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

### **Slovenian Monitoring Network for Environmental Radioactivity**

#### **Krško Nuclear Power Plant (on- and off site)**

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**Date:** 12 to 16 June 2006

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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 the 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 different sites for monitoring environmental radioactivity and the Krško NPP site in Slovenia, from 12 to 16 June 2006. 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 Krško Nuclear Power Plant (on-site monitoring of environmental radioactivity and discharges).
- The environmental radioactivity monitoring programme in the surroundings of the Krško Nuclear Power Plant,
- The structure of the national environmental monitoring and sampling programme,
- The analytical laboratories.

The team carried out verifications of monitoring systems and sampling facilities at several locations in Slovenia. These verifications covered both on-line and off-line environmental and foodstuffs radioactivity monitoring provisions.

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

Recommendations are addressed to the Slovenian competent authority, the Slovenian Nuclear Safety Administration within the Ministry of the Environment and Spatial Planning.

## 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. Main findings with respect to the Krško Nuclear Power Plant – General issues and radioactive discharge monitoring**

The verification activities performed at the Krško Nuclear Power Plant:

- 1.1. Confirmed the existence and functionality of the environmental monitoring and sampling programme and established the existence of relevant equipment and procedures.
- 1.2. Established that the Slovenian Nuclear Safety Administration does not have sampling and measurement capabilities of its own. It therefore uses services of contractors selected through a tendering process.
- 1.3. Confirmed that the monitoring of liquid and aerial discharges is satisfactory.
- 1.4. Established that with reference to the monitoring of discharges, different methods in reporting activities close to the Minimum Detectable Activity were used for the decay corrections and that different contractors use different methodologies in data management and therefore it is possible that the results between contractors are not fully comparable.

However,

- 1.5. With reference to point 1.2. above, the verification team was informed that effluent and environmental monitoring is the responsibility of the NPP operator, partly contracted to research institutions. The regulatory control is based on contracts that may involve the same groups that are contracted by the NPP. Due to the dual ownership of the Krško NPP by Slovenia and Croatia, the contracts for laboratory measurements are distributed evenly between the two countries. While at the moment the contractors are willing and able to perform these different tasks in a reasonably independent manner, this arrangement does not fully meet the requirements of independence and transparency.

*The verification team recommends setting-up a real independent surveillance system by the regulator both for discharge control and environmental radioactivity monitoring in the surroundings of the Krško-Nuclear Power Plant.*

- 1.6. In addition with regard to point 1.4., the practice was to report zero activity if the measurement results indicated an activity below the Minimum Detectable Activity and there appeared to be no Slovenian Nuclear Safety Administration requirement for the Minimum Detectable Activity in discharge activity measurements.

*The verification team suggests defining a common methodology for sample activity measurements for all contractors involved in the work.*

*The verification team recommends that the Slovenian Nuclear Safety Administration defines a standard for the Minimum Detectable Activity in all discharge activity measurements.*

## **2. Main findings with respect to the Krško-Nuclear Power Plant On-site Environmental Monitoring**

The verification activities performed concerning the on site monitoring of environmental radioactivity at the Krško Nuclear Power Plant:

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

## **3. Main findings with respect to the Krško-Nuclear Power Plant Off-site Environmental Monitoring**

The verification activities performed concerning the off site monitoring of environmental radioactivity at the Krško Nuclear Power Plant:

- 3.1. Confirmed the existence and functionality of monitoring and sampling facilities as defined in the regulatory obligations.
- 3.2. Established that sampling is performed on behalf of the nuclear power plant and on behalf of the regulator.

However,

- 3.3. With respect to point 3.2. above the verification team noted that it was not always easy to distinguish between samples that are taken on behalf of the nuclear power plant operator and those taken for the regulator. Sometimes tasks are mixed, such as sampling by operator staff and sample transfer as well as sample analysis by the contracted laboratory.

*The verification team strongly recommends a clear separation between measurements carried out for the nuclear power plant and the control measurements implemented by the authorities.*

- 3.4. Confirmed the existence and functionality of the ambient dose rate monitoring stations at Vyhre and Libna (new Automatic Measuring Systems (AMES) type).

However,

- 3.5. With reference to point 3.4. the team noted that at Libna the device was mounted on the wall of the building. The former version of the detectors had been set up in an orchard. The station serves as an 'altitude' station and the orography does not allow easy comparison with results from 'ideally located' devices.

*The verification team suggests considering to move the dose rate monitor in Libna to avoid the influence of the house wall. It also suggests reconsidering the siting of the thermoluminescence dosimetry device in Vyhre.*

#### **4. Main findings with respect to the National Environmental Radioactivity Monitoring**

The verification team noted that two governmental organisations are involved in national monitoring at the same level of competence, namely the Slovenian Nuclear Safety Administration (with regard to general environmental media) and the Slovenian Radiation Protection Administration (with regard to drinking water and food). The verification activities performed concerning the national environmental radioactivity monitoring:

- 4.1. Confirmed the existence and functionality of monitoring and sampling facilities as defined in the regulatory requirements.
- 4.2. Established that laboratory based monitoring is based on annual contracts established by the authorities. Calls for tender are published and suitable laboratories are selected. One year contracts are awarded upon tendering.

However,

- 4.3. With regard to 4.2., this can lead to situations where only by the end of the contract period a laboratory has built up a reliable infrastructure and the necessary connections to efficiently manage the programme, in particular for sampling. Such a case could lead to a lack in continuity of applied methods and consequently may cause higher uncertainties of the obtained results. Currently the authorities are not asking for accreditation of the institute for the tasks contained in the work programme.

*The verification team suggests considering contracting for longer periods to allow for more continuity in the work. It also suggests including in the tendering process a request for accreditation according to ISO 17025 for all analytical tasks associated with the work programme.*

#### **5. Main findings with respect to the monitoring laboratories**

##### **A. The verification activities performed at the analytical laboratories of the Krško Nuclear Power Plant:**

- 5.1. Established that the laboratories are satisfactorily equipped and staffed with adequately trained personnel.
- 5.2. Established that quality assurance and control is implemented through a compilation of written procedures and working instructions.

However,

- 5.3. With regard to 5.2., the team noted that there are no instructions for storing the individual tank samples for a possible need for re-analysis.

*The verification team recommends the Slovenian Nuclear Safety Administration to consider instructing the nuclear power plant laboratory to put in place a procedure for storing the liquid discharge samples for a reasonable time in order to allow re-analysis.*

**B. The verification activities performed at the 'Ruder Bošković' Institute, Zagreb:**

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

5.5. Established that a quality control programme exists.

However,

5.6. With regard to 5.5., the team noted that stability control (peak energy and width) of the gamma spectroscopy systems is performed only occasionally, and is not specifically required in the quality manual. Background measurements are performed in 'a few months' intervals.

*As a matter of good laboratory practice, the verification team recommends that a gamma spectroscopy system stability control (peak energy and width) be included in the formal quality control programