interviews were conducted in the period from 22 October to 14 November 2001. The purpose of the interviews with the Ministry of the Environment, SFT, NODCS and NSB BA was to clarify how the objectives in the area of polluted ground and sediments will be followed up. The purpose of the interview with SNT was to obtain more information about SNT's efforts to issue warnings against consumption and bans on sales of fish and shellfish from certain areas. The minutes from the interviews have been verified by these respective entities.

A draft of the report's auditing criteria was submitted to the Ministry of the Environment for comments in May 2001. In connection with this, a meeting was held with the ministry on 13 June 2001.

3 Audit criteria

3.1 Introduction

The audit criteria are determined from objectives that have been presented to the Storting concerning pollution that is caused by polluting activities in bygone years. These criteria have also been determined from the Norwegian Pollution Control Act and from fundamental principles that the environmental protection authorities employ in their work.

A key principle for the authorities is that pollution control policy shall be socio-economically efficient.[10] This means that the policy instruments must be organised in such a way that an optimal level of pollution is achieved at the least possible cost to society.[11] This principle also entails that an assessment be made of improving the environment relative to the costs of achieving this environmental improvement. If the value of improved environmental quality is assessed to be higher than the costs of achieving it, an improvement in the environment will result in greater socio-economic efficiency. That entails that the "correct" level of environmental quality is achieved when the amount of environmental benefits is such that the value of a unit of improved environmental quality is equal to the value of the resources that are used to achieve this improvement.

In practice, the requirements for a socio-economically efficient adaptation are only partly met, because there will normally be incomplete information about environmental damage, the cost of measures and changes in technology, and the value of benefits changes with time. This may entail that a socio-economically efficient solution at a given time would not necessarily

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[10] The requirement that environmental policy should be socio-economically efficient is incorporated into a number of government documents, including Report no. 46 (1988-89) to the Storting on Environment and Development (Programme for Norway's follow-up to the Report from the World Commission on Environment and Development), p. 73, Report no. 58 (1996–97) to the Storting on Environmental Policy for a Sustainable Development, voluntary work for the future, p. 25, Report no. 8 (1999–2000) to the Storting on the Government's Environmental Policy and the State of the Environment, p. 12, and Report no. 24 (2000–2001) to the Storting on the Government's Environmental Policy and the State of the Environment, p. 12.

[11] The requirement of cost-effectiveness entails that in a situation where different sources of pollution produce the same environmental deterioration per unit, discharge reductions ought to be divided equally among sources in such a way that the marginal cost of reducing the discharges is the same for all sources. If the environmental deterioration per unit varies among the sources, cost effectiveness entails that it is the marginal cost of reducing the environmental impact that shall be equal for all sources. Cost effectiveness also entails that contributions to an improved environment from the individual source shall be achieved in the least expensive way, cf. Norwegian Official Report (NOU) 1995:4 Policy instruments in environmental policy.

be one at some other time. In practice, it will usually only be possible to make a relatively rough estimate of the benefit of environmental improvements in that the authorities set specific targets for cleanup measures.

3.2 Policy objectives

The policy objectives have changed many times since 1988. With time, they have become less ambitious, and deadlines have either been rescinded or postponed. These changes have gradually been submitted to the Storting as the environmental protection authorities have acquired a better overview and more knowledge about the environmental damages and the difficulties of cleaning them up.

3.2.1 Objectives in the period 1988–1996

In 1988, the following national objective was established in this area:[12]
"The risk of serious pollution problems as a result of inappropriate disposal of hazardous waste in bygone years shall be reduced to a minimum by the year 2000."

At this point in time, the authorities did not have an overview of the scope of these pollution problems. Therefore, a nationwide registration of landfills and areas with polluted ground, among other things, was launched.

In 1992, on the basis of this registration, the Norwegian Pollution Control Authority (SFT) launched an ambitious action plan for the clean up of (1) landfills and polluted ground, (2) pollution from mines, (3) polluted sediments and (4) abandoned hazardous waste.[13] Within these four target areas, 11 sub-goals were defined taking the national objective from 1988 as the point of departure.

3.2.2 Objectives and work schedule for the period 1996–2000

In Proposition no. 1 (1996-97) to the Storting for the Ministry of the Environment, the national objective is amended to: *"Inappropriate disposal of hazardous waste, etc. in bygone years shall not entail any risk of serious*

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[12] Proposition no. 111 (1988–89) to the Storting on further measures to deal with hazardous waste, p. 20.
[13] *SFT-rapport 92:32 Deponier med spesialavfall, forurenset grunn og forurensede sedimenter. Handlingsplan for opprydning.* (SFT Report 92:32 Landfills with hazardous waste, polluted ground and polluted sediments. Action plan for cleanup).

pollution problems in that studies and necessary measures are implemented in:

- *areas where it is known that there is a potential risk*
- *polluted areas where land-use changes, etc. are planned"*

This amendment was justified on the grounds that it was no longer appropriate to have absolute deadlines for the completion of the cleanup.[14] The ministry specified, however, that the overall priorities that were set and the principle that were stipulated in SFT's action plan from 1992, should be maintained, including targets for various recipients.[15]

At the same time, the government presented a work schedule to the Storting, which included the following performance targets and/or requirements:[16]

- The cleanup of the remaining 272 sites with landfills and polluted ground where a risk of hazardous pollution has been registered is expected to be completed in the course of five years, i.e. in 2002.
- Efforts shall commence to establish criteria for priorities and measures for dealing with 75 fjord areas.
- Measures will be evaluated when the project "Regional studies of polluted lake sediments" is completed at the close of 1996.

In Report no. 58 (1996–97) to the Storting on Environmental Policy for a Sustainable Development, it was pointed out that the main share of the remaining work would be completed by the close of 2000, but that the most long-term part of the effort, in accordance with experiences and plans in other countries, would take at least a generation.[17] It was also explained that the authorities would prepare information that could help strengthen the municipalities' use of the Norwegian Planning and Building Act and the Act relating to the municipal health services in the efforts to gain an overview of and take measures to clean up polluted sites.

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[14] Proposition no. 1 (1996-97) to the Storting for the Ministry of the Environment, pp. 86–87.

[15] Recipient: Natural areas that receive discharges of pollutants. The main types of recipients are air, ground and water. The recipients can be more or less naturally bounded, e.g. a lake, a river, a land area, the air space above Oslo, etc. A recipient has a certain normal state characterised, among other things, by certain forms of plant and animal life that are part of an ecological system. The state of the recipient can be described by certain measurable characteristics, e.g. the amount of fish in a lake, the degree of acidity in a lake and the quantity of algae in a lake (Source: *Aschehoug og Gyldendals Store norske leksikon; Førsund og Strøm, Miljø og ressursøkonomi*, (Environmental and resource economics) Universitetsforlaget, 1980.

[16] Proposition no. 1 (1996-97) to the Storting for the Ministry of the Environment, p. 87.

[17] Report no. 58 (1996–97) to the Storting on Environmental Policy for a Sustainable Development, voluntary work for the future, pp. 188–189.

In the consideration of Report no. 58 (1996–97) to the Storting, the Standing Committee on Energy and the Environment referred to the government's objective of a complete PCB cleanup by 2005 and requested a higher priority for this important work.[18] Proposition no. 1 (1998–99) to the Storting specifies that the performance target regarding PCBs was intended to entail a halt in the discharges to the environment of PCBs, among other chemicals, and that the goal was therefore not intended to include the so-called "sins of the past" such as landfills with hazardous waste, polluted ground and polluted sediments.[19]

In 1999, the objectives and strategy in this area were amended.[20] The national performance target was formulated as follows: "Pollution of the ground, water and sediments caused by polluting activities in bygone years, inappropriate disposal of waste, etc. shall not entail a risk of serious pollution problems."

The work objective for environmental management was formulated as follows: "The environmental protection authorities shall make sure that the responsible persons remove or justifiably ensure that polluted ground caused by polluting activities in bygone years does not entail a risk of dispersal of hazardous pollution or damage to human health."

In Proposition no. 1 (1999-2000) to the Storting, priority target areas for the next five–six years were submitted.[21] These priority target areas seem to take their point of departure from the work schedule from 1996, except that the deadlines have been changed.

1 "One goal is to complete the most serious cases by the end of 2005." This applies to the 100 sites assessed as the most severely polluted.
2 "An effort should be made to clarify the state of the environment in the great majority of the sites that require study by the end of 2005." This applies to 500 sites where there is a need to study whether the pollution is so serious that measures are required.
3 "An effort should be made to locally solve the problem of polluted ground that first becomes a problem when it is dug up, and an effort will be launched to simplify administrative procedures and increase local responsibility."

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[18] Recommendation no. 150 (1997–98) to the Storting, Recommendation from the Standing Committee on Energy and the Environment relating to environmental policy for a sustainable development, voluntary work for the future.
[19] Proposition no. 1 (1998-99) to the Storting for the Ministry of the Environment, pp. 150–151.
[20] Proposition no. 1 (1999-2000) to the Storting for the Ministry of the Environment, p. 52.
[21] Proposition no. 1 (1999-2000) to the Storting for the Ministry of the Environment, pp. 58–59.

4 "A plan shall be prepared for cleaning up marine sediments, and at the same time studies will be initiated in certain priority areas."
5 "Information about where polluted ground is located shall be made more easily accessible to the inhabitants of the individual municipalities, developers and others who have an economic interest in real estate."

3.2.3 Objectives and strategy from 2000 onward

In Report no. 8 (1999–2000) to the Storting on the Government's Environmental Policy and the State of the Environment, a strategy is proposed for intensifying and targeting the efforts to clean up polluted ground and sediments.[22] This report considers sectoral responsibility of the ministries concerned, which, among other things, involves the preparation of sectoral environmental action plans.[23] The Ministry of the Environment shall co-ordinate these plans. In this context, it is pointed out that the sectoral work objectives shall be based on the national performance target, and that the work objectives shall be based as far as possible on analyses where the impact and the cost of implementing measures in the various sectors is assessed comprehensively in order to ensure a great degree of cross-sectoral cost effectiveness.[24]

In Report no. 24 (2000–2001) to the Storting on the Government's Environmental Policy and the State of the Environment, the national performance target from 1996 is still pursued. Notice is given that the government will give the Storting a broad presentation of the efforts to clean up polluted sediments in 2001, among other things so as to clarify the level of ambition of the cleanup.[25] The funding of the cleanup efforts is still based on the polluter-pays principle. However, it is also stated that in the cases where the polluter is unknown or unable to bear the financial costs of the cleanup, the government will evaluate various policy instruments with the aim of finding a funding solution. Not least, this may be the case for the cleanup of polluted sediments in cases where the costs may be very high. It is pointed out that this must be considered in the context of the specification of alternative levels of ambition for the cleanup of marine sediments and the consequences of this cleanup.

Report no. 24 (2000–2001) to the Storting goes on to state that the priority target areas that were presented in 1999 will form the basis for the ongoing

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22 Report no. 8 (1999–2000) to the Storting for the Ministry of the Environment, p. 72.
23 Report no. 8 (1999–2000) to the Storting for the Ministry of the Environment, p. 91.
24 Report no. 8 (1999–2000) to the Storting for the Ministry of the Environment, p. 12.
25 Report no. 24 (2000–2001) to the Storting on the Government's Environmental Policy and the State of the Environment, pp. 59 and 69.

efforts. However, it adds that the local authorities must be able to acquire the necessary authority and access to information in order to be able to assume the responsibility for seeing that the general public shall gain better access to information about polluted ground.

In Proposition no. 1 (2000–2001) to the Storting the work objective for environmental management is amended to: *"The environmental protection authorities shall see that the responsible persons ensure that polluted ground caused by polluting activities in bygone years does not entail a risk of dispersal of hazardous pollution or damage to human health."* According to the Ministry of the Environment, the amendment is not meant to weaken the work objective, but only as a linguistic correction.[26]

Goal attainment in the period from 1992 to 2001 will be evaluated in relation to the dates when the various environmental targets were valid. However, it is natural that the current objectives be given the greatest emphasis.

3.3 The Pollution Control Act

The main objective of the Pollution Control Act is to protect the natural environment from pollution and to reduce existing pollution, while promoting better waste treatment. The Act shall also ensure a reasonable level of environmental quality in which pollution and waste do not cause damage to human health, diminish well being or damage the productivity of the natural environment and its capacity for regeneration.[27] According to the preparatory works of the Act, the Act also covers unfortunate consequences of pollution even though this is not specified in the Act.[28]

In connection with the consideration of the Act's objects clause, the Standing Committee on Local Government and the Environment stated that environmental quality cannot always be measured in monetary terms and that it should also be possible to measure improvements in environmental quality with other standards for social development.[29]

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[26] Letter of 21 June 2001 from the Ministry of the Environment to the Office of the Auditor General.

[27] The Pollution Control Act. section 1

[28] *Utkast til lov om vern mot forurensning og forsøpling med motiver* (Preliminary draft of the Act relating to protection against pollution and deliberate refuse dumping, i.e. the preliminary draft of the Pollution Control Act) p. 110. A study from the Ministry of the Environment. Published in May 1977.

[29] Recommendation no. 25 (1980–81) to the Odelsting concerning the Act relating to protection against pollution and relating to waste (the Pollution Control Act), p. 20. This comment resulted in a clarification of section 1, sub-section 1, which deals with the purpose of the Act.

3.3.1 The polluter-pays principle[30]

Section 2, sub-section 5 of the Pollution Control Act states that the costs of preventing or limiting pollution and waste disposal problems shall be borne by the person responsible for the pollution or waste.[31] According to the preparatory work for the Act, this principle is based on a recommendation from the OECD.[32]

The original justification for establishing this principle was the general need for internalising the costs of achieving a rational utilisation of scarce environmental resources.[33] One important consideration was that the person upon whom measures were imposed to reduce pollution, should bear the costs of those measures. Another important consideration in this respect was that no public support should be given that could result in inequalities in international competition. The OECD has later added further specifications with regard to when and to what extent public support can still be accepted.[34] The principle does not give any indication of how strict the measures that are required must be and thus gives no answer to the question of who shall bear the socio-economic costs of any pollution that may remain after the measures have been implemented. This is because the principle assumes that each individual country will decide for itself what its "right" level of environmental quality shall be; i.e. that the society's total utility from an environmental improvement relative to the costs of achieving this improvement may differ from country to country.

The Pollution Control Act is based on the narrow interpretation of this principle, i.e. that the persons responsible for the pollution have no claim to receive financial support from the public authorities when environmental measures are imposed on them. However, this does not prevent the government from bearing the remaining cleanup costs so that the "right" level of environmental quality is achieved.

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30 In addition to the text of the Act, it is stated in a number of government documents that Norwegian pollution policy is based on the polluter-pays principle, e.g. Report no. 46 (1988-89) to the Storting on Environment and Development (Programme for Norway's follow-up to the Report from the World Commission on Environment and Development), p. 73, Report no. 58 (1996–97) to the Storting on Environmental Policy for a Sustainable Development, voluntary work for the future, p. 186 and Report no. 8 (1999–2000) to the Storting on the Government's Environmental Policy and the State of the Environment, p. 68.

31 The Pollution Control Act, section 2

32 In Proposition no. 11 (1979-80) to the Odelsting concerning the Act relating to protection against pollution and relating to waste (the Pollution Control Act), p. 89, it is briefly stated that section 2 subsection 5 "…expresses the principle that the polluter pays, which is an accepted international principle, which the OECD has stipulated in the form of a recommendation."

33 Recommendation C(72)128 of 26 May 1972: "Guiding Principles concerning International Economic Aspects of Environmental Policies".

34 Recommendation C(74)223 of 14 November 1974: "The implementation of the Polluter-Pays Principle."

Regardless of how the principle is interpreted, the study is based on the premise that the polluter-pays principle shall not apply as a mandatory rule of law, but as a key factor to consider when the authorities weigh the costs and benefits to society in connection with environmental measures.

3.3.2 Delegation of responsibility for the pollution

The Pollution Control Act is based on the principle that pollution and the creation of a risk of pollution are forbidden unless they have been expressly permitted. Therefore, there is an implicit duty to take measures in the Act's section 7, paragraph 1:[35] *"Anyone who risks generating pollution that is not permitted must take the necessary steps to prevent that pollution from occurring and remove the risk."* Section 7, paragraphs 2 to 4 of the Act contains more detailed rules about the duty to take measures.

In section 7, paragraph 2, sentence 1 of the Pollution Control Act, it is laid down that when there is danger of pollution in violation of this Act, or of decisions taken pursuant to this Act, the person responsible for the pollution shall take measures to prevent it from occurring.[36] In the preparatory work for the Act, it is assumed that it will usually be the owner of the facility, the object or the site from which the pollution or the risk of pollution originates, who is responsible. The environmental protection authorities base their practice on the principle that the current owner is deemed to be the person responsible pursuant to section 7.[37]

If more than one person is associated with the pollution, it is not unreasonable that several persons must be deemed to be responsible in certain cases. In such cases, it is assumed that the authorities attempt to find out who can take the necessary measures to clean up the pollution. In this assessment, emphasis can be given, among other things, to how closely the responsible persons are associated with the pollution or the risk of pollution and what possibilities they have of taking effective measures. It is also possible that the person who is deemed to be responsible may vary

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35 Hans Chr. Bugge: *Forurensningsansvaret. Det økonomiske ansvaret for å forebygge, reparere og erstatte skade ved forurensning* (The Responsibility for Pollution: The economic responsibility for preventing, repairing and compensating damage caused by pollution), Tano Aschehoug, 1999, p. 244.

36 The Pollution Control Act, section 7

37 One example of this practice is the following: Norsk Auksjon AS acquired a polluted industrial site in an enforced auction. Almost all of the pollution occurred in the period before the Pollution Control Act came into effect. The property had had at least five owners after the War who could have contributed to the pollution. Norsk Auksjon AS was ordered to study the extent of the pollution and to implement cleanup measures. This decision was appealed to the Ministry of the Environment with the argument that, pursuant to section 7 of the Pollution Control Act, the company could not be deemed to be the responsible person. The decision was upheld by the Ministry, cf. the Ministry of the Environment's decision of 27 July 1994, journal no. 93/4082-VA.

depending on the measure that needs to be taken. It is further stated in the proposition to the Act that the Ministry assumes that the specific delegation of responsibility in this area must be determined by the particulars of each situation.[38]

3.3.3 The authorities right to issue orders and impose pollution fines

If there is a risk of pollution in violation of the Act, the authorities have the right to issue orders that measures be taken pursuant to section 7, paragraph 4. The proposition to the Act[39] states that a reasonableness assessment shall be made because the person responsible can only *"be instructed to take measures that are deemed to be reasonable in the specific circumstances. In a reasonableness assessment it will be possible to emphasize the extent to which the person responsible can be blamed for the pollution or risk of pollution that has occurred."* This must be interpreted to mean that it is only the non-statutory limits on the authorities' free discretion that impose limits on what the pollution authorities can decide, i.e. that the decision cannot be arbitrary or extremely unreasonable or involve unfair discrimination.[40] Thus, section 7, paragraph 4 of the Pollution Control Act gives the authorities sweeping authority with regard to what they can impose on the person responsible for the pollution.

Pursuant to section 51 of the Pollution Control Act, the pollution control authority can require that a study be done by the person responsible for an activity that is causing, or that there is reason to suppose may cause, pollution.[41] The person responsible can be required to arrange for or pay for the investigations that can reasonably be demanded in order to determine whether and to what extent the activity causes or can cause pollution. The person responsible can also be instructed to ascertain the cause or effects of pollution that has taken place and how the pollution shall be counteracted.

The pollution control authority can make decisions about pollution fines to be paid to the state for the violation of the Act or of a decision pursuant to this Act.[42] Pollution fines can be imposed when a violation of the Act or of a decision pursuant to the Act are discovered. The pollution fine becomes

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[38] Proposition no. 11 (1979-80) to the Odelsting concerning the Act relating to protection against pollution and relating to waste (the Pollution Control Act), p. 97.

[39] Proposition no. 11 (1979-80) to the Odelsting concerning the Act relating to protection against pollution and relating to waste (the Pollution Control Act), p. 98.

[40] Hans Chr. Bugge: Forurensningsansvaret. *Det økonomiske ansvaret for å forebygge, reparere og erstatte skade ved forurensning* (The Responsibility for Pollution: The economic responsibility for preventing, repairing and compensating damage caused by pollution), Tano Aschehoug, 1999, p. 329.

[41] The Pollution Control Act, section 51

[42] The Pollution Control Act, section 73

effective when the person responsible fails to meet the deadline stipulated by the pollution control authority for correcting the condition. The pollution fine can also be imposed in advance, and will then become effective from the time the violation takes place. Pollution fines can be imposed either as a running penalty or as a lump-sum fine. It can be stipulated that the pollution fine shall continue to be paid for as long as the unlawful condition lasts, or that it is payable for each violation.[43]

3.3.4 The polluter's obligation to reimburse and liability in damages

In connection with the rules concerning the duty to take measures in section 7, the Pollution Control Act has rules concerning the polluter's obligation to reimburse in sections 74–76. The obligation to reimburse entails that the polluter must provide financial compensation for expenses of measures that others have had to take in his place. Pursuant to section 76, paragraph 1, sentence 1 of the Pollution Control Act, the public authorities can be refunded for their own *"costs, damage or loss"* pursuant to section 74.

There are three situations that give the public authorities the right to take measures themselves and demand a refund. The extent of the obligation to reimburse must be specially evaluated for each of these three cases.

1 Where the pollution control authority has instructed the person responsible to take measures pursuant to section 7, paragraph 4, or section 37, paragraph 1 or 2, and the person responsible has not complied with this instruction. In that case, the public authorities can execute *"the measure that was imposed on the person responsible."*

2 Where the pollution control authority deems it necessary to take measures without first instructing the person responsible to do so, because an instruction may entail that the implementation of the measures *"is delayed"*, cf. section 74, paragraph 2.

3 Where the authorities themselves have arranged for measures to be taken because it is *"uncertain who is responsible"*, cf. section 74, paragraph 2.

It is stated in the preparatory works to the Act that neither the duty to take measures nor the obligation to reimburse requires negligence in order to be invoked. The obligation to reimburse comes into effect without any consideration of whether the polluter has been culpable of negligence in

[43] The Pollution Control Act, section 73, paragraph 2

connection with the pollution or the risk of this pollution – it is a matter of an obligation on an objective basis.[44]

Damages from pollution can invoke liability in damages. The main rule relating to liability for damages from pollution, cf. section 57 a of the Pollution Control Act, is objective liability, i.e. liability without any consideration of negligence. A necessary condition for liability in damages is that *damage has occurred*. The rules in chapter 8 pertaining to compensation for damage from pollution apply pursuant to section 53, paragraph 1 to the extent that *"the question of liability is not specially regulated by other legislation or by contract."* This entails that other legislation, non-statutory bases of liability and special regulation of liability terms in contracts partly modify and are partly supplemented by the rules in chapter 8. In some situations, there are many possible causes of damage. Section 59, paragraph 1 of the Pollution Control Act states: *"Any person who causes pollution, which by itself or together with other causes of damage may be capable of having caused the pollution damage shall be deemed to have caused the damage if it is not established that some other cause is more likely."*[45]

3.3.5 The Pollution Control Act applies to pollution from activities in bygone years

In the preparatory study for the Pollution Control Act, the question of retroactivity is discussed, and it is concluded that there are no legal doubts about making the new Act completely valid for activities in bygone years. It was argued that section 97 of the Norwegian Constitution, which stipulates that Acts must not be given retroactive effect, does not prevent a new Act from making the terms stricter for those who have been granted a permit pursuant to an older Act, or from completely cancelling the permit.[46]

Section 86, paragraph 1 of the Pollution Control Act states that: *"The Act also applies to activities initiated before the Act entered into force. The provision in section 37 concerning the obligation to clean up and remove waste, etc. also applies in the event of violations of the prohibition described in section 28, which occurred before the Act entered into force."*[47]

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[44] *Hans Chr. Bugge: Forurensningsansvaret. Det økonomiske ansvaret for å forebygge, reparere og erstatte skade ved forurensning* (The Responsibility for Pollution: The economic responsibility for preventing, repairing and compensating damage caused by pollution), Tano Aschehoug, 1999, p. 252.

[45] The Pollution Control Act, section 59

[46] *Utkast til lov om vern mot forurensning og forsøpling med motiver* (Preliminary draft of the Act relating to protection against pollution and deliberate refuse dumping, i.e. the preliminary draft of the Pollution Control Act), p. 180. A study from the Ministry of the Environment. Published in May 1977.

