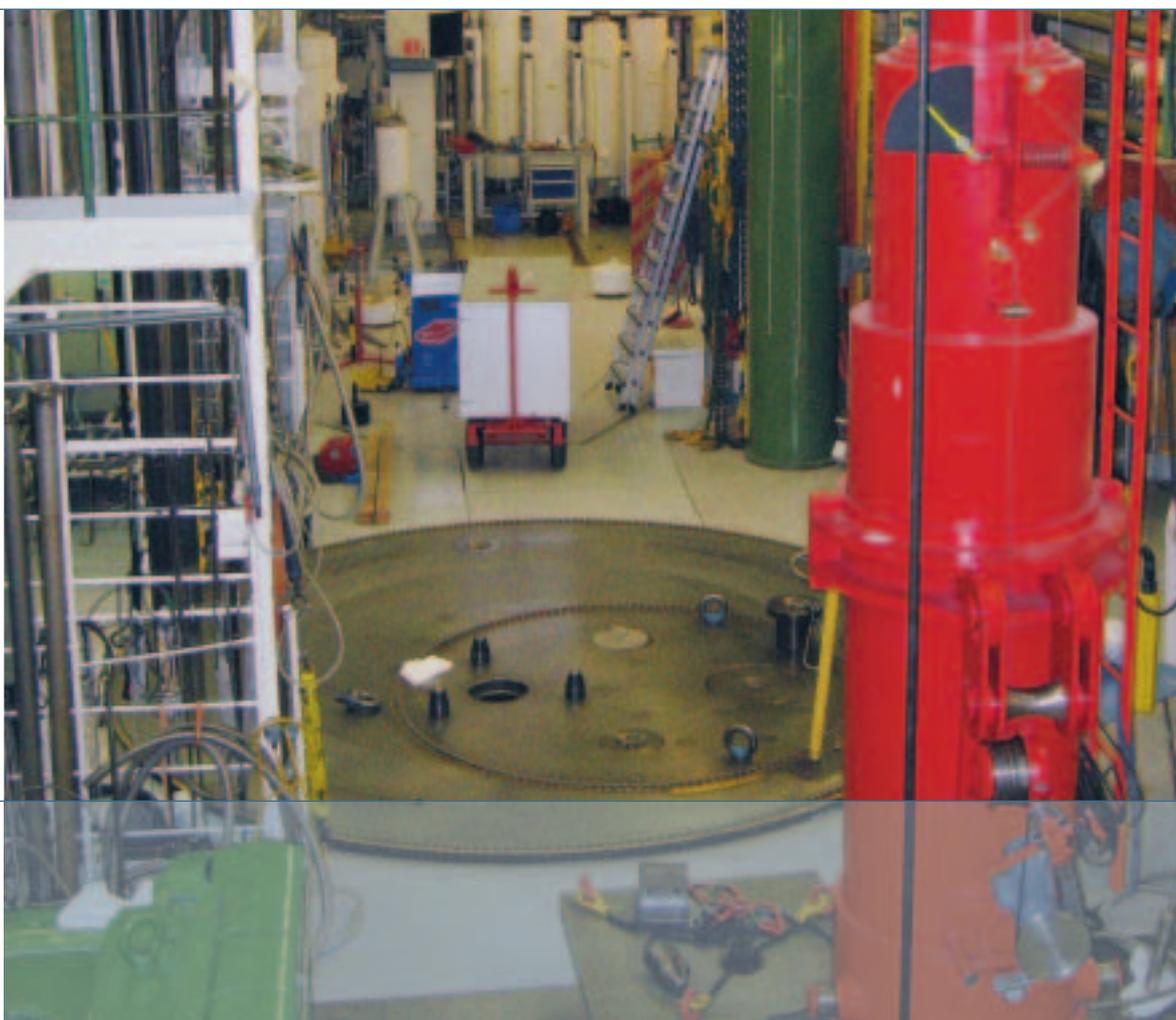




StrålevernRapport ■ 2007:7



## Implementation of the Obligations of the Convention on Nuclear Safety in Norway

The Fourth Norwegian Report in Accordance with  
Article 5 of the Convention



Statens strålevern  
Norwegian Radiation Protection Authority

**Reference:**

Hornkjøl, S. Implementation of the Obligations of the Convention on Nuclear Safety. StrålevernRapport 2007:7. Østerås: Statens strålevern, 2007.

