EUROPEAN COMMISSION

DIRECTORATE-GENERAL FOR ENERGY
Directorate D – Nuclear Energy
D.4 – Radiation Protection

Main Findings of the Commission's Article 35 verification in the Netherlands

BORSSELE NUCLEAR POWER STATION

Date: 03 to 07 March 2008

Verification team: Mr. C. Gitzinger (team leader)

Mr. E. Henrich

Ms. A. Godeanu-Metz

Mr. J-L. Frichet (national expert on secondment – France)

Reference of report: NL-08/01

INTRODUCTION

Article 35 of the EURATOM Treaty requires that each Member State shall establish facilities necessary to carry out continuous monitoring of the levels of radioactivity in air, water and soil and to ensure compliance with the basic safety standards [1].

Article 35 also gives the European Commission (EC) the right of access to such facilities in order that it may verify their operation and efficiency.

For the EC, the Directorate-General for Energy (DG ENER) – formerly Directorate General for Energy and Transport (DG TREN) – and in particular its Radiation Protection Unit (ENER D.4) is responsible for undertaking these verifications.

For the purpose of such a review, a team of four inspectors from DG TREN H.4 visited the Borssele NPP from 03 to 07 March 2008. The goal of this verification was to obtain complete information and to verify a number of monitoring installations involved in the environmental radioactivity monitoring of the Borssele NPP. The laboratories performing the measurements were also included into this verification.

The visit to the Borssele NPP site included also meetings with the Dutch competent authorities, the Ministry of Housing, Spatial Planning and the Environment (*Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer; VROM*), with Nuclear Research Group (NRG)-Arnhem – *Radioanalytisch Laboratorium*, which, under contract with Borssele NPP, provides technical support to perform the sampling within the operator's programme and analyses these samples, with the *Rijksinstituut voor Volksgezondheid en Milieu* (*RIVM*; National Institute for Public Health and the Environment) at Bilthoven, which runs the national radiological environmental monitoring programme for the regulator, and with the *Rijkswaterstaat Waterdienst* (*RWS WD*; Centre for Water Management) which runs the environmental monitoring program in water and sediment.

The present report summarises the results of the discussions with the site operator, other actors and the Dutch competent authority *VROM*, as well as results of the verification team's review of some aspects of the environmental surveillance at and around the Borssele NPP site.

The purpose of the review was to acquire full information both from the operator and from the regulator concerning the Borssele NPP site and to get state of the art information on the monitoring put in place.

1 Directive 96/29/Euratom, Council Directive of 13 May 1996 laying down basic safety standards for the health protection of the general public and workers against the dangers of ionising radiation (OJ L 159, 29.6.1996, p. 1).

MAIN FINDINGS

The proposed verification programme could be completed within the time allocated. In this regard the verification team appreciates the advance information supplied, as well as the additional documentation received during and after the verification.

1 INTRODUCTION

The Commission's decision to request the conduct of an Article 35 verification was notified to the Dutch authorities on 20 July 2007. Subsequently, practical arrangements for the implementation of the verification were made with the persons designated by the Dutch authority.

2 COMPETENT AUTHORITIES AND LEGAL BACKGROUND

2.1. INTRODUCTION

In the Netherlands, the facilities liable to generate radioactive waste must have effluent storage, treatment and removal systems. Radiological monitoring programmes must be based on site and discharge characteristics. For an NPP the environmental radiological monitoring programme is composed of a network implemented by the operator at the site and in the zones of influence, as well as by a site-specific programme implemented by NRG-Petten and NRG-Arnhem on behalf of the operator. In addition, NRG is contracted by the regulator to do scientific work for policymaking. Nation wide environmental radiological monitoring networks are managed by *RIVM*-Bilthoven, *RWS WD* Lelystad and the Institute of Food Safety (*Instituut voor Voedselveiligheid – RIKILT*), Wageningen.

The operator of the nuclear power plant has to run the sampling, analysis and measurement programmes of radiation levels and radionuclides present in the environment within a 10 km radius.

The on-site independent environmental monitoring programme of *RIVM*-Bilthoven is limited to the network for ambient dose rate monitoring at the fence of the NPP (Monitoring Network Terrains - MONET).