[47] The Pollution Control Act, section 86

It is assumed that polluted ground is covered by the expression ”activities” as it is used in section 86, and that the Act’s rules will therefore also apply to infusions of pollution from the years before the Act went into effect.[48] This derives from the principle, which was expressed in the Norwegian Law Gazette 1979, that a permanent condition can be regulated by a new Act notwithstanding the provisions of section 97 of the Norwegian Constitution.[49]

Cases may arise where the rules governing damages, which were included in the Pollution Control Act in 1989, cannot automatically be invoked. In practice, it turns out that it is often difficult to be able to sufficiently establish when a particular polluting activity first started and when it has ended if indeed it has. The situation is complicated in cases where activities and property have changed ownership under way. In this study, it is assumed that the Act’s rules governing damages cannot necessarily be invoked in specific cases where the pollution derives from activities in bygone years.

3.4 The environmental protection authorities’ intersectoral responsibilities

3.4.1 The sectoral authorities’ responsibilities in the environmental policy

In Report no. 46 (1988-89) to the Storting on Environment and Development (Programme for Norway’s follow-up to the Report from the World Commission on Environment and Development), the government introduced a fundamental principle for Norwegian environmental policy: the independent responsibility that all sectors and participants have to take environmental factors into consideration in their field.[50] It was supposed to be ensured that all development and planning in the various sectors was in keeping with sustainable development, and that the budget and other policy instruments were formulated in such a way that existing environmental

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[48] Hans Chr. Bugge: *Forurensningsansvaret. Det økonomiske ansvaret for å forebygge, reparere og erstatte skade ved forurensning* (The Responsibility for Pollution: The economic responsibility for preventing, repairing and compensating damage caused by pollution), Tano Aschehoug, 1999, p. 650.

[49] Norwegian Law Gazette, 1979 pp. 1279–1280, concerning Sandnes municipality, which wanted to remove a rubbish heap from an agricultural property pursuant to the provision in section 16 of the Nature Conservation Act, which was in effect at that time. The property owner submitted a claim to the court of execution and enforcement relating to an interim court order to prevent the removal of the waste and argued that the encroachment entailed that the Nature Conservation Act had been given retroactive effect in contravention of section 97 of the Norwegian Constitution. The property owner’s claim was not granted. The Appeal Committee of the Supreme Court stated: “The Committee also finds it obvious that even if the rubbish heap was already there when the Nature Conservation Act was issued, section 97 of the Constitution does not give the owners any right to let it lie there for an indefinite period of time.”

[50] Report no. 46 (1988-89) to the Storting on Environment and Development (Programme for Norway’s follow-up to the Report from the World Commission on Environment and Development), p. 71.

problems were diminished and new ones were prevented. In connection with this, the Standing Committee on Local Government and the Environment stated that the environmental policy had to be intersectoral, and that by co-ordinating the efforts of several sectors the various measures would support and strengthen each other so that the cumulative environmental impact would be improved.[51]

In the same report to the Storting, the elements in the management system for an intersectoral environmental policy are illustrated as follows: target – monitoring – implementation of measures – verification. According to the report, targets for environmental improvements should be set in the various sectors, and these targets were supposed to be quantitative and verifiable to the greatest possible extent. The Ministry of the Environment was delegated the responsibility for co-ordinating this work and for ensuring the co-ordination and development of appropriate monitoring systems. The responsibility for the implementation of measures, verification and reporting to the Ministry of the Environment was delegated to the sectoral authorities.

In Report no. 58 (1996–97) to the Storting on Environmental Policy for a Sustainable Development, it is emphasized that an intersectoral environmental policy requires an integrated, cross-sectoral use of policy instruments.[52] In this report, notice is given that sectoral environmental action plans based on the principle of cross-sectoral management by objectives and cost-effectiveness will be prepared.[53] These sectoral plans shall be prepared in a collaboration among affected ministries.[54] This Report to the Storting also mentions the system for performance monitoring, which is supposed to provide a basis for evaluating whether the total effort is satisfactory in relation to existing targets and obligations, and whether the allocation among sectors and sources is cost-effective.[55] The system for performance monitoring will then become a tool for adjusting the targets and the use of policy instruments in the environmental policy. According to this Report to the Storting, an important part of the environmental protection authorities' task is to co-ordinate the government's efforts on these matters,

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[51] Recommendation no. 273 (1988–89) to the Storting from the Standing Committee on Local Government and the Environment on Environment and Development - Programme for Norway's follow-up to the Report from the World Commission on Environment and Development), pp. 10 and 11.
[52] Report no. 58 (1996–97) to the Storting on Environmental Policy for a Sustainable Development, voluntary work for the future, p. 25.
[53] Report no. 58 (1996–97) to the Storting on Environmental Policy for a Sustainable Development, voluntary work for the future, p. 26.
[54] Report no. 58 (1996–97) to the Storting on Environmental Policy for a Sustainable Development, voluntary work for the future, p. 27.
[55] Report no. 58 (1996–97) to the Storting on Environmental Policy for a Sustainable Development, voluntary work for the future, p. 27.

and indicators and effective reporting routines shall be established by the sectoral ministries in close collaboration with the Ministry of the Environment.

The Standing Committee on Energy and the Environment endorsed the proposal concerning the preparation of sectoral environmental action plans.[56] The Standing Committee also expressed its support for preparing indicators as a basis for yearly reporting on environmental impact, the state of the environment and environmental protection measures for the individual environmental challenges.

In Report no. 24 (2000–2001) to the Storting on the Government's Environmental Policy and the State of the Environment, it is emphasized that the performance reporting in the environmental protection area depends on good systems and tools for the gathering, processing and quality assurance of data.[57] The most important sources of data will be reports from the sectors, environmental monitoring and environmental statistics. These shall be gathered together in a system for performance documentation managed by the environmental protection authorities. This Report to the Storting emphasizes the importance of continuously developing and improving the management systems so that the sectoral environmental action plans and the system for performance monitoring will constitute an integrated system of policy instruments, measures and monitoring and/or control, which shall facilitate effective, target-oriented management of the environmental policy.[58]

In Norwegian Official Report (NOU) 1995:4 "Policy instruments in environmental policy," it is also recommended, among other things, that performance monitoring systems for the environment should be developed, which are common for sector and environmental authorities, and that the system should be developed toward reporting the development in the sectors relative to the government's expectations for the sectors and the national environmental targets.[59]

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[56] Recommendation no. 150 (1997-98) to the Storting from the Standing Committee on Energy and the Environment on Environmental Policy for a Sustainable Development, voluntary work for the future, p. 4 (Internet version).

[57] Report no. 24 (2000–2001) to the Storting on the Government's Environmental Policy and the State of the Environment, p. 17.

[58] Report no. 24 (2000–2001) to the Storting on the Government's Environmental Policy and the State of the Environment, p. 18.

[59] Norwegian Official Report (NOU) 1995:4 "Policy instruments in environmental policy", p. 148.

3.4.2 Requirements for the cross-sectoral role of the environmental protection authorities

The Ministry of the Environment has the paramount responsibility for surveying and cleaning up pollution from activities in bygone years. In this context, the Ministry of the Environment's tasks can be determined from Report no. 46 (1988-89) to the Storting, Report no. 58 (1996–97) to the Storting and Report no. 24 (2000–2001) to the Storting, supplemented with certain sections from Norwegian Official Report (NOU) 1995:4.

As the competent ministry, the Ministry of the Environment has greater knowledge and insight into environmental matters than any of the other sectors can be expected to have. In addition, the Ministry of the Environment has access to more specific expertise in the Norwegian Pollution Control Authority in the area of surveying and cleaning up pollution from activities in bygone years. It will therefore be natural that the environmental protection authorities provide professional advice and guidance with regard to the various sectors' responsibilities for this area.

The Ministry of the Environment's task is to co-ordinate the efforts by setting targets for the environmental improvements within the various sectors. In this case, co-ordination must mean that the Ministry of the Environment takes the initiative with relevant sectors and requests that efforts be initiated to set targets for environmental improvements. Subsequent to this kind of initiative, it will be natural for the Ministry of the Environment to follow up the sectors in order to ensure that the efforts have commenced and measures have been implemented.

The Ministry of the Environment is also responsible for supervising the co-ordination and development of adequate systems for monitoring. The systems for monitoring are closely related to the goals that are set for the sectors and whether there are any conflicts between the environmental targets and other goals for the sectors. This entails that the Ministry of the Environment must also posses a certain amount of expertise regarding the other sectors. The environmental protection authorities are responsible for coordinating and promoting the government's efforts to set the national performance targets for environmental policy, but they are not responsible for facilitating the actual integration of environmental considerations.[60]

The sectoral environmental action plans are prepared in collaboration among the affected ministries. The Ministry of the Environment must be counted as an affected ministry for all sectoral environmental action plans, and one of

[60] Letter of 21 June 2001 from the Ministry of the Environment to the Office of the Auditor General.

the tasks for the Ministry of the Environment must therefore be to take part in the preparation of environmental action plans for the various sectors. In connection with this, the Ministry of the Environment must be responsible for the plans in their entirety so that the overall effect of the measures in the various action plans is to help solve the national environmental problems.

The Ministry of the Environment also has the task of evaluating whether the total effort is satisfactory relative to existing targets and obligations, and whether the allocation among sectors and sources is cost-effective. This must mean that the Ministry of the Environment must be able to recommend the relative priority of the cross-sectoral measures so that they help to ensure socio-economically efficient solutions.

The establishment of indicators and effective reporting routines shall be carried out in close collaboration between the Ministry of the Environment and the affected sectoral ministries. Without a satisfactory system for performance reporting, the Ministry of the Environment cannot evaluate the environmental policy.

In order for the Ministry of the Environment to be a key player in the government's efforts to survey and clean up polluted ground and sediments caused by polluting activities in bygone years, the Ministry must have a complete overview of sites that ought to be cleaned up, regardless of the sector to which the pollution belongs. Without a complete overview, the Ministry of the Environment loses the basis for measuring the results that have been achieved and thus also the basis for being able to make a statement about the effectiveness of the use of policy instruments. It is essential in this respect that the basic data that is prepared by the environmental protection authorities be of high quality. The overviews form the basis for the system for performance monitoring and thus also for decisions related the use of policy instruments and the formulation of policy. In this context, high quality must mean that the data contain correct and comparable information. In order to achieve high quality in the data that is reported in, the gathering and updating of data should be done in a systematic way so that the reporting from various sources is carried out according to the same criteria.

4 Description of the findings

4.1 The extent of pollution of ground and sediments that is due to polluting activities in bygone years

4.1.1 Introduction

The first nationwide surveys of polluted ground were conducted in the period 1989–1991. Several supplemental surveys have been conducted since then, but there are still some areas with polluted ground that have not been surveyed.

In the 1980s, a survey was conducted of hazardous substances in fjords where major industrial enterprises were located.[61] In the 1990s, exploratory studies were conducted to improve our overview of the extent of hazardous substances in polluted sediments along the Norwegian coast.[62] A survey was also conducted of pollution in marine organisms in a number of areas. This survey has not yet been completed for the whole coast.[63]

The surveys of polluted ground show that many of the sites are located near the coast, where a river and/or a fjord are the main recipients. This is especially true of the sites that are contaminated with the most hazardous pollutants.[64] The survey of polluted sediments has revealed that there are severely polluted sediments along the entire Norwegian coast. Particularly in areas near point sources and in harbours, sediments and marine organisms have been found with high concentrations of hazardous substances. There is broad agreement among experts that polluted ground where the main recipient is a river and/or fjord can be a significant source of pollution to marine sediments and organisms.[65] It is therefore natural to consider measures for cleaning up polluted ground and sediments in the same context.

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61 *SFT-rapport 1774/2000 Miljøgifter i norske fjorder* (SFT Report 1774/2000 Hazardous substances in Norwegian fjords), p. 78.
62 *SFT-rapport 1774/2000 Miljøgifter i norske fjorder* (SFT Report 1774/2000 Hazardous substances in Norwegian fjords), p. 12.
63 *SFT-rapport 1774/2000 Miljøgifter i norske fjorder* (SFT Report 1774/2000 Hazardous substances in Norwegian fjords), p. 13.
64 *SFT Report 91:01 Kartlegging av spesialavfall i deponier og forurenset grunn – Sluttrapport* (SFT Report 91:01 Survey of hazardous waste in landfills and polluted ground – Final Report), p. 23.
65 *SFT-rapport 1774/2000 Miljøgifter i norske fjorder* (SFT Report 1774/2000 Hazardous substances in Norwegian fjords), p. 4.

4.1.2 Areas with polluted ground and their ranking

According to the Norwegian Pollution Control Authority (SFT), 3,390 areas (sites) with polluted ground have been surveyed and registered so far. In the ranking of these sites, the point of departure has been potential conflicts between hazardous waste and/or hazardous chemicals and the surrounding environment with regard to vulnerability, user interests and the potential for the spread of pollution. Table 1 shows the number of sites divided according to the ranking that SFT has given them.[66] The environmental protection authorities have decided that the ranking that was given to a site in 1992, or later if it was discovered after 1992, shall be kept even if they find out that the case was more or less serious than its ranking would indicate. As a result, there are sites that are ranked among the most serious, but which have turned out not to be after a closer examination, and conversely, that the sites have been given a lower ranking than they should have been given.

Table 1 Number of sites divided according to ranking[67]

Ranking	Number of sites
Need to take measures (rank 1 and 2*)	100
Need for study (rank 2)	500
Minor pollution (rank 3)	1,500
No environmental problems/problem solved (rank 4 and completed cases)	1,290
Total	3,390

Need to take measures (rank 1 or 2*)

This group consists of sites that have been given ranks 1 or 2*. Rank 1 is sites where there is an immediate need for study or measures. There is reliable information about deposited hazardous waste or leakage of hazardous chemicals. According to the Norwegian Pollution Control Authority (SFT), reliable information about hazardous waste usually means that the waste has been identified in the area during the survey, documentation has been submitted, the source has first-hand knowledge of the situation and can give a detailed and probable account of the event, or the

66 Report no. 8 (1999–2000) to the Storting on the Government's Environmental Policy and the State of the Environment, p. 69.
67 Report no. 8 (1999–2000) to the Storting on the Government's Environmental Policy and the State of the Environment, p. 69.

information has been provided by two independent sources.[68] Types of waste, quantities of waste and the sites' location indicate a risk of hazardous pollutants or injury to humans and animals. The Rank 2* cases are equivalent to rank 1, but are cases that were being considered by SFT before the survey commenced.[69] In these cases, studies have been conducted in order to clarify the pollution situation in connection with an evaluation of the need to take measures.

Need for study (rank 2)

In this group, there is a justifiable suspicion that there is hazardous waste and/or hazardous chemicals in the ground. In any case, this may entail a risk of hazardous pollutants or injury to humans and animals. The group also includes sites where reliable information about hazardous waste and/or hazardous chemicals in the ground requires further studies in order to determine the risk of pollution.

Minor pollution (rank 3)

In this group, there is a need for studies in the event of any altered use of land or recipient. There is reliable information about or a suspicion of hazardous waste and/or hazardous chemicals in the ground. The site's location and the current use of land and recipients do not indicate any risk of hazardous pollution or injury to humans and animals.

No environmental problems (rank 4)

In this group, there is not any need for studies. The sites have been evaluated in the survey, but there is no basis for any allegation that hazardous waste has been deposited there, or that any leakage of hazardous chemicals has occurred that will have a significant impact on the surroundings.

There are many areas with polluted ground that have not yet been surveyed. The unfinished surveys and registration are due to the fact that certain business sectors were excluded from the nationwide survey effort that took place in the period 1989–1991. The fact that some areas have not yet been surveyed, can also be explained by the fact that these areas are not discovered until the ground is excavated in connection with construction projects, etc.

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[68] *SFT rapport 92:32 Deponier med spesialavfall, forurenset grunn og forurensede sedimenter. Handlingsplan for opprydning.* (SFT report 92:32 Landfills with hazardous waste, polluted ground and polluted sediments. Action plan for cleanup), p. 50

[69] This ranking group (rank 2*) was introduced in phase 2 of the nationwide survey project in 1989–1991, because the general ranking criteria were not adapted to areas where documented information about the pollution load already existed. Many of the sites can be otherwise characterised as cases in rank 1.

4.1.3 The efforts to survey polluted ground

Nationwide survey in 1989–1991

In the period 1989–1991, the Norwegian Pollution Control Authority (SFT) commissioned the Geological Survey of Norway (NGU) to conduct a nationwide survey of landfills and industrial sites polluted with hazardous waste. A total of 2,452 of these sites were registered. It was established or there was reason to suspect that 1,742 of these sites contained hazardous waste.

Site visits were conducted to most of the sites that constituted the most serious sources of pollution. However, the survey did not include separate field tests or other taking of samples that would normally be necessary before they could reliably determine which environmental problems were to be found in each individual site, and which measures should be taken.[70]

According to SFT, there is a high probability that many sites were not discovered in this study. There are two main reasons for this.[71] First, for reasons of capacity, a number of business sectors were more or less excluded from the study. Second, SFT considered certain industries and business sectors to be special problem area, where there might be a need for separate reviews. Among others, these included the Norwegian Armed Forces, airports, power plants, oil storage facilities and mine tips.

Given that a number of business sectors and enterprises were excluded from a systematic survey, the scope of the efforts was limited.

The ranking was made on the basis of information about:
- deposited hazardous waste or spillage of chemicals
- types of waste and generator of the waste (business sector)
- former (at the time when the waste was generated) and planned utilisation of land and water resources
- general impression of soil conditions before any studies were done

In connection with the ranking, emphasis was given to conflicts between hazardous waste and/or hazardous chemicals and the surrounding environment with regard to vulnerability, user interests and the potential for the spread of pollution. The final ranking of each individual site was done by

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[70] *SFT Rapport 91:01 Kartlegging av spesialavfall i deponier og forurenset grunn, Sluttrapport* (SFT Report 91:01 Survey of hazardous waste in landfills and polluted ground – Final Report).

[71] *SFT Rapport 91:01 Kartlegging av spesialavfall i deponier og forurenset grunn, Sluttrapport* (SFT Report 91:01 Survey of hazardous waste in landfills and polluted ground – Final Report), summary.

the Geological Survey of Norway (NGU) in collaboration with the Norwegian Pollution Control Authority (SFT).

Table 2 shows the number of sites that were registered by NGU in the period 1989–1991, divided into five ranks according to how hazardous the pollutants were thought to be in these sites.

Table 2 Ranking of landfills and areas with polluted ground, NGU 1989–1991[72]

	Rank 1	Rank 2*	Rank 2	Rank 3	Rank 4	Total
Landfills:						
Municipal landfills	12	1	149	533	337	1,032
Industrial landfills	20	11	124	205	132	492
Other landfills	6	6	48	181	241	482
Polluted ground:						
Industrial sites	8	19	55	191	0	273
Other polluted ground	3	1	19	47	0	70
Landfills and polluted ground	12	4	44	43	0	103
Total i)	61	42	439	1,200	710	2,452

i) In addition, there are 40 unranked sites in Finnmark county.

According to the Ministry of the Environment, a case is completed when measures have been taken in accordance with requirements from SFT, so that the environmental protection authorities' role in the case is finished. The normal routine is that SFT shall have a report from the project so that they can evaluate whether the status is satisfactory before they consider themselves finished with the case.[73]

Survey of polluted ground at wood impregnation enterprises

On behalf of SFT, the Centre for Soil and Environmental Research visited 143 sites where wood impregnation has been or is being conducted. The goal of the project was to clarify whether ground polluted by impregnation liquid poses a threat to health and the environment at each individual site. Based on

[72] *SFT Rapport 91:01B Kartlegging av spesialavfall i deponier og forurenset grunn* (SFT Report 91:01B Survey of hazardous waste in landfills and polluted ground), table 1.

[73] Letter of 1 March 2000 from the Ministry of the Environment to the Office of the Auditor General.

the site visits, follow-up studies were recommended at 35 sites in order to clarify whether there are conflicts with health and the environment and whether there may be a need for cleanup measures. In 1998, these sites had been given different status and different ranks based on an evaluation of the potential for pollution and the need for follow-up studies and measures, cf. table 3.

Table 3 Number of sites with polluted ground at current and former wood impregnation enterprises divided according to rank and status in 1998

	Need for study	Study	Measures	Finished	Total
Rank 1		3	3		6
Rank 2*			1		1
Rank 2	20	3	1		24
Rank 3	2	1		1	4
Total	22	7	5	1	35

Source: SFT-rapport 98:01 Grunnforurensning fra treimpregneringsvirksomhet i Norge (SFT Report 98:01 Ground pollution from wood impregnation enterprises in Norway).

Table 3 shows that most of the sites were given rank 2, i.e. there is a need for study. Among these sites, the status in 1998 reveals that a few of them were already in the study phase, and that one was in the measure phase. The overview also shows that one site, with rank 3, was already completed in 1998. That means that follow-up studies were primarily concerned with the 22 sites where studies had not been initiated. Many of the sites were also registered in the nationwide study that NGU conducted in the period 1989–1991.

Survey of hazardous waste in military litter

Registration of sites (landfills and/or polluted ground) with hazardous waste in military litter was carried out through introductory studies in the period 1991–1992.[74] A total of 76 new sites with military litter were registered,

[74] Letter of 8 August 1996 from NODCS to the Norwegian Pollution Control Authority and the Directorate for Cultural Heritage, where it was announced that in 1992 NODCS in collaboration with Environmental Consultants AS conducted a nationwide survey of military litter on military and civilian sites. The survey was a follow-up of the Norwegian Armed Forces' survey of landfills and polluted ground on the Norwegian Armed Forces' land, which revealed that there were a considerable number of unregistered sites with military litter in Norway. SFT commissioned and funded this study. In the letter, it is stated that there is also a great need to clean up military litter in the Sør-Varanger district, and reference is made to an accompanying report. NODCS requests that SFT review this report and see whether there are any sites that ought to be registered in SFT's landfill database.

with 64 in civilian areas and 12 in military areas.[75] In 1993, a supplementary study was conducted, and 22 new sites were registered. That means that in 1994 a total of 98 sites were registered, in which the authorities suspected the presence of hazardous waste in a landfill and/or polluted ground. 95 of these sites were entered into the Norwegian Pollution Control Authority's landfill database.

Survey of landfills and sites where pesticides were applied at nurseries

In the period 1998–1999, a survey of landfills and sites where pesticides were applied was conducted at 43 nurseries. According to the Norwegian Ministry of Agriculture's environmental action plan, there is an environmental risk at 29 sites, and at 11 of these sites, there may also be some health risk.[76] One of the nurseries has a landfill with hazardous waste that the Norwegian Pollution Control Authority (SFT) has given the strictest ranking, i.e. rank 1.[77] This ranking was based on information that the operation of the nursery had resulted in DDT-polluted ground, and that DDT had been found in the ground water just downstream from the landfill. In 1995 and 1996, studies were done, and suitable measures were supposed to be evaluated after that. The Norwegian Pollution Control Authority (SFT) reports that the status for this site as per September 2001 is still "under study".

The Norwegian Armed Forces' survey of polluted ground

In the period 1990–1991, the Norwegian Defence Construction Service (NODCS), acting on behalf of the Norwegian Armed Forces, conducted a survey of hazardous waste in landfills and polluted ground on the Norwegian Armed Forces' land. At that time, 262 sites were registered. Subsequently, 120 new sites were registered. In other words, the database now contains 382 sites with polluted ground and/or polluted landfills. In connection with this survey, the sites have been classified in four ranks according to the severity of the pollution. This classification is equivalent to the same classification that SFT employs in its surveys. In addition, the Norwegian Armed Forces employ a rank 0 for sites that are waste repositories. Table 4 shows that most of the new sites that have been added will be studied if a change occurs in the use of the land or of the recipient, i.e. rank 3 sites.

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[75] Letter of 19 September 1994 from SFT to selected municipalities. The letter concerns hazardous waste in military litter, where SFT asks the municipalities to check information from the landfill database and supplement and/or correct this information.

[76] The Ministry of Agriculture's environmental action plan 2001–2004.

[77] Site no. 425002. DDT-landfill at Sønsterud tree nursery.