**Key words:**

Nuclear Safety. Institute for Energy Technology. Research Reactors. Convention on Nuclear Safety. NRPA.

**Abstract:**

The fourth Norwegian report in accordance with Article 5 of the Convention on Nuclear Safety concludes that Norway is in compliance with its obligations under the convention.

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**Referanse:**

Hornkjøl, S. Implementation of the Obligations of the Convention on Nuclear Safety. StrålevernRapport 2007:7. Østerås: Norwegian Radiation Protection Authority, 2007. Language: English.

**Emneord:**

Nuclear Safety. Institute for Energy Technology. Research Reactors. Convention on Nuclear Safety. NRPA.

**Resymé:**

Basert på rapporteringen under de relevante artikler i kjernesikkerhetskonsvensjonen for en part uten nukleære installasjoner på sitt territorium, konkluderes det med at Norge overholder sine forpliktelser under konvensjonen.

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Head of project: Sverre Hornkjøl.

*Approved:*



Gunnar Saxebøl, director, Department of Radiation Protection and Nuclear Safety.

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12 pages.

Published 2007-28-09.

Printed number 150 (07-09).

Cover design: LoboMedia AS.

Printed by LoboMedia AS, Oslo.

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ISSN 0804-4910

# **IMPLEMENTATION OF THE OBLIGATIONS OF THE CONVENTION ON NUCLEAR SAFETY IN NORWAY**

The Fourth Norwegian Report in Accordance with  
Article 5 of the Convention

**Statens strålevern**  
Norwegian Radiation  
Protection Authority  
Østerås, 2007



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## A Introduction

### A.1 General

This report is issued according to Article 5 of the Convention on Nuclear Safety. Norway signed and ratified the Convention on 20 September 1994.

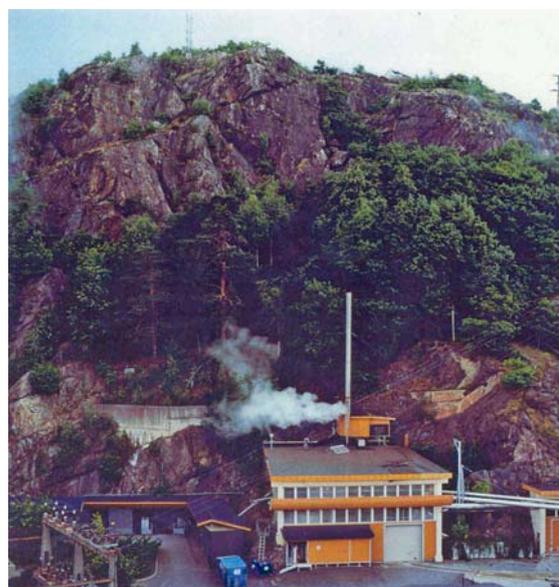
As Norway is not a nuclear state according to the terms of the Convention, this report will give a brief overview over the nuclear research activities in Norway and describe briefly how the different Articles are applied to that activity. Part A of the report provides general information about the situation in Norway and Part B provides the article-by-article approach to show the compliance with the Convention. *Changes in the situation which have occurred since the third report in 2005 are written in italics.*

### A.2 Nuclear Activities in Norway

The Norwegian nuclear activities were started in 1948 by the establishment of Institutt for Atomenergi (Institute for Atomic Energy, at present Institute for Energy Technology) at Kjeller north-east of Oslo. The first research reactor JEEP I, reached criticality in July 1951. It was followed by the Halden Boiling Heavy Water Reactor in Halden in 1959 (the OECD Halden Reactor Project). The NORA reactor was built at Kjeller in 1961. It was shut down in 1968 and later decommissioned, the same had happened to JEEP I in 1967. JEEP II was built in 1965-66 and reached criticality in December 1966. At present, the JEEP II at Kjeller and the HBWR in Halden are in operation. JEEP II has a thermal capacity of 2 MW. HBWR has a thermal capacity of 25 MW, but it is usually operated at less than 20 MW. Both reactors are owned and operated by the Institute for Energy Technology.



