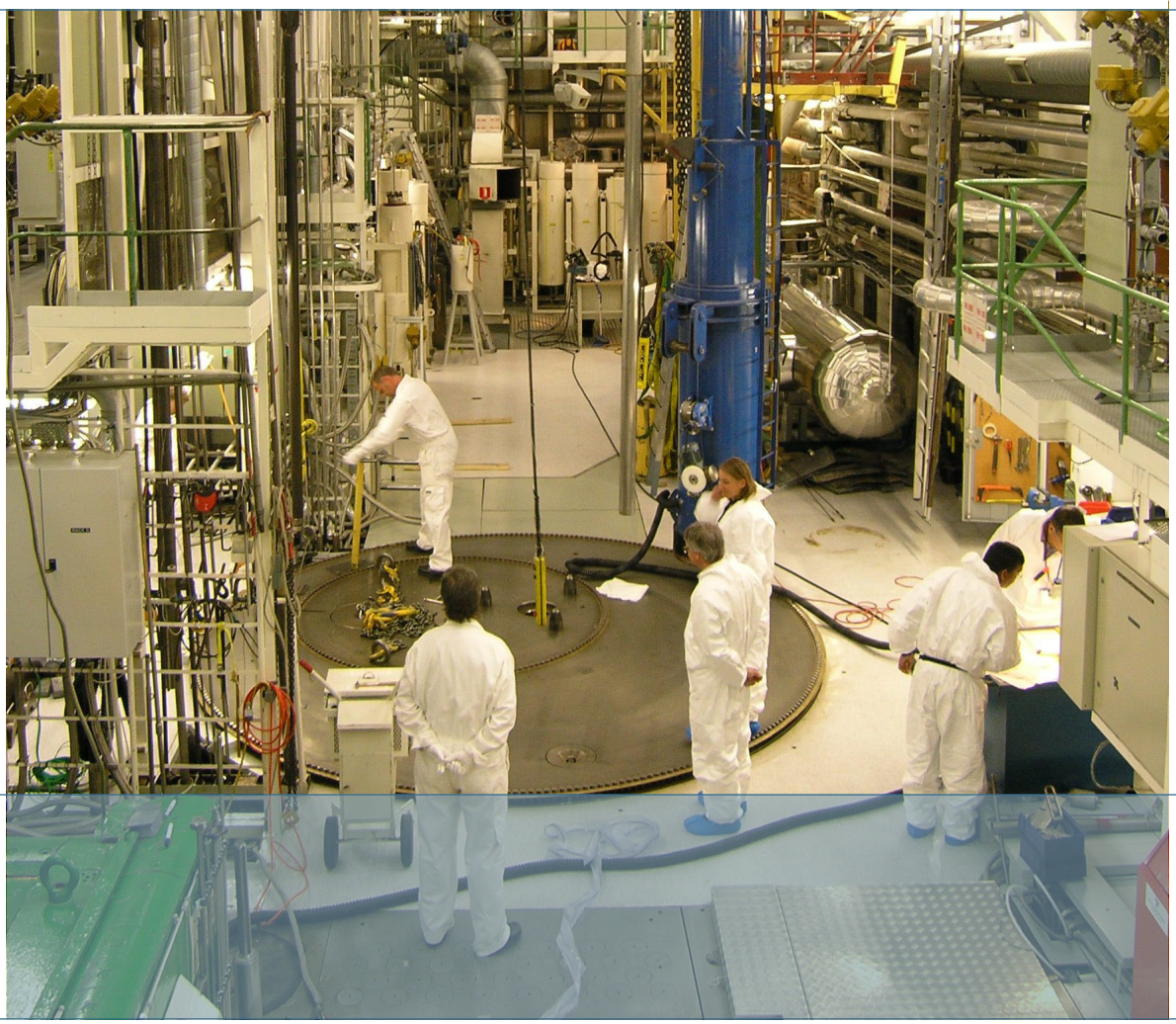
StrålevernRapport ▪ 2010:7



Implementation of the obligations of the convention on nuclear safety in Norway

The fifth 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 2010:7. Østerås: Statens strålevern, 2010.

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

Abstract:
The fifth 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.

Referanse:
Hornkjøl, S. Implementation of the Obligations of the Convention on Nuclear Safety. StrålevernRapport 2010:7. Østerås: Norwegian Radiation Protection Authority, 2010.
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 kjernesikkerhetskonvensjonen for en part uten nukleære installasjoner på sitt territorium, konkluderes det med at Norge overholder sine forpliktelser under konvensjonen.

