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

Ignalina nuclear power plant

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INTRODUCTION

Article 35 of the Euratom Treaty requires that each Member State shall establish the 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.

Article 35 also gives the European Commission 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:

- Liquid and airborne discharges of radioactivity into the environment by a site (and control thereof).
- Levels of environmental radioactivity at the site perimeter and in the marine, terrestrial and aquatic environment around the site, for all relevant exposure pathways.
- Levels of environmental radioactivity on the territory of the Member State.

For the purpose of such a review a verification team from the European Commission visited, from 21 to 25 February 2005:

- The Ignalina nuclear power plant (hereafter Ignalina NPP) and its surrounding area.
- The Environmental Protection Agency of the Ministry of the Environment, located in Vilnius.
- The Radiation Protection Centre of the Ministry of Health, located in Vilnius.

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

- The operator's (Ignalina NPP) statutory monitoring and control facilities for liquid and airborne discharges of radioactivity into the environment.
- The operator's statutory environmental radioactivity monitoring programme.
- The operator's analytical laboratories for discharge and environmental samples, including aspects of quality assurance and control as well as document control.
- The independent discharge monitoring programme as performed by the competent authority (regulatory control).
- The independent environmental radioactivity monitoring programmes around the Ignalina site as performed by the competent authorities (check monitoring).
- The competent authorities' analytical laboratories for environmental samples, including aspects of quality assurance and control as well as document control.

The present report gives an overview of the main findings of the verification team and corresponding recommendations.

Recommendations are addressed to the Lithuanian competent authority, VATESI.

MAIN FINDINGS

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

1. Main findings with respect to the operator's radioactive discharge monitoring programme and related regulatory control

The verification activities performed at the facilities for monitoring and sampling of liquid and airborne discharges of radioactivity into the environment:

1.1 Confirmed the existence and functionality of monitoring and sampling facilities as defined in the regulatory obligations.

1.2 Confirmed that discharges of airborne radioactivity are monitored and sampled in general accordance with regulatory obligations.

Note: The verification team visited the location of the former discharge tanks with the aim to verify the provisions put in place to disable discharges of active process waters from the Ignalina NPP (since 1995). To that effect technical drawings were provided against which the team identified plant items and verified the actual layout of the plant.

The verification team could satisfy itself that routine discharges of active process waters from the Ignalina NPP are physically impossible.

1.3 Established that the monitoring and sampling facilities are in general adequate and that the sampling programme for airborne discharges is satisfactory.

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

However,

1.5 With respect to point 1.2 above, for airborne discharges, the verification team noted that, contrary to the provisions laid down in the legally binding national standard LAND 42-2001 that regulates the operation of nuclear facilities under normal conditions, the monitoring of Tritium and C-14 is not implemented.

It is recommended that the competent regulatory authority enforces the provisions for airborne discharge assessment for H-3 and C-14 as laid down in LAND 42-2001.

1.6 With respect to point 1.3 above, the verification team noted that the connection between sampling lines and sampling devices of the RKS-3 airborne discharges monitoring system is made with sections of transparent water hose. These sections are of considerable length (up to more than one metre) and bending radiuses are not controlled. Depositions of dirt were clearly visible within these connectors, despite the presence of HEPA filters upstream of the vent stacks. These depositions were of various kinds: not only adsorbed on the hoses' inner walls but also as loose particulate accretions. Consequently the verification team must question the representativeness of the samples collected.

It is recommended that the competent regulatory authority investigate, as a matter of urgency, the current design of the connectors between sampling lines and sampling devices to establish whether the representativeness of samples taken for the assessment of radioactive discharges is guaranteed or which correction factors need to be applied. It may be appropriate to install state-of-the-art connectors.

1.7 With respect to point 1.3 above, for airborne discharges, the verification team noted that the labelling of various plant items belonging to the sampling chains could be improved. Linking plant items to technical drawings could not always easily be established. This leaves room for quality assurance and control improvements.

It is recommended that the competent regulatory authority requests the operator, in the framework of general quality assurance and control, to improve the plant item labelling system for RKS-7 and RKS-3 so as to ensure unambiguous identification of the various components of the monitoring and sampling chains.