*JEEP II at Kjeller (Photo: NRPA).*



*Halden Boiling Heavy Water Reactor (Photo: IFE).*

### A.3 The Institute for Energy Technology

The Institute for Energy Technology is a free foundation devoted to research in all fields of energy technology. Part of its budget is support from the Government through the Ministry of Trade and Industry and the rest is from research contracts with industry and other research institutions.

### A.4 The Regulatory Body

The Norwegian Radiation Protection Authority, NRPA, is the regulatory body for nuclear activities in Norway. It is divided into two technical departments and one administrative department. The department dealing with nuclear safety is the Department

for Radiation Protection and Nuclear Safety and the department dealing with environmental management and emergency preparedness is the Department for Emergency Preparedness and Environmental Radioactivity.

#### **A.5 Other Activities in the Nuclear Field**

The Institute for Energy Technology is responsible for handling, storage and final disposal of radioactive waste excluding NORM, and for that purpose, the institute also operates the Combined Storage and Repository for Low and Medium Level Radioactive Waste in Himdalen 25 km south-east of Kjeller. The capacity is about 10 000 barrels of waste, and it is expected to be filled around 2030. The strategy for storage and final disposal of spent nuclear fuel is under planning and an official committee issued a report on possible strategies in December 2001. The recommendations in this report have been assessed by a working group to establish technical specifications for a storage facility for spent fuel and intermediate level long-lived waste. *The establishment of a new group which among other issues will give recommendations on siting and technical solutions for a new storage facility for spent nuclear fuel and long lived intermediate level waste is under consideration on the ministerial level.* Further details of the waste management system are reported under the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.



*The Combined Storage and Repository for Low and Medium Level Radioactive Waste in Himdalen (Photo: NRPA).*

In 1995, The Government of Norway issued a plan of action to enhance safety and reduce the threat to the environment from the nuclear activities in the former Soviet Union, especially in the north-west region of the Russian Federation. The work is mainly carried out through the Royal Ministry of Foreign Affairs and the NRPA serves as a directorate under that ministry for these questions. One of the main objectives of this work is to minimize the risk of radioactive contamination of Norwegian territory and the adjacent ocean waters.

As Norway is a Member State of the IAEA, Norwegian authorities are taking part in various activities organised by the IAEA.

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## B Compliance with Articles 4 to 19

### Article 4: IMPLEMENTING MEASURES

The measures to fulfil the obligations of the Convention are discussed in this report.

### Article 5: REPORTING

The present report constitutes the *fourth* Norwegian report issued in obligation with Article 5.

### Article 6: EXISTING NUCLEAR INSTALLATIONS

According to the terms of the Convention, Norway has no nuclear installations. However, there are two research reactors:

1. JEEP II at Kjeller. Heavy water pool reactor with thermal capacity 2 MW.
2. HBWR in Halden. Boiling heavy water reactor with maximum thermal capacity of 25 MW.

### Article 7: LEGISLATIVE AND REGULATORY FRAMEWORK

All nuclear activities are regulated by two legal instruments, the Act on Atomic Energy Activity of 12 May 1972 and the Act on Radiation Protection and Use of Radiation of 12 May 2000. The Act on Atomic Energy Activity regulates the licensing regime, general requirements for licences, inspection regime and the legal basis for the regulatory body. Chapter III of the Act establishes the liability regime according to the Paris Convention of 29 July 1960 as amended and related international legal instruments. The last part of the Act regulates confidentiality and penalties in case of non-compliance.

Pursuant to the Act, there are four regulations issued:

- Regulations of 2 November 1984 on the Physical Protection of Nuclear Material.