Head of project: Sverre Hornkjøl.
Approved:

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

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

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

Statens strålevern

Norwegian Radiation
Protection Authority
Østerås, 2010

Innhold

A Introduction

A.1 General

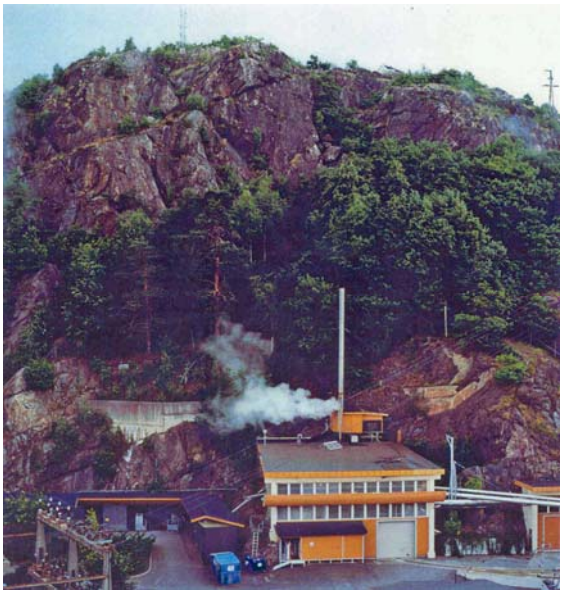
This report is issued according to Article 5 of the Convention on Nuclear Safety. Norway signed and ratified the Convention on 20 September 1994.

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 in accordance with the guidelines provided in INFCIRC/572 Rev. 3 Part II.E. *Changes in the situation which have occurred since the fourth report in 2008 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 (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 N0RA 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 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.

The Institute for Energy Technology has a total turn-over for 2009 of around 656 MNOK (82 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.

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 development after the first official report on possible strategies issued in December 2001. The main recommendation in this report was to build a storage facility for temporary storage of spent fuel and intermediate level long-lived waste. This has thereafter been assessed by a working group to establish technical specifications for such a storage facility. *Two governmental commissions were appointed in 2009, one to investigate the disposal of spent metallic fuel and one to investigate the siting of the storage facility. The first commission presented its results in 2010 recommending reprocessing as the optimum solution. The second commission will present its findings in 2011.* 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.

The NRPA has been engaged in several other projects within nuclear safety, *the most prominent one at present is a cooperation project with the Romanian and Bulgarian authorities organised by the IAEA*. NRPA also takes part in activities under OECD/NEA, WENRA etc.

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 *fifth* 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 on Atomic Energy Activity, there are four regulations issued:

- Regulations of 2 November 1984 on the Physical Protection of Nuclear Material and Nuclear Facilities (amended 29 June 2007).
- 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 and Nuclear Facilities as amended 2005.

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 *28 November 2008* 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 2018 except for the licence for HBWR which expires 31*

December 2014. 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. Revised regulations are expected to come in force 1 January 2011.

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

Organisation

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, for national nuclear and radiological emergency preparedness and response and for radiation protection. It 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 125 persons and a total annual budget of around 100 MNOK (12.5 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.

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 NRPA is mainly funded through the government, i.e. the budget chapter of the Ministry of Health and Social Care. Fees are taken from the operator of the nuclear facilities for license hearing and assessment and for inspection activities. However, this constitutes a minor part of the total budget.

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 4 to 5 people mainly engaged in nuclear safety regulation belong to this department.

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.

Licensing activities

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 hearing and decision. 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.

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 general conclusion of the INSARR-team was that there are no major safety issues that prevent continued operation of the HBWR. The INSARR-team concluded with a list of recommendations, the most serious was a need to perform a new comprehensive fire analysis and to implement improvements in the fire protective measures. *In addition, the inspection activities from the NRPA have been intensified as a result of the recommendations from the INSARR team. In September 2010, a follow-up mission is organised to assess whether the fulfilment of the recommendations given are on track or not.*

The INSARR report is available to the public at www.nrpa.no.

Inspection activities

Taking a graded approach into account, the inspection regime for two research reactors is far smaller than for power reactors. 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 under Article 9. *Regular meetings between the NRPA and IFE to coordinate the inspection activities are conducted on a quarterly basis.*

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 mentioned, the NRPA also has taken advantage of the INSARR services provided by the IAEA.

Training and external cooperation

On the job training is used extensively together with different kinds of seminars. The Nordic Committee for Nuclear Safety Research has in this respect for a long time been a part of the portfolio of the NRPA, for the recent time mostly for emergency preparedness.

Staff from the NRPA regularly takes part in training courses and seminars to enhance its competence.

The NRPA has recently initiated a cooperation effort with the Australian Radiation Protection and Nuclear Safety Agency ARPANSA to exchange experience of regulation of research reactors in countries without nuclear power.

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. A Safety Analysis Report of the facilities is the basis for the license application. This should cover a description of the facilities (including OLCs and safety systems), radiation protection work, emergency preparedness, management system, administrative rules and organization.

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.

As a license requirement, a status report on the safety of the installations is to be issued *annually.* 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.