2. Main findings with respect to the operators' analytical laboratory for discharge samples and related regulatory control

The verification activities performed at the analytical laboratory for liquid and airborne discharges samples:

2.1 Established that the laboratory is well equipped and satisfactorily staffed with adequately trained personnel.

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

However,

2.3 With respect to point 2.2 above, the verification team took note of the procedures applicable to accounting and reporting of measurement results that are below detection limit. In this context the verification team should like to recall that the European Commission issued Recommendation 2004/2/Euratom[(1)] wherein substitution rules for values below the detection limit are presented. Such rules are proposed to avoid unnecessary over- or underestimation of discharged activities. These substitution rules are in line with ISO standard 11929-7:2005.

It is recommended that the competent regulatory authority considers the benefit of revising its regulatory requirements for substitution of analytical results below detection limit by bringing these requirements in line with Commission Recommendation 2004/2/Euratom and ISO standard 11929-7:2005.

2.4 With respect to point 2.2 above, the verification team noted that the laboratory does not participate in international intercomparison exercises. However, periodically the laboratory and the Lithuanian Institute of Physics undertake proficiency tests to compare results on samples of airborne releases from the Ignalina NPP.

It is recommended, in the framework of general quality assurance and control that the competent regulatory authority considers the benefit of requiring that the laboratory regularly participate in international intercomparison exercises.

3. Main findings with respect to the operators' environmental monitoring programme

The verification activities performed at the facilities for monitoring and sampling the environment on and around the Ignalina NPP site:

3.1 Confirmed the existence and functionality of most of the monitoring and sampling facilities as defined in the regulatory obligations.

3.2 Confirmed that the levels of radioactivity in the environment are monitored and sampled in accordance with regulatory obligations.

3.3 Established that the monitoring and sampling facilities are in general adequate and that the programmes of sampling are satisfactory.

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

However,

[1] Official Journal L 002, 06/01/2004 P. 0036 - 0046

3.5 With respect to point 3.1 above, the verification team noted that the environmental monitoring stations are not equipped with uninterruptible power supply systems. Continuous operation of these monitoring stations is not guaranteed.

It is recommended that the competent regulatory authority requests the operator to ensure continuous operation of its environmental monitoring stations by fitting these with uninterruptible power supply systems.

3.6 With respect to point 3.3 above, the verification team noted that the air sampling devices are not equipped with air flow meters. The air flow through the devices is estimated by recording the power consumption of the air pumps for each sampling period.

It is recommended that the competent regulatory authority requests the operator to improve the accuracy of the data obtained from its air sampling devices by fitting these with flow meters.

3.7 With respect to point 3.3 above, the verification team noted that the two systems in place for precipitation sampling are not satisfactory. The wet and dry deposition collector (open dish) suffers from inaccuracy due to uncontrolled evaporation of the sample collected. The device for filtering precipitation through a filter cloth only provides indicative results for combined wet and dry deposition. A representative sampling and assessment of rain water as medium is not fully mastered.

It is recommended that the competent regulatory authority requests the operator to set up a sampling system that effectively collects rain water and to measure the samples obtained with the methodologies that are applied to other water samples.

3.8 With respect to points 3.3 and 3.4 above, the verification team noted that the off-site sampling stations as well as the sampling locations on-site are, in general, not adequately fenced-off. It is believed that restricted access (duly authorised personnel only) and physical protection are integral part of an appropriate quality assurance programme.

It is recommended that the competent regulatory authority considers whether requiring the operator to implement restricted access to and/or to put in place a physical protection of the various monitoring and sampling stations within the 30 km zone around the Ignalina NPP would be beneficial.

3.9 With respect to point 3.4 above, the verification team noted that the labelling of various monitoring and sampling systems and the devices being part of these systems could be improved. An adequate labelling for the purpose of identification and maintenance control are believed to be integral part of an appropriate quality assurance programme.

It is recommended that the competent regulatory authority requests the operator, in the framework of general quality assurance and control, to put in place an adequate labelling system for its environmental monitoring and sampling devices. Such a labelling system should ensure unambiguous identification as well as maintenance control of the various components of the systems.

3.10 With respect to foodstuff sampling, the verification team was informed that milk and meat sampling, both part of the statutory environmental monitoring programme, cannot be ensured at all times. It was stated that disruptions in the continuity of the sampling programme are due to lack of funds to purchase the samples from local producers.

It is recommended that the competent regulatory authority enforces the operator to provide such budgetary means that are necessary to maintain an adequate and representative number of milk (and meat) samples.

3.11 With respect to the environmental sampling programme in general, the verification team was informed about a probable future reduction, approximately by half, of the samples taken within the 30 km zone around the Ignalina NPP.

