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DIRECTORATE-GENERAL ENERGY & TRANSPORT  
Directorate H – Nuclear Energy  
**TREN.H.4 – Radiation Protection**

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## **Main Findings of the Commission's Article 35 verification in Romania**

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### **CERNAVODĂ – NPP AND THE NATIONAL NETWORK IN SOUTH-EASTERN ROMANIA**

#### **ROMANIA**

**Date:** 04 to 12 June 2007

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## 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 <sup>(1)</sup>.

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.

The main purpose of verifications performed under Article 35 of the Euratom Treaty is to provide an independent assessment of the adequacy of monitoring facilities for levels of environmental radioactivity on the territory of the Member State.

From 4 to 12 June 2007 a verification team from DG TREN visited the site of the Cernavodă nuclear power plant and various environmental radioactivity monitoring and measuring sites located in the south-eastern part of Romania (Dobrogea region). The Horia Hulubei National Institute of Research and Development in Physics and Nuclear Engineering (IFIN-HH) at Măgurele was also visited. The verification also comprised a control of radiological monitoring of food imports.

The present document contains the results of the verification team's review of relevant aspects of all these issues.

The visit also included meetings with representatives of various national authorities having competence in the field of radiation protection. An opening meeting was held, with all parties involved during the visit, on the premises of the National Commission for Nuclear Activities Control (CNCAN).

The purpose of the review was to provide independent verification of the adequacy of monitoring facilities for:

- Discharges of radioactivity into the environment.
- Levels of environmental radioactivity at the site perimeter and in the terrestrial and aquatic environment around the site, for all relevant exposure pathways.

With due consideration of the scope of the verification and taking into account the relatively short time available for the execution of the programme, it was agreed that emphasis would be put on:

- The operators' (Cernavodă-NPP and IFIN-HH) monitoring and control facilities for gaseous and liquid discharges of radioactivity into the environment.
- The implementation of the statutory environmental radioactivity monitoring programme as performed by the operators (Cernavodă-NPP and IFIN-HH) and by the regulator.
- The operator's (Cernavodă-NPP and IFIN-HH) effluent laboratories including aspects of quality assurance and control as well as document control.

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<sup>1</sup> Council Directive Directive 96/29/EURATOM of 13 May 1996 laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation. (Official Journal L 159, 29.6.1996, p. 1-114)

- The national environmental monitoring programme as established by the competent authority in the south-eastern part of Romania (Dobrogea region), including sampling and measurements.

Recommendations are addressed to the Romanian competent authority.

## 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 CERNAVODĂ NPP DISCHARGE MONITORING

#### 1.1. Liquid discharges

The verification team visited the liquid effluent monitoring arrangements in Unit 1 of Cernavodă NPP. Arrangements in Unit 2 are identical to Unit 1. The system consists of both on-line monitoring and sampling. Waste waters are collected in five discharge tanks, each tank with a capacity of 50 m<sup>3</sup>. Tanks TK1 and TK2 contain water with "high activity".

A one litre sample is taken before each tank discharge for analysis in the chemistry laboratory. Samples are taken from a single sampling point with individual sampling lines to each tank.

However,

- 1.2. the verification team noted that there were no clear tank labels on the sampling line valves, so the sample could accidentally be taken from a wrong tank.

*The verification team suggests the discharge tank sampling line labelling be improved in order to avoid sampling from the wrong tank.*

#### 1.3. Airborne discharges

The verification team visited the monitoring facilities for airborne discharges (GEM) at the Cernavodă Unit 2 stack D20.

Sampling is carried out continuously by an isokinetic sampling system from the exhaust duct. Samples are monitored for particulates, radioiodine and noble gases. GEM monitors alarm when predefined release levels are exceeded. All systems in Unit 2 are new and in very good condition. It should be noted that the gaseous discharge monitoring arrangements are not identical in Units 1 and 2 since the systems have different manufacturers. However, the team was informed that the systems in the older Unit 1 will be upgraded to an identical standard with the new Unit 2.