Table 4 Yearly trend in the number of registered sites with polluted ground on the Norwegian Armed Forces' land that are due to polluting activities in bygone years, divided by rank

Year	Rank 1	Rank 2	Rank 3	Rank 4	Rank 0	Total
1992	17	54	154	37	0	262
1993	17	57	155	37	0	266
1994	18	65	167	38	0	288
1995	19	65	181	38	0	303
1996	21	72	189	38	0	320
1997	23	78	214	40	0	355
1998	19	77	210	35	27	368
1999	19	84	212	35	27	377
2000	19	86	214	35	27	381
2001	19	88	213	35	27	382

Table 4 shows that in 1998 the number of ranked sites decreased and a new rank 0 was established. According to NODCS, waste repositories were initially not ranked because at the time it was assumed that they did not constitute any potential pollution risk.[78] Subsequent experience has shown that there can also be pollution at these repositories. In table 4, these sites are classified in rank 0. The number of ranked sites in the other ranks decreased in 1998. According to NODCS, this is due to a cleanup in twice-registered sites, i.e. sites registered in both SFT's database and NODCS's database. In addition, there were a number of sites that were registered in the database, but that were located on civilian land, and which were therefore transferred to SFT's database. All of the sites that were located in the civilian part of Gardermoen were transferred in that year to the civilian database when Oslo Lufthavn (OSL) acquired the property.

Table 4 shows that 120 new sites have been surveyed on the Norwegian Armed Forces' land since 1992. It is likely that more new sites will be discovered. Among other things, pollution has subsequently been found at a number of unranked waste repositories on the Norwegian Armed Forces' land.[79]

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[78] E-mail of 4 December 2001 from the Norwegian Defence Construction Service (NODCS) to the Office of the Auditor General.

[79] E-mail of 4 December 2001 from the Norwegian Defence Construction Service (NODCS) to the Office of the Auditor General.

Survey of polluted ground at the Norwegian Armed Forces' telecommunications and data stations

In 1997, the Norwegian Defence Construction Service (NODCS) initiated a complete survey of landfills and polluted ground at the Norwegian Armed Forces' telecommunications and data stations. As of 31 December 2000, information had been reported in about 18 stations.[80] According to NODCS, this information constitutes the basis for further monitoring and site visits.

Survey of artillery ranges on the Norwegian Armed Forces' land

In 1995, the Norwegian Armed Forces initiated a survey of butts and landfills on artillery ranges on the Norwegian Armed Forces' land. The preliminary results show that a large amount of bullets and ammunition have been deposited in butts and on artillery ranges throughout the country.[81] These constitute a potential pollution load on the surroundings, especially with respect to leakage of lead, copper, cadmium, zinc, nickel and antimony.[82]

In its status report of 1 January 2001, NODCS states that 429 artillery ranges and/or firing ranges have been registered. None of these sites have been classified in ranking group 1. There are 30 sites in group 2, 348 sites in group 3 and one site in group 4. NODCS notes that these are preliminary rankings, and that a more detailed evaluation of these rankings must be carried out after there has been a satisfactory amount of reporting from the sites.[83]

Survey of polluted ground on NSB's property[84]

In April 2001, NSB konsernstab Miljø sent out a request to the regional units, asking them to prepare an overview of polluted ground, including sites where pollution has been confirmed and sites that may be polluted. This

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80 The Norwegian Defence Construction Service, *Avfallsfyllinger, forurenset grunn, skytefelt og forurensede sedimenter* (Landfills, polluted ground, artillery ranges and polluted sediments), Status Report as per 1 January 2001, p. 77.

81 The Norwegian Defence Construction Service, *Avfallsfyllinger, forurenset grunn, skytefelt og forurensede sedimenter* (Landfills, polluted ground, artillery ranges and polluted sediments), Status Report as per 1 January 2001, p. 72.

82 For example, on the firing ranges at Trandum, Sessvollmoen, Hauerseter and Gardermoen, a total of about 450 tonnes of lead and about 200 tonnes of copper have been deposited. Based on foreign studies, the Norwegian Defence Construction Service (NODCS) estimates that the leakage from these areas amounts to about 2.2 tonnes of lead and about 1 tonne of copper.

83 The Norwegian Defence Construction Service, *Avfallsfyllinger, forurenset grunn, skytefelt og forurensede sedimenter* (Landfills, polluted ground, artillery ranges and polluted sediments), Status Report as per 1 January 2001, p. 72.

84 Meeting between NSB BA and the Office of the Auditor General, 25 October 2001.

overview was supposed to include the non-operations-related properties and properties that might be put up for sale. A similar survey was also conducted in 1997. The reports back from the regional units in response to the request in 2001, proved to be somewhat deficient. Therefore, visits were made and more thorough studies were conducted during the summer months. On the basis of this survey, NSB konsernstab Miljø has prepared a report dated 20 October 2001 that contains an overview of the status of sites with confirmed pollution and possible pollution. So far, 46 sites have been surveyed that have polluted ground that is due to polluting activities in bygone years. The report also contains an overview of storage facilities for diesel fuel at Nettbuss AS. The pollution status and extent of pollution at these sites is currently unknown, and the sites are not ranked in the same way as in the Norwegian Pollution Control Authority's landfill database.

The above-mentioned survey only includes pollution from storage facilities for oil and diesel fuel. The reason for this limitation is that NSB thinks that they are the ones that are by and large responsible for the cleanup of this pollution.

NSB reports that they lack historical information about what installations exist on the individual properties, because the Norwegian National Rail Administration acquired NSB's former files when NSB (formerly the Norwegian State Railways) was spun off as a separate unit.

4.1.4 The survey of polluted sediments and the content of hazardous substances in marine organisms

Preliminary list from 1992 of fjord areas with polluted sediments

In 1992, the environmental protection authorities had a preliminary list of 32 fjord areas where the sediments were classified as severely polluted in some places.[85] The polluting components that were decisive for the classification were generally PAHs, PCBs, lead, cadmium, mercury and copper. Table 5 shows the 32 fjord areas with polluted sediments classified as severely polluted.

[85] *SFT rapport 92:32 Deponier med spesialavfall, forurenset grunn og forurensede sedimenter. Handlingsplan for opprydning.* (SFT report 92:32 Landfills with hazardous waste, polluted ground and polluted sediments. Action plan for cleanup). "Severely polluted" is equivalent to class 4 according to the Norwegian Institute for Water Research's classification.

Table 5 Overview of 32 fjord areas with polluted sediments classified as severely polluted in 1992[86]

County	Fjord areas
Østfold:	The Idde fjord
	The Single fjord
Oslo/Akershus:	Bekkelagsbassenget
	Oslo inner harbour
	The Lysaker fjord
Buskerud:	The inner Drammen fjord
Vestfold:	The Horten Canal
	Tønsberg-Valløy
	The Larvik fjord
Telemark:	The Gunnekleiv fjord
	The Voll fjord
	The Frier fjord
Aust-Agder:	The Tromøy Sound
Vest-Agder:	The Kristiansand fjord
	The Feda fjord
	The Grise fjord
Rogaland:	The Karm Sound
	The Sauda fjord
Hordaland:	The inner Sør fjord
	The outer Sør fjord
Sogn og Fjordane:	The Årdal fjord
	The Høyanger fjord
Møre og Romsdal:	The Sunndal fjord
	The Haram fjord
Sør-Trøndelag:	Ilsvika
	Hommelvika/The Stjørdal fjord
Nord-Trøndelag:	The Beistad fjord
	The Trondheim fjord at Skogn
Nordland:	The Vefsn fjord
	The Rana fjord
	Glomfjord
	The Ballang fjord

Survey of areas with polluted sediments on the Norwegian Armed Forces' land

In 1995, the Norwegian Pollution Control Authority launched a nationwide survey of the pollution status in Norwegian fjords. The study showed that a number of harbours and fjords are extremely polluted in places with various hazardous substances, such as heavy metals, petrochemicals, PAHs, PCBs and DDT. At many of the harbours, the Norwegian Armed Forces have installations. The Norwegian Defence Construction Service has subsequently conducted environmental studies in several harbour areas, including Haakonsvern, Ramsund and Horten. Since 1997, the Norwegian Armed Forces have conducted cleanup measures at Haakonsvern, cf. chap. 4.3.1, where this is discussed further.

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86 *SFT rapport 92:32 Deponier med spesialavfall, forurenset grunn og forurensede sedimenter. Handlingsplan for opprydning.* (SFT report 92:32 Landfills with hazardous waste, polluted ground and polluted sediments. Action plan for cleanup).

Exploratory studies in Norwegian harbours and selected coastal areas in 1993–1994

In the period 1993–1994, exploratory studies were carried out along the coast in order to attain a better overview of the extent of the problem with polluted sediments.[87] Sediments at more than 120 major and minor sites in the fjords were studied and found to have high concentrations of hazardous substances. Samples from about 90 of the sites showed that the sediments were extremely polluted with one or more of the following substances: PCBs PAHs TBT, mercury, lead and cadmium.

Survey of the content of hazardous substances i marine organisms in Norwegian harbours and fjords

The Norwegian Pollution Control Authority's exploratory studies in Norwegian harbours and selected coastal areas revealed areas with polluted sediments where there was a lack of knowledge about the pollution levels in marine organisms. On the basis of these studies, the Norwegian Food Control Authority (SNT), the Norwegian Pollution Control Authority (SFT) and the National Institute of Public Health proposed in 1997 that they should begin to study the content of hazardous substances in fish and shellfish from 30 fjord areas where this kind of data was not previously available.[88] According to SNT, this initiative was not followed up with any allocations.[89] Nevertheless, studies were conducted of the content of hazardous substances in marine organisms and in sediments in relevant harbours along the coast from Østfold county up to and including Rogaland county, and in Troms and Finnmark counties.[90] Nordland county began its survey in 2001. These surveys are supervised and partly funded locally by municipalities and county authorities. SFT and SNT have participated in steering committees, particularly in connection with planning and the reporting and/or evaluation of the results, along with some of the funding.[91]

According to SNT, a survey of the remaining stretches of coast in western Norway and the Trøndelag counties is dependent on local initiatives. SNT

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87 Norwegian State Pollution Monitoring Programme. *Rapport 587/94 Fase 1. Miljøavgifter i sedimenter på strekningen Narvik–Kragerø* (Report 587/94 Phase 1. Hazardous substances in sediments on the stretch Narvik–Kragerø). *Rapport 588/94 Fase 2. Miljøavgifter i sedimenter på strekningen Stavern–Hvitsten.* (Report 588/94 Phase 2. Hazardous substances in sediments on the stretch Stavern–Hvitsten). *Rapport 608/95 Fase 3. Miljøavgifter i sedimenter på strekningen Ramsund–Kirkenes.* (Report 608/95 Phase 3. Hazardous substances in sediments on the stretch Ramsund–Kirkenes).

88 *SNT-rapport 10, 1997. Forslag til strategi for kartlegging av miljøgifter i marine organismer i norske havner og fjorder.* (SNT Report 10, 1997. Proposed strategy for a survey of hazardous substances in marine organisms in Norwegian harbours and fjords).

89 Meeting between SNT and The Office of the Auditor General on 22 October 2001.

90 Meeting between SNT and The Office of the Auditor General on 22 October 2001.

91 Meeting between SNT and The Office of the Auditor General on 22 October 2001.

reports that they are unable to take responsibility for launching, supervising or completely funding these surveys.[92]

Fjords with warnings against consumption and bans on sales of fish caught in these waters

Based on the efforts to survey hazardous substances in marine organisms, a number of new warnings against consumption and bans on sales have been issued. As a result, the number of areas with restrictions has increased. Table 6 shows the fjords for which warnings against consumption and bans on sales had been issued as per October 2001. The table also shows the pollutants on which the warnings against consumption and bans on sales, if any, are based, and the year in which these evaluations were last made by the Norwegian Food Control Authority (SNT). The table also shows that even though warnings against consumption have been issued for 26 fjords, corresponding bans on sales of fish caught in these waters have only been issued for five of them.

Table 6 Fjords with warnings against consumption and bans on sales, if any[93]

Fjord	**Pollutant**	**Last evaluated by SNT**	**Warnings against consumption and/or bans on sales in certain areas** *(specified geographically by SNT)*
The Oslo fjord	PCBs	2000	Consumption of fish liver is not advisable.
The Drammen fjord	PCBs and dioxins	1992	Consumption of fish liver is not advisable. Ban on sales with the same scope as the warning.
The Sandefjord fjord	PCBs	1993	Consumption of liver from round fish is not advisable. Ban on sales with the same scope as the warning.
The Grenland fjord	Chlorinated organic compounds, especially dioxins	2000	Consumption of all fish and shellfish is not advisable. In addition, consumption of sea trout, crab and fish liver from certain areas is not advisable. Ban on sales with the same scope as the warning.
Tvedestrand	PCBs	2000	Consumption of fish liver is not advisable.
Arendal	PCBs	2000	Consumption of fish liver is not advisable.

92 Meeting between SNT and The Office of the Auditor General on 22 October 2001.

93 www.snt.no as per September 2001.

The Kristiansand fjord	Chlorinated organic compounds, especially dioxins and PCBs, but also others	2000	Consumption of fish and shellfish (crab, shrimp, shellfish) is not advisable. Locally issued bans on sales of cod caught in certain areas, which must be cleaned before they are sold. Consumption of cod liver from the same area is not advisable. Consumption of fish liver from a certain area is not advisable.
Farsund	PCBs, PAHs	2000	Consumption of shellfish and fish liver caught in certain areas is not advisable.
The Feda fjord	PAHs	1995	Consumption of shellfish gathered in certain areas is not advisable.
Flekkefjord	PCBs	2000	Consumption of liver from fish caught in certain areas is not advisable.
Stavanger	PAHs, PCBs	2001	Consumption of shellfish and liver from cod caught in certain areas is not advisable.
Sandnes	PAHs	2001	Consumption of shellfish from certain areas is not advisable.
The Karm Sound	PAHs, PCBs	2001	Consumption of shellfish, crab and fish liver from certain areas is not advisable.
The Sauda fjord	PAHs	1992	Consumption of shellfish and fish liver from certain areas is not advisable.
The Hardanger fjord/ the Sør fjord	Heavy metals - cadmium, lead and mercury	2001	Consumption of shellfish is not advisable, and consumption of cod more than once a week from certain areas is not advisable. Pregnant women and nursing mothers should not eat fish and shellfish caught in the Sør fjord.
Bergen	PCBs	1998	Consumption of fish and shellfish is not advisable. In addition, consumption of eel and fish liver is not advisable. Ban on sales with the same scope as the warning.
The Årdal fjord	PAHs	1995	Consumption of shellfish is not advisable.
The Sunndal fjord	PAHs	1993	Consumption of shellfish and fish liver is not advisable.
Hommelvik	PAHs	1985	Consumption of shellfish is not advisable.
The Vefsn fjord	PAHs	1992	Consumption of shellfish is not advisable.

The Ran fjord	PAHs and heavy metals (lead and mercury)	1997	Consumption of shellfish is not advisable.
Ramsund	PCBs	2000	Consumption of fish and other kinds of seafood is not advisable.
Harstad	PCBs and heavy metals	2000	Consumption of fish liver and shellfish is not advisable.
Tromsø	PAHs	2000	Consumption of shellfish is not advisable.
Hammerfest	PAHs	2000	Consumption of shellfish is not advisable.
Honningsvåg	PAHs	2000	Consumption of shellfish is not advisable.

4.2 The most serious ground pollution cases that are due to activities in bygone years

4.2.1 Introduction

In 1992, the Norwegian Pollution Control Authority submitted an action plan that included the question of landfills and polluted ground. In this plan, priority was given to 98 sites with pollution resulting from activities in bygone years where there was a need for immediate studies and measures. This assignment of priorities was based on the nationwide survey of polluted ground conducted by the Geological Survey of Norway (NGU). Since then, more areas with polluted ground have been added to the list of sites given priority.

The Office of the Auditor General's study includes a description of the scope and a review of the administrative documents concerning the 151 sites with polluted ground that the environmental protection authorities have given highest priority in the cleanup efforts (ranks 1 and 2*). According to the authorities, these are the sites that represent the most serious sources of pollution. Table 7 shows the status of these sites in the Norwegian Pollution Control Authority's landfill database as of September 2001.

Table 7 The most serious cases that are due to polluting activities in bygone years classified according to status

Status	Number	Per cent
Sites that have been completed with or without restrictions	63	41
Sites being monitored	23	15
Sites subject to measures	28	19
Sites under study	37	25
Total	151	100

Source: the Norwegian Pollution Control Authority's landfill database as of September 2001

Of the total 151 sites, 37 have the "under study" status. These are sites where studies have been planned, commenced or completed.[94] Twenty-eight of the sites are subject to measures, i.e. for these sites measures have been planned, commenced or completed, and 23 of the sites are being monitored. Sites categorised as "being monitored" are sites where monitoring has been planned, commenced or completed. The remaining 63 sites amount to 41% of the total 151 sites and have the status "completed".

The Norwegian Pollution Control Authority's efforts to clean up polluted ground

Through letters of allocation to the County Governors, the Norwegian Pollution Control Authority (SFT) has presented the objective that rank 1 and rank 2* cases shall be completed during 2005, and that rank 2 cases shall be studied by 2005. These targets have also been put forward at meetings of professional circles and through "Miljøringen" – a network of organisations concerned with environmental issues – where both advisors and those responsible for the problems participate. In SFT's opinion, these goals are well known in professional circles and in public administration.[95] SFT also states that efforts have been made to create understanding for the objectives within their own organisation.[96]

No further resources have been allocated to the efforts to clean up polluted ground as a result of the objectives. This is because SFT takes the view that

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[94] *SFT-rapport 98:24 Forurenset grunn i Norge, Statusrapport 1998* (SFT Report 98:24 Polluted ground in Norway, Status Report 1998).

[95] Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.

[96] Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.

other assignments were more urgent in this period, and that higher investment was not essential for the achievement of goals.[97] Efforts have been made to increase the efficiency of the administrative procedures by preparing a draft of the regulations on cleaning up polluted ground containing standard conditions for excavating polluted ground in connection with building projects.[98] In this draft, which has now been submitted to the Ministry of the Environment for consideration, the municipalities are assigned supervisory responsibility.[99] Another measure that will contribute to better and speedier processing of the cases is that information in the landfill database will be made accessible on the Internet starting in January 2002.[100]

No sites that represent an extremely small source of pollution are registered in the present landfill database. This also applies to sites where total cleanup work is taking place. Twice a year, the professional staff at SFT review the status of the cases they have been assigned responsibility for to ensure that reports to the Ministry of the Environment are as correct as possible.[101] The landfill database is updated on the basis of these six-monthly reviews.

In the new landfill database that is now accessible on the Internet, the four ranks are replaced by three degrees of impact. The degree of impact of each site will be amended underway as studies are made and measures implemented. Degree of impact 3 (possible and/or known impact and need for study/measures) will cover the previous ranks 1, 2* and 2. Degree of impact 2 (minor and/or no impact with the current land use) will replace the previous rank 3. Degree of impact 1 (minor and/or no impact, no need for restrictions on land use) will cover the areas where monitoring has been completed. According to SFT, this system will ensure that sites with polluted ground are assigned the degree of impact that is considered to be correct in relation to the knowledge available at any given time.[102]

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97 Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.

98 Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.

99 The draft was submitted in October 2001, meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.

100 Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.

101 Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.

102 Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.

The new database will also contain references to previous ranking so that it will be possible to make reports to the ministry that can be compared with the current objectives.[103] Reporting from the Norwegian Pollution Control Authority is also intended to also include the following key figures:

1 The number of sites on the A list, i.e. the number of rank 1 cases that were registered and not completed as of 1 June 1998.
2 The number of sites on the B list, i.e. the number of rank 2 cases that were registered and not completed as of 1 June 1998.
3 Land with polluted ground in Norway, i.e. the sites that are included in the database.
4 The number of sites with degree of impact 3.

The A and B lists are also currently reported to the Ministry of the Environment.[104]

Of the total of 151 serious pollution cases that are due to activities in bygone years, the Office of the Auditor General's review has shown that the Norwegian Pollution Control Authority (SFT) is responsible for 132 of them,[105] 14 cases have been delegated to the County Governor, and the responsible party for five of the cases is not known.[106] The administrative procedures in SFT are divided between two departments: the Department of Local Environmental Management handles 70 of the cases, while the Department of Industry is responsible for 44. A comprehensive plan is being compiled within SFT to describe how the resources are to be employed up to 2005.[107] This plan includes proposals on the project organisation of the remaining work in this area, where the Department of Local Environmental Management and the Department of Industry will be included in the project team.[108]

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[103] Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.
[104] Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.
[105] Eighteen of these cases are being handled by the Norwegian Defence Construction Service (NODCS) pursuant to a framework agreement from the Norwegian Pollution Control Authority.
[106] It has not been possible to specify who is responsible for the cleanup in the following cases: NSB, Verkstedet Grorud (301001), Impregnor AS (417002), Sediments in Lågen (501005), the Gunnekleiv fjord (805027) and Scand Boats (921007).
[107] Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.
[108] Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.

SFT emphasises that achieving the objective will be a more realistic proposition if a few more resources are injected.[109] Initially, SFT did not want objectives that specified absolute deadlines, but at the same time they stressed that when the deadlines had been set at 2005, it was convenient to work towards that time limit.[110] They also had discussions with the Ministry of the Environment about this deadline before it was finally set.[111]

The monitoring of 549 cases of ranks 3 or 4 has been registered in the landfill database. SFT presumes that it is the interest in building projects that has prompted the monitoring of these cases.[112] SFT has stated that building projects have also been considered for areas of polluted ground that have not been registered in the database, as these cases are not registered if contaminated ground is completely removed and disposed of or is treated in approved facilities. SFT points out that the administrative rules in the Public Administration Act and procedural instructions lead to priority being given to building projects.[113] Such projects are also given priority because any excavation of contaminated ground in itself entails a greater risk of pollution than that involved in allowing this ground to remain as it is.[114] Two other reasons why priority is assigned to these projects are that the developers put pressure on public authorities in order to obtain the permits required to enable the building to be completed within the economic and time limits imposed, and also that pursuant to the Pollution Control Act the responsible person or persons are normally specified in these projects. SFT states that the building projects require a considerable amount of the professional staff's resources,[115] but that it is nonetheless not considered appropriate for SFT to assign higher priority to rank 1 and rank 2* cases that do not represent an immediate risk of pollution than the priority given to building projects that require immediate consideration. They also point out that speedy processing on their part generally helps induce the developers to submit these projects to the pollution control authorities before the excavation starts.[116]

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[109] Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.

[110] Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.

[111] Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.

[112] Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.

[113] Letter of 16 August 2002 from the Norwegian Pollution Control Authority to the Ministry of the Environment.

[114] Section 68 of the Planning and Building Act concerns building sites and environmental conditions. Paragraph 2 of section 68 gives the municipalities legal authority to impose a ban on building if necessary, or to set specific requirements for building sites etc.

[115] Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.

[116] Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.

Categorisation of cleanup measures

On the basis of the Office of the Auditor General's review of the cases, each of the sites has been classified according to the measures that have been implemented. The types of measures are divided into four main categories, three of which are also divided into sub-categories. Category 0, which indicates that it has not been possible to identify which types of measures have been implemented from the information given by the environmental protection authorities, has been allocated to a few cases. The four main types of measures are shown in table 8.

Table 8 List of types of measures

Type of measure	Explanation
I No or limited measures	This category includes the sites where nothing has been done about the actual pollutants. Category I is divided into three sub-categories: Ia: No physical intervention Ib: Regulation, advice, restrictions, enclosure etc. Ic: Elimination of sources, repairs to the pipe system, cleanup etc.
II In situ treatment (treatment at the site)	For example, biological decomposition of the pollution at the site.
III Isolation and/or sealing off the pollution	This category includes the sites that have been partially or totally isolated and/or sealed off from the surroundings. Category III is divided into two sub-categories: IIIa: Partial isolation and/or sealing off IIIb: Total isolation and/or sealing off
IV Removal or partial removal of the pollution	The contaminated ground has been removed and delivered to treatment plants for hazardous waste and/or is disposed of and secured at an approved site. Category IV is divided into three sub-categories: IVa: Partial removal + residual pollution IVb: Partial removal + isolated residual pollution IVc: Removal ex situ/disposal/treatment

4.2.2 Completed cases

In a letter of 1 March 2000,[117] the Ministry of the Environment explains what is meant by the term "completed". The letter states that by "completed" the Norwegian Pollution Control Authority (SFT) means that its administrative procedures have been completed as measures have been implemented pursuant to SFT's requirements. This means that the environmental protection authorities' role in the matter is terminated. The ministry has also stated that no list is kept of the dates when SFT considers measures to be satisfactorily completed. Completed cases are filed in the usual manner, and, according to the ministry, the normal routine is that SFT shall have a final report from the project and shall assess whether the status is satisfactory before they regard their role in the case as concluded.