With regard to off-site monitoring by the regulator, the MONET ambient dose rate monitoring network at the NPP fence combined with the National Monitoring network for radioactivity (NMR), both providing data at a ten minute interval, are considered to be adequate.

The nation-wide radiological monitoring network established by *VROM* and managed mainly by *RIVM*-Bilthoven is independent from the network associated with nuclear facilities.

2.2. MINISTRY OF HOUSING, SPATIAL PLANNING AND THE ENVIRONMENT (*VROM*)

The Ministry of Housing, Spatial Planning and the Environment has overall responsibility for legislation concerning the Nuclear Energy Act, for licensing and for ensuring that the current legislation is being adequately enforced. It is also responsible for the technical safety considerations on which the decision to grant or reject an application for a licence is based. As a result, the various bodies within the Ministry of Housing, Spatial Planning and the Environment, together with the Ministry of Social Affairs and Employment, are responsible for formulating the conditions attached to the licence concerning the safety and the (radiation) protection of the workers and the public and the environment.

2.3. MINISTRY OF SOCIAL AFFAIRS AND EMPLOYMENT

The Directorate Health and Safety at Work within the Ministry of Social Affairs is responsible for the legal aspects of radiation protection of workers.

2.4. MINISTRY OF ECONOMIC AFFAIRS

The Directorate-General for Energy and Telecommunications of the Ministry of Economic Affairs is responsible for aspects concerning the energy demand and energy supply.

2.5. OVERVIEW OF THE LEGAL FRAMEWORK

The following are the main laws to which nuclear installations in the Netherlands are subject:

- The Nuclear Energy Act *(Kernenergiewet)*;
- The Environmental Protection Act;
- The General Administrative Act *(Algemene wet bestuursrecht)*.

The basic legislation governing nuclear activities is contained in the **Nuclear Energy Act.**

A number of Decrees have also been issued containing additional regulations and these continue to be updated in the light of ongoing developments. The most important of these in relation to the safety aspects of nuclear installations are:

- the Nuclear Installations, Fissionable Materials and Ores Decree;
- the Radiation Protection Decree;
- the Transport of Fissionable Materials, Ores and Radioactive Substances Decree.

The Nuclear Installations, Fissionable Materials and Ores Decree regulates all activities involving fissionable materials and nuclear installations (including licensing).

The Radiation Protection Decree regulates the protection of the public and workers against the hazards of all ionising radiation. It also establishes a licensing system for the use of radioactive materials and radiation-emitting devices, and prescribes general rules for their use.

The Transport of Fissionable Materials, Ores and Radioactive Substances Decree deals with the import, export and inland transport of fissionable materials, ores and radioactive substances by means of a reporting and licensing system.

The **Nuclear Energy Act** and the aforementioned Decrees are fully in compliance with the relevant EURATOM Directive laying down the basic safety standards for the protection of workers and the general public against the health risks associated with ionising radiation. This Directive (96/29/Euratom) is incorporated into the relevant Dutch regulations.

The **Environmental Protection Act**, in conjunction with the **Environmental Impact Assessment Decree,** stipulates that any licence application for a nuclear installation must be accompanied by an environmental impact assessment. This complies with EU Council Directive 97/11/EC.

The **General Administrative Act** sets out the procedure for obtaining a licence and describes the role played by the general public in this procedure (i.e. objections and appeals).

3 BORSSELE NPP SITE

3.1. INTRODUCTION

The Borssele Nuclear Power Plant is located on the right bank of the Schelde estuary, within the municipal boundary of the village of Borsele, some 10 km east of the town of Vlissingen, in the province of Zeeland, in the south-western part of the Netherlands.

The Borssele-NPP is located at a straight line distance of 55 km from the city of Antwerp (B), 120 km from Utrecht and 130 km from Amsterdam (the region within a perimeter of 200 km is a highly populated region of high electricity consumption and an area of agricultural and high industrial activity).

The building authorisation for the Borssele NPP is dated 1969. The plant was connected to the electric grid in July 1973 and commercial operation started on 26 October 1973. The plant is currently operated by *Energie Productiemaatschappij Zuid-Nederland* (*EPZ*).