*The verification activities performed do not give rise to particular remarks.*

#### 1.4. Control room

The verification team visited the Unit 1 control room. The chief supervisor informed the verification team how data from the gaseous and liquid effluents are gathered and monitored.

*The verification activities performed do not give rise to particular remarks.*

### **1.5. Dosimetry laboratory**

The verification team visited the Unit 1 dosimetry laboratory, which is responsible for all laboratory measurements of the NPP operator monitoring programme. The dosimetry laboratory measures the activity of approximately 700 discharges from liquid effluent monitoring system tanks every year. The dosimetry laboratory measures the activity of the GEM system sampling filters. The particulate filters are measured by gamma spectrometry and alpha/beta-counting. The iodine filters are measured by gamma spectrometry.

The verification team visited the laboratory where it checked:

- The presence of working instructions (sample management).
- The adequacy of measurement systems, including calibration and quality control procedures.
- Document control procedures (data management and filing systems).

*The verification activities performed do not give rise to particular remarks.*

## **2 CERNAVODĂ NPP ENVIRONMENTAL MONITORING PROGRAMMES**

### **2.1. "On-site" environmental radioactivity monitoring**

The verification team was informed that the on-site environmental monitoring is done by the Environmental Control Laboratory, the Dosimetry Laboratory and by the Operation Division. The internal procedures for sampling, preparation and measurements of samples are developed by each designated group.

#### **2.1.1 Air and groundwater sampling; dose and dose rate measurement**

The verification team noted that gamma radiation is only measured with TLD devices at several locations leading to integrated dose results.

However,

**2.1.2** no continuous automatic system for dose rate monitoring covering the perimeter around the NPP is available.

*For air and groundwater sampling, the verification did not give rise to recommendations. The verification team recommends exploring the possibility to set up an automatic on-line dose rate monitoring system that continuously would transmit values to a central location.*

### **2.2. "Off-site" environmental monitoring programme**

The NPP operates a continuous off-site monitoring system, including thermoluminescence dose monitors (TLD) in selected locations situated outside the plant perimeter in so called "indicator stations". Additionally, in various locations different types of samples are taken. The off-site monitoring has a perimeter of 30 km. Samples are measured in the NPP's laboratory for environmental sample analysis in Cernavodă town.

### **2.2.1 Air, precipitation, surface water, soil, sediment, milk, dose and dose rate monitoring**

The verification team was informed that formerly a *Reuter Stokes* dose rate monitor had been available; however this device is not any more operable. Currently it is foreseen to buy a system of automatic ambient gamma dose rate probes (in a first phase four devices, later on to be extended to ten) for an area of some 10 km around the NPP with data communication to the NPP and the NPP's Environmental Control Laboratory.

*For air, precipitation, river water, soil and sediment, as well as milk sampling, the verification did not give rise to recommendations.*

*The verification team encourages the plans for installing an automatic on-line ambient dose rate monitoring system in the surroundings of the NPP.*

### **2.3. CERNAVODĂ NPP – Environmental control laboratory**

The verification team visited the environmental control laboratory of the Cernavodă NPP, situated in Cernavodă town, near the town centre. The laboratory is responsible for the implementation of the Environmental Radioactivity Monitoring Programme at Cernavodă NPP. Altogether 8 persons work in the lab (2 engineers, 5 technicians, one person for sampling). Every staff member is trained on every task performed but has his specialty. Through-put of the laboratory is about 1000 samples per year. The laboratory is spacious, well kept and very orderly.

The verification activities performed at the laboratory:

**2.3.1** Established that the laboratory is well equipped and staffed with adequately trained personnel.

**2.3.2** Established that quality assurance and control is implemented through a compilation of written procedures and working instructions.

*Verification does not give rise to recommendations.*

### **2.4. CERNAVODĂ NPP – Independent Control by the Regulator**

#### **2.4.1 CNCAN environmental laboratory in Afumați**

The verification team visited the CNCAN environmental laboratory in Afumați, close to Bucharest.