In the meeting held on 14 November 2001, SFT stated that a case is completed when the state of the environment has been clarified.[118] This means, for example, that a landfill that is still in active use can be completed if its operation takes place under safe conditions and there is no uncontrolled run-off. The environmental protection authorities' goals have thus been attained.

In the period up to September 2001, 63 cases of the presumed most severe ground pollution (i.e. rank 1 and rank 2* cases) were completed. This amounts to 41% of these cases, i.e. 88 cases remain to be completed by 2005, cf. the environmental protection authorities' work objective.

The environmental protection authorities complete cases with or without restrictions on the use of property. A case that is completed with restrictions on the use of property is a case where the property is officially registered with an encumbrance stating that there is still pollution in the ground. Official registration is used when the pollution does not represent an environmental or health risk with the current land use. Official registration of restrictions on the use of property requires an individual decision in the Norwegian Pollution Control Authority (SFT).[119] Official registration has not been implemented in all of the cases where it could be appropriate, as this demands considerable work since separate decisions must be made in each individual case. Discussions as to whether this should be done have

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[117] Letter of 1 March 2000 from the Ministry of the Environment to the Office of the Auditor General.
[118] Meeting between the Ministry of the Environment and the Office of the Auditor General on 14 November 2001.
[119] Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.

taken place in SFT, but it has been resolved that processing cases that require continuous solutions constitutes a better use of resources.[120]

Table 9 Completed cases of the most severe ground pollution that is due to activities in bygone years classified according to type of measure

Type of measure	Completed	Completed before 1992	Completed with restr.	Total
0: Insufficient info, delegated etc.	2			2
Ia: No physical intervention	20	1	4	25
Ib: Regulation, advice, restrictions, enclosure etc.	2			2
Ic: Elimination of sources, repairs to the pipe system, cleanup etc.	4	2	1	7
II: In situ treatment				
IIIa: Partial isolation and/or sealing off	3	1		4
IIIb: Total isolation and/or sealing off	4	1	1	6
IVa: Partial removal + residual pollution	2		2	4
IVb: Partial removal + isolated residual pollution			2	2
IVc: Removal ex situ / disposal/treatment	10		1	11
Total	47	5	11	63

[120] Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.

In SFT's action plan from 1992, it was stated that nine of the most severely polluted sites were completed.[121] The study confirms that five of these cases are still classified as completed. The remaining four cases have been re-opened in the sense that two of them are being monitored, one is subject to measures, and one is under study.[122]

Even though a case is given the status of completed by SFT, this does not necessarily mean that the site cleanup has involved the total removal of contaminated ground and its delivery to an approved treatment plant for hazardous waste. The study shows that of the most serious cases of ground pollution, only 17 of the 63 completed cases have been placed in category IV, which includes removal or partial removal of the pollution. Of these 17 cases, 11 are sites where the pollution has been totally removed.

At ten of the 63 completed sites, measures have been implemented that entail partial or total isolation and/or sealing off, i.e. category III. None of the cases that are completed have been placed in category II (in situ treatment).

No or limited measures have been taken at 34 of the completed sites. The study shows that for a total of 25 of these sites no physical intervention has been made. For seven of the sites measures have been initiated that cover elimination of sources, repairs to the pipe system, cleanup, etc. The reason cleanup measures have not been initiated – or only limited measures – is that technical environmental studies of the site concluded that there is no pollution, or that the pollution does not represent a health risk given the use of the land at the time of the study. Should a change of land use affect this assessment, the site can be officially registered with restrictions on the use of the property.

The review of the 63 completed cases among the most serious ground pollution cases shows that this group contains

- completed cases where the authorities' requirements for cleanup have not been met
- completed cases that have been ranked incorrectly and where the original environmental problem has not been solved

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[121] In appendix 5 of the Norwegian Pollution Control Authority's action plan for cleanup from 1992, it is reported that the following nine sites were completed:
627006 Viking Oljeraffineri AS, 807019 Submerged barrels – Norsk Hydro, 814001 Barrel dump site – Statoil, 1824012 Lundveien, 104006 Moss Glassverk – Kambo division, 805011 the Gunneklev tip, 805012 the Frier tip, 806013 Findalen bark landfill and 1004003 Dalens Garveri.

[122] In the Norwegian Pollution Control Authority's landfill database, four previously completed sites have the following status: 805011 the Gunneklev tip and 814001 Barrel dump site – Statoil: being monitored, 806013 Findalen bark landfill: subject to measures, 805012 the Frier tip: under study.

- completed cases that have been ranked incorrectly, i.e. they should not have been ranked as rank 1 or rank 2*
- completed cases that have been re-opened

The following four examples are given to illustrate these points:

Example 1 Completed case where the authorities' requirements for cleanup have not been met

Stabil Fabrikker AS (id. no. 211004) had its production plant at Hvitsten in Vestby municipality. The company was established in 1908 and has manufactured various paint products with the main focus on ship paints, which among other things contained heavy metals and PCBs.[123] The company site is owned by Fred. Olsen and is leased to Stabil.[124] The company had different owners until 1967 when the present owners took over.[125] There was a landfill of blasted rock and production waste at the edge of the fjord near Stabil Fabrikker AS, the waste originating from paint production.[126] The pollutants in the paint waste and ground water had a high content of heavy metals and also contained PCBs and solvents and/or oil-related compounds.[127] Sediments were polluted by heavy metals and PCBs, and mussels were contaminated by PCBs.[128] Lumps of production waste lay around from previous dumping into the sea.[129] Noteby writes that the waste could have an acute toxic effect on human beings on direct ingestion.[130] The risk of this was restricted as the landfill is enclosed, but it was not eliminated as there was access to exposed waste from the seaward side.[131]

In 1989, the Norwegian Pollution Control Authority (SFT) ordered Stabil Fabrikker AS to survey the pollution on the site in question, and in September 1992 the company was ordered to make further studies in the area.[132] In June 1994, SFT requested a supplementary study to survey the extent of polluted sediments and the possible leakage of hazardous substances into the fjord.[133] Pursuant to section 7, paragraph 2 of the Pollution Control Act, SFT, in its decision of 6 May 1996, issued an order

123 Letter of 19 August 1996 from the Ministry of the Environment to the law firm, Torkildsen, Tennøe & Co.
124 Letter of 19 August 1996 from the Ministry of the Environment to the law firm, Torkildsen, Tennøe & Co.
125 Letter of 19 August 1996 from the Ministry of the Environment to the law firm, Torkildsen, Tennøe & Co.
126 Memo of 5 September 1995 from Noteby AS to Stabil fabrikker AS.
127 Memo of 5 September 1995 from Noteby AS to Stabil fabrikker AS.
128 Memo of 5 September 1995 from Noteby AS to Stabil fabrikker AS.
129 Memo of 5 September 1995 from Noteby AS to Stabil fabrikker AS.
130 Memo of 5 September 1995 from Noteby AS to Stabil fabrikker AS.
131 Memo of 5 September 1995 from Noteby AS to Stabil fabrikker AS.
132 Letter of 19 August 1996 from the Ministry of the Environment to the law firm, Torkildsen, Tennøe & Co.
133 Letter of 8 June 1994 from the Norwegian Pollution Control Authority to Stabil Fabrikker AS.

for the removal of the contaminated ground in the area by 1 May 1997.[134] Stabil appealed SFT's decision, but the Ministry of the Environment rejected the appeal and upheld the decision.[135]

In October 1996, SFT emphasised to the owner that they regarded it as particularly important that the deadline for the cleanup (1 May 1997) be met. They asked the company to make alternative, possibly provisional, waste disposal arrangements if NOAH on Langøya (a treatment plant and landfill for inorganic hazardous waste) could not accept the contaminated ground for final disposal by the deadline.[136] In a letter of 24 June 1997, Noteby gave notice that the contaminated ground had been dug up and was temporarily stored in containers pending sorting according to its degree of pollution. Ground that was clean and contained only minor pollution was to be returned to the ground, while the contaminated ground was to be further processed by the waste disposal facility.[137] On behalf of Stabil Fabrikker AS, Noteby wrote to SFT in February 1998 informing them that the contaminated ground was now temporarily stored on a waterproof reinforced PVC tarpaulin on a level concrete surface and covered with an all-welded waterproof PVC tarpaulin until an acceptable treatment solution for the ground was found.[138] In May 1998, SFT requested new information about the final treatment of the temporarily stored contaminated ground at Hvitsten.[139]

Pursuant to the Planning and Building Act, Vestby municipality granted Stabil Fabrikker AS permission for temporary storage of the contaminated ground until 1 October 1998.[140] In February 2000, in a statement to Vestby municipality, SFT wrote that in their opinion Stabil Fabrikker AS had had sufficient time to study the possibilities for the final disposal of the contaminated ground,[141] and they therefore recommended that Stabil Fabrikker AS should not be granted a renewal of its temporary storage permit.

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134 Letter of 19 August 1996 from the Ministry of the Environment to the law firm, Torkildsen, Tennøe & Co.
135 Letter of 19 August 1996 from the Ministry of the Environment to the law firm, Torkildsen, Tennøe & Co.
136 Letter of 16 October 1996 from the Norwegian Pollution Control Authority to the law firm, Torkildsen, Tennøe & Co.
137 Memo of 1 September 1997 from the Norwegian Pollution Control Authority.
138 Letter of 10 February 1998 from Noteby to the Norwegian Pollution Control Authority.
139 Letter of 13 May 1998 from the Norwegian Pollution Control Authority to Stabil Fabrikker AS.
140 Letters of 9 December 1997 and 18 June 1998 from Vestby municipality to Stabil Fabrikker AS.
141 Letter of 23 February 2000 from the Norwegian Pollution Control Authority to Vestby municipality.

In an e-mail of 28 August 2001, SFT stated that the case was completed.[142] They later said that the contaminated ground was not delivered to an approved landfill until December 2001.[143]

Example 2 Completed case that has been ranked incorrectly and where the original environmental problem has not been completely solved

In 1992, the Norwegian National Coastal Administration was asked to perform dredging operations by the slipway and quay structures of Brattvåg Skipsverft AS (id. no. 1534004). On behalf of Brattvåg Skipsverft AS, the Norwegian National Coastal Administration therefore applied to the County Governor of Møre og Romsdal county in June 1992 for permission to dump 3,000 m3 of dredged material into the Harams fjord.[144] When increased values of hazardous substances were measured in the sediments, the case was submitted to the Norwegian Pollution Control Authority (SFT). In July 1992, SFT rejected the application because the concentrations of hazardous substances that were measured in the sediment samples were so high that normal dumping could not be permitted, and an alternative disposal method for the materials had to be found.[145] SFT considered that the content of hazardous substances was so high that mobilisation and leakage of these substances in connection with dredging and dumping could pose a threat to marine life. In the same letter, SFT set specific conditions for the dredging operations.

In October 1992, Brattvåg shipyard was granted permission on certain conditions for the disposal of up to 200 m3 of polluted dredging mass on a stipulated plot on shore.[146] Before the permission had been granted, SFT had been informed that the landfill was already in use and that 100 m3 of ground had been deposited there. SFT therefore emphasised in its letter that a disposal permit was to be obtained before the disposal took place. They also stated in the letter that the reason they had been able to grant permission was because it was a question of temporary disposal. In the permit, the right was reserved to require that the dredged material be removed if the environmental protection authorities found this necessary.

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142 E-mail of 28 August 2001 from the Norwegian Pollution Control Authority to the Office of the Auditor General with the status for rank 1 and rank 2* cases.

143 Letter of 16 August 2002 from the Norwegian Pollution Control Authority to the Ministry of the Environment.

144 Letter of 16 June 1992 from the Norwegian National Coastal Administration to the County Fishery Officer in Møre og Romsdal county.

145 Letter of 7 July 1992 from the Norwegian Pollution Control Authority to Brattvåg Skipsverft AS.

146 Letter of 8 October 1992 from the Norwegian Pollution Control Authority to Brattvaag Skipsverft AS.

In a letter from January 2002, SFT stated that the dredged material was still in the temporary landfill but that the word "temporary" was probably misleading as SFT had received no indication that it was now necessary to move the landfill. On that basis, they had closed the case.[147] SFT also stated in their letter that the site should have been assigned rank 2 (need for study), but had been given rank 2* by mistake. According to SFT, the quality of the remaining sediments would be addressed in a major project concerning the cleanup of polluted sediments at shipyards.[148]

Example 3 Completed case that has been incorrectly ranked

Before the Norwegian Defence Construction Service (NODCS) was granted a framework planning permission, SFT issued a number of orders to the Norwegian Armed Forces, including an order to clean up a site at Terningmoen (id. no. 427005).

NODCS has for some time been of the opinion that this site had quite clearly been incorrectly ranked from the start, and was most probably a rank 3 case.[149] Later studies confirmed this.[150]

Example 4 Completed case that has been re-opened

Contaminated material was excavated from the fire drill field at Fornebu (id. no. 219041) in June 2000.[151] The oil pollution had seeped into the underlying rock, which had to be excavated to a depth of 0.5 to 1 metre over a large part of the area. The contaminated material was driven to the treatment plant,[152] and the case was then considered completed. Statsbygg wrote in a memo that there may be a need for further excavation on this site, and this proved to be correct.[153] As yet, the Norwegian Pollution Control Authority (SFT) has not received the final report for this excavation work. On re-opening the case, the status in SFT's landfill database was not changed from "completed" to "measures".[154]

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147 Letter of 7 January 2002 from the Norwegian Pollution Control Authority to the Office of the Auditor General.

148 Letter of 7 January 2002 from the Norwegian Pollution Control Authority to the Office of the Auditor General.

149 Meeting between the Norwegian Defence Construction Service (NODCS) and the Office of the Auditor General on 24 October 2001.

150 Meeting between the Norwegian Defence Construction Service (NODCS) and the Office of the Auditor General on 24 October 2001.

151 Letter of 16 June 2000 from Statsbygg to the Norwegian Pollution Control Authority.

152 Minutes from meeting no. 10 of the co-ordinating committee for the cleanup of polluted ground at Fornebu, Statsbygg, 12 June 2000.

153 Minutes from meeting no. 12 of the co-ordinating committee for the cleanup of polluted ground at Fornebu, Statsbygg, 8 May 2001.

154 As of November 2001.

4.2.3 Cases being monitored

According to SFT's landfill database as of September 2001, 23 of the 151 sites where there is a need for immediate studies and measures (i.e. sites with rank 1 and rank 2*) are being monitored. In the landfill database, a site will be given the status of being monitored if the monitoring has been planned, commenced or completed. This means that a site with the "being monitored" status is not necessarily being monitored, but that monitoring is planned or has been completed without the actual case being completed.

SFT states that it will be regarded as necessary for many of the cases to be monitored for some time after studies have been made and measures taken, if necessary, to ensure that the state of the polluted area is stable. Even though the area is being monitored in this way, SFT considers that the goals of solving the environmental problems by 2005 will be attained for these areas.[155]

No distinction is made in the landfill database between local monitoring and regional monitoring. Local monitoring means that a specific monitoring programme has been drawn up for the site, and measuring wells have been installed on and near the landfill or the polluted ground to monitor whether the run-off is polluted. Regional monitoring means that the sites are indirectly monitored through the Norwegian State Pollution Monitoring Programme (SPFO) and/or through the Joint Assessment Monitoring Program (JAMP). These programmes have a number of measuring stations in the fjords and in some watercourses. The regional monitoring mainly takes place in areas where there is considerable pollution from industrial activities and where sites with pollution due to activities in bygone years constitute only one of several sources of pollution.

Table 10 shows the number of sites with monitored status classified according to the type of measure that has been implemented as of October 2001.

[155] Letter of 7 January 2002 from the Norwegian Pollution Control Authority to the Office of the Auditor General.

Table 10 Monitored cases of the most severe ground pollution that is due to activities in bygone years classified according to type of measure

Type of measure	Total
0: Insufficient info, delegated etc.	
Ia: No physical intervention	10
Ib: Regulation, advice, restrictions, enclosure etc.	2
Ic: Elimination of sources, repairs to the pipe system, surface cleanup etc.	2
II: In situ treatment	1
IIIa: Partial isolation and/or sealing off	4
IIIb: Total isolation and/or sealing off	
IVa: Partial removal + residual pollution	3
IVb: Partial removal + isolated residual pollution	1
IVc: Removal ex situ /disposal/treatment	
Total	23

Table 10 shows that no or limited cleanup measures have been initiated in 14 of the cases with monitored status. Various types of cleanup measures have been implemented in the nine remaining cases with the aim of reducing or partially removing the pollution from these locations.

The review of the 23 cases with monitored status shows that this group contains

- landfills with deficient monitoring
- landfills that will still be in active use for a considerable time in the future
- landfills that both are being monitored and are subject to measures
- landfills that are to be monitored for 30 years

The following four examples are given to illustrate these points:

Example 1 Deficient landfill monitoring

The Norwegian Pollution Control Authority's reason for classifying the industrial landfill on the property of O. Mustad & Søn AS (id. no. 502010) as rank 1 is because the landfill's content includes chips containing cadmium, and also ashes from the combustion of paint, varnish, lynol, white

spirit etc. There is a risk of run-off towards the river Hunnselva, and thus a possible conflict with flora and fauna, fishing interests and plans to restore the watercourse.[156] The area above the landfill is currently used as a car park.

According to the Norwegian Pollution Control Authority's landfill database, hazardous waste has been deposited at the landfill, but samples have not shown pollution in the river Hunnselva. The review of the case indicates that cleanup measures have not been implemented as no order has been issued to do so. However, on 30 December 1998, the Norwegian Pollution Control Authority (SFT) issued an order to the company concerning a proposal for monitoring. The company accepted the order. During an audit in 1999, SFT discovered that the monitoring was inadequate. On 13 June 2000, SFT notified the company that this would be followed up as a separate case with requirements regarding an appropriate monitoring programme. As of October 2001, the company had not received these requirements. The landfill is not covered by the company's discharge permit. According to SFT, the follow-up of the case will be delegated to the County Governor.

Example 2 A landfill that is still in use

SFT's reason for classifying the Elkem Aluminium Lista – NEW TIP (id. no. 1003005) site as a rank 1 site was that the landfill contained waste that generated the run-off to Husebybukta via the company's drainage system of substances such as fluorides and PAHs. This pollution resulted in conflict with recreational activities such as bathing and fishing, and also had an impact on the flora and fauna in the area.

In the company's discharge permit of 26 June 1992, SFT set requirements regarding the implementation of measures aimed at preventing leakage from the landfill after future waste disposal.[157] In addition, an order was also issued to conduct a ground water study and to reduce leachate from the landfills to a minimum. On 21 April 1993, the company reported to SFT, informing them that the Norwegian Centre for Soil and Environmental Research had studied and described the soil condition, the drainage basin, the formation of leachate, and the design of and pollution at the company's two landfills including NEW TIP.[158] Intercepting ditches had been dug at this landfill in 1992, and manholes installed with appurtenant drainage pipes. Notification was also given that cover material would be chosen in 1993 and

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156 *NGU Rapport nr. 90.122 Kartlegging av spesialavfall i deponier og forurenset grunn* (NGU Report no. 90.122 Survey of hazardous waste in landfills and polluted ground), p. 39.

157 Referred to in the letter of 21 April 1993 from Elkem Aluminium to the Norwegian Pollution Control Authority.

158 Letter of 21 April 1993 from Elkem Aluminium to the Norwegian Pollution Control Authority.

that a cell for cathode waste would be designed and constructed. In addition, parts of the peat marsh would be removed and replaced with stones.

SFT was sceptical about the company's proposal of using asphalt as the cover material, but did finally approve this solution.[159]

The review of the case indicates that the landfill is monitored locally and that it is still used for the disposal of industrial waste. This means that the pollution control authorities must continuously monitor the company's discharge permit by reviewing the company's internal reporting and control activities. It also means that the landfill must be monitored as long as it is in use and as long as it represents a potential source of pollution.

Example 3 Polluted ground being monitored at the same time as it is subject to measures

SFT received the case concerning Hjemmets Trykkeri (id. no. 301058) for evaluation when the nationwide survey was conducted in the period 1989–91. On the basis of this survey, the case was registered as rank 2*. The case concerns the leakage of toluene from a buried tank, which resulted in the pollution of ground water and the ground. According to the NGU report, cleanup measures were carried out in 1991.[160]

The Norwegian Pollution Control Authority (SFT) claims that the toluene pollution lies in a "pocket" in the ground, which means that the pollution can leak out at high groundwater levels. A toluene tank in the polluted area has been removed and the hole has been refilled. A review of the case indicates that six unused tanks remain. SFT further reports that a drainage pipe has been installed in the hole to pump up any polluted liquid, and that yearly samples are taken from the area. This is to be done at times when a high ground-water level is anticipated. According to SFT, pumping and accumulation should be initiated when toluene content is registered. No information has been received as to the length of time the monitoring and subsequent measures will be carried out.[161]

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[159] Letter of 25 September 1992 from the Norwegian Pollution Control Authority to Elkem Aluminium and fax of 9 October 1992 from Elkem Aluminium to the Norwegian Pollution Control Authority.

[160] *NGU Rapport nr. 89.145 Kartlegging av spesialavfall i deponier og forurenset grunn* (NGU Report no. 89.145 Survey of hazardous waste in landfills and polluted ground), section 3.25.

[161] Letter of 7 January 2002 from the Norwegian Pollution Control Authority to the Office of the Auditor General, applies to the entire paragraph.

Example 4 A landfill that is to be monitored for 30 years

Tasta landfill (id. no. 1103012) was originally a municipal landfill from 1956 to 1982. It was constructed in a marshy area, but the area is currently well covered with cultivated land, housing etc. Dumping at the landfill was controlled, and many barrels of oil, paint and solvents from the Dusavik and Tananger bases were disposed of, along with sacks of substances that mainly contained PCBs. The site has been allocated rank 1. Run-off into the closed stream that flows into Byfjorden has been registered, and polluted run-off to the small boat harbour nearby has been observed.

In 1991, a report was issued by Berdal Strømme from the introductory studies with a proposal for further studies. In the preliminary study, samples were taken in the manholes to the pipe system for accumulating leachate from the landfill in 1990. On a commission from Stavanger municipality, Asplan Viak later conducted scientific environmental tests in response to an order from SFT. Samples were taken of water and sediments in manholes (SFT) to the pipe system for accumulating leachate in 1997–98. The results were compared with water samples taken from surface water that had not been affected by the landfill. The samples were studied in relation to physical and/or chemical parameters (e.g. B, Cd, Pb, Fe, TOC and nutrient salts) and oil-related compounds. Meetings were held underway with SFT and the County Governor, and the final report was completed on 14 September 1998. In the permit of 29 May 2001 for Tasta landfill, the County Governor set requirements for recipient studies in the sea below the landfill and of the ground water, and also for monitoring the leachate.[162]

The report from SFT[163] states that all landfills shall be required to undergo subsequent testing of their discharges to the air and water and recipient testing for a period of up to 30 years after the closing of the landfill.

4.2.4 Cases that are subject to measures

According to SFT's landfill database, 28 severely polluted sites are subject to measures as of September 2001. For these sites, measures are planned, commenced or completed.

The cost of the measures will to a large extent depend on the strictness of the requirements set regarding cleanup or cleansing measures for each area. In the action plan from 1992, the level of ambition chosen entails that the

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[162] Letter of 7 January 2002 from the Norwegian Pollution Control Authority to the Office of the Auditor General, applies to the entire paragraph.

[163] *SFT Rapport 94:03 Krav til fyllplasser. Retningslinjer til Fylkesmannen* (SFT Report 94:03 Requirements for landfills. Guidelines for the County Governor), p. 4.

degree of cleanup for each area is adapted to the area's environmental qualities and to the user interests associated with the surrounding areas and recipients.[164] According to the action plan, the most important goal for this level of ambition is to prevent the spread of pollution and to ensure that human beings, animals and other living organisms are not exposed to hazardous substances.

Table 11 Cases subject to measures of the most severe ground pollution that is due to activities in bygone years classified according to type of measure

Type of measure	**Measures**
0: Insufficient info, delegated etc.	
Ia: No physical intervention	9
Ib: Regulation, advice, restrictions, enclosure etc.	
Ic: Elimination of sources, repairs to the pipe system, cleanup etc.	2
II: In situ treatment	2
IIIa: Partial isolation and/or sealing off	3
IIIb: Total isolation and/or sealing off	3
IVa: Partial removal + residual pollution	4
IVb: Partial removal + isolated residual pollution	3
IVc: Removal ex situ /disposal/treatment	2
Total	28

Twenty-eight of the total of 151 sites are subject to measures. No physical intervention has taken place at nine of these, and limited measures have been taken at two of the sites. In situ treatment of the pollution has been carried out at another two sites, while at six of the sites the pollution has been isolated or sealed off from the surroundings. At nine of the sites, the contaminated ground has been totally or partially removed.