The Borssele Nuclear Power Plant is a 2-loop pressurised water reactor, built under a turn-key contract between the operator (formerly *PZEM*) and *KWU*/*Siemens*. It is licensed for a thermal power of 1365 MW.

3.2. DISCHARGES – GENERAL VERIFICATION ASPECTS

The verification included control of the discharge monitoring facilities and the associated laboratories of the Borssele NPP in order to verify their adequacy and effectiveness. In addition a spot check on archived data was made in order to verify procedures for data management and archiving.

Laboratories of NRG at Petten and of *AREVA* at Erlangen, Germany, that perform measurements for the Borssele NPP on contract basis were not within the scope of the verification.

In the reactor control room the verification team was shown the data presentation facilities for various on-line measuring devices and the discharge tank information. The equipment in the control room had been partly replaced in 1997. Staff in the control room works in eight hour shifts.

Verification does not give rise to recommendations.

3.3. GASEOUS DISCHARGES

The main sources of releases to the atmosphere are the ventilation streams from the reactor containment, the reactor building ('Building 1'), and Buildings 2 (surrounding Building 1) and 3 (separate construction) with auxiliary functions. All these paths are monitored separately (noble gases, radio-iodine, and particulates) before being piped to the stack, which is attached to the reactor building. In case of an increased activity level filters are taken and analysed by gamma spectrometry. If the activity surpasses certain limits the ventilation of Building 1 can be reduced or turned off. All gaseous radioactive discharges (including from containment venting) go through this stack.

In a room near the control room the verification team was shown the venting measurement device.

The team was shown the aerosol on-line measurement devices, the iodine monitor, the noble gas monitors and the aerosol and iodine sampling devices. The description of function tests is taped to the on-line equipment, however, dates do not always seem to match. With regards to sampling all relevant information is shown on a display.

The verification team also saw the sampling devices for H-3 and C-14 and was shown part of the isokinetic sampling pipe as distributor to the various devices in the nearby rooms. A dose rate monitor serves for room surveillance.

The verification team was informed that these on-line check measurements are not used for balancing radioactive discharges.

The verification team recommends exploring the possibility to supply the authority with zeolite samples to allow for independent checking of aerial releases of H-3 and C-14. It also recommends performing any planned equipment controls within the time frame foreseen.

3.4. LIQUID DISCHARGES

Liquids to be discharged come from three areas:

a) The radioactive waste treatment system – three closed excess water tanks (180 m^3 each; with ventilation system with carbon filters that are changed annually);

b) The nuclear laundry and showers system – two detergent tanks (7.5 m^3 each);

c) Leakage and spill-over water.

Liquids are piped to four tanks. After stirring for several hours a sample is taken; if the limit of 200 kBq/m^3 gross gamma activity is not surpassed, the liquid is passed on to one of the discharge tanks ; liquids with higher activity potential go to the waste treatment system. The resulting sludge is treated as radioactive waste; the condensate is piped to the discharge tanks.

Before release from the discharge tanks to the Westerschelde each discharge batch is controlled. After stirring, a sample is taken and analysed for gross gamma activity. The results are transmitted to the control room who gives authorisation for the discharge if the limits are not surpassed. During discharge, a gross gamma on-line measurement allows stopping of the discharge if needed. As a check, two automatic measuring devices are set up in sea waters; however there is no possibility to stop a discharge based on their results.

The verification team inspected the gross gamma on-line measuring device for the final discharge checks and was informed about the details of the calibration procedure.

Verification does not give rise to recommendations.

3.5. REGULATORY CONTROL PROGRAMME

The regulator (nuclear inspectorate at *VROM*) defines the basis of the regulatory control programme also with regard to discharges from the Borssele NPP. Samples for this programme ('counter expertise') are taken by NPP staff; pre-prepared if needed and are stored and reserved for *RIVM*. *RIVM* staff generally selects on random basis samples for analysis at *RIVM* (eight per year). For Ni-63 and Fe-55 determinations in discharge water no such 'counter-expertise' is performed.