##### **2.4.1.1 Staffing of the laboratory**

There are 15 persons working in the extended emergency organisation in the case of a possible radiological accident.

However,

**2.4.1.1.1** only five of these persons (plus one suspended position) are working in the Section for Radiation Emergencies, performing routine activities in CNCAN's emergency response centre. From these five persons, three are directly involved in performing environmental radioactivity measurements.

*The verification team recommends ensuring that enough qualified personnel is available in CNCAN's Section for Radiation Emergencies, in order to be able to manage the specific radioactivity analysis on the environmental samples, measurements necessary for a good control of the NPP.*

#### **2.4.1.2 Radiation measurement equipment**

The laboratory has an old HPGe-detector (*Canberra*, 30% efficiency) for gamma measurements.

However,

2.4.1.2.1 the laboratory does not have a routine for regular control of the energy, resolution and efficiency calibrations of the HPGe detectors in order to ensure stability of the systems.

2.4.1.2.2 at the moment of the visit the laboratory was not able to perform gamma spectroscopy due to liquid nitrogen supply problems.

2.4.1.2.3 the calibration standards in use are *Amersham* Marinelli and Petri dish sources from 1996. CNCAN's staff emphasized the need to have new sources.

*The verification team advises CNCAN to ensure regular liquid nitrogen supply to the laboratory with appropriate back-up arrangements.*

*The verification team advises CNCAN to purchase new calibration sources and establish a regular control programme for HPGe detector energy, peak width and efficiency calibrations.*

#### **2.4.1.3 Mobile systems**

The laboratory has a Phare-funded *Nissan Pathfinder* monitoring vehicle equipped with an in-situ gamma spectrometer (*Canberra*) and portable dose rate meters (*RADIAGEM 2000*, *Automess*, *Eberline*). There is a plan to install a new mobile NaI(Tl) detector with GPRS data transfer.

However,

2.4.1.3.1 the laboratory personnel has so far received no training for mobile measurements.

*The verification team recommends CNCAN to carry out training on mobile measurements for a sufficient number of staff members.*

#### **2.4.1.4 Quality assurance**

CNCAN's laboratory is not accredited, but the team was informed that it is in process of accreditation. The verification team took note of the CNCAN laboratory and emergency group quality manual dating from the year 2005.

The laboratory has participated between 1996 and 1997 in intercomparison exercises with Cernavodă NPP on C-14 measurements in vegetable and fruit samples.

In 1996 and 1997 it participated in intercomparisons with the Institute for Meteorology and Hydrology on tritium measurements in ground water samples.

For gamma spectrometry the laboratory has participated in the past in IAEA intercomparisons on environmental sample measurement.

*The verification team supports the intercomparison activity and CNCAN's work towards accreditation according to ISO 17025 for all analytical tasks.*

#### **2.4.2 The Survey Station for Radiological Monitoring (SSRM) in Cernavodă**

The National Environmental Radioactivity Surveillance Network (NERSN) is made up of the Reference Laboratory for Radioactivity (NRL) of the National Environmental Protection Agency (NEPA) at Bucharest and the Survey Stations for Radiological Monitoring (SSRMs) of the various Local Environmental Protection Agencies (LEPAs) that themselves are controlled by NEPA.

SSRM Cernavodă (that itself is part of LEPA Constanța), SSRM Constanța, SSRM Călărași and SSRM Slobozia, under the co-ordination and participation of NRL, are performing a monitoring programme in the influence area of Cernavodă NPP.

NERSN's local environmental monitoring laboratory at Cernavodă is a laboratory on 24 hours duty that strictly follows its daily programme (normal for national monitoring tasks and special for NPP related tasks). In this laboratory all data are archived on paper only.

The verification activities performed at this analytical laboratory:

**2.4.2.1** Established that quality assurance and control is implemented through a compilation of written procedures and working instructions.