- Regulations of 15 November 1985 on Exemption from the Act on Atomic Energy Activity for Small Amounts of Nuclear Material.
- Regulations of 12 May 2000 on Possession, Transfer and Transportation of Nuclear Material and Dual-use Equipment.
- Regulations of 14 December 2001 on Economical Compensation after Nuclear Accidents.

The regulations of 2 November 1984 establish requirements for the physical protection of nuclear material and nuclear facilities. The regulations implement the obligations of the Convention of the Physical Protection of Nuclear Material. *These regulations were revised 29 June 2007 i.e. to take the concept of Design Basis Threat into account.*

The regulations of 15 November 1985 exempt small amounts of nuclear material from Chapter III of the Act and thus from the liability regime.

The regulations of 12 May 2000 regulate the control and accountancy of nuclear material as required in the Additional Protocol to the Safeguards Agreement between Norway and the IAEA.

The regulations of 14 December 2001 regulate how Contracting Parties to the Vienna Convention of 21 May 1963, Contracting Parties to the Joint Protocol of 21 September 1988 and Hong Kong shall be considered in connection to Norwegian legislation on nuclear liability. It also regulates how nuclear accidents in a non-party state shall be considered in connection to the Norwegian legislation.

Royal Decree of 22 December 1999 on Licence for Operation of Nuclear Installations pursuant to the Act on Nuclear Energy Activity issued to the Institute for Energy Technology. The licence expires 31 December 2008. The main basis for the licence is the Safety

Analysis Reports for the two reactors and the connected auxiliary facilities.

The Act on Radiation Protection and Use of Radiation of 12 May 2000 constitutes the legal basis for regulating the use of ionising and non-ionising radiation, radiation protection requirements, the medical use of radiation, contingency planning, waste management and discharges to the environment. The Act itself establishes the framework which is spelled out in further details by the Regulations on Radiation Protection and Use of Radiation of 21 November 2003.

The Royal Decree of *17 February 2006* describes the organisation of the emergency preparedness and response system in Norway. This is further described under Article 16.

#### **Article 8: REGULATORY BODY**

The regulatory body is the Norwegian Radiation Protection Authority. It is organised as a directorate under the Ministry of Health and Care Services. It has the responsibility for nuclear safety, nuclear emergency preparedness and radiation protection, and is organised in three departments:

- Department for Radiation Protection and Nuclear Safety
- Department for Emergency Preparedness and Environmental Radioactivity
- Department for Planning and Administration

The departments are further divided into specialised sections. The NRPA has a total staff of about 100 persons and a total annual budget of around 110 MNOK (13.5 M€). The NRPA acts as a directorate under the Ministry of Foreign Affairs in carrying out the plan of action for assistance to the north-west region of the Russian Federation. In addition to this, the NRPA is funded from other governmental sources, including the Ministry of the Environment, for miscellaneous projects.

Applications for licences and renewals of licences for the operation of nuclear facilities

are submitted to the Ministry of Health and Care Services. On behalf of the ministry, the NRPA handles the applications. The assessment with recommendations is then sent to the ministry for further handling. Licence is finally given by the Government. The NRPA also carries out regular inspections and audits to ensure that the requirements of a licence are fulfilled. The NRPA is since 12 June 2004 responsible for the State System of Accountancy and Control under the Safeguards Agreement between Norway and the IAEA.

The Department for Radiation Protection and Nuclear Safety is responsible for the supervision of the safety of the nuclear facilities, industrial and medical use of radiation and radiation protection. The staffs of this department consist of 41 persons.

The Department for Emergency Preparedness and Environmental Radioactivity acts as the secretariat for the emergency preparedness organisation against nuclear accidents, ref. article 16. It is also responsible for environmental monitoring and assessment as well as assessment of environmental and health consequences of discharges of radioactive substances from nuclear, industrial and medical facilities. The staffs count 42 persons.