At *RIVM* the verification team discussed the situation of independent control of the operator's work with regard to discharge monitoring: formerly such applications by the nuclear inspectorate were organised year after year, now every ½ year. Currently there are plans to re-organize the nuclear inspectorate; it may be removed from the ministry (*VROM*) and become an agency (with possible disadvantages due to the 'distance' to the ministry). The nuclear inspectorate currently is financed by the way of general taxation (not directly by nuclear power production related means).

The verification team strongly recommends guaranteeing the necessary independence of all regulatory bodies; in particular with regard to controlling the operator's discharge monitoring system, and supplying ample staffing and budget. The team also suggests exploring the possibility to provide 'counter-expertise' (i.e. checks by RIVM on behalf of the regulator) for Ni-63 and Fe-55 analyses in discharge water samples from the NPP.

3.6. THE OPERATOR'S ENVIRONMENTAL RADIOACTIVITY MONITORING PROGRAMME

The number and location of sampling points, the type of samples to be collected and the required analyses have been defined in the pre-operational phase of the NPP, and they have been updated through the years of plant operation.

The Borssele NPP does not carry out site related monitoring of grass, milk, leafy vegetables or food stuffs. In the 90's, part of the environmental monitoring consisted of a TLD network.

The verification team was informed that based on an evaluation of the previous environmental monitoring programme, measurements of environmental radioactivity parameters have been abandoned and a decision was taken by the regulator to limit the operator's on-site monitoring programme to the continuous measurement of the ambient gamma dose rate at the fence of the NPP, complementary to the regulator's monitoring network "MONET.

The verification team verified the installation of several probes and witnessed the data transfer from one of the probes to a data notebook.

Verification does not give rise to recommendations.

3.7. OFF-SITE ENVIRONMANTAL MONITORING

Sampling and analytical assessments of environmental samples off-site the NPP fenced-in area are outsourced. The independent Nuclear Research Group (NRG) executes this task on a contract basis. The NPP is responsible for the continuity of the programme, the analysis of the results and the determination of the net dose at the site boundary.

Ambient gamma dose rate monitoring

The ambient gamma dose rate measurement system consists of eight *Genitron Gamma Tracer* probes, each containing two GM tubes and having a measuring range of 10 nSv/h to 10 Sv/h

at temperatures of -40 to +60°C. The detectors are read out by use of a *Genitron infrared RS-232* data gate.
The team verified the off-site ambient gamma dose rate monitoring system of the operator at measuring sites n° 27, 28, 29 and 30. It witnessed the presence of the gamma probes at all four stations and the data transfer by *Genitron* infrared technology to a data notebook. The team notes that not all devices were optimally placed.

The verification team suggests discussing the installation of the ambient dose rate probes (i.e.: the possibility to install the probes at one meter above soil or above a large flat surface without any obstacles in the surroundings).

Air monitoring (particles and iodine)

In order to monitor the environmental compartment air, monitoring devices are located in nine different locations.
The team verified the low volume air samplers of the operator at measuring sites n° 23, 27 and 29. It also witnessed at all three stations the change of the cartridge holder by NRG-Arnhem staff.

Verification does not give rise to recommendations

Sediments, surface water and algae

At four locations samples of River Schelde surface water, sediment and algae are taken. The team witnessed the sampling of the monthly sample of sea water and algae at sampling site n° 1.

Verification does not give rise to recommendations.

Grass

The team witnessed grass sampling at the three sites n° 23, 27 and 29.

Verification does not give rise to recommendations.

Borssele soil sampling

The verification team witnessed the sampling of a soil (sand) sample, at sampling site n° 1, on the beach at a distance of 1 m from the waterfront (low tide). There are four such sampling sites on the sea-shore.

Verification does not give rise to recommendations.

3.8. THE COMPETENT AUTHORITY'S ON-SITE INDEPENDENT CONTROL PPROGRAMME

From 1972 onwards, measurements of radioactivity in surface water, milk, grass, air, mussels and algae were included into the operator's environmental monitoring programme. An evaluation of this monitoring programme led to the decision to limit the operator's on-site monitoring programme to the continuous measurement of the ambient gamma dose rate with eight GM probes installed at the fence of the NPP. At the same time and based on the same evaluation, the regulator's on-site monitoring programme was limited to the MONET network. Thus, *RIVM* does not carry out on-site monitoring of grass, milk, leafy vegetables or food stuffs.