**2.4.2.2** Established that the laboratory is satisfactorily equipped and staffed with adequately trained personnel.

However,

**2.4.2.2.1** no H-3 determinations are made in milk samples. This formerly was done by NEPA in Bucharest but there the oxidizer broke down. Air samples are measured for gross beta activity at location; for gamma spectrometric analysis they are transported to SSRM Constanța, then (together with other samples) all are sent to the NEPA laboratory in Bucharest.

**2.4.2.2.2** the verification team was informed about original intentions to operate a high resolution gamma spectrometry system in this laboratory. Currently all samples that have to undergo gamma spectrometric analysis are sent to SSRM Constanța.

*The verification team recommends setting up a routine programme for H-3 measurements in this laboratory, at Cernavodă, close to the NPP. It also recommends reconsidering to install a high resolution gamma spectrometry system in this laboratory with a view to avoid time delays due to transporting samples to SSRM Constanța.*



### **3 NATIONAL RADIOACTIVITY MONITORING**

#### **3.1. Ambient Gamma Dose Rate Monitoring Networks**

The verification team visited different gamma dose rate monitoring stations.

Data transmission from the 49 stations of the early warning network (relating to the Cernavodă NPP and the NPP at Kozloduy, Bulgaria) is currently performed by satellite; however for cost reasons NEPA wants to switch to GPRS. Three automatic stations have GPRS transmission (in test). Data are transmitted to servers; the devices have backups and are firewall protected. Data are sent to the EUROpean Data Exchange Platform (EURDEP). Under normal conditions the stations daily send a data package with 24 hourly average values. In alarm mode the transmission is changed to 5 minutes. The locations selected for detector installation were well chosen.

However,

**3.1.1** the detector tubes are generally mounted ca. 2 m above ground.

An 'old' system consisting of dose rate measuring devices at all SSRMs and manual data transfer to NEPA Bucharest is still used as a backup system.

Within a Phare project 39 stations (new network) with GSM/GPRS main transmission and satellite transmission were set up. Currently at NEPA Bucharest the data receipt and presentation facilities are in an installation phase. During the visit a technician from the German producer was working on it. The verification team was told that the system will be finished 'very soon'. Some detectors are mounted close to obstacles.

Data are validated at NEPA Bucharest.

However,

**3.1.2** they are not yet sent to the EUROpean Data Exchange Platform (EURDEP). The team was explained that data transmission to EURDEP is close to finalisation.

*The verification team encourages all efforts to transmit all relevant data to EURDEP. The verification team recommends completing and setting-up the 'new' system in an efficient and speedy way. The verification team also advises mounting gamma dose rate detectors everywhere at 1 m above ground in an area without obstacles.*

#### **3.2. National Environmental Radioactivity Monitoring Laboratories**

The National Environmental Radioactivity Surveillance Network (NERSN) is made up of the Reference Laboratory for Radioactivity (NRL) of the National Environmental Protection Agency (NEPA) at Bucharest and the Survey Stations for Radiological Monitoring (SSRMs) of the various Local Environmental Protection Agencies that themselves are controlled by NEPA.

### **3.2.1 NEPA central radiological laboratory at Bucharest**

The verification team visited the central NEPA laboratory (NRL) that had recently moved to the first floor of the building and at the time of the visit was in the process of renovation.

The radiation laboratory is not accredited yet according to ISO 17025 or certified according to ISO 9001 but intends to do so. The laboratory received construction authorisation in 2006 but is not yet 'notified' by CNCAN.

The verification activities performed at the analytical laboratory:

**3.2.1.1** Established that the laboratory is satisfactorily equipped and staffed with adequately trained personnel.

However,

*3.2.1.1.1* the team noticed that not all the measuring devices were in function at the moment of the visit.

*The verification team strongly recommends getting the laboratory fully operational as quickly as possible.*

**3.2.1.2** Established that quality assurance and control is implemented through a compilation of written procedures and working instructions.