The review of the 28 cases that are subject to measures shows that this group contains examples of cases where no measures have as yet been implemented to remove the pollution.

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[164] *SFT rapport 92:32 Deponier med spesialavfall, forurenset grunn og forurensede sedimenter. Handlingsplan for opprydning.* (SFT Report 92:32 Landfills with hazardous waste, polluted ground and polluted sediments. Action plan for cleanup), p. 18.

Example 1 Limited measures implemented without the pollution being removed

Falconbridge Nikkelverk sludge disposal site in the sea (id. no. 1001008) is an open sludge disposal site on the bottom of the Kristiansand fjord that contains heavy metals and chlorinated hydrocarbons. Along with other landfills, this site has polluted ground from the activities of the same company and the current industrial discharges have a severe polluting impact on life in the fjord. The sludge disposal site is one of the causes of the extinction of life in the sediments of that entire part of the Kristiansand fjord. Rigorous restrictions are currently imposed on fishing and harvesting of marine resources in the area, and the catch cannot be distributed for sale.

Pilot tests have been carried out at the site on the feasibility of covering severely polluted sediments, and in 2001 the sediments were surveyed. No measures have been implemented at the site, but a test has been conducted on depositing sand on top of the soft sediments. Falconbridge Nikkelverk is also considering dredging along its own quay, which can be regarded as constituting part of the measures. A solution must also be found for the disposal of this polluted sludge. According to the Norwegian Pollution Control Authority (SFT), an action plan has been drawn up for the sludge disposal site in the sea. SFT reports that roads are being built in the vicinity, and the ground extracted from this construction work is being used to cover the sludge disposal site.[165]

4.2.5 Cases under study

Sites where studies have been planned, commenced or completed have been given the status "under study" by SFT,[166] and they claim that comprehensive studies are required for the rank 1 and rank 2* sites before the most appropriate measures can be determined.[167] Basic surveys can take from 1–2 months up to two years, and relatively substantial costs may be incurred.[168] The need for measures at each individual site cannot be evaluated with certainty until the studies have been conducted.[169]

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165 Letter of 16 August 2002 from the Norwegian Pollution Control Authority to the Ministry of the Environment

166 *SFT-rapport 97:24 Forurenset grunn i Norge, Statusrapport 1997* (SFT Report 97:24 Polluted ground in Norway, Status report 1997), p. 6.

167 *SFT-rapport 97:24 Forurenset grunn i Norge, Statusrapport 1997* (SFT Report 97:24 Polluted ground in Norway, Status report 1997), p. 7.

168 *SFT rapport 92:32 Deponier med spesialavfall, forurenset grunn og forurensede sedimenter. Handlingsplan for opprydning.* (SFT Report 92:32 Landfills with hazardous waste, polluted ground and polluted sediments. Action plan for cleanup), p. 22.

169 *SFT rapport 92:32 Deponier med spesialavfall, forurenset grunn og forurensede sedimenter. Handlingsplan for opprydning.* (SFT Report 92:32 Landfills with hazardous waste, polluted ground and polluted sediments. Action plan for cleanup), p. 22.

Of the total of 151 sites, 37 (approx. 25%) are under study as of September 2001.[170] In 1997, SFT's objective was that sites with the status "under study" should be assessed for measures by 2002.[171]

Table 12 The most serious ground pollution cases with the status "under study" that are due to activities in bygone years classified according to type of measure

Type of measure	Under study
0: Insufficient info, delegated etc.	
Ia: No physical intervention	19
Ib: Regulation, advice, restrictions, enclosure etc.	8
Ic: Elimination of sources, repairs to the pipe system, cleanup etc.	3
II: In situ treatment	
IIIa: Partial isolation and/or sealing off	5
IIIb: Total isolation and/or sealing off	1
IVa: Partial removal + residual pollution	
IVb: Partial removal + isolated residual pollution	
IVc: Removal ex situ /disposal/treatment	1
Total	37

Table 12 shows that no physical intervention has been made for 19 of the sites with the status "under study". At 11 of the sites, only limited measures have been taken. Isolation or sealing off of the pollution has been implemented at six of the sites.

The Office of the Auditor General's study shows that of the 37 most severely polluted sites that are under study, 24 have been studied since 1992. Two of the cases which had the status "under study" in 1992 have been completed, only to be re-opened. Several of the sites are located completely or partially in the sea. The review of the 37 cases with the status "under study" shows that among these cases there are examples of

- cases that probably cannot be completed by 2005
- cases that have been studied since 1992

[170] E-mail of 28 August 2001 from the Norwegian Pollution Control Authority to the Office of the Auditor General with a list of status for rank 1 and rank 2* sites.

[171] *SFT-rapport 97:24 Forurenset grunn i Norge, Statusrapport 1997* (SFT Report 97:24 Polluted ground in Norway, Status report 1997), p. 10.

The following examples are given to illustrate these points:

Example 1 A case that probably cannot be completed by 2005

In connection with excavations in dock 6 in the submarine pen in Laksevåg (id. no. 1201012) in Bergen municipality in autumn 1991, a meter-thick layer of oily gravel was found in the excavated material, which turned out to contain PCBs.[172] These presumably originated from German transformers that were destroyed after the War. Studies that were conducted inside and outside the submarine pen in the period 1992–94 indicated that there were also PCBs in the sediments outside the pen.[173] The contaminated ground on shore has now been cleaned up, but the pollution in the sediments outside the submarine pen has not been removed.[174] NODCS takes the view that removing this contaminated material will have little effect as there are many other sources of pollution in the fjord, and that measures must therefore be coordinated through a joint action plan for the fjord.[175] The Norwegian Armed Forces are one of many polluters who are responsible for these problems, and the progress of the work of compiling an action plan is therefore dependent on a number of parties. NODCS is of the opinion that there is little probability that the pollution in the sediments can be removed before 2005.[176]

Example 2 Cases that have been studied since 1992

It has been estimated that between 15 and 50 tonnes of mercury can be found in the area near Norsk Hydro's chlorine plant (id. no. 805023), including the ground beneath the actual plant.[177] It has been confirmed that the ground water and the ground in the area are polluted, and run-off into the Frier fjord has been proven.[178] The Norwegian Pollution Control Authority (SFT) has

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172 The Norwegian Defence Construction Service, *Undersøkelser av forurensningsfare fra avfallsfyllinger og forurenset grunn og gjennomførte miljøtiltak på Forsvarets områder* (Studies of the risk of pollution from landfills and polluted ground and environmental measures implemented on the Norwegian Armed Forces' land), Status Report as per 1 January 1998, p. 47.

173 The Norwegian Defence Construction Service, *Undersøkelser av forurensningsfare fra avfallsfyllinger og forurenset grunn og gjennomførte miljøtiltak på Forsvarets områder* (Studies of the risk of pollution from landfills and polluted ground and environmental measures implemented on the Norwegian Armed Forces' land), Status Report as per 1 January 1998, p. 47.

174 Meeting between the Norwegian Defence Construction Service (NODCS) and the Office of the Auditor General on 24 October 2001.

175 Meeting between the Norwegian Defence Construction Service (NODCS) and the Office of the Auditor General 24 October 2001.

176 Meeting between the Norwegian Defence Construction Service (NODCS) and the Office of the Auditor General 24 October 2001.

177 Letter of 24 June 1998 from the Norwegian Pollution Control Authority to Hydro Porsgrunn Industripark.

178 *NGU Rapport nr. 89.147 Kartlegging av spesialavfall i deponier og forurenset grunn* (NGU Report no. 89.147 Survey of hazardous waste in landfills and polluted ground), section 3.11.8.

made studies of the area, and on 3 December 1990 they issued an order for the study of measures (the removal and disposal of contaminated materials).[179] As a response to this order, Norsk Hydro claimed that the low amount of run-off made it environmentally justifiable to allow the area to remain as it was without implementing measures. Monitoring of the quality of the ground water was initiated in order to follow the development before a final decision on measures was to be taken. As of September 2001, the case still had the status "under study", i.e. the decision on measures has not been taken.

4.3 The use of key policy instruments in the efforts to clean up polluted ground and sediments that are due to activities in bygone years

4.3.1 The application of legal policy instruments – the Pollution Control Act

The Pollution Control Act came into effect on 1 October 1983. The main principle of the Pollution Control Act is that the person who is responsible for pollution has the sole responsibility for dealing with the problem. Pursuant to the Pollution Control Act, the authorities are able to order the responsible person to take the necessary measures.[180]

The application of the Pollution Control Act

Each year, the environmental protection authorities take a considerable number of decisions in cases pursuant to the Pollution Control Act. In the first instance, these orders concern cases of discharge permits pursuant to section 11 of the Act, orders to take measures pursuant to section 7 of the Act, and investigations pursuant to section 51 of the Act.[181] When an appeal is made against a decision, this usually reflects disagreement from the recipient of the order or from those who are affected by the severity of the requirements or the scope of the order imposed.[182]

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[179] Letter of 24 June 1998 from the Norwegian Pollution Control Authority to Hydro Porsgrunn Industripark.

[180] Section 7 *(Duty to avoid pollution)*.

[181] Hans Chr. Bugge: *Forurensningsansvaret. Det økonomiske ansvaret for å forebygge, reparere og erstatte skade ved forurensning* (The Responsibility for Pollution: The economic responsibility for preventing, repairing and compensating damage caused by pollution), Tano Aschehoug, 1999, p. 48.

[182] Hans Chr. Bugge: *Forurensningsansvaret. Det økonomiske ansvaret for å forebygge, reparere og erstatte skade ved forurensning* (The Responsibility for Pollution: The economic responsibility for preventing, repairing and compensating damage caused by pollution), Tano Aschehoug, 1999, p. 49.

The Ministry of the Environment points out that the most important policy instrument in the efforts to clean up polluted ground is the issuing of orders for cleanup pursuant to the Pollution Control Act to the person responsible for the pollution.[183]

The ministry also points out that it is the responsibility of the Norwegian Pollution Control Authority (SFT) to discover who is responsible for the pollution and to issue the order to that person.[184] As a rule, the Pollution Control Act and its regulations require that SFT send notice of the order before it is actually issued.[185] According to the ministry, the environmental protection authorities cannot issue an order to owners of polluted ground and/or polluted sediments if that order would have unreasonable economic consequences.[186]

In Proposition no. 1 (1996–97) to the Storting for the Ministry of the Environment,[187] status and work schedules were submitted, in response to a resolution from the Storting, for the efforts to clean up landfills with hazardous waste, polluted ground and polluted sediments.[188] The proposition states that there has been conflict in many cases about who is to bear the responsibility for the cleanup operations. In the proposition, the Ministry of the Environment points out that this has proved to be a task that demands considerable resources and that represents a supplement to the traditional application of authority.

The Ministry of the Environment considers that the provisions of the Pollution Control Act relating to those responsible for pollution are sufficient to allow cases to be resolved, for example those concerning polluted ground.[189]

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183 Meeting between the Ministry of the Environment and the Office of the Auditor General on 14 November 2001.

184 Meeting between the Ministry of the Environment and the Office of the Auditor General on 14 November 2001.

185 Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.

186 Meeting between the Ministry of the Environment and the Office of the Auditor General on 14 November 2001.

187 Proposition no. 1 (1996-97) to the Storting for the Ministry of the Environment, p. 84.

188 Resolution of 29 April 1996: "The Storting requests that the Government submit an overview of the monitoring and implementation of *„Handlingsplan for Gamle Synder"* (Action Plan for Sins of the Past). The Storting must receive an overview of what has been done, along with a work schedule of the ongoing efforts as soon as possible and no later than the budget deliberations for 1997. The work schedule must clarify responsibility and contain a specific list of the measures that are to be implemented."

189 Meeting between the Ministry of the Environment and the Office of the Auditor General on 14 November 2001.

In cases relating to polluted sediments, the question of who is responsible pursuant to the Pollution Control Act will in practice be more complicated.[190] *SFT Rapport 1774/2000 "Miljøgifter i norske fjorder"* (SFT Report 1774/2000 Hazardous substances in Norwegian fjords) contains levels of ambition and a strategy for the efforts involved in cleaning up polluted sediments. The report points out that special aspects pertaining to polluted sediments can complicate the enforcement of the duty to implement measures on the person responsible for the pollution. In the first place, there are often many parties who have contributed to polluting the sediments over a long period of time. Secondly, in contrast to polluted land, nobody usually owns the polluted sediments. Thirdly, cleanup measures in polluted sediments can be so expensive that it is unreasonable to order someone to implement them. This is one of the reasons why the Ministry of the Environment would like to submit to the Storting the particular challenges involved in the cleanup of polluted sediments.[191]

In August 2000, the Norwegian Pollution Control Authority (SFT) gave notice of orders[192] for the 11[193] most polluted harbours in Norway. This notice was sent to the port authorities in all 11 harbours and stated that SFT deemed it appropriate that the harbours should be assigned responsibility for coordinating the planning and implementation efforts, even though the responsibility for paying for the measures would mainly be delegated to others. The environmental protection authorities regard this notification as mild pressure on the responsible persons to convince the participants to coordinate their activities with the aim of implementing cleanup.[194]

In some cases, SFT has issued an order to clean up sediments. An example is given below.

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190 Meeting between the Ministry of the Environment and the Office of the Auditor General on 14 November 2001.

191 Meeting between the Ministry of the Environment and the Office of the Auditor General on 14 November 2001.

192 Letter of 4 August 2000 from the Norwegian Pollution Control Authority to the port authorities in Oslo, Drammen, Sandefjord, Grenland, Kristiansand, Stavanger, Bergen, Ålesund, Trondheim, Harstad and Tromsø.

193 In Oslo, Drammen, Sandefjord, Grenland, Kristiansand, Stavanger, Bergen, Ålesund, Trondheim, Harstad and Tromsø.

194 Meeting between the Ministry of the Environment and the Office of the Auditor General on 14 November 2001.

Example 1 The use of an order pursuant to the Pollution Control Act relating to cleaning up polluted sediments – Haakonsvern Naval Base[195]

Haakonsvern Naval Base was first used in 1962. Constructions on the base included a fire drill field. Observations of oil on the surface of the sea near the fire drill field were frequently reported. Sub-surface surveys made in 1992–93 showed that the ground under the fire drill field contained large amounts of oil that were leaking into the sea, and the fire drill field was therefore closed in the summer of 1993.

The first studies in the sea were conducted by NIVA in 1993 when sediments and flora and fauna were studied. The conclusion drawn was that the sediments and to some extent living organisms were severely polluted with PCBs and PAHs. As a result of the study, the Norwegian Food Control Authority advised against the consumption of fish and shellfish from the Haakonsvern area due to the high content of PCBs.

Subsequent studies in the sea around Haakonsvern show that the sediments are polluted by PCBs, PAHs, heavy metals (mercury, lead, copper and zinc) and TBT (used in ship paints and antifouling paint). Due to the diverse activities that take place and have taken place at Haakonsvern, it is difficult to link a precise source on land with the pollution in the sediments. However, it is possible to register a certain pattern in the sediment pollution. The highest concentrations of pollution are found by quays and docks where ships have been anchored, been repaired and undergone maintenance. Studies also indicate that pollution is not only deposited into the sea from land, but also directly from ships through the peeling off of ship paint, the disposal of vessel bilge water, the dumping of waste etc. Calculations made in 1998 show that there are around 68 kg of PCBs in the sediments off Haakonsvern.

In a letter of 22 December 1993, the Norwegian Pollution Control Authority (SFT) issued an order to the Norwegian Defence Construction Service (NODCS) to investigate measures to clean up pollution on land and in the sea.

The order was issued pursuant to sections 7 and 51 of the Pollution Control Act.[196] In the order, the deadline for submitting an interim plan to SFT for

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[195] The Norwegian Defence Construction Service (NODCS), *Opprydding av forurensede sjøsedimenter og forurenset grunn på Haakonsvern orlogsstasjon i Bergen kommune, Statusrapport per 31.12.2000* (Cleanup of polluted marine sediments and polluted ground at Haakonsvern Naval Base in Bergen municipality, Status report as per 31 December 2000).

[196] Letter of 22 December 1993 from the Norwegian Pollution Control Authority to the Norwegian Defence Construction Service (NODCS).

the total scientific environmental activities was set at 1 March 1994. Furthermore, all of the necessary scientific environmental activities were to be described in an action plan that was supposed to be sent to SFT by 1 December 1994, and measures were to be initiated by 1 February 1995. The reason for the order was that civil engineering work in both the ground and the sediments demonstrated a clear need to obtain a comprehensive assessment of the potential for pollution and the environmental risks at the base. One of the goals of the orders is to improve the state of the marine environment off Haakonsvern to a level that in the long term will lead to the abolition of the warning against the consumption of fish and shellfish.

A comprehensive action plan for measures on land, *"Handlingsplan for opprydding av forurenset grunn på Haakonsvern orlogsstasjon i Bergen kommune"* (Action plan for cleaning up polluted ground at Haakonsvern Naval Base in Bergen municipality) was submitted to SFT on 1 December 1994. An action plan that addressed studies that had been conducted in the sea and measures initiated on land, and that included proposals for measures in the sea pursuant to SFT's order was submitted on 1 December 1995. The action plan was approved by SFT in a letter of 1 February 1996. In the same letter, SFT requested that an application be drawn up for the work involved in the measures that were to be implemented. This application was submitted to SFT on 1 March 1996.

In July 1996,[197] the Norwegian Armed Forces were given permission by the Norwegian Pollution Control Authority (SFT) to dredge, excavate, process and treat/dispose of polluted ground and polluted sediments. Permission was granted to dredge 90,000 m^3 of sediments and to remove 1,000 m^3 of polluted soil from two sites on land. These materials were to be deposited in two dumping grounds at sea. The permit specified certain requirements for the dumping grounds.

The dumping grounds at sea were ready for use at the beginning of 1998. The dredging of the site started in January 1998 and continued up to and including the end of June 1998. A total of approximately 4,100 m^3 of material was dredged from site 1, and were then deposited in one of the sea dumping grounds.

Phase 2 – dredging the sea bottom around Haakonsvern with the exception of the small boat harbour – began in August 2000.

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[197] Letter of 2 July 1996 from the Norwegian Pollution Control Authority to the Norwegian Defence Construction Service (NODCS), *"Tillatelse til mudring, oppgraving, håndtering og behandling/deponering av forurensede masser for Forvarets Bygningstjeneste Haakonsvern orlogsstasjon"* (Permission to NODCS for the dredging, excavating, processing and treating/disposing of contaminated material at Haakonsvern Naval Base).

NODCS's objective is that the sea area around Haakonsvern shall be ranked in class III in the Norwegian Pollution Control Authority's system for classifying environmental quality in fjords and coastal waters (97:03). It is expected that such a ranking will result in the abolition of the warning against the consumption of fish and shellfish in the area. Estimates have shown that PCBs in the sediments at Haakonsvern will be reduced by about 85%.[198] At site 1, the percentage of PCBs was reduced by 90.7%.

The dredging activities that were carried out in 1998 at site 1 indicate that it is possible to remove the majority of the PCB-polluted sediments. In the long term, this will contribute to a decrease in the PCB pollution in fish and shellfish. However, several new areas with PCB-polluted sediments have been discovered not far from Haakonsvern. These had not been discovered at the time when the risk assessment was made, and these pollutants originate from discharges from other polluters. SFT has issued no order in this case. This can mean that, despite the cleanup carried out at Haakonsvern, the desired reduction in the PCB content in fish and shellfish will not be attained. An action plan is being compiled for Byfjorden in Bergen, but this plan does not include the area near Haakonsvern where the existence of PCBs has been proven.

Time-consuming disputes about who is responsible according to the Pollution Control Act

Time-consuming disputes about who is responsible for paying for measures and studies are mentioned in the budget proposition for 1997 as one of the reasons why objectives were not attained.[199]

In response to a question from the Office of the Auditor General, the Ministry of the Environment pointed out that there had been a dispute about who was responsible for the cleanup in 27 of the most serious cases of ground pollution (rank 1 and rank 2* cases).[200] In an appendix to the letter, the ministry specified the cases to which this applied. The Ministry of the Environment writes in the letter that apart from four or five instances, the cases have now been resolved, but that progress may still be inhibited in some of them because of the responsible persons' inability to pay. The Office of the Auditor General has gone through all of the cases that are regarded as the most serious (i.e. rank 1 and rank 2*), a total of 151 cases. Below, an

198 Letter of 1 March 1996 from the Norwegian Defence Construction Service (NODCS) to the Norwegian Pollution Control Authority.
199 Proposition no. 1 (1996-97) to the Storting for the Ministry of the Environment, p. 82.
200 Letter of 1 March 2000 from the Ministry of the Environment to the Office of the Auditor General.

example is presented of one of the 27 rank 1 and rank 2* cases – approximately 18% – where the Ministry of the Environment reports that there has been a disagreement as to who is responsible for the cleanup.

Example 1 The issuing of an order pursuant to the Pollution Control Act with a subsequent appeal to the Ministry of the Environment

The background of the Roe II and Juteskar I and II cases (id. nos. 807004, 807008 and 807010) is that as a result of Norsk Hydro's former operations in Notodden, contaminated ground was deposited at various landfills that are not situated on Norsk Hydro's property. Norsk Hydro was responsible for disposing of this material. Studies conducted in 1995 concluded that there was little probability of the spread of pollution via the ground from the landfills, but that there was some leakage of pitch compounds and lead into the ground water and the course of the brook. The landfills lie beneath cultivated land with some exposure at the surface. In August 1997, pursuant to paragraph 4, section 7 of the Pollution Control Act, the Norwegian Pollution Control Authority (SFT) ordered Norsk Hydro to register an encumbrance concerning restrictions on the use of property resulting from the pollution on the properties due to the risk of spread if the current use of the land is altered.[201] Norsk Hydro appealed this order.[202] In September 1999, SFT rescinded its decision, citing a procedural error concerning the fact that the owners of the land had not been treated as parties to the cases, and that this could have had a deciding effect on the content of the decision.[203] At the same time, the Norwegian Pollution Control Authority gave notice that they intended to make a new decision regarding restrictions on the use of the properties and their official registration. After a new consideration of the case, and with advance warning to both the owners of the land and Norsk Hydro, SFT made a new decision and ordered Norsk Hydro to register an encumbrance on the properties concerning restrictions on their use.[204] Norsk Hydro appealed this decision in December 1999 by questioning the company's responsibility for the landfills on the grounds that the polluted material had been transferred to the landowners of the properties in question and had been legally deposited before the Pollution Control Act

[201] Letter of 6 August 1997 from the Norwegian Pollution Control Authority to Norsk Hydro ASA.
[202] Letter of 28 August 1997 from Norsk Hydro's legal department to the Norwegian Pollution Control Authority.
[203] Letter of 22 September 1999 from the Norwegian Pollution Control Authority to Norsk Hydro ASA.
[204] Letter of 26 November 1999 from the Norwegian Pollution Control Authority to Norsk Hydro ASA.

came into force.[205] In August 2001, the Ministry of the Environment did not allow the appeal, but reworded the decision and submitted further reasons for it.[206]

4.3.2 The use of financial policy instruments

Allocations and accounts made over the Ministry of the Environment's budget area

Starting in the budget year 1991, a separate subsidy item – item 71 – was established for the cleanup of shipwrecks and the initiation of the action plan for "sins of the past" consisting of hazardous waste landfills, polluted fjords and the pollution of closed mines.[207] The item covered the costs of surveying, monitoring and planning and of physical measures under both private and municipal management including emptying and removing wrecks.

Item 71 ceased to exist in 1998. The reason was that according to the Pollution Control Act costs incurred in cleanup should essentially be covered by the person or persons responsible for the pollution.[208] To the extent that the government, represented by the Ministry of the Environment, was to take part in the cleanup, the costs would be covered under chapter 1441, item 39. Item 39 was established in 1998 and was to be applied when the Norwegian Pollution Control Authority (SFT) took charge of the cleanup itself, either using its own resources or by assigning the investigation and cleanup to another party. [209]

Responsibility for pollution can be assigned to private, municipal or government sectors. When referring to item 39, chapter 1441, Proposition no. 1 (2001-2002) to the Storting states that if a responsible polluter cannot be identified, is not able to pay or is not considered fit to undertake a satisfactory cleanup, or if the government – represented by the environmental protection authorities – is the responsible party according to the Pollution Control Act, the costs of studies and necessary cleanup will be covered by the environmental protection authorities' resources. The

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[205] Letters of 1 November 1999 and 20 December 1999 from Norsk Hydro's legal department to the Norwegian Pollution Control Authority.