#### **Article 9: RESPONSIBILITY OF THE LICENCE HOLDER**

The Institute for Energy Technology is the licence holder for the two research reactors and for the operation of the waste repository. It is their responsibility to keep the safety as high as possible and in accordance with the licence requirements and appropriate international standards. As all licences are reviewed at least every ten years, this means a more or less continuous revision of the Safety Analysis Reports. This updating is an important requirement in the licence. The experimental programmes have to be kept within the safety requirements of the licence and the safety documents. It is also the responsibility of the licence holder to provide the necessary financial and human resources needed for keeping the safety at an appropriate level.

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### **Article 10: PRIORITY TO SAFETY**

The Institute is able to lay down considerable resources in safety and by this show that the safety has a high priority, both for the reactor safety and for the radiation protection of the staff. Long shut down periods to prepare for experimental work gives room for improvements of the safety as well. The main tool for keeping the doses to the staff as low as reasonably achievable has been intensive monitoring and planning of the work. The Act on Atomic Energy Activity enables the NRPA to impose sanctions on the Institute if this is deemed necessary to keep the safety standard at an acceptable level.

### **Article 11: FINANCIAL AND HUMAN RESOURCES**

The Institute for Energy Technology has a budget for 2007 of around 540 MNOK (66 M€), of which around 20 % is governmental funding. With this basis, it provides the financial resources and the staff to operate the two research reactors and keep the safety of the reactors at a high level. At present, 28 persons are employed at JEEP II and 60 persons at HBWR. The total permanent staffs employed at the institute count at present 531 persons.

According to the licence requirements, the Institute organises the necessary training and retraining of their staff for both new and old staff at Kjeller and in Halden respectively. The NRPA ensures through inspections and audits that the resources and training/retraining provided are adequate.

### **Article 12: HUMAN FACTORS**

The Institute for Energy Technology conducts a considerable research on the relation between man, technology and organisation in connection to the OECD Halden Reactor Project. The results from this research are used in the foreign nuclear industry as well as in non-nuclear industry like oil refineries and chemical industry. The Institute also makes use of the results of this research in the operation of its own facilities, and the research is largely integrated with the control room operation at the HBWR in Halden.

The employment at the Institute is stable with a low turnover rate. This indicates that the Institute provides a sound working environment.

### **Article 13: QUALITY ASSURANCE**

The Institute has established a comprehensive system for quality assurance of health, safety and environment including the research reactors and the waste repository. This QA-system takes care of all aspects of operating a nuclear facility as well as the general labour safety issues. The system is subdivided into *four* levels, where the top level addresses the general policy issues, *the second level covers single research sectors including several departments*, the third level addresses the issues applicable to a single department and the bottom level contains procedures and instructions applicable to the local work operations.

This QA-system is supervised and audited by the NRPA, as well as other safety authorities being responsible for the non-nuclear part of the activity at the Institute. Audits of the QA-system are also performed by customers as a part of commercial research contracts.

### **Article 14: ASSESSMENT AND VERIFICATION OF SAFETY**

The NRPA is continuously monitoring the operation of the reactor facilities through weekly reporting of the operation. The safety of the facilities is supervised by inspections and assessments as deemed necessary between the reporting milestones mentioned below.

*Annually*, the regulator and the licensee meet to discuss relevant items of the operation of the licensed facilities, regulatory issues, reporting and other topics. These meetings serve as important tools to ensure that licence conditions and other decisions by the NRPA are followed up in due time.

As a license requirement, a status report on the safety of the installations is to be issued every three years. This report is issued to confirm that the safety of the facilities still conforms to the requirements set up in the licence documents which are based on the Safety

Analysis Reports for the facilities. Verification by analysis, surveillance, testing and inspection is also a part of the licensing process. This type of verifications also constitutes a part of the preparation of the reactors before every start up for a new experimental cycle. In particular, this is applied to the HBWR with a shorter interval than the ordinary licensing period.

The NRPA avails itself of the possibility to engage external consultants when reviewing the safety of the reactor facilities and other aspects of the activities on the two sites. In line with this, an IPPAS-mission organised by the IAEA was carried out in September/October 2003.