It is recommended that the competent regulatory authority ensures, in case it decides to reduce the scale of the statutory site-related environmental monitoring programme of the Ignalina NPP, that such a reduction does not negatively affect the adequacy and representativeness of the programme.

4. Main findings with respect to the operators' analytical laboratory for environmental samples and related regulatory control

The verification activities performed at the analytical laboratory for environmental samples:

4.1 Established that the laboratory is well equipped and satisfactorily staffed with adequately trained personnel.

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

However,

4.3 With respect to point 4.2 above, the verification team noted that although not accredited, the laboratory aims at working in compliance with ISO standards. It was also noted that the laboratory participates in international intercomparison exercises.

It is recommended that the competent regulatory authority considers the benefit, in the framework of general quality assurance and control, of requiring the laboratory for environmental samples of the Ignalina NPP to seek accreditation under ISO/IEC 17025.

It is recommended that the competent regulatory authority requires that the laboratory for environmental samples of the Ignalina NPP, as a matter of good practice, continues to regularly participate in intercomparison exercises and/or proficiency tests.

4.4 With respect to point 4.2 above, the verification team noted that the current procedures for quality assurance and control of the gamma spectrometry systems leave room for improvement. Indeed, the regular calibration checks address the

efficiency (cps) and location (keV) of the Cobalt peaks without, however, including peak width control (FWHM).

It is recommended that the competent regulatory authority requires the laboratory for environmental samples of the Ignalina NPP to strengthen its quality assurance and control capability over the gamma spectrometry systems by not only checking the efficiency (cps) and location (keV) of the Cobalt peaks in standard geometry, but also by including a systematic peak width control (FWHM). It is also recommended that such a system stability control procedure be performed on a weekly basis in order to allow for an efficient early identification of any detector degradation.

4.5 With respect to point 4.2 above, the verification team noted the absence of formal requirements regulating the storage/archiving of environmental samples after measurement results have been obtained. The decision for what time span samples need to be kept is left to the discretion of the operator.

It is recommended that the competent regulatory authority regulates the storage and release requirements for all types of samples that result from the Ignalina NPP environmental surveillance programme.

4.6 With respect to point 4.2 above, the verification team noted that sample information and corresponding analytical results are manually transferred into (and between) multiple electronic supports (word processors, spreadsheets, databases). This situation is insofar unsatisfactory as the risk of easily and unwittingly introducing clerical errors is clearly present.

It is recommended that the competent regulatory authority considers the benefit of requiring the operator to enhance its quality assurance and control capability over data handling through the implementation of electronically automated data transmission routines wherever relevant.

5. Main findings with respect to the Environmental Protection Agency of the Ministry of the Environment.

The verification activities performed at the Environmental Protection Agency (EPA):

5.1 Established that the Radiology Division Laboratory of the EPA is understaffed and insufficiently equipped.

5.2 Established that quality assurance and control is implemented through a compilation of written procedures and working instructions. The laboratory is not accredited but aims to comply with the ISO/IEC 17025 standard.

5.3 Established that the programme of activities performed by the laboratory, in the framework of the national environmental monitoring programme is, in theory, satisfactory.

Note: At the time of the verification visit it transpired that the Radiology Division Laboratory of the EPA was operating under precarious conditions. This had

apparently been induced by a lack of funding and the ensuing shortcomings in infrastructure and shortage of personnel.

This finding is further discussed in section 7 below.

5.4 With respect to point 5.2 above, the verification team acknowledged that the procedure in place for sample reception (registration and identification), although adequate for routine operations, is likely not to be robust enough to cope with situations wherein the number of incoming samples would significantly increase.

It is recommended, in the general framework of quality assurance and control, that the EPA laboratory reviews its sample receipt, identification and handling procedures with a view to ensure enough robustness of the system, especially for situations where the number of incoming samples would significantly increase.

5.5 With respect to point 5.2 above, the verification team noted that the gamma spectrometry system calibration checks are performed every quarter without however including detector stability or resolution control. This approach does not allow for an efficient early identification of detector degradation.

It is recommended, that a Co-60 calibration source be made available so as to allow a weekly control programme for the efficiency (cps), location (keV) and width (FWHM) of the cobalt peaks in standard geometry.

5.6 With respect to point 5.1 above, the verification team noted that the laboratory possesses only one functional but obsolete single chamber beta counter. This unduly restricts the laboratory's capacity for beta measurements.