[206] Letter of 31 August 2001 from the Ministry of the Environment to Norsk Hydro ASA. (The letter apologises for the delay in dealing with the case.)

[207] Proposition no. 1 (1990–91) to the Storting for the Ministry of the Environment, and Proposition no. 1 (1991–92) to the Storting for the Ministry of the Environment.

[208] Proposition no. 1 (1998-99) to the Storting for the Ministry of the Environment, p. 166.

[209] Proposition no. 1 (1997–98) to the Storting for the Ministry of the Environment, p. 155. Funds were allocated to both item 71 and item 39 in 1998.

proposition points out that the environmental protection authorities can also pay in advance for studies and/or partly finance cleanup projects in cases where partial financing is necessary in order to prompt cleanup measures.

Figure 1 shows the funds that have been utilised under item 71 and item 39 from 1991 up to and including 2000, and how they have been distributed between the cleanup of pollution from activities in bygone years ("sins of the past") and shipwrecks. A total of NOK 289.4 million was allocated in the period from 1991 to 2000.

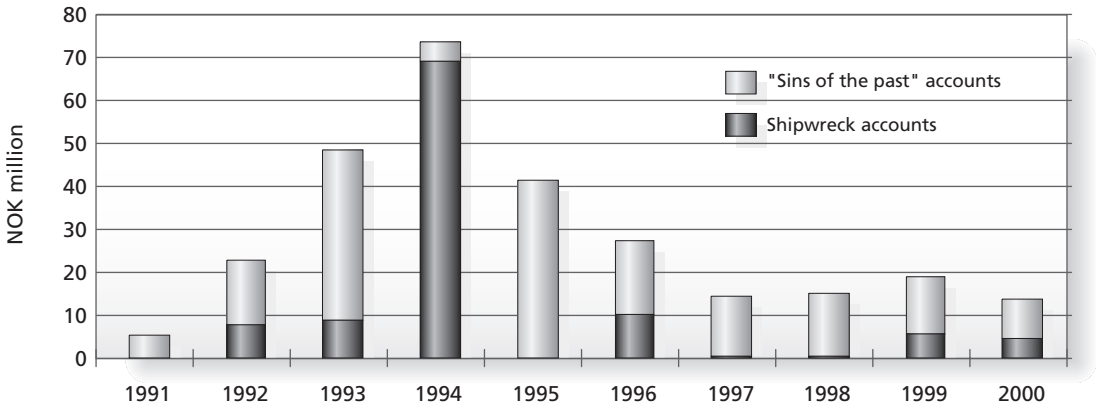

Figure 1 Distribution of costs for shipwrecks and the cleanup of pollution from activities in bygone years ("sins of the past")

Of a total of NOK 281.4 million spent under items 71 and 39, NOK 174.6 million has been utilised on efforts to clean up polluted ground and sediments caused by polluting activities in bygone years. The remaining NOK 106.8 million has been used for cleaning up shipwrecks.

The cost of the cleanup efforts on polluted ground and sediments in this period has on average amounted to around NOK 17.5 million per year, but for the years 1993 and 1995 the expenditures were far higher, i.e. approximately NOK 40 million per year.[210]

[210] Meeting between the Ministry of the Environment and the Office of the Auditor General on 14 November 2001.

The Ministry of the Environment has previously told the Storting that until 1992 the cleanup of pollution from activities in bygone years was financed through chapter 1448, item 70. In total about NOK 28 million was allocated through this item.[211] Starting in 1992, funds were allocated over chapter 1441, item 71, "Subsidy for cleanup measures". The Ministry of the Environment states that up to 1996 around NOK 70 million was allocated to "sins of the past" through this item.[212]

The accounting figures for item 71 show that a total of NOK 100.6 million was spent from 1992 until 1996.[213] This is over NOK 30 million more than the amount reported by the Ministry of the Environment.

The environmental protection authorities' cost estimates for studies and cleanup

The environmental protection authorities have submitted several calculations for the costs of studying and cleaning up polluted ground and sediments caused by polluting activities in bygone years.

In 1992, the Norwegian Pollution Control Authority (SFT) made estimates of the total costs for the cleanup of deposited and abandoned hazardous waste, polluted ground and polluted sediments, for different levels of ambition.[214]

Level of ambition 1:	The area shall be free of pollution.
Cost estimate:	NOK 9–14 billion.
Level of ambition 2:	The pollution shall be removed or reduced to a satisfactory level relative to the environmental qualities and probable user interests for the land and recipients.
Cost estimate:	NOK 2.0–3.0 billion.
Level of ambition 3:	The pollution shall be reduced to a satisfactory level relative to the current use of the land and recipients in the area.
Cost estimate:	NOK 0.6–0.8 billion.

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211 Proposition no. 1 (1996-97) to the Storting for the Ministry of the Environment, p. 85.

212 Proposition no. 1 (1996-97) to the Storting for the Ministry of the Environment, pp. 85–86.

213 The figures have been obtained from Report no. 3 to the Storting Central Government Financial Statements for the years 1992 to 1996.

214 *SFT rapport 92:32 Deponier med spesialavfall, forurenset grunn og forurensede sedimenter. Handlingsplan for opprydning.* (SFT Report 92:32 Landfills with hazardous waste, polluted ground and polluted sediments. Action plan for cleanup.)

The point of departure taken for the cost assessment is that 450 sites shall be studied for possible measures by 2000. When deciding the level of ambition, SFT finds level of ambition 1 too high relative to requirements specified for other sources of pollution. They also take the view that the utility value of the measures is too high relative to the costs. In the SFT's opinion, level of ambition 3 will not achieve the Storting's goal of reducing the risk of pollution to a minimum. The environmental protection authorities therefore used level of ambition 2 as a basis for the action plan from 1992. In their view, this would give a satisfactory degree of cleanup relative to the Storting's objective, and would be justifiable from both environmental and socio-economic viewpoints.[215]

Based on level of ambition 2, cleanup costs for landfills and polluted ground are estimated at NOK 1.625 billion, cleanup of pollution from mines at NOK 220 million, and cleanup of polluted sediments at NOK 600 million – a total of approximately NOK 2.4 billion. Taking into account the uncertainty in the cost assessments, SFT estimates the total costs at NOK 2.0–3.0 billion.

In 1992 the government's expenses were estimated at a total of a little less that NOK 1 billion, as a review of ownership of the sites indicated that the government must finance around 30% of the cases and cover a somewhat larger percentage share of the costs.[216]

According to the Ministry of the Environment, during 1996 a total of NOK 0.8 billion was spent on cleaning up "sins of the past". This amount covers the total expenses for the central governmental, municipal and private sectors. Revised estimates from 1996 show that the total costs of future cleanup in polluted areas will be around NOK 2–3 billion. Costs of measures constitute approximately 85% of this amount, and costs of studies about 15%. The central government's direct liability for the pollution warrants a proportion of these costs of around 10%, i.e. NOK 200–300 million.[217]

In *SFT Rapport 1774/2000 "Miljøgifter i norske fjorder"* (SFT Report 1774/2000 Hazardous substances in Norwegian fjords) alternative levels of ambition and strategies are presented for the efforts involved in the cleanup

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215 *SFT rapport 92:32 Deponier med spesialavfall, forurenset grunn og forurensede sedimenter. Handlingsplan for opprydning.* (SFT Report 92:32 Landfills with hazardous waste, polluted ground and polluted sediments. Action plan for cleanup), p. 18.

216 *SFT rapport 92:32 Deponier med spesialavfall, forurenset grunn og forurensede sedimenter. Handlingsplan for opprydning.* (SFT Report 92:32 Landfills with hazardous waste, polluted ground and polluted sediments. Action plan for cleanup), p. 40.

217 Proposition no. 1 (1996-97) to the Storting for the Ministry of the Environment, pp. 87–88, applies to the entire paragraph.

of polluted sediments, along with cost estimates for the various levels of ambition.

Level of ambition 1:	The entire fjord shall be of an environmental quality that ensures that biological impacts or side effects on the ecosystem are avoided.
Cost estimate:	Highly uncertain.
Level of ambition 2:	The entire fjord shall be of an environmental quality that ensures its suitability for fishing and harvesting of other marine resources. The outer area shall also be of an environmental quality that ensures that biological impacts or impacts on the ecosystem are avoided.
Cost estimate:	NOK 25 billion.
Level of ambition 3:	The unacceptable dispersal of hazardous substances shall be avoided in the entire fjord. The outer area shall also be of an environmental quality that ensures suitability for fishing and harvesting marine resources.
Cost estimate:	NOK 8 billion.

The cost estimates are extremely uncertain, particularly because there is considerable doubt as to which measures for cleaning up sediments will have the greatest effect under different conditions. To estimate the costs of levels of ambition 2 and 3 on a national basis, rough estimates have been made of the scope of the measures for cleaning up sediments required in order to achieve these goals.[218] For example, it has been estimated that with level of ambition 3 there will be no physical intervention on the sediments of almost twice as many sites as with level of ambition 2. A high degree of uncertainty means that the estimates for the total costs at level of ambition 2 lie between NOK 10 and 50 billion, with the best estimate at NOK 25 billion. In general, the report concludes that it will be more reasonable to reduce the initial disposal of pollutants in the ground and sediments rather than be obliged to initiate cleanup measures afterwards. For example, measures that safeguard the ground against leakage to the sea are relatively reasonable. If polluted ground leaks into the sea, the clearance cost per square metre of contaminated ground will probably increase by a factor of ten or more.[219]

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[218] *SFT-rapport 1774/2000 Miljøgifter i norske fjorder* (SFT Report 1774/2000 Hazardous substances in Norwegian fjords).

[219] *SFT-rapport 1774/2000 Miljøgifter i norske fjorder* (SFT Report 1774/2000 Hazardous substances in Norwegian fjords), p. 22.

Table 13 The environmental protection authorities' cost estimates for studies and cleanup, level of ambition 2

	Action plan 1992	Proposition no. 1 to the Storting (1996-1997)	Doc. 1774/2000
Level of ambition	2	2	2
Polluted ground	NOK 1.625 billion		
Pollution from mines	NOK 220 million		
Polluted sediments	NOK 600 million		NOK 25 billion
Total	NOK 2.0–3.0 billion	NOK 2.0–3.0 billion	
Government coverage	30%	10%	?

Table 13 gives a summary of the environmental protection authorities' various cost estimates for surveys and cleanup of polluted ground, pollution from mines, and polluted sediments caused by polluting activities in bygone years.

The revised calculations from 1996 agree with the cost estimates from 1992. However, in 1996 the Ministry of the Environment assumed direct liability for only 10% of the total costs, whereas according to the 1992 action plan from the Norwegian Pollution Control Authority (SFT), the government is responsible for 30% of the sites and the corresponding financing costs.

A comparison of the costs for cleanup of polluted sediments reveals that the action plan from 1992[220] estimates total costs of NOK 600 million, while SFT's report from 2000[221] assesses the total costs at NOK 25 billion if level of ambition 2 is used as the basis for calculation.

4.3.3 Information policy instruments

Professional guidelines for executive officers and those responsible for ground pollution

In report 95:09 *Håndtering av grunnforurensningssaker – Foreløpig saksbehandlingsveileder* (Management of contaminated land - Preliminary

[220] *SFT-rapport 92:32 Deponier med spesialavfall, forurenset grunn og forurensede sedimenter. Handlingsplan for opprydning.* (SFT Report 92:32 Landfills with hazardous waste, polluted ground and polluted sediments. Action plan for cleanup.)
[221] *SFT-rapport 1774/2000 Miljøgifter i norske fjorder* (SFT Report 1774/2000 Hazardous substances in Norwegian fjords).

guidelines for administrative procedures) SFT outlines the procedures and the theoretical approach when assessing measures for cleaning up polluted ground. In report 99:01A Risikovurdering av forurenset grunn (Risk assessment of polluted ground) general standards have been defined for the most sensitive use of land and for tools for making risk assessments. Report 99:01A was compiled as a supplement and a continuation of report 95:09. A set of examples was also prepared (99:01B) which illustrates how the guidelines can be applied in practice. The guidelines are intended to be an aid for those responsible for pollution, executive officers and public administration in order to ensure uniform, cost-effective decisions on measures and a good verifiability in the basis for decision-making.[222]

Information and follow-up tasks for the municipalities

The Norwegian Pollution Control Authority (SFT) has previously sent several letters[223] to all of the municipalities, giving information on polluted ground and landfills with hazardous waste.[224] SFT is of the opinion that informing the municipalities in this way presumably has little effect as it is difficult to prove that the municipalities have taken the initiative to implement cleanup measures as a result of these letters.[225]

Information in the landfill database is accessible to the general public on the Internet

SFT has drawn up regulations that are meant to give the municipalities the power to issue orders for studies and/or measures to clean up polluted ground in building projects regardless of the rank of the site.[226] In this connection, SFT has employed resources on the development of the landfill database with the object of making some parts of it accessible on the Internet. The chief purpose is to give public authorities, including municipal authorities, a tool for the administrative processing of building projects on polluted ground. Moreover, access to the database will give both the general public and developers an overview of sites with polluted ground. The

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222 *SFT-rapport 99:01A Risikovurdering av forurenset grunn* (SFT Report 99:01A Risk assessment of polluted ground).

223 Letter of 12 November 1991 from the Norwegian Pollution Control Authority to the Norwegian municipalities. Letter of 3 September 1993 from the Norwegian Pollution Control Authority to the technical works offices in all of the country's municipalities. Letter of 28 August 1997 from the Norwegian Pollution Control Authority to the Norwegian municipalities.

224 Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.

225 Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.

226 Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.

regulations are being considered in the Ministry of the Environment, and the ministry stresses that a number of factors must be clarified before the regulation can be sent out for comments.[227] In this connection, the necessity of coordinating with the Ministry of Local Government and Regional Development was pointed out. It is therefore not clear when the regulations will come into effect. The Ministry of the Environment has stated that the most serious cases will not be delegated to the municipalities, and consequently SFT will continue to issue orders in these cases.[228]

SFT does not offer guidance in individual cases to those responsible for pollution and others whose work involves polluted ground.[229] The Norwegian Defence Construction Service (NODCS) has stated that in their opinion there is little contact with SFT in connection with surveying, studies, measures and monitoring.[230] In this context, NODCS points out that the government departments in Sweden, Denmark and the USA that correspond to SFT give considerably more advice and constructive assistance in finding appropriate solutions. NSB (formerly the Norwegian State Railways) has not met with SFT since NSB took the initiative to hold a meeting in 1999.[231] Contact has largely consisted of SFT's issuing orders to NSB in various ground pollution cases. Consequently, NSB was not informed about the environmental protection authorities' objectives regarding polluted ground.[232]

Conveying information to professional circles and owners of polluted ground

The Norwegian Pollution Control Authority (SFT) conveys information on a general basis in *Miljøringen*, a forum for parties who own polluted ground and sediments, authorities that lay down framework conditions, R&D institutions and consultancy companies that do problem-solving work, suppliers, and building contractors who help find technical solutions to the problems.[234] *Miljøringen* is intended to serve as a link between its members

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227 Meeting between the Ministry of the Environment and the Office of the Auditor General on 14 November 2001.
228 Meeting between the Ministry of the Environment and the Office of the Auditor General on 14 November 2001.
229 Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.
230 Meeting between the Norwegian Defence Construction Service (NODCS) and the Office of the Auditor General on 24 October 2001.
231 Meeting between NSB and the Office of the Auditor General on 25 October 2001.
232 Meeting between NSB and the Office of the Auditor General on 25 October 2001.
233 Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.
234 www.miljoringen.no

and public authorities, R&D circles and international networks, and so it has good contact with SFT, receiving regular information about their efforts on the problem of cleaning up polluted ground.[235] SFT is also frequently included in the programme at meetings of Miljøringens members, and takes part in order to inform the members about the authorities' efforts.[236]

4.3.4 The application of organisational policy instruments – sector responsibility and primary responsibility

Sectoral responsibility and primary responsibility

The government's environmental policy is founded on the principle that all private and public participants in all sectors of society have an independent responsibility for basing their activities on environmental considerations. In Report no. 58 (1996–97) to the Storting a management system was outlined that consisted of sectoral environmental action plans, a system for performance monitoring, and an annual presentation in a report to the Storting on the government's environmental policy and the state of the environment. This was based on the need to increase the use of sectoral authorities' policy instruments, knowledge and creativity to ensure sustainable development and to prevent environmental damage. The environmental protection authorities' responsibility in this system will be to coordinate the government's efforts to specify the environmental policy goals, both nationally and for sectors.[237] Furthermore, the Ministry of the Environment is responsible for securing the development of suitable monitoring systems.[238]

Sectoral environmental action plans

Sectoral environmental action plans describe the sector's environmental impact and plans for environmental efforts linked to the ministry's areas of responsibility through the formulation of sectoral work objectives, measures and the use of policy instruments in the medium term and for the upcoming budget year.[239] Table 14 shows the ministries that have drawn up environmental action plans, and specifies when the remaining ministries expect to present their respective environmental action plans.

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235 www.miljoringen.no

236 www.miljoringen.no

237 In June 2001, the Storting decided that the Report to the Storting on the State of the Environment should be submitted each alternate year.

238 Report no. 46 (1988-89) to the Storting on Environment and Development (Programme for Norway's follow-up to the Report from the World Commission on Environment and Development), p. 72.

239 Memo of 15 January 2001 from the Ministry of the Environment to the Ministry of Justice and the Police, the Ministry of Cultural Affairs, the Ministry of Finance and the Ministry of Foreign Affairs about the work on sectoral environmental action plans.

Table 14 In which national budget the various ministries are to present or have presented their respective environmental action plans[240]

Ministry	1999	2000	2001	2002	2003
The Ministry of Transport and Communications	×				
The Ministry of Defence	×				
The Ministry of Petroleum and Energy		×			
The Ministry of Fisheries		×			
The Ministry of Agriculture			×		
*The Ministry of Education, Research and Church Affairs			×		
The Ministry of Trade and Industry			×		
The Ministry of Local Government and Regional Development			×		
The Ministry of Finance				×	
The Ministry of Justice and the Police				×	
The Ministry of Foreign Affairs				×	
The Ministry of Cultural Affairs				×	
The Ministry of Labour and Government Administration					×
The Ministry of Children and Family Affairs					×
** The Ministry of Health and Social Affairs					×

* Replaced from 1 January 2002 by the Ministry of Education and Research

** Replaced from 1 January 2002 by the Ministry of Health and the Ministry of Social Affairs

Follow-up and any minor revisions to the plans shall be reported yearly in the ministries' budget propositions. The plans that have so far been compiled are regarded as first-generation plans.[241] The aim is to revise each sectoral environmental action plan every fourth year.[242]

According to the Ministry of the Environment's guidelines for the work of compiling the sectoral environmental action plans, these plans have a

[240] Information obtained from Report no. 24 (2000–2001) to the Storting on the Government's Environmental Policy and the State of the Environment, p. 12, and Proposition no. 1 (2001–2002) to the Storting for the Ministry of the Environment, p. 32. The new names of the ministries are therefore not used.

[241] Report no. 24 (2000–2001) to the Storting on the Government's Environmental Policy and the State of the Environment, p. 12.

[242] Letter of 22 August 2001 from the Ministry of the Environment to the Office of the Auditor General.

number of purposes.[243] They are to give an overview of the activities for which the various ministries are administratively responsible and the environmental impact of these activities, to identify the major challenges for each ministry within the relevant performance areas in the government's environmental policy, and to devise work objectives to describe how the ministry is to help meet the national performance targets. In addition the plans shall describe the policy instruments that are to be used and shall formulate specific measures to be implemented in the near future with the main focus on policy instruments and measures for which the ministry has an independent administrative responsibility. Any new policy that is addressed in the environmental action plan shall be reflected in the ministries' budget propositions and shall be conveyed to their subordinate government departments.

The Ministry of the Environment emphasizes that sectoral environmental action plans are an important tool that will enable the Government to look at environmental efforts in an overall context and will clarify how the policies of the individual ministries can assist in attaining Norway's environmental policy goals at the lowest possible cost for society.[244]

The Ministry of the Environment takes the view that the sectoral environmental action plans play a minor role in the area of polluted ground and sediments because it is the environmental protection authorities rather than the sectoral ministries that manage the most important policy instruments in this area.[245] The ministry is of the opinion that the sectoral environmental action plans may well help increase awareness in business sectors and facilitate a speedier cleanup than would otherwise have been effected, but that the most significant policy instrument in the efforts to clean up polluted ground is to issue orders for cleanup pursuant to the Pollution Control Act. According to the ministry, the environmental protection authorities do not make any distinction between government and private polluters or between polluters in different sectors when they enforce the Pollution Control Act.[246]

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[243] Memo of 15 January 2001 from the Ministry of the Environment to the Ministry of Justice and the Police, the Ministry of Cultural Affairs, the Ministry of Finance and the Ministry of Foreign Affairs about the work on sectoral environmental action plans.

[244] Report no. 24 (2000–2001) to the Storting on the Government's Environmental Policy and the State of the Environment, p. 12 and Memo of 15 January 2001 from the Ministry of the Environment to the Ministry of Justice and the Police, the Ministry of Cultural Affairs, the Ministry of Finance and the Ministry of Foreign Affairs about the work on sectoral environmental action plans.

[245] Meeting between the Ministry of the Environment and the Office of the Auditor General on 14 November 2001.

[246] Meeting between the Ministry of the Environment and the Office of the Auditor General on 14 November 2001.

When compiling the sectoral environmental action plans, the Ministry of the Environment gives the relevant ministries advice and guidance on how the sectoral work objectives should be devised. The Ministry of the Environment has drawn up guidelines for the work on the sectoral environmental action plans. In these guidelines, and in meetings with the ministries at the start of the work on the sectoral environmental action plans, the Ministry of the Environment attempts to ensure that the goals are as specific and verifiable as possible, and that policy instruments and measures are linked to the sectoral work objectives. Moreover, the ministry intends the environmental action plans to describe the challenges associated with the performance areas affected by the sectoral ministry's activities. This also applies to the area of polluted ground and sediments caused by polluting activities in bygone years. Once the ministries have made a draft of the environmental action plan, the environmental protection authorities prepare comments on the content of the plan, including the formulation of the goals on which the ministries shall base their reports. The work of compiling the sectoral environmental action plans is intended to promote comprehensive internal processes in the Ministry of the Environment and its subordinate agencies. The ministry emphasises, however, that the environmental action plans belong to each individual sectoral ministry and that they can therefore only give advice on the content and formulation of the plan.[247] If there is substantial disagreement between the Ministry of the Environment and a sectoral ministry, attempts are made to solve the problem politically.[248]

The Norwegian Pollution Control Authority (SFT) was previously sent drafts of the sectoral environment action plans for their comments.[249] Substantial work was put into these comments, but they were not well received by the sectoral ministries. Therefore, SFT only submits comments on these environmental action plans when the Ministry of the Environment requests them.

In a letter of 22 August 2001 to the Office of the Auditor General, the Ministry of the Environment refers to Statskonsult. This company has surveyed experiences from the work of compiling sectoral environmental action plans in eight ministries and in the environmental protection administration.[250] This survey shows that the weaknesses of this work are primarily linked to the lack of collaboration between the sectoral ministries

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247 Letter of 22 August 2001 from the Ministry of the Environment to the Office of the Auditor General.
248 Meeting between the Ministry of the Environment and the Office of the Auditor General on 14 November 2001.
249 Meeting between the Norwegian Pollution Control Authority and the Office of the Auditor General on 12 November 2001.
250 Statskonsult memo 2001:2 was drawn up on commission from the Ministry of the Environment.

and the environmental protection authorities, to poor cross-sectoral and in-house coordination on environmental matters, and to a lack of correlation between sectoral environmental action plans and the system for performance monitoring. Another main impression was that the content of the plans is in general not action-oriented and specific with regard to the section relating to policy instruments and measures. According to Statskonsult's assessment, two main aspects have contributed to weakness in the work of compiling the sectoral environmental action plans: firstly the purpose of the plans has not been clear, and secondly the work on the system for performance monitoring was still in its research phase, and the prerequisites for how the sectoral ministries were to prepare performance documentation had therefore not been clarified.