*The verification team supports all efforts to receive accreditation according to ISO 17025 to the largest extent possible.*

### **3.2.2 NERSN laboratory at Afumați – Bucharest**

The verification team visited the Survey Station for Radiological Monitoring at Bucharest which is situated in Afumați, in the same premises as CNCAN's environmental laboratory that does work related to the regulatory control of nuclear facilities and their environment. Some equipment is used by both laboratories for sample preparation; some similar tasks are performed by the same persons for both laboratories.

The verification activities performed at this laboratory:

**3.2.2.1** Established that the laboratory is satisfactorily equipped and staffed with adequately trained personnel.

**3.2.2.2** The verification team was told that the Survey Station has all the records for calibrations since 1986.

However,

*3.2.2.2.1* they were not found at the working place during the verification visit.

*The verification team advises the laboratory to make available at the working place the calibration records for all the analytical scales as part of the quality assurance procedures.*

### **3.2.3 NERSN laboratory in Călărași**

The verification team visited the measuring and monitoring station in Călărași, situated in the premises of the Local Environmental Protection Agency.

For radiological sampling and measurement tasks two persons of altogether 33 to 34 are available. The whole agency employs no physicist. The team was told that in case of problems one would be needed. Currently such a person would have to come from Bucharest or Constanța; in case of an emergency this is seen as doubtful.

The laboratory operates on an 11-hour duty basis. It has the normal (standard) programme based on a ministerial order and special programmes relating to Cernavodă NPP which are updated once per year.

*The verification team suggests exploring the possibility of employing a knowledgeable physicist for tasks associated with the whole local environmental protection agency.*

### **3.2.4 NERSN laboratory in Slobozia**

The verification team visited the NEPA laboratory in Slobozia, which handles a large amount of environmental radiation monitoring samples (on average a total of 160 samples per month). There are three people employed for the radiological measurements.

The radiation laboratory is not accredited yet according to ISO 17025 but intends to do so.

The verification activities performed at the analytical laboratory:

**3.2.4.1** Established that the laboratory is satisfactorily equipped and staffed with adequately trained personnel.

*The verification did not give rise to recommendations; the team encourages accreditation according to ISO 17025.*

### **3.2.5 NERSN laboratory in Constanța**

The verification team visited the laboratory situated in the building of the Regional Meteorological Agency.

The laboratory is a 24 hr duty station with five persons working in shifts. The lab also performs gamma spectrometry on samples from other NERSN stations (Slobozia, Călărași, Cernavodă, Tulcea, Sfântu Gheorghe, the high mountains stations and Moldovian stations), some of them in context with the monitoring of the Cernavodă NPP.

The verification team was informed that in total around 1100 samples are measured annually. At the time of the visit the laboratory used only one gamma spectrometer for measurement, a second one was under installation.

The radiation laboratory is not accredited yet according to ISO 17025 but intends to do so.

*The verification team encourages accreditation according to ISO 17025.*

*The team suggests checking if the available equipment and number of personnel is sufficient for performing all gamma spectrometric measurements as currently foreseen.*

### **3.3. Constanța Public Health Authority**

Constanța Public Health Authority (under authority of the Ministry of Public Health) is the implementing body for the national public health programme at local level. It operates a radiation hygiene laboratory, covering Constanța and Tulcea districts.

It provides assistance to Constanța harbour by giving advice with regard to food, consumer product and building material control.

An agreement between ANSVSA (*Autoritatea Națională Sanitară Veterinară și pentru Siguranța Alimentelor*; National Sanitary, Veterinary and Food Safety Authority) and the Health Ministry is foreseen for the near future in order to define the kind of assistance to be provided. ANSVSA does not have a well equipped laboratory of its own; necessary measurements could be performed in the laboratory of the Public Health Authority at Constanța.

*The verification team strongly recommends setting up a stable co-operation between all authorities involved in food control at customs. It strongly encourages formalising this by defining and distributing tasks and responsibilities. Protocols and procedures should be developed and regular exercises should be held in this context.*

### **3.4. Foodstuffs monitoring by ANSVSA (*Autoritatea Națională Sanitară Veterinară și pentru Siguranța Alimentelor*; National Sanitary, Veterinary and Food Safety Authority)**

The verification team visited the central laboratory of ANSVSA in Bucharest. The laboratory is situated in an old building. The laboratory consists of several measurement rooms. Only two persons work in the laboratory.