It is recommended, that the laboratory increases its beta counting capacity to levels that are adequate for easily coping with the current monitoring programme as well as facing situations wherein the number of samples would significantly increase.

5.7 With respect to point 5.2 above, the verification team noted that the laboratory has participated in an intercomparison exercise.

It is recommended that the laboratory, as a matter of good practice, puts in place a schedule aiming at regularly participating in intercomparison exercises and/or proficiency tests.

6. Main findings with respect to the Radiation Protection Centre of the Ministry of Health.

The verification activities performed at the Radiation Protection Centre (RPC):

6.1 Established that the laboratory is equipped with state-of-the-art systems and staffed with adequately trained personnel.

6.2 Established that quality assurance and control documentation (written procedures and working instructions) are in place and that the laboratory is accredited to ISO 17025.

6.3 Established that the programme of activities performed by the laboratory, in the framework of the national environmental monitoring programme is satisfactory.

However,

6.4 With respect to point 6.2 above, the verification team was informed that in Lithuania the supply of liquid nitrogen depends on a single commercial source. The RPC laboratory, in case of supply shortage, has two possible back-up options that are the Ignalina NPP and a company in Poland. As a matter of quality assurance it is indicated that the laboratory should minimise the risk of loosing a part of its analytical capacity as a result of a supply disruption.

It would be welcomed if the RPC laboratory, in the general framework of quality assurance and control, should ensure that the risk of a disruption in its liquid nitrogen supply be kept at a minimum, especially in the case a radiological emergency situation would occur.

6.5 With respect to point 6.2 above, the verification team noted the absence of formal sample storage requirements and that the storage room has a relatively small capacity.

It would be welcomed if the RPC laboratory, in the general framework of quality assurance and control, should define a comprehensive set of criteria applicable to sample storage and/or release.

6.6 With respect to point 6.1 above, the verification team noted that the capacity of the laboratory to handle environmental samples is only partially exploited. This leaves room for a possible if not desirable redistribution of tasks and responsibilities between the RPC and the EPA, in particular where it concerns the implementation of the national environmental monitoring programme.

This finding is further discussed in section 7 below.

7. Other recommendations

7.1 <u>With respect to independent regulatory control of radioactive discharges</u>

The principal responsibilities attributed to VATESI are centred upon safety and security of nuclear installations, as well as licensing of these.

The Ministry of the Environment is in charge of issuing the discharge limitations for radioactive effluents from the Ignalina NPP.

The regulatory control whether the Ignalina NPP abides by these limitations is, however, within the remit of VATESI. Indeed, VATESI, through its on-site representative (inspector) requires the Ignalina NPP to daily transmit its discharge data for verification against regulatory limits. VATESI does however not validate these discharge data through an independent check monitoring and/or sampling and analysis programme[(2)]. VATESI's validation procedure is, as a matter of fact, restricted to the approval, control and follow-up of discharge-related Ignalina NPP

[2] The Ministry of the Environment does not implement such a programme either.

quality assurance documentation: a paper-based supervision without an effective and independent verification of the source term (the radioactive discharges).

This quality assurance documentation subjected to VATESI control encompasses, between others:

- The compulsory discharge monitoring and sampling programme.
- Operating procedures (working instructions) at plant and at laboratory level.
- Analytical methodologies used in the laboratory.
- Calibration results and maintenance reports of monitoring and sampling devices.
- Calibration results and maintenance reports of analytical equipment present in the laboratory.

Currently it is accepted good practice in the European Union that the regulator himself implements a systematic sampling and analysis programme on the discharges of radioactive effluents. To that effect the regulators may have their own sampling systems in place or have a co-operation agreement with the operator where the latter provides the samples (under random supervision of an inspector). Analysis of these samples is then done at the regulator's laboratory (or by a contractor) and results obtained are compared with those reported by the operator. This comparison then is the basis for validation of the operator's discharge data.

Furthermore, the regular transmission of the results of the regulator's samples to the operator may provide the latter with a valuable means of performing analytical quality assurance checks.

Therefore:

It is recommended that VATESI, in order to fully discharge itself from its responsibilities as a regulator having competence in discharge control, whilst maintaining its current control over aspects of quality assurance, puts in place a comprehensive and independent check monitoring programme on the discharges of radioactive effluents from the Ignalina NPP, in particular with respect to airborne discharges.