*As a part of the relicensing procedure, an INSARR-mission was organised by the IAEA on request from the NRPA in June 2007 to the HBWR site in Halden. The mandate for this mission was to evaluate the safety of the operation of the facility as outlined in the general terms of reference for such missions. The team will provide several recommendations and suggestions.*

#### **Article 15: RADIATION PROTECTION**

In accordance with the Act on Radiation Protection and Use of Radiation with regulations, any user of ionising radiation is committed to measure the radiation doses to workers that have been exposed to ionising radiation. The annual doses for each worker should be kept below the ICRP limits. The NRPA is providing a dose measurement service for workers in medical services and non-nuclear industry. The Institute for Energy Technology is, as a nuclear operator, responsible for its own dose registration system. The NRPA is currently planning to build up a national dose register.

The operator measures individual whole-body dose, skin dose, finger dose and internal dose. The whole-body dose for the last 12 months is reported monthly for each worker, while the other dose measurements are reported annually to the NRPA.

The operator has developed a system for work planning to keep the doses to the staff as low as reasonably achievable especially during maintenance work. This has led to substantial reduction of the dose burden to the staff. Even during an extended outage at the HBWR in 2003 when complicated repair work was performed, the doses were kept well below limits.

As a part of the discharge authorisation, doses to members of the public from releases of radioactivity have to be kept below 1  $\mu\text{Sv}/\text{y}$  for releases to the aquatic environment. For discharges to the air, the dose limit is 100  $\mu\text{Sv}/\text{y}$ . These are applicable to each of the facilities individually. Release limits are set according to this, and the real releases are a fraction of the limits.

#### **Article 16: EMERGENCY PREPAREDNESS**

The licensee is responsible for organising plans for on-site emergency preparedness and response. Each site has adapted own plans, and these are exercised several times per year. The off-site response is planned by the local police authorities and coordinated with the Crisis Committee (see below). The plans are exercised every three years.

Based on the Royal Decree *17 February 2006*, the Government has established an organisation made up of representatives of the following entities:

- the relevant Ministries;
- the Ministerial Co-ordination Committee;
- the Crisis Committee for Nuclear and Radiological Accidents and Events;
- the Advisors to the Crisis Committee;
- the Secretariat for the Crisis Committee and
- the Regional emergency organisations.

The Ministries are responsible for emergency preparedness in their area of competence. In order to deal effectively with the early phase of a nuclear accident, the Ministries have

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transferred responsibility for remedial actions to the Crisis Committee.

The Ministerial Coordination Committee is responsible for ensuring cooperation and coordination between the different Ministries. The Ministry of Health and Care Services head the Committee.

The Crisis Committee is made up of representatives of the following institutions:

- the Norwegian Radiation Protection Authority;
- the National Police Directorate;
- the Ministry of Defence;
- the Directorate for Civil Protection and Emergency Planning;
- the Directorate for Health and Social Affairs and
- the Norwegian Food Safety Authority.

The Crisis Committee is responsible for deciding and implementing remedial actions in case of a nuclear incident or event or an impending nuclear accident representing a potential threat to Norway. It must organise the evacuation of the population if the situation represents a direct threat to health and life; provide shelter, administer stable iodine, block and secure contaminated areas; in the short term restrict production and distribution of foodstuffs; and advise on dairy products and other dose-reducing actions. The Norwegian Radiation Protection Authority heads the Crisis Committee. Wherever possible, the Crisis Committee must consult its decisions with the Ministries before acting on such decisions.

The Crisis Committee for Nuclear and Radiological Accidents and Events is operating with two levels of emergencies. These apply both for domestic and foreign accidents. No countermeasures are automatically implemented on the basis of declaration of level of emergency. The countermeasures will be implemented on an ad hoc basis depending on the assessments of the situation.

The Advisors to the Crisis Committee is made up of representatives of organisations and institutions with expertise and responsibility required for an emergency organisation, both as regards the management of nuclear accident situations and for further development and maintenance of emergency preparedness.