The laboratory has a low resolution NaI(Tl) and a high resolution HPGe gamma spectrometry system.

However,

**3.4.1** the verification activities performed at the analytical laboratory established that:

The laboratory staffed with only two persons, is situated in an old building and is only poorly equipped.

The verification team was informed that the laboratory had had supply problems for liquid nitrogen which is necessary for cooling some of the detectors.

Due to lack of funds the laboratory has only rarely an opportunity to participate in intercomparison exercises and emergency exercises.

*The verification team points out that the laboratory would benefit from a new and modern laboratory facility especially constructed for radioactivity measurements.*

*The verification team suggests ensuring that enough trained persons are available to be able to manage the measurement workload, also during holiday periods.*

*Verification points out that in order to ensure measurement capability it is important to have a reliable source of liquid nitrogen, preferably with back-up arrangements.*

*As a matter of good laboratory practise, the verification team advises the ANSVSA's laboratory to seek opportunities to participate in international intercomparison exercises.*

### **3.5. Marine monitoring by the National Institute for Marine Research and Development, "Grigore Antipa"**

The radiological laboratory of the national marine institute functions according to a CNCAN notification. The laboratory has only very little involvement in the national routine monitoring,

*The verification team suggests involving the laboratory closer in the national routine monitoring programme for environmental radioactivity, with respect to marine samples. To fulfil such a task, according staffing and supply with equipment have to be warranted.*

### **3.6. Food import control by the Romanian Customs**

#### **3.6.1 Harbour Facilities**

The verification team visited the customs control facilities and the associated laboratory in the main Black Sea Harbour of Romania in Constanța.

The verification team verified also the container radiation monitoring system installed at the customs container X-ray inspection facility. The verification team noted that the radiation measurement system is installed as a separate subsystem in the same facility with the container X-ray investigation system. The number of measured trucks is around 500 per month. This means that only some 10% of the containers transported through the harbour are actually monitored for radioactivity.

*The verification team points out that a more effective location for the radiation monitoring systems would be at the harbour exit, where it could facilitate radiation monitoring of all containers leaving the harbour area.*

#### **3.6.2 Sanitary Veterinary and Food Safety Directorate laboratory at Constanța**

Currently only one laboratory is involved in the measurement of food imports at the main Romanian harbour at Constanța. The verification team visited the laboratory of the Sanitary Veterinary and Food Safety Directorate for measuring samples taken by the customs in Constanța.

##### **3.6.2.1 Radioactivity measurements**

Radioactivity measurements are carried out with a lead-shielded NaI(Tl) spectroscopy system. An HPGe system is being considered.

*The verification team encourages installation of a high resolution gamma spectrometry system with adequate quality assurance measures and staffing.*

#### **4 "HORIA HULUBEI" NATIONAL INSTITUTE OF RESEARCH AND DEVELOPMENT IN PHYSICS AND NUCLEAR ENGINEERING (IFIN-HH)**

IFIN-HH is located in Magurele town, in the south-east part of Bucharest. The institute is under the coordination of the Ministry of Education, Research and Youth, National Authority for Scientific Research.

IFIN-HH has as main nuclear facility, a *VVR-S* research reactor, currently not operating but in conservation. Upon a Governmental Decision, in April 2002, the *VVR-S* reactor was shutdown permanently for decommissioning. For this purpose, a detailed plan has been submitted to CNCAN for approval.

In the neighbourhood of the *VVR-S* Research Reactor facility the following research and production units are situated:

- Radioisotopes Production Centre (3 buildings);
- Radioactive Waste Management Department (5 buildings);
- Detectors Laboratory of Nuclear Physics Department (2 buildings);
- Heavy-Ions Van de Graaff-Tandem Accelerator;
- Subcritical assembly Zero-Power Nuclear Reactor;
- Thermal Plant (4 buildings).