The environmental protection authorities' system for performance monitoring

The system for performance monitoring shall provide a comprehensive and consistent framework that covers the government's entire environment policy efforts and results. Within this framework, both the sectoral authorities and the environmental protection authorities are responsible for developing, reporting, and analysing results. The environmental protection authorities are responsible for seeing that a system is set up for performance reporting of the development of the state of the environment, of the factors that influence the state of the environment, and of implemented environmental measures and their costs.[251]

Performance reporting is conditional on the retrieval and processing of data, and retrieving data will primarily be based on environmental monitoring, environmental statistics and reporting from the sectors. Performance monitoring will also constitute an important foundation for international reporting.

The Ministry of the Environment takes the view that Norway has made great progress relative to other countries with regard to establishing a management system for environmental protection, but it is emphasised that the system has not yet been completely developed.[252] The Ministry of the Environment is of the opinion that, when it is fully developed, the system for performance monitoring will provide an excellent platform for evaluating whether the total effort is satisfactory in relation to goals and obligations. The Ministry of

[251] Letter of 22 August 2001 from the Ministry of the Environment to the Office of the Auditor General.
[252] Meeting between the Ministry of the Environment and the Office of the Auditor General on 14 November 2001.

the Environment also thinks that the current reporting helps reveal the areas where efforts may have to be intensified. The work of developing the system for performance monitoring is extensive and will therefore take several years to complete.

In Report no. 58 (1996–97) to the Storting,[253] the system for performance monitoring is described as a system that will provide a basis for evaluating whether the total effort is satisfactory in relation to existing targets and obligations and whether the allocation among the sectors is cost-effective. The Ministry of the Environment expects to be able to make a satisfactory assessment of this when the whole system has been fully developed.[254] The Ministry of the Environment does not specify a definite date for the completion of the system for performance monitoring.

The Ministry of the Environment takes the view that the system for performance monitoring is not in itself decisive for providing the professional basis required in connection with adjusting goals and policy instruments within the area of polluted ground and sediments. In this connection, the ministry refers to the fact that the most effective policy instrument has been and will continue to be the legal authority under the Pollution Control Act to issue orders to clean up pollution.[255]

Areas where warnings against the consumption of fish and shellfish have been issued are used as an indicator by the environmental protection authorities. The Ministry of the Environment finds the use of this indicator problematic as it is the Norwegian Food Control Authority (SNT) rather than the environmental protection authorities that is responsible for issuing these warnings against consumption.[256]

As part of the performance monitoring, the Norwegian Pollution Control Authority (SFT) submits reports to the Ministry of the Environment from the landfill database in the form of an A and B list. According to SFT, the A list constitutes the number of rank 1 cases that were registered and not completed as of 1 June 1998, and the B list is the number of rank 2 cases that were registered and not completed as of 1 June 1998. The Ministry of

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253 Report no. 58 (1996–97) to the Storting on Environmental Policy for a Sustainable Development, voluntary work for the future, p. 27.
254 Letter of 4 December 2001 from the Ministry of the Environment to the Office of the Auditor General.
255 Meeting between the Ministry of the Environment and the Office of the Auditor General on 14 November 2001.
256 Meeting between the Ministry of the Environment and the Office of the Auditor General on 14 November 2001.

the Environment reports the number of rank 1 and rank 2 cases to the Storting in Proposition no. 1 to the Storting and in the Report to the Storting on the State of the Environment.

4.3.5 Examples of sector responsibility

Example 1 The Norwegian Armed Forces

Most military bases have had their own landfills. Previously, waste was burnt on these landfills along with residues of paint, glue and varnish, and in some cases waste oil and solvents. In 1990–91, the Norwegian Defence Construction Service (NODCS) conducted a survey of hazardous waste and polluted ground on the Norwegian Armed Forces' land. The survey showed that there were 262 polluted sites on this land. A few severely polluted sites have been added since the first survey.

In 1998, the Norwegian Armed Forces also began to survey and evaluate the state of the environment in marine sediments where it may be presumed that military activities have had an impact on ecological conditions. The studies revealed that a number of harbours and fjords are to some extent severely polluted by various hazardous substances, such as heavy metals, petrochemicals, PAHs, PCBs and DDT.

The Norwegian Armed Forces' environmental action plan

The Ministry of Defence submitted its environmental action plan, as they have been defined by the Ministry of the Environment, in connection with the national budget for 1999.[257] However, the first action plan for environmental protection efforts in the Norwegian Armed Forces was submitted in Report no. 21 (1992-93) to the Storting on an Action Plan for Environmental Protection in the Armed Forces. This report contains a description of the environmental impact of the Norwegian Armed Forces and specific measures to limit negative environmental consequences. These measures included the preparation of guidelines and directives and the organisation of the environmental efforts. Cleanup of old environmental problems had a separate section in the first action plan. Here it was shown that in 1990–91 the Norwegian Armed Forces carried out a survey of hazardous waste landfills and polluted ground on their own land, and the work continued with other studies in 1992. In the action plan, the Norwegian Defence Construction Service (NODCS) was assigned the task of following

[257] Report no. 21 (1992-93) to the Storting on an Action Plan for Environmental Protection in the Armed Forces and Report no. 24 (2000–2001) to the Storting on the Government's Environmental Policy and the State of the Environment, p. 12.

up the landfill study that was already underway by continuing the studies of the sites with highest priority and carrying out any cleanup measures and monitoring programmes that might be required. A plan for a study of the sites with lower priority was also supposed to be drawn up.

The action plan that is incorporated into the budget for 1999 concludes that the measures from the plan that was issued in 1993 have been initiated and mostly implemented.[258] One of the sub-goals of the new plan is to survey pollution in military areas. This entails a continuation of the survey of polluted marine sediments at military installations near the coast, and also a continuation of the work of surveying and cleaning up polluted ground on military land.

Efforts to clean up polluted ground and sediments in the Norwegian Armed Forces

In the environmental action plan from 1993,[259] the Ministry of Defence, represented by the department involved with construction and property (now the Section for Infrastructure and Environmental Affairs in the Ministry's Department of Defence Resources) was assigned the responsibility for co-ordinating environmental protection.[260] In 1993, NODCS was given the responsibility for planning cases, for new Acts and regulations in the field of environmental protection, for conducting environmental impact assessments in major construction cases, and for looking after environmental considerations in land use planning.

The Norwegian Defence Estates Agency,[261] formerly NODCS, has a framework planning permission to dig up and treat the ground on Norwegian Armed Forces properties that is polluted with oil and PAHs, and also to dig up the ground on these properties that is polluted with heavy metals and PCBs. The terms of the framework planning permission require the Norwegian Armed Forces to submit annual status reports to the Norwegian Pollution Control Authority (SFT).[262]

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[258] Report no. 21 (1992-93) to the Storting on an Action Plan for Environmental Protection in the Armed Forces.

[259] Report no. 21 (1992-93) to the Storting on an Action Plan for Environmental Protection in the Armed Forces.

[260] Report no. 21 (1992-93) to the Storting on an Action Plan for Environmental Protection in the Armed Forces.

[261] Proposition no. 77 (2000–2001) to the Storting Reorganisation of the Norwegian Armed Forces' property management and Recommendation no. 343 (2000–2001) to the Storting from the Standing Committee on Defence relating to the reorganisation of the Norwegian Armed Forces' property management.

[262] Letter of 1 December 1997 from the Norwegian Pollution Control Authority to the Norwegian Defence Construction Service (NODCS).

NODCS' Environmental Section holds meetings each year with the regions to plan the surveys, studies, measures and monitoring that are to be carried out. NODCS then proposes annual allocations and participates in budget negotiations with the Norwegian Armed Forces' supreme command.

The practical work of carrying out the cleanup projects is dealt with in the four regions by an environmental coordinator. A draft of the tender documents, e.g. in connection with studies, measures or monitoring, are first sent to the Environmental Section at NODCS' head office for quality assurance.

The Norwegian Armed Forces' landfill database

The Norwegian Armed Forces register sites with polluted ground on their land in their own database. This landfill database has recently been expanded to include sites with firing ranges and sites with polluted sediments. In connection with this, the Norwegian Pollution Control Authority (SFT) was invited to take part in this development work. However, this invitation was not accepted as SFT had other development plans for their own landfill database. There has been no formal collaboration between SFT and NODCS with regard to the work of developing the two databases. NODCS' database is centrally updated by NODCS. SFT has asked NODCS not to change the ranking of sites when performing the updating; i.e. if a site has been given a ranking, it will retain that ranking even if further studies show that it should have been allocated a different ranking.

NODCS' Environmental Section was aware that SFT is currently working on organising its own landfill database on the Internet, but they were not aware that this would lead to fewer ranking categories and that it would be possible for sites to change rank if this was indicated by new information. No procedures have been established to notify SFT of sites that are sold for civilian purposes so that these sites can be included in SFT's landfill database.

The Norwegian Armed Forces' collaboration with the pollution control authorities

The Norwegian Armed Forces are aware of the objective that all rank 1 and 2* cases shall be completed by SFT during 2005, and that all rank 2 cases shall also be studied by 2005. In this context, NODCS has not received requirements or orders to intensify or focus their efforts on these sites so that the goals can be attained. At the same time, it is emphasised that the Norwegian Armed Forces have more or less already achieved these goals, and reference was made in this context to their last status report.

The Ministry of the Environment and the Ministry of Defence have semi-annual co-ordination meetings at the political level where environmental cases are discussed. NODCS' Environmental Section usually takes part in these meetings. There have been few meetings between SFT and NODCS in recent years, and these have mostly addressed individual cases.

NODCS' Environmental Section is satisfied with SFT's instructions for risk assessment of polluted ground (99:01A), and this is used as a template for the studies that have been conducted on the Norwegian Armed Forces' land. SFT has little contact with NODCS in connection with surveys, studies, measures and monitoring. In this context, NODCS points out that the government departments in Sweden, Denmark and the USA that correspond to SFT give considerably more advice and constructive assistance in finding appropriate solutions. In individual cases, contact is made with municipalities.

The Norwegian Armed Forces' cleanup costs

The Norwegian Armed Forces report that in the period 1997–2001 they have spent somewhat more than NOK 30 million on cleaning up pollution that is due to activities in bygone years. This amounts to an average of over NOK 6 million per year. It is not clear how much the Norwegian Armed Forces spent on environmental measures prior to 1997 as their economic system was changed in that year. According to the Norwegian Defence Estates Agency, it would be difficult to add up these costs using the current system.[263]

The cleanup efforts at Haakonsvern are organised as a separate project and are not included in the normal division of labour.[264] The studies off Haakonsvern started in 1994. In December 1996, the Norwegian Armed Forces were ordered to implement protective environmental measures. Environmental measures involving dredging began at the turn of the year 1997/98. The costs of dredging the sediments and placing them in sludge disposal sites in the sea are estimated at approximately NOK 68 million.[265] The total costs at Haakonsvern, including previous costs, are estimated at

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263 Fax of 6 March 2002 from the Norwegian Defence Estates Agency to the Office of the Auditor General.

264 Meeting between the Norwegian Defence Construction Service (NODCS) and the Office of the Auditor General on 24 October 2001.

265 The Norwegian Defence Construction Service, *Undersøkelser av forurensningsfare fra avfallsfyllinger og forurenset grunn på Forsvarets områder* (Surveys of the risk of pollution from landfills and polluted ground on the Norwegian Armed Forces' land), Status Report as per 1 January 1996.

around NOK 130 million.[266] A third phase is planned that will comprise completing the clean up of landfills and monitoring the measures.

In addition, NODCS has paid some of the cleanup costs at Oslo Lufthavn Gardermoen (OSL). The Norwegian Armed Forces' polluted sites were transferred to OSL, and NODCS had little opportunity to help decide on solutions.[267]

Example 2 NSB (formerly the Norwegian State Railways)

Pollution from activities in bygone years linked to railway operations is particularly associated with two types of pollutants: creosote pollutants and oil and diesel pollutants. Creosote was used to impregnate the sleepers and masts used in constructing the railway network, whereas oil and diesel pollutants are primarily related to railway operations. This type of ground pollution was caused by overfilling and leakage, often near station areas.

NSB and the Norwegian National Rail Administration own eight of the 151 sites with polluted ground where immediate measures are required (rank 1 and rank 2*).

The Ministry of Transport and Communications' environmental action plan

In the Ministry of Transport and Communications' environmental action plan from 1998, polluted ground is addressed under the performance area Hazardous chemicals.[268] Notification has been given that the Norwegian National Rail Administration has now closed down all of the workshops previously used for impregnating timber sleepers with creosote. According to the plan, the Norwegian National Rail Administration considers it an important task to restore these areas, which represent a potential pollution risk. The plan also states that the Norwegian National Rail Administration's former workshops for creosote impregnation are now being surveyed, and that measures have been or will be initiated.

In an appendix to the environmental action plan, a brief account is given of the environmental strategies of wholly owned companies under the Ministry of Transport and Communications, including NSB BA. Cleanup of oil-

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266 The Norwegian Defence Construction Service, *Avfallsfyllinger, forurenset grunn, skytefelt og forurensede sedimenter* (Landfills, polluted ground, artillery ranges and polluted sediments), Status Report as per 1 January 2000.

267 Meeting between the Norwegian Defence Construction Service (NODCS) and the Office of the Auditor General on 24 October 2001.

268 Environmental action plan for the transport and communications sector 1998, The Ministry of Transport and Communications.

polluted ground is mentioned in the appendix as an example of an environmental measure in NSB BA.

Efforts to clean up polluted ground and sediments in NSB[269]

NSB BA has a special section of staff for environmental matters in the group management. In 1997, NSB BA compiled an overall environmental plan for the period 1997–2001. Section 6 of the plan addresses the cleanup of existing ground pollution and the replacement of poorly secured tanks by 1 December 1997. This plan was later replaced by the Strategic Environmental Plan for NSB, 1999–2002, which is based on Local Agenda 21, and which includes the environmental goals of NSB. As well as 12 measurable environmental areas, the environmental plan also includes the intention of making NSB one of the best environmental companies by 2002. Apart from these goals, there are no specific guidelines for how NSB shall solve its environmental problems associated with polluted ground. The strategic environmental plan shall be put into action in units and subsidiaries through their respective business and activity plans.[270] Internal priorities are determined locally and are therefore not controlled in detail by this plan, which consequently does not give precise dates for the measures.[271] Furthermore, the treatment of polluted ground is one of the topics that are addressed both in general and in detail in the annual environmental report from NSB. NSB has provided input to the efforts involved in drawing up the environmental action plan for the Ministry of Transport and Communications.

With regard to the organisation of the cleanup efforts, the individual regional units were initially supposed to use their own resources in the cleanup of polluted ground, and NSB konsernstab Miljø was supposed to provide advice. This led to the cleanup cases being handled in different ways, and NSB BA is therefore centralising tasks connected with this work to a greater extent. Among other things, this means that NSB konsernstab Miljø will carry out more quality and environmental audits of the units' efforts to clean up areas with polluted ground.

According to NSB konsernstab Miljø, the main focus will be on non-operations-related properties and properties that are intended to be sold. Further priorities will be set in keeping with NSB's strategic plan for the period 1999–2002, i.e. priorities will be assigned on the basis of the

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269 Meeting between NSB BA and the Office of the Auditor General on 25 October 2001, not the first sentence of the paragraph.

270 *Strategisk miljøplan for NSB, 1999–2002,* (Strategic environmental plan for NSB, 1999-2002).

271 *Strategisk miljøplan for NSB, 1999–2002,* (Strategic environmental plan for NSB, 1999-2002).

environmental impact of the pollution on the surroundings. The assignment of priorities will also be based on economic considerations and on NSB's reputation. Another essential factor to be considered when setting priorities is the establishment of goals for the cleanup. In this context, it was pointed out that it is a challenge to find a level of cleanup that is "good enough". NSB konsernstab Miljø will contact the Norwegian Pollution Control Authority (SFT) to discuss objectives for cleanup measures. It was reported that the properties with ground pollution that were given first priority in practice are the properties that are going to be sold.

According to NSB konsernstab Miljø, no general boundary has been set nor clarification made as to whether NSB or the Norwegian National Rail Administration is responsible for the various cases of pollution. NSB konsernstab Miljø considers the Norwegian National Rail Administration to be mainly responsible for the creosote pollutants, while NSB is chiefly responsible for the diesel pollution. However, NSB konsernstab Miljø was not aware that the Norwegian National Rail Administration submitted an action plan for the cleanup of creosote-polluted ground to SFT in 1997. It was also stated that the Norwegian National Rail Administration is responsible for the cleanup of the impregnation plant in Råde. The responsibility for Hommelvik and Brakerøya and other areas remains to be determined. NSB does not think that it should pay the entire costs of the extensive cleanup at Lillestrøm. However, the situation still needs to be clarified with the Norwegian National Rail Authority and Telenor.

Collaboration with the pollution control authorities[272]

NSB konsernstab Miljø has not been explicitly informed or ordered to comply with the objective of the environmental protection authorities concerning polluted ground resulting from activities in bygone years. It was not clear to NSB konsernstab Miljø which sites were to be completed by 2005 as they had not been made aware of the ranks that SFT had given to their sites, nor was it clear to NSB which sites had been allocated rank 2 and whether these sites were also going to be studied by 2005. However, it was stated at the meeting that it is realistic to assume that the eight rank 1 sites that the Office of the Auditor General listed in their questions to NSB will be completed by 2005. The only site where completion by 2005 may be problematic is Marienborg.

[272] Meeting between NSB BA and the Office of the Auditor General on 25 October 2001.

The professional and administrative input required for the handling of specific pollution cases is provided by the County Governors' Departments of Environmental Affairs (FMVA), to which NSB reports in these cases. The dialogue between NSB and FMVA was in general described as open and good, and focused on achieving environmentally satisfactory results. Orders from SFT in this context have largely been issued in individual cases where a requirement has been set for the official registration of restrictions on the use of property in areas with polluted ground. SFT has taken part in some site visits, e.g. at Lillestrøm. NSB took the initiative to meet with SFT 1999. After that, no further meetings have been held with SFT where the cleanup of polluted ground has been addressed. NSB konsernstab Miljø will request a new meeting with SFT, at which the agenda will include the presentation of an overview of the survey that has been conducted of sites with polluted ground and an account is given of the status of these cases. A clarification of environmental goals or what is regarded as "good enough" will also be discussed at this meeting.

NSB konsernstab Miljø was unaware of the framework planning permission that SFT has given to NODCS and Statsbygg (for Fornebu only), the purpose of which is to increase the efficiency of the efforts to clean up polluted ground and to ensure that this is done in a uniform manner. NSB konsernstab Miljø expressed their interest in applying for a similar framework planning permission, particularly in connection with the cleanup of ground pollution caused by to leaking diesel tanks, as this concerns many sites with seemingly similar research questions.

NSB's cleanup costs

From its formation on 1 December 1996 up to and including December 1999, NSB BA reports that it has spent about NOK 3.9 million on cleaning up polluted ground, and around NOK 6.1 million on replacing and removing the fuel tanks.[273]

The scope of the costs from 2000 and 2001 are highly uncertain. This is because several substantial cleanup costs have not been settled in detail, e.g. due to the costs of subsequent testing. NSB BA has spent just under NOK 13 million on cleaning up pollution during these years. This amount is divided between the cleanup of PCB pollution at Hamar/Åkersvika and the oil

[273] Letter of 4 February 2002 from NSB to the Office of the Auditor General. The figures have been obtained from NSB Eiendom, which owns most of the polluted sites.

pollution at Åndalsnes (2000) and the Sundland workshop area (2001). Oil pollution costs of around NOK 4.0 million (to be clarified with the insurance company Vesta forsikring) are not included in the estimates. In addition, the financial responsibility for the ground pollution at Lillestrøm has not yet been settled. In the Lillestrøm case, the legal system will allocate responsibility among Telenor, Henry Johansen LTD AS, the Norwegian National Rail Administration and NSB BA. The cleanup of creosote pollutants at Lillestrøm is estimated to cost a total of about NOK 280.9 million, for which NSB BA has set aside NOK 45 million.

5 Evaluations

5.1 Goal attainment and reporting

A total of 3,390 sites with polluted ground have been surveyed and registered. The surveys show that many of the sites are located near the coast, where a river and/or a fjord are the main recipients. This particularly applies to the sites that are the most severely polluted.[274] The Norwegian Pollution Control Authority (SFT) has ranked the sites according to their impacts on the surrounding environment with regard to vulnerability, user interests and the potential for the spread of pollution. As of September 2001, 151 sites have been ranked as the most severely polluted, and for these sites there has been a need for a prompt studies or measures (rank 1 and 2* cases). These 151 sites have been divided by the Norwegian Pollution Control Authority into the categories ”completed”, ”being monitored”, ”measures” and ”under study”. In addition, the Office of the Auditor General has divided the sites according to the measures that have actually been initiated. In the table below, the sites are divided according to category and type of measure.

	Categories at the Norwegian Pollution Control Authority				
	Completed	Being monitored	Measures	Under study	Total
Type of measure					
0: Insufficient info, delegated etc.	2				2
I: No or limited measures	34	14	11	30	89
II: In situ treatment		1	2		3
III: Isolation and/or sealing off of the pollution	10	4	6	6	26
IV: Removal or partial removal of the pollution	17	4	9	1	31
Total	63	23	28	37	151

[274] *SFT Rapport 91:01 Kartlegging av spesialavfall i deponier og forurenset grunn – Sluttrapport* (SFT Report 91:01 Survey of hazardous waste in landfills and polluted ground – Final Report), p. 23.

Since 1992, the authorities have repeatedly changed the objectives and reduced the level of ambition for when serious pollution cases from polluting activities in bygone years should be completed.[275] The Office of the Auditor General's review of the cases has turned up examples of cases that will presumably not be completed by the close of 2005. That means that the environmental protection authorities' current objective is also at risk of not being met.

The Office of the Auditor General's study shows that the 23 sites with the status "being monitored" include some landfills that are in active use and landfills that will be monitored for a long time in the future (up to 30 years). Studies also show that of the 37 severely polluted sites that are being studied, 24 have had this status since 1992.[276] The fact that cases have been in the category "under study" for ten years may indicate that they are complicated, either with regard to the determination of responsibility or to remedial measures. These include many sites that completely or partly include polluted sediments. Taking into consideration the amount of time it has taken so far to complete cases, it can be questioned whether it will be possible to complete all of these cases by the end of 2005.

According to the Norwegian Pollution Control Authority (SFT),[277] a site that includes a landfill in active use can be registered as completed in the landfill database if the operation of the landfill takes place under safe conditions and if there is no uncontrolled run-off. At 34 of the 63 completed sites, no or limited measures have been taken.[278] For 25 of these 34 cases, there has been no physical encroachment. A site can be a potential pollution risk as long as the pollution at the site has not been adequately cleaned up or it is a landfill in active use. Such sites will require monitoring by the environmental protection authorities even if they have been registered as completed.

The environmental protection authorities define "completed" as the administrative procedures have been completed because measures have been taken in accordance with the requirements from SFT.[279] The Office of the Auditor General's study has revealed examples of cases that have been

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275 Cf. Proposition no. 1 (1996-97) to the Storting for the Ministry of the Environment and Proposition no. 1 (1999-2000) to the Storting for the Ministry of the Environment.

276 Two of the cases with the status "under study" in 1992 have been completed, only to be reopened again.

277 Meeting between the Ministry of the Environment and The Office of the Auditor General on 14 November 2001.

278 Measure type I.

279 Letter of 1 March 2000 from the Ministry of the Environment to the Office of the Auditor General.

registered as “completed” in the landfill database, but where the authorities’ requirements with regard to cleanup have not been fulfilled. Nonetheless, completed sites are reported to the Storting as if the pollution problems have been solved. Therefore, there is reason to question whether the reporting in all cases reflects the actual status at the most severely polluted areas. Furthermore, there is reason to question SFT’s monitoring of its own specified requirements for the cleanup of polluted sites.

Under the nationwide survey in 1989–91, 2,452 sites were registered. As of 1999, this number had increased to 3,390 sites. There still remain some polluted areas that have not been surveyed, and this is especially true of polluted sediments. The coast from Hordaland county up to and including Nord-Trøndelag county has not yet been surveyed. It must be expected that the number of areas with polluted sediments will increase after the remaining stretches of the coast have been surveyed. There is also reason to assume that more new sites with polluted ground will also be registered. In the nationwide survey that was conducted in 1989–1991, many industries and business sectors were excluded. There is still more surveying work that must be carried out here.

The nationwide survey did not include separate field studies or other sampling that would normally be necessary before it could be confirmed which environmental problems existed at each site. In addition, the environmental protection authorities have decided that the ranking that was given to a site in 1992, or later if it was discovered after 1992, shall be kept even if they find out that the case was more or less serious than its ranking would indicate. As a result, there are sites that are ranked among the most serious, but which have turned out not to be after a closer examination, and conversely that the sites have been given a lower ranking than they should have been given. Some uncertainty is therefore associated with the previous ranking.