During accident situations, the tasks of the Advisors are to:

- submit and make available all information, data and measurements of relevance to the emergency situations and make forecasts for radioactive dispersion, fallout and radiation doses to the public and
- advise on preventing or reducing the radiological and economic consequences of a nuclear accident in Norway.

The Secretariat for the Crisis Committee (the Norwegian Radiation Protection Authority) is responsible, *inter alia*, for alerting the Nuclear Emergency Organisation and relevant international bodies. The Secretariat organises a 24-hrs Officer on Duty Service.

The Regional Emergency Organisations are established under the direction of the County Governors. They coordinate regional and local preparedness and response. They are responsible for planning and initiating countermeasures according to local needs and demands, and shall continuously liaise with the Crisis Committee.

Norway has a new national automatic gamma monitoring network operating, consisting of 25 stations running continuously. The data acquired are directly available to the competent authority and the emergency response organisation.

In addition Norway has 5 high volume air samplers, some with alarming capability (GM-tubes on top of the filters).

The Nordic countries: Denmark, Finland, Iceland, Norway and Sweden have established an agreement that makes all the data from the

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national automatic gamma monitoring networks directly available to all Nordic countries. Similar agreements cover the rest of the countries around the Baltic Sea.

Norway has established bilateral agreements on early notification with Finland, Germany, Lithuania, the Netherlands, Poland, Russia, Sweden, Ukraine and United Kingdom. The texts in the different agreements are slightly different but are all based on the IAEA Convention of Early Notification from 1986. We feel confident that these agreements will ensure a first notification if an accident at a facility covered by the agreements, should occur in the vicinity of Norway.

*NRPA has arranged and participated in regular exercises among the Nordic countries: i.e. the Demoex exercise in Sweden in October 2006. NRPA also participates in the IAEA Convex exercises when arranged. These exercises are valuable training opportunities for our staff.*

#### **Article 17: SITING**

Not applicable. The siting of the waste storage facility will be covered in reporting under the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

#### **Article 18: DESIGN AND CONSTRUCTION**

Not applicable. Construction of nuclear power plants or new research reactor is not planned in the foreseeable future.

#### **Article 19: OPERATION**

The operation of the two research reactors is limited to the time needed for performance of the research activities. For JEEP II this means that the reactor is shut down during all holiday seasons such as Christmas/New Year, Easter and summer. The HBWR needs considerable shut down periods twice a year to rearrange the experimental devices in the reactor core and the reactor hall. As a rule of thumb, the availability is somewhat greater than 50 %.

The discovery of non-penetrating cracks in the sub-cooler pipe in the HBWR in June 2003 resulted in an extended outage of about seven months for repair of the piping.

All experience gained from the regular operation and from incidents is fed back into the operation regime and relevant information from this is contained in the Safety Analysis Reports which form the basis for the licensing of the reactors. The Institute updates the QA-system based on operational experience both regularly and as feed-back from incidents. This updating is closely supervised by the NRPA.

## **CONCLUSION**

Based on the above reporting under the applicable articles for a party having no nuclear installations on their territory, we conclude that Norway is in compliance with its obligations according to the Convention on Nuclear Safety.



Statens strålevern  
Norwegian Radiation Protection Authority

**StrålevernRapport 2007:1**

Virksomhetsplan 2007

**StrålevernRapport 2007:2**

Representative doser i Helse Øst. Representative doser for røntgendiagnostikk rapportert fra virksomheter i Helse Øst høsten 2006

**StrålevernRapport 2007:3**

Radioecological consequences of a potential accident during transport of radioactive materials along the Norwegian coastline

**StrålevernRapport 2007:4**

Measuring radon levels at high exposures with alpha-track detectors. Calibration and analysis

**StrålevernRapport 2007:5**

Upgrading the Regulatory Framework of the Russian Federation for the Safe Decommissioning and Disposal of Radioisotope Thermoelectric Generators

**StrålevernRapport 2007:6**

Stråledose til screena kvinner i Mammografiprogrammet i 2005 og 2006