An early warning alarm network (MONET = Monitoring Network Terrains) was constructed around the former NPP Dodewaard, the NPP Borssele and the waste storage facility *COVRA*. With this MONET network, the regulator has on-line access to the gamma dose rate data around the facilities. It is assumed that a possible discharge of a nuclear site to air will always contain a gamma emitter; a discharge of pure alpha or beta emitters is considered highly unlikely. Alarm levels are set at 200 nSv/h in a usual background of about 80 nSv/h. The information which is supplied by the MONET network is thought to be much faster and more accurate than a food stuff analysis.

For Borssele, there are eight radiation monitors positioned along the fence surrounding the nuclear power plant .The ambient gamma dose rate monitors used are identical with the national radioactivity monitoring network devices. The counter tube is placed at 1 m above the ground in an area free from obstacles (in practice a free radius of three times the height of the nearby obstacle is aimed for) to reduce environmental influences on the measurements. The readings are averaged over a 10 minute interval and stored in a database at *RIVM*.

The verification team verified sites n°9; 12 and 31.

Verification does not give rise to recommendations.

4 DUTCH NATIONAL ENVIRONMENTAL RADIOACTIVITY MONITORING PROGRAMME

4.1. INTRODUCTION

The Netherlands installed several monitoring programmes with regard to environmental radioactivity, both, networks based on automatically working stations with on-line data transmission to a data centre, and networks based on sampling of various environmental media and sample analysis in a laboratory.

In the context of the verification the team visited sampling sites of the Dutch national monitoring programme near the Borssele NPP. The laboratories contracted by the national authority to perform the sampling and measurements of samples stemming from the national environmental radioactivity monitoring programme, the *RWS WD*-Environmental Radioactivity Laboratory for surface water samples and the *RIVM*-Bilthoven radiological laboratory for air and soil monitoring, were visited. Spot checks on archived data were made in the laboratories in order to verify the procedures for data management and archiving.

The Dutch National Radioactivity Monitoring Network (*NMR*) measures

- airborne alpha and beta activity concentrations and ambient dose rates under routine and emergency conditions (done under contract and control by *RIVM*).

  This task is realised by a dense network consisting of 153 ambient dose rate monitors and a sparse network consisting mainly of 14 alpha/beta air monitors.

- waters and sediments.

  This task is done by the *Rijkswaterstaat Waterdienst* (*RWS WD*; *Rijkswaterstaat* Centre for Water Management).

- various foodstuffs.

The Institute of Food Safety monitors radioactivity e.g. in milk on a weekly basis via the National Monitoring Network for Radioactivity in Food and Feed (*Landelijk Meetnet Radioactiviteit in Voedsel*, *LMRV*).

4.2. VERIFICATION ACTIVITIES

4.2.1 Air and dose rate monitoring

The team verified the dense network gamma dose rate probe at Elst which is installed on the premises of the local fire brigade (as are most of the 153 devices installed in the Netherlands). The team was shown the measurement values of the day of the verification. The team witnessed such a device also at *RIVM* Bilthoven. The team was informed that calibration and control checks are performed at each site by NRG Petten.

Verification does not give rise to recommendations.

With regard to the sparse network the team visited the stations at *Keuring Electrotechnisch Materieel Arnhem* (*KEMA*) on the same campus as NRG-Arnhem, and at *RIVM*-Bilthoven. The station at *KEMA* contains a dose rate monitor and an air monitor, the one at *RIVM* additionally an iodine monitor, a high resolution gamma spectrometric air monitor, a high volume air sampler and a precipitation sampler. Concerning dose rate, the team observed that the probes were mounted on the flat roof of the housing of the station at a height of 1 metre above the roof and about 3.5 metres above the soil surface.

The verification team suggests discussing the installation of the ambient dose rate probes (i.e.: the possibility to install the probes at one meter above soil or above a large flat surface without any obstacles).