A cleanup of the sites that involve a risk of pollution has been planned ever since the beginning of the 1990s. It can be questioned whether the survey has provided a good enough basis for implementing this cleanup in an appropriate and efficient way as long as many of the sites have been incorrectly ranked or excluded.

In the Norwegian Pollution Control Authority’s new landfill database, which was made available on the Internet in 2002, the sites shall be ranked according to their degree of impact, and in that context, the goal is to give the sites the degree of impact that is thought to be correct according to the knowledge that we have at any given time. At the same time, the new

database will also contain references to former rankings in the old landfill database, so that reports can be made relative to current performance targets. In the long run, this will have a positive effect, but the new database will also give a partially incorrect picture until all of the sites have been thoroughly examined.

5.2 Use of legal and economic policy instruments

The environmental protection authorities regard the issuing of orders in accordance with the Pollution Control Act as the most important policy instrument in the efforts to clean up polluted ground and sediments.

The authorities have the authority to issue orders, which they often do. However, these orders are not always complied with, or it takes a long time before they are complied with. The Office of the Auditor General's study has shown that in these cases, the environmental protection authorities have been restrained in their use of the Pollution Control Act's coercive measures. The Act allows for the use of pollution fines. If necessary, the environmental protection authorities can initiate the implementation of the order, and subsequently require that the expenses be met by the persons responsible for the pollution. There is reason to question whether the environmental protection authorities should not make greater use of the coercive measures sanctioned by the Act in order to ensure that the pollutants are removed.

In Proposition no. 1 (1996-97) to the Storting for the Ministry of the Environment estimated the total expenses for the cleanup of polluted ground and sediments at about NOK 2.0–3.0 billion. The Norwegian government assumed direct liability for about 10 % of the pollution and the costs of cleaning it up, i.e. NOK 200-300 million. In a more recent report, the total expenses for the cleanup of polluted sediments are estimated at NOK 25 billion.[280]

The estimates of the cost ceilings for the efforts to clean up polluted ground and sediments are highly uncertain. Much of the cleanup work has yet to be completed, and the government's expenses in this area will also be higher than previously assumed.

5.3 The authorities' allocation of responsibility

It is the Ministry of the Environment's responsibility to evaluate whether the total effort to clean up pollution from activities in bygone years is

[280] *SFT-rapport 1774/2000 Miljøgifter i norske fjorder* (SFT Report 1774/2000 Hazardous substances in Norwegian fjords).

satisfactory relative to current goals and obligations, and whether the allocation among sectors and sources is cost effective. The system for performance monitoring, which is supposed to give the Ministry of the Environment a platform for measuring this, is not yet completely developed. It is also the Ministry of the Environment's responsibility to co-ordinate the efforts to set targets for the environmental improvements in the various sectors. As the competent ministry, the Ministry of the Environment has greater knowledge and insight into environmental matters than any of the other sectors can be expected to have.

The Office of the Auditor General's study shows that the sectors have very different ways of working to resolve the cases of pollution from activities in bygone years. State owners of polluted ground have only had a limited dialogue with the environmental protection authorities. This has tended to increase the uncertainty with regard to goals and their implementation. To a great extent, it is the sectors' own objectives and priorities that determine how far they have come in the cleanup efforts. The Ministry of the Environment thinks that the sectors themselves should take the responsibility, but it can be questioned whether there may not be a need for better co-ordination of the other sectors by the Ministry of the Environment.

Appendix

Appendix I: List of documents

Propositions

1 Proposition no. 111 (1988–89) to the Storting on further measures to deal with hazardous waste

2 Proposition no. 1 (1990–91) to the Storting for the Ministry of the Environment

3 Proposition no. 1 (1991–92) to the Storting for the Ministry of the Environment.

4 Proposition no. 1 (1996–97) to the Storting for the Ministry of the Environment

5 Proposition no. 1 (1997–98) to the Storting for the Ministry of the Environment

6 Proposition no. 1 (1998–99) to the Storting for the Ministry of the Environment

7 Proposition no. 1 (1999–2000) to the Storting for the Ministry of the Environment

8 Proposition no. 1 (2000–2001) to the Storting for the Ministry of the Environment

9 Proposition no. 77 (2000–2001) to the Storting Reorganisation of the Norwegian Armed Forces' property management

10 Proposition no. 11 (1979–80) to the Odelsting concerning the Act relating to protection against pollution and relating to waste (the Pollution Control Act)

Reports to the Storting

1 Report no. 46 (1988–89) to the Storting on Environment and Development (Programme for Norway's follow-up to the Report from the World Commission on Environment and Development)

2 Report no. 3 to the Storting Central Government Financial Statements for the years 1991–2000

3 Report no. 21 (1992–93) to the Storting on an Action Plan for Environmental Protection in the Armed Forces

4 Report no. 58 (1996–97) to the Storting on Environmental Policy for a Sustainable Development, voluntary work for the future

5 Report no. 8 (1999–2000) to the Storting on the Government's Environmental Policy and the State of the Environment

6 Report no. 24 (2000–2001) to the Storting on the Government's Environmental Policy and the State of the Environment

Recommendations

1 Recommendation no. 25 (1980–81) to the Odelsting concerning the Act relating to protection against pollution and relating to waste (the Pollution Control Act)

2 Recommendation no. 273 (1988–89) to the Storting from the Standing Committee on Local Government and the Environment on Environment and Development - Programme for Norway's follow-up to the Report from the World Commission on Environment and Development

3 Recommendation no. 150 (1997–98) to the Storting, Recommendation from the Standing Committee on Energy and the Environment relating to environmental policy for a sustainable development, voluntary work for the future

4 Recommendation no. 343 (2000–2001) to the Storting from the Standing Committee on Defence relating to the reorganisation of the Norwegian Armed Forces' property management

5 Budget Recommendation no. 9 (1996–97) to the Storting from the Standing Committee on Energy and the Environment relating to allocations in the Fiscal Budget for 1997 concerning the Ministry of Industry and Energy and the Ministry of the Environment

6 Budget Recommendation no. 9 (1999–2000) to the Storting from the Standing Committee on Energy and the Environment relating to allocations in the Fiscal Budget for 2000 concerning the Ministry of Petroleum and Energy and the Ministry of the Environment

7 Budget Recommendation no. 9 (2000–2001) to the Storting from the Standing Committee on Energy and the Environment relating to allocations in the Fiscal Budget for 2001 concerning the Ministry of Petroleum and Energy and the Ministry of the Environment

Letters of allocation

1 Letter of allocation from the Ministry of the Environment to the Norwegian Pollution Control Authority for 1996

2 Letter of allocation from the Ministry of the Environment to the Norwegian Pollution Control Authority for 1997

3 Letter of allocation from the Ministry of the Environment to the Norwegian Pollution Control Authority for 1998

4 Letter of allocation from the Ministry of the Environment to the Norwegian Pollution Control Authority for 1999

5 Letter of allocation from the Ministry of the Environment to the Norwegian Pollution Control Authority for 2000

6 Letter of allocation from the Ministry of the Environment to the Norwegian Pollution Control Authority for 2001

Meetings

1 Meeting between the Norwegian Food Control Authority (SNT) and the Office of the Auditor General on 22 October 2001

2 Meeting between the Norwegian Defence Construction Service (NODCS) and the Office of the Auditor General on 24 October 2001

3 Meeting between NSB BA and the Office of the Auditor General on 25 October 2001

4 Meeting between the Norwegian Pollution Control Authority (SFT) and the Office of the Auditor General on 12 November 2001

5 Meeting between the Ministry of the Environment and the Office of the Auditor General on 14 November 2001

Reports

1 The Norwegian Defence Construction Service, *Undersøkelser av forurensningsfare fra avfallsfyllinger og forurenset grunn på Forsvarets områder* (Studies of the risk of pollution from landfills and polluted ground on the Norwegian Armed Forces' land), Status report as per 1 January 1996

2 The Norwegian Defence Construction Service, *Undersøkelser av forurensningsfare fra avfallsfyllinger og forurenset grunn og gjennomførte miljøtiltak på Forsvarets områder* (Studies of the risk of pollution from landfills and polluted ground and measures implemented on the Norwegian Armed Forces' land), Status report as per 1 January 1998

3 The Norwegian Defence Construction Service, *Avfallsfyllinger, forurenset grunn, skytefelt og forurensede sedimenter* (Landfills, polluted ground, artillery ranges and polluted sediments), Status report as per 1 January 2000

4 The Norwegian Defence Construction Service (NODCS). *Opprydning av forurensede sjøsedimenter og forurenset grunn på Haakonsvern orlogsstasjon i Bergen kommune* (Cleanup of polluted marine sediments and polluted ground at Haakonsvern Naval Base in the municipality of Bergen), Status report as per 31 December 2000

5 The Norwegian Defence Construction Service, *Avfallsfyllinger, forurenset grunn, skytefelt og forurensede sedimenter* (Landfills, polluted ground, artillery ranges and polluted sediments), Status report as per 1 January 2001

6 *NGU Rapport nr. 89.145 Kartlegging av spesialavfall i deponier og forurenset grunn* (NGU Report no. 89.145 Survey of hazardous waste in landfills and polluted ground). Oslo 1989

7 *NGU Rapport nr. 89.147 Kartlegging av spesialavfall i deponier og forurenset grunn* (NGU Report no. 89.147 Survey of hazardous waste in landfills and polluted ground). Telemark county 1989

8 *NGU Rapport nr. 89.148 Kartlegging av spesialavfall i deponier og forurenset grunn* (NGU Report no. 89.148 Survey of hazardous waste in landfills and polluted ground). Rogaland county 1989

9 *NGU Rapport nr. 89.149 Kartlegging av spesialavfall i deponier og forurenset grunn* (NGU Report no. 89.149 Survey of hazardous waste in landfills and polluted ground). Hordaland county 1989

10 *NGU Rapport nr. 90.083 Kartlegging av spesialavfall i deponier og forurenset grunn* (NGU Report no. 90.083 Survey of hazardous waste in landfills and polluted ground). Østfold county 1990

11 *NGU Rapport nr. 90.084 Kartlegging av spesialavfall i deponier og forurenset grunn* (NGU Report no. 90.084 Survey of hazardous waste in landfills and polluted ground). Akershus county 1990

12 *NGU Rapport nr. 90.121 Kartlegging av spesialavfall i deponier og forurenset grunn* (NGU Report no. 90.121 Survey of hazardous waste in landfills and polluted ground). Hedmark county 1990

13 *NGU Rapport nr. 90.122 Kartlegging av spesialavfall i deponier og forurenset grunn* (NGU Report no. 90.122 Survey of hazardous waste in landfills and polluted ground). Oppland county 1990

14 *NGU Rapport nr. 90.123 Kartlegging av spesialavfall i deponier og forurenset grunn* (NGU Report no. 90.123 Survey of hazardous waste in landfills and polluted ground). Aust-Agder county 1990

15 *NGU Rapport nr. 90.127 Kartlegging av spesialavfall i deponier og forurenset grunn* (NGU Report no. 90.127 Survey of hazardous waste in landfills and polluted ground). Sør-Trøndelag county 1990

16 *NGU Rapport nr. 90.128 Kartlegging av spesialavfall i deponier og forurenset grunn* (NGU Report no. 90.128 Survey of hazardous waste in landfills and polluted ground). Nord-Trøndelag county 1990

17 *NGU Rapport nr. 90.129 Kartlegging av spesialavfall i deponier og forurenset grunn* (NGU Report no. 90.129 Survey of hazardous waste in landfills and polluted ground). Nordland county 1990

18 *NGU Rapport nr. 90.159 Kartlegging av spesialavfall i deponier og forurenset grunn. Brukerveiledning for avfallsdeponidatabasen 1990* (NGU Report no. 90.159 Survey of hazardous waste in landfills and polluted ground. User instructions for the landfill database 1990).

19 *NGU Rapport nr. 91.142 Kartlegging av spesialavfall i deponier og forurenset grunn. Systemdokumentasjon for avfallsdeponidatabasen 1990.* (NGU Report no. 91.142 Survey of hazardous waste in landfills and polluted ground. System documentation for the landfill database 1990).

20 *NIVA 1994. Overvåkingsrapport 586/94. Sonderende undersøkelser i norske havner og utvalgte kystområder. Miljøgifter i sedimenter i Sandefjordsfjorden* (NIVA 1994 Monitoring Report 586/94. Exploratory studies in Norwegian harbours and selected coastal areas. Hazardous substances in sediments in the Sandefjord fjord)

21 *NIVA 1994. Undersøkelser av forurensninger i Grønlibukta, Oslo havn* (NIVA 1994. Studies of pollutants in Grønlibukta, Oslo harbour)

22 *NIVA 1994. Undersøkelse av oljeforurensning i sedimentene utenfor Sjursøya Oljehavn, Indre Oslofjord 1993* (NIVA 1994. Study of oil pollution in the sediments beneath harbour waters near the oil storage facilities at Sjursøya in the inner Oslo fjord 1993)

23 *NIVA 1995. Overvåkingsrapport 561/94. Miljøgiftundersøkelser i Indre Oslofjord. Delrapport 4* (NIVA 1995. Monitoring Report 561/94. Studies of hazardous substances in the inner Oslo fjord. Interim Report 4)

24 *NIVA 1995. Overvåkingsrapport 587/94. Sonderende undersøkelser i norske havner og utvalgte kystområder. Fase 1: Miljøgifter i sedimenter på strekningen Narvik-Kragerø* (NIVA 1995. Monitoring Report 587/94. Exploratory studies in Norwegian harbours and selected coastal areas. Phase 1: Hazardous substances in sediments on the stretch Narvik-Kragerø)

25 *NIVA 1995. Overvåkingsrapport 588/94. Sonderende undersøkelser i norske havner og utvalgte kystområder. Fase 2: Miljøgifter i sedimenter på strekningen Stavern-Hvitsten, (Vestfold, Østfold og Akershus)* [NIVA 1995. Monitoring Report 588/94. Exploratory studies in Norwegian harbours and selected coastal areas. Phase 2: Hazardous substances in sediments on the stretch Stavern-Hvitsten (Vestfold, Østfold and Akershus counties)]

26 *NIVA 1995. Overvåkingsrapport 612/95. Miljøgiftundersøkelser i Indre Oslofjord. Delrapport 8. Forslag til mulige tiltak* (NIVA 1995. Monitoring Report 612/95. Studies of hazardous substances in the inner Oslo fjord.Interim Report 8. Proposals for possible measures)

27 *NIVA 1995. Undersøkelse av mudringsmasser i kommunale småbåthavner i Bestumkilen, Ormsundet og Paddehavet, Indre Oslofjord, 1995* (NIVA 1995. Study of dredged material in municipal small boat harbours in Bestumkilen, Ormsundet and Paddehavet in the inner Oslo fjord, 1995)

28 *NIVA 1996. Overvåkingsrapport 608/95. Sonderende undersøkelser i norske havner og utvalgte kystområder. Fase 3: Miljøgifter i sedimenter på strekningen Ramsund-Kirkenes, (Nordland, Troms og Finnmark)* [NIVA 1996 Monitoring Report 608/95. Exploratory studies in Norwegian harbours and selected coastal areas. Phase 3: Hazardous substances in sediments on the stretch Ramsund-Kirkenes, (Nordland, Troms and Finnmark counties)]

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30 *SFT-rapport 91:01 Kartlegging av spesialavfall i deponier og forurenset grunn, Sluttrapport* (SFT Report 91:01 Survey of hazardous waste in landfills and polluted ground, Final Report)

31 *SFT-rapport 91:01B Kartlegging av spesialavfall i deponier og forurenset grunn* (SFT-rapport 91:01B Survey of hazardous waste in landfills and polluted ground), table 1

32 *SFT rapport 92:32 Deponier med spesialavfall, forurenset grunn og forurensede sedimenter. Handlingsplan for opprydning.* (SFT Report 92:32 Landfills with hazardous waste, polluted ground and polluted sediments. Action plan for cleanup)

33 *SFT-rapport 94:03 Krav til fyllplasser. Retningslinjer til Fylkesmannen* (SFT Report 94:03 Requirements for landfills. Guidelines for the County Governor)

34 *SFT-rapport 95:09 Håndtering av grunnforurensningssaker. Foreløpig saksbehandlingsveileder* (SFT Report 95:09 Management of contaminated land - Preliminary guidelines for administrative procedures)

35 *SFT-rapport 97:24 Forurenset grunn i Norge, Statusrapport 1997* (SFT Report 97:24 Polluted ground in Norway, Status report 1997)

36 *SFT-rapport 98:01 Grunnforurensning fra treimpregneringsvirksomhet i Norge* (SFT Report 98:01 Ground pollution from wood impregnation enterprises in Norway)

37 *SFT-rapport 98:11 Forurensede marine sedimenter. Oversikt over tilstand og prioriteringer* (SFT Report 98:11 Polluted marine sediments. Status overview and priorities)

38 *SFT-rapport 98:24 Forurenset grunn i Norge, Statusrapport 1998* (SFT Report 98:24 Polluted ground in Norway, Status Report 1998)

39 *SFT-rapport 99:01A Risikovurdering av forurenset grunn* (SFT Report 99:01A Risk assessment of polluted ground)

40 *SFT-rapport 99:01B Risikovurdering forurenset grunn, Eksempelsamling* (SFT Report 99:01B Risk assessment of polluted ground, Set of examples)

41 *SFT-rapport 1774/2000 Miljøgifter i norske fjorder* (SFT Report 1774/2000 Hazardous substances in Norwegian fjords)

42 *SNT-rapport 10, 1997. Forslag til strategi for kartlegging av miljøgifter i marine organismer i norske havner og fjorder* (SNT Report 10, 1997. Proposed strategy for a survey of hazardous substances in marine organisms in Norwegian harbours and fjords)

Letters, faxes and e-mails

1 Letter of 12 November 1991 from the Norwegian Pollution Control Authority (SFT) to the Norwegian municipalities

2 Letter of 16 June 1992 from the Norwegian National Coastal Administration to the County Fishery Officer in Møre og Romsdal county

3 Letter of 7 July 1992 from the Norwegian Pollution Control Authority to Brattvåg Skipsverft AS

4 Letter of 25 September 1992 from the Norwegian Pollution Control Authority to Elkem Aluminium

5 Letter of 8 October 1992 from the Norwegian Pollution Control Authority to Brattvaag Skipsverft AS

6 Letter of 21 April 1993 from Elkem Aluminium to the Norwegian Pollution Control Authority

7 Letter of 3 September 1993 from the Norwegian Pollution Control Authority to the technical works offices in all of the country's municipalities

8 Letter of 22 December 1993 from the Norwegian Pollution Control Authority to the Norwegian Defence Construction Service (NODCS)

9 Letter of 8 June 1994 from the Norwegian Pollution Control Authority to Stabil Fabrikker AS

10 Letter of 27 July 1994 from the Ministry of the Environment to Norsk Auksjon AS, journal no. 93/4082-VA

11 Letter of 19 September 1994 from the Norwegian Pollution Control Authority to selected municipalities

12 Letter of 1 March 1996 from NODCS to the Norwegian Pollution Control Authority

13 Letter of 2 July 1996 from the Norwegian Pollution Control Authority to NODCS, Discharge permit

14 Letter of 8 August 1996 from NODCS to the Norwegian Pollution Control Authority and the Directorate for Cultural Heritage

15 Letter of 19 August 1996 from the Ministry of the Environment to the law firm, Torkildsen, Tennøe & Co

16 Letter of 16 October 1996 from the Norwegian Pollution Control Authority to the law firm, Torkildsen, Tennøe & Co

17 Letter of 6 August 1997 from the Norwegian Pollution Control Authority to Norsk Hydro ASA

18 Letter of 28 August 1997 from Norsk Hydro's legal division to the Norwegian Pollution Control Authority

19 Letter of 28 August 1997 from the Norwegian Pollution Control Authority to the Norwegian municipalities

20 Letter of 1 December 1997 from the Norwegian Pollution Control Authority to NODCS

21 Letter of 5 December 1997 from the Norwegian Pollution Control Authority to NODCS

22 Letter of 9 December 1997 from Vestby municipality to Stabil Fabrikker AS

23 Letter of 10 February 1998 from Noteby to the Norwegian Pollution Control Authority

24 Letter of 13 May 1998 from the Norwegian Pollution Control Authority to Stabil Fabrikker AS

25 Letter of 18 June 1998 from Vestby municipality to Stabil Fabrikker AS

26 Letter of 24 June 1998 from the Norwegian Pollution Control Authority to Hydro Porsgrunn Industripark

27 Letter of 22 September 1999 from the Norwegian Pollution Control Authority to Norsk Hydro ASA

28 Letter of 1 November 1999 from Norsk Hydro ASA's legal division to the Norwegian Pollution Control Authority.

29 Letter of 10 November 1999 from the Ministry of the Environment to the Office of the Auditor General

30 Letter of 26 November 1999 from the Norwegian Pollution Control Authority to Norsk Hydro ASA

31 Letter of 20 December 1999 from Norsk Hydro ASA's legal division to the Norwegian Pollution Control Authority

32 Letter of 23 February 2000 from the Norwegian Pollution Control Authority to Vestby municipality

33 Letter of 1 March 2000 from the Ministry of the Environment to the Office of the Auditor General

34 Letter of 16 June 2000 from Statsbygg to the Norwegian Pollution Control Authority

35 Letter of 4 August 2000 from the Norwegian Pollution Control Authority to the port authorities in Oslo, Drammen, Sandefjord, Grenland, Kristiansand, Stavanger, Bergen, Ålesund, Trondheim, Harstad and Tromsø

36 Letter of 21 June 2001 from the Ministry of the Environment to the Office of the Auditor General

37 Letter of 22 August 2001 from the Ministry of the Environment to the Office of the Auditor General

38 Letter of 31 August 2001 from the Ministry of the Environment to Norsk Hydro ASA

39 Letter of 4 December 2001 from the Ministry of the Environment to the Office of the Auditor General

40 Letter of 7 January 2002 from the Norwegian Pollution Control Authority to the Office of the Auditor General

41 Letter of 4 February 2002 from NSB BA to the Office of the Auditor General

42 Letter of 16 August 2002 from the Norwegian Pollution Control Authority to the Ministry of the Environment

43 Fax of 9 October 1992 from Elkem Aluminium to the Norwegian Pollution Control Authority

44 Fax of 6 March 2002 from the Norwegian Defence Estates Agency to the Office of the Auditor General

45 E-mail of 28 August 2001 from the Norwegian Pollution Control Authority to the Office of the Auditor General concerning the status of the rank 1 and rank 2* cases

46 E-mail of 29 August 2001 from the Norwegian Pollution Control Authority to the Office of the Auditor General

47 E-mail of 4 December 2001 from NODCS to the Office of the Auditor General

Memos and minutes

1 Memo of 5 September 1995 from Noteby AS to Stabil fabrikker AS

2 Memo of 1 September 1997 from the Norwegian Pollution Control Authority

3 Memo of 15 January 2001 from the Ministry of the Environment to the Ministry of Justice and the Police, the Ministry of Cultural Affairs, the Ministry of Finance and the Ministry of Foreign Affairs about the work on sectoral environmental action plans

4 Minutes from meeting no. 10 of the co-ordinating committee for the cleanup of polluted ground at Fornebu, Statsbygg, 12 June 2000

5 Minutes from meeting no. 12 of the co-ordinating committee for the cleanup of polluted ground at Fornebu, Statsbygg, 8 May 2001

6 Statskonsult memo 2001:2 Sektorvise miljøhandlingsplaner (Sectoral environmental action plans)

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7 *PCB-opprydding og produsentansvar. Forstudie om mulige søksmålsgrunnlag for Oslo Havnevesen* (PCB cleanup and manufacturer's responsibility. Preliminary study of possible causes of action for the Oslo Port Authority). The law firm, Føyen & Co ANS in collaboration with the Norwegian Society for the Conservation of Nature

8 Recommendation C(72)128 of 26 May 1972: "Guiding Principles concerning International Economic Aspects of Environmental Policies"

9 Recommendation C(74)223 of 14 November 1974: "The implementation of the Polluter-Pays Principle"

10 *Strategisk miljøplan for NSB* (Strategic Environmental Plan for NSB), 1999–2002

11 *Utkast til lov om vern mot forurensning and forsøpling med motiver* (Draft of an Act relating to protection against pollution and intentional refuse dumping) p. 110. A study by the Ministry of the Environment. Published in May 1977