However:

A discharge check monitoring programme, in order to be in line with what is practised by most other Member States of the European Union, should be implemented by the Ministry regulating the discharge limitations.

It is therefore questioned, notwithstanding the recommendation formulated above, whether VATESI is the most effective choice, all the more since the principal domain of competence of VATESI lies with matters of nuclear safety and security. However, should VATESI maintain its control function over radioactive discharges, it may consider outsourcing the implementation of a check monitoring programme to a third party. Such an outsourcing should in every case be duly formalised with respect to the responsibilities of the parties involved.

Taking into account that the EPA operates under the Ministry of the Environment, the EPA naturally seems the most indicated body for the implementation of such a check

monitoring programme, be it on behalf of its sponsoring Ministry, be it on behalf of VATESI.

7.2 With respect to the distribution of responsibilities between the Environment Protection Agency and the Radiation Protection Centre

Both the Ministries of Health and the Environment have responsibilities in the implementation of the national environmental monitoring programme, respectively through the RPC (Radiation Protection Centre) and the EPA (Environmental Protection Agency). The EPA is an agency with regulatory duties whereas the RPC is a fully fledged regulatory body.

7.2.1 The EPA laboratory is poorly housed, lacks enough space to reasonably accommodate analytical equipment as well as personnel. The equipment used in the EPA is obsolete and mostly lacks back-up systems. Additionally, the laboratory has severe staff shortages.

Despite of this precarious situation the EPA has major responsibilities with respect to the implementation of the national environmental monitoring programme. These responsibilities encompass not only the radiological surveillance network and nuclear emergency preparedness, but also the implementation of a substantial part of the laboratory-based environmental monitoring (sampling of air, surface waters, soil and sediments).

The EPA furthermore centralises all data from the national radiological surveillance programme, data that are generated by the RPC and the Ignalina NPP (the latter providing data from within its sanitary protection zone). The EPA is charge of transmitting part of these data to the EC under the terms of Article 36 of the Euratom Treaty.

It is probable, in view of the above, that the laboratory is not always in a position to correctly carry out its activities. Also, there are no provisions made to facilitate a large number of incoming samples in an emergency situation. Should the number of incoming samples be higher that normal, the laboratory would most likely fail to carry out the measurements altogether.

Therefore:

It is recommended that the competent regulatory authorities, in order to remedy the precarious situation of the EPA, provide the necessary resources for the latter so as to ensure that it can correctly discharge itself from its responsibilities, especially in situations were a significantly increased number of environmental samples must be processed.

7.2.2 It is noted that the RPC runs a state-of-the-art laboratory that has the capacity to take over most - if not all - routine environmental sampling activities that are currently allocated to the EPA.

A redistribution of tasks between the RPC and the EPA, whereby RPC would take over those tasks of EPA that are not related to radiological surveillance and

emergency preparedness should generate scale benefits through the optimisation of human and financial resources.

It is believed that a full scope centralisation of the laboratory-based part (sampling and analysis) of the routine national monitoring programme within the RPC would create a more efficient surveillance system.

Therefore:

It is recommended that the competent regulatory authorities consider, taking into account the capacities of both the EPA and the RPC laboratories, the benefits of a redistribution of the tasks and responsibilities that are currently allocated to both laboratories within the national environmental monitoring programme.

CONCLUSIONS

8.1 The verification visit was successful and the objectives of the review were met. Within the remit of verification activities under Article 35 of the Euratom Treaty it has been demonstrated that the facilities necessary to carry out continuous monitoring of levels of radioactivity in the air, water and soil around the Ignalina NPP site and on the territory of Lithuania are adequate. The Commission could verify the operation and efficiency of these facilities.

8.2 However, some shortcomings were noted and lead to recommendations by the Commission to the Lithuanian competent authorities with the aim to achieve improvements. It should be noted that these recommendations do not discredit the fact that radiological environmental monitoring in Lithuania is generally in conformity with the provisions laid down in Article 35 of the Euratom Treaty.

8.3 The Lithuanian authorities would benefit from a review of the current roles attributed to the actors having operational and regulatory responsibilities in the field of radiation protection.

8.4 The Commission would appreciate being kept informed about the actions the Lithuanian competent authorities may undertake in the framework of the recommendations made.

8.5 Finally, the verification team acknowledges the excellent co-operation it received from all persons involved.

[signed]

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Team Leader