With regard to the other facilities verification does not give rise to recommendations.

4.2.2 Data centre at *RIVM*

The National Radioactivity Monitoring Network uses a central system to collect and display the automatic measurement data and to alert the users in case of elevated radiation levels, including the MONET network. The system is made up of two servers in a cluster configuration. A back-up system automatically takes over in case of a malfunction in the operational system. The verification team received a comprehensive presentation of the system.

Verification does not give rise to recommendations

4.2.3 Emergency monitoring provisions

The verification team was informed that during emergencies the number of nuclide specific measuring possibilities is increased by the activation of nine so-called 'pilot-flame' institutes, located all-around the country, and with two mobile measuring vans. The emergency measurement programme is co-ordinated by *RIVM*. The team witnessed the two vans equipped with hand-held monitors and a high purity germanium gamma spectrometry system. These vans also contain sampling equipment, a power generator, on-line data communication with *RIVM* and a GPS.

RIVM also has some mobile solar powered dose rate meters to be used where appropriate.

Verification does not give rise to recommendations.

4.2.4 *RWS WD*-Monitoring Programmes (waters and sediments)

Within the National Radioactivity Monitoring Network waters and sediments are dealt with by monitoring programmes of the *Rijkswaterstaat Waterdienst* (*RWS WD*; *Rijkswaterstaat* Centre for Water Management).

Verification does not give rise to recommendations.

4.2.5 Foodstuffs sampling programme

RIKILT (*Instituut voor Voedselveiligheid;* Institute of Food Safety) is a Dutch independent scientific organisation that carries out radiological analyses on grass and milk over the country, however not in the vicinity of the Borssele-NPP by setting up an appropriate sampling and measuring network (*Landelijk Meetnet Radioactiviteit in Voedsel, LMRV)*. *LMRV* is a monitoring network that in principle is set up as an emergency network for monitoring relatively high contamination levels. It consists of 70 '*Voedselmonitors*' (foodstuff monitors with NaI(Tl) detector and Marinelli beaker as measurement geometry) of which 24 are stationed at dairy factories.

The verification team witnessed one such monitor at the premises of *RWS WD*-Lelystad

5 LABORATORIES INVOLVED - VERIFICATION

5.1. THE OPERATOR'S LABORATORIES FOR DISCHARGE SAMPLES

The verification team was informed that the chemical laboratories are staffed with six technicians (five technicians are available in the Radiation Protection Department), both, for work in the 'warm' and in the 'cold' laboratory.

The team received explanations of sample preparation methods procedure management. It noted the high level of quality control and management.

Verification does not give rise to recommendations.

5.1.1 The 'Radiation Protection Counting Room'

The verification team visited the Radiation Protection Counting Room which is located in the controlled area. It is also used by the Department of Chemistry that measures stack samples here.

The team was impressed by the technical expertise of the staff, in particular with regard to gamma spectrometry.

Verification does not give rise to recommendations.

5.1.2 The Chemistry Department 'Warm' Laboratory

The verification team was shown the Chemistry Department's 'Warm' Laboratory, where gross gamma measurements on liquid discharge samples and low energy beta emitter determinations are performed.

In particular, the team received explanations of sample preparation for tritium and C-14 analysis from ventilation stack air samples using zeolite. It was told that also all German NPPs use this method.

The verification team encourages co-operation with partners e.g. in Germany with a view to improve quality and reliability of the zeolite method.

5.1.3 The Chemistry Department 'Cold' Laboratory

The verification team was shown the Chemical Department's 'Cold' laboratory and was explained its tasks and procedures. It could verify all measuring devices in use.

With regard to discharge samples the laboratory is responsible for gamma spectrometric measurements on samples from the discharge tanks.

With regard to measurement result handling for values below minimum detectable activity the rule *KTA 1504* (*Kerntechnischer Ausschuss*) is applied, the procedure being agreed with the authority. The verification team notes that this procedure is in discrepancy with Commission Recommendation 2004/2/Euratom of 18 December 2003 on standardised information on radioactive airborne and liquid discharges into the environment from nuclear power reactors and reprocessing plants in normal operation.