Ageing management is primarily related to the reactor tank and the primary system as most other parts have been changed since the construction of the reactors. For the HBWR, the Institute established a material surveillance program in 1958 and samples of the original vessel have been irradiated since then to be able to predict the behaviour of the reactor tank. In addition, a Service Inspection programme is established and implemented in accordance with the ASME Code. External experts are consulted for independent investigation and assessment of the condition of the reactor tank. Institute for Energy Technology also has a system for management of ageing in other safety related systems. These management systems are supervised by the relevant authorities in addition to the NRPA.

Article 10: PRIORITY TO SAFETY

The Institute invests considerable resources in safety and by this shows 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.

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.

The Institute has established a comprehensive system for quality management of health, safety and environment including the research reactors and the waste repository. This management system takes care of all aspects of operating a nuclear facility as well as the general labour safety issues.

The management 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 management system are also performed by customers as a part of commercial research contracts.

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 dose for each worker should be kept below the ICRP limits as set out in their Publications 60 and 103. The Institute for Energy Technology is, as a nuclear operator, responsible for its own dose registration system.

The Institute 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 NRPA is currently planning to establish a national dose register.

The Institute 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 μSv/y for releases to the aquatic environment. For discharges to the air, the dose limit is 100 μSv/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

General

In general, the licensee is responsible for organising plans for on-site emergency preparedness and response. The Institute has adapted plans for each site, and these are exercised regularly. The off-site response is planned by the local police authorities and coordinated with the Crisis Committee (see below).

Based on the Royal Decree 17 February 2006, the Government has established a national response 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

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 transferred responsibility for remedial actions to the Crisis Committee.

The Ministerial Coordination 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

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

- the Norwegian Radiation Protection Authority;
- the National Police Directorate;
- the Norwegian Defence Staff;
- 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.

Emergency Levels

The Crisis Committee is operating with two levels of emergencies, an "information preparedness" level and a "high preparedness" level. These apply both for domestic and foreign accidents. Information preparedness is declared when a situation occurs which is of relevance to the response organisation and which might develop to a more severe situation. High preparedness declared when there is a risk of radiological consequences.

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

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 the Crisis Committee on preventing or reducing the radiological and economic consequences of a nuclear accident in Norway.

The Secretariat for the Crisis Committee

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 organise a 24-hrs Officer on Duty Service.

The Regional Emergency Organisations

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.

Dimensioning Scenarios

The Crisis Committee has recommended dimensioning scenarios as a basis for the national emergency planning. these scenarios have been approved on the ministerial level. These dimensioning scenarios will help the Crisis Committee to prioritise and meet the needs and plan for a best possible upgrade of the emergency preparedness. The dimensioning scenarios represent a wide range of scenarios with different characteristics. Dimensioning scenarios take both consequences to life, health, environment and the society into account.

Standing Preparedness

Norway has a national automatic gamma monitoring network operating, soon consisting of *34* stations running continuously. *One of these stations is operated by the Norwegian Defence, but the NRPA has access to the data. A mobile monitoring unit is also available*. The data acquired are directly available to the competent authority, the emergency response organisation *and the public at radnett.nrpa.no*.

In addition Norway has 5 high volume air samplers, *4* with alarming capability (GM-counters 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 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.

Exercises

NRPA contributes to exercise activities on different levels in the response organisation. The last years, a major focus has been on enhancing the competence on nuclear and radiological response on the regional level. A major exercise for the ministries was arranged in 2008. NRPA participated regularly in exercises among the Nordic countries: i.e. the Demoex exercise in Sweden in October 2006. NRPA also participates in most of the IAEA Convex exercises when arranged. These exercises are valuable training opportunities for the NRPA staff.

Norwegian emergency response arrangements are exercised at the national, regional and local levels on several relevant scenarios like satellite re-entry, nuclear submarine accidents,

nuclear ice -breaker accidents, transport accidents, dirty bombs etc. Orphan sources are found every now and then, which helps to keep the awareness of such incidents high. There is no predefined regularity in these exercises.

The Institute for Energy Technology has adapted emergency plans for each site. These emergency plans are exercised regularly.

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. As a rule of thumb, the availability is somewhat greater than 50 %.

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 management system based on operational experience both regularly and as feed-back from incidents. This updating is closely supervised by the NRPA.

The Institute for Energy Technology participates in international forums like European Atomic Energy Society where operating experiences from research reactors are exchanged. Norway also participates in the IRSRR system under the IAEA.

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 2010:1
Virksomhetsplan 2010

StrålevernRapport 2009:2
A novel dosimetric protocol for high energy photon radiotherapy beams in Norway using radiochromic film (electronic version only)

StrålevernRapport 2010:3
Om kvalitetskontroll av linac

StrålevernRapport 2010:4
Mal for utarbeidelse av faglige anbefalinger for strålebehandling i Norge

StrålevernRapport 2010:5
Overvåking av radioaktivitet i omgivelsene 2008–2009

StrålevernRapport 2010:6
Estimerte kostnader forbundet med radonmålinger og radontiltak i barnehager, skoler og boliger i Norge

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