##### **4.1 Research and Radioisotopes Production Centre Department**

The verification team visited the Research and Radioisotopes Production Centre Department, in particular with a view to see the facilities dealing with radioactive waste and the measuring laboratories involved in monitoring. The team was informed that currently sealed sources of Co-60 and radium (up to 100 Ci) and I-131 for nuclear medical applications are produced. This leads to some 80% of the discharges of the institute.

The Nuclear Reactor has not discharged liquid effluents to the Radioactive Waste Management Department since 2002, and this department does not discharge liquid effluents to the Ciorogârla River.

*With regards to discharge monitoring the verification does not give rise to recommendations.*

##### **4.2 Solid radioactive waste management**

Solid radioactive waste is managed using the existing Radioactive Waste Treatment Plant on site and the National Repository for Radioactive Waste at Băița Bihor. Both are to be refurbished.

The verification team was shown the site where old, corroded waste drums are managed. Their use has been stopped, and the old 200 l drums are placed into new 420 l drums; the drums are filled with cement.

The old drums storage hall contains some 100 to 150 drums. Tests are performed by measuring gamma dose rate at surface and at 1 m distance. After placing in the 420 l drum a gamma spectrum is obtained using an ORTEC device, giving information on gamma

activity and – by detection of activation products – on neutron emitters. The team was informed that until now such neutron emitters have not been found.

*With regards to solid waste management the verification does not give rise to recommendations.*

#### 4.3 Environmental radioactivity monitoring programme

The team was explained that a site-related environmental radioactivity monitoring programme is in place taking into account emissions under normal operation, meteorology and hydrology of the Magurele area, as well as significant exposure pathways. Annually all measurement data are sent to CNCAN.

*With regards to environmental radioactivity monitoring the verification does not give rise to recommendations.*

#### 4.4 Research and Radioisotopes Production Centre Department

At the Research and Radioisotopes Production Centre Department the verification team was shown discharge related facilities and the associated laboratory.

*With regards to discharge monitoring the verification does not give rise to recommendations.*

The verification team visited the laboratory managing all discharge samples from the Research and Radioisotopes Production Centre Department. The verification team acknowledges the paper archive of the laboratory. Spectra from 2003 onward are stored; but archiving is not systematically done. All gamma spectra are kept in paper format.

However,

4.4.1 the PC is not connected to the network and only the most important spectra (from 2003 onwards) are recorded on diskettes.

*The verification team recommends building up a proper electronic and systematic archiving system.*

#### 4.5 Life and Environmental Physics Department's laboratory

The verification team was informed that in the Life and Environmental Physics Department's laboratory, measurements on two types of samples of the environmental and the discharge monitoring programme of IFIN-HH are performed as well as on other samples coming from institutions with which IFIN-HH has a contract.

The department also manages most of the sampling tasks and operates sampling devices.

Measurement results, detection limits, MDA values and uncertainty values are recorded in ledgers according to procedures. An analysis bulletin is issued on the basis of the measurement results on separate PCs using Excel spreadsheets. Reports on the analysis of the environmental samples are submitted monthly to a special department at IFIN-HH and annually to CNCAN.

The laboratory performs regularly calibration of its laboratory equipment.

## 5. CONCLUSIONS

All verifications that had been planned by the verification team 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, was useful.

- (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 Cernavodă nuclear power plant site as well as the verified parts of the national monitoring system for environmental radioactivity and of the food import control facilities are adequate. The Commission could verify the operation and efficiency of these facilities.
- (2) A number of topical recommendations are formulated. These recommendations aim at improving some aspects of discharge monitoring from, and environmental surveillance around the Cernavodă site and the national monitoring system. The recommendations do not discredit the fact that environmental monitoring around the Cernavodă 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.
- (3) The Commission services having competence will closely follow up the progress made by the Romanian authorities with respect to point (2).
- (4) Finally, the verification team acknowledges the excellent co-operation it received from all persons involved in the activities it performed.

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*[signed]*

C. GITZINGER

Team Leader