The verification team suggests studying in depth the differences between using KTA 1504 rules and Commission Recommendation 2004/2/Euratom, in particular with regard to reporting discharge data to the EC.

5.2. LABORATORIES CONTRACTED BY THE OPERATOR

NRG-Petten (discharges samples), AREVA Erlangen, Germany (discharge samples), and NRG-Arnhem (environmental samples) are laboratories contracted by the operator. The first two were not included in the verification.

The verification team verified the Environmental Radioactivity Laboratory belonging to NRG-Arnhem, in particular equipment, data handling and quality management.

Verification does not give rise to recommendations.

5.3. THE REGULATOR'S LABORATORIES

5.3.1 Environmental Radioactivity Laboratory of *RWS WD* Lelystad

The verification team visited this environmental radioactivity measuring laboratory, which is responsible for analysis of environmental samples from seawater, surface water and sediments. Three persons are working in the lab in the frame of the national monitoring programme. The team concentrated on measuring equipment, data handling and quality management. It was informed that the laboratory has ISO 17025 accreditation for some of the analysis methods and that for others the accreditation process is ongoing.

Verification does not give rise to recommendations. The team encourages the ongoing additional accreditations.

5.3.2 *RIVM*

The Dutch National Institute for Public Health and the Environment (*RIVM*) is formed as an agency, under the responsibility of the Ministry of Public Health. Approximately two thirds of its work is commissioned by the Ministry of Public Health, the rest by the Ministry of the Environment (*VROM*), which includes tasks for the nuclear inspectorate.

The verification team was told that currently funding is reasonable but there is a staffing issue. Co-operation with universities is possible in some areas but not in the field of radioactivity measurements due to the necessary confidentiality.

At the time of the verification visit the law establishing the institute has given wide independence: The government has no right to interfere with how work is done. The verification team was told that a law that has been recently proposed may decrease the number of civil servants (including *RIVM* personnel) and may reduce the institute's independence in technically fulfilling its tasks in the future.

The verification team strongly recommends guaranteeing the necessary independence of RIVM in fulfilling all its tasks.

All radiological tasks including analyses of radioactivity in various media are performed in the Laboratory of Radiation Research (*Laboratorium voor StralingsOnderzoek*, *LSO*) of the institute. *LSO* employs five staff. The verification team verified the facilities and received a comprehensive explanation of the methods used. It notes that the use of Uninterruptible Power Supplies (UPS) for securing electric power is planned. The laboratory has ISO 17025 accreditation for some of its analysis methods; for additional ones accreditation is planned.

With regard to measuring equipment the verification does not give rise to general recommendations. The use of UPS devices to increase power security is encouraged.

Concerning reporting, verification does not give rise to recommendations.

Concerning quality assurance, the verification team encourages all efforts to have accreditation according to ISO 17025 in as many areas as necessary for fulfilling the radiological monitoring tasks.

6 CONCLUSIONS

All verification activities that had been planned were completed successfully. In this regard, the information supplied in advance of the visit, as well as the additional documentation received during and after the verification activities, was useful.

The information provided and the verification findings led to the following conclusions:

(1) The verification activities that were performed demonstrated that the facilities necessary to carry out continuous monitoring of levels of radioactivity in the air, water and soil around the site of the Borssele NPP as well as on the territory of the Netherlands are adequate. The Commission could verify the operation and efficacy of a representative part of these facilities.

(2) Independence of all regulatory bodies is an important issue and should be granted, in particular with regard to controlling the operator's discharge monitoring system.

(3) A number of topical recommendations and suggestions are formulated. These aim at improving some aspects of discharge monitoring from, and environmental surveillance around the Borssele NPP site and the national monitoring system. They do not discredit the fact that environmental monitoring around the NPP site as well as the verified parts of the national monitoring system for environmental radioactivity are in conformity with the provisions laid down under Article 35 of the Euratom Treaty.

(4) The Commission services having competence will closely follow up the progress made by the Dutch authorities with respect to points (2) and (3).

(5) Finally, the verification team acknowledges the excellent co-operation it received from all persons involved in the activities it performed.

****

[signed]

C. GITZINGER

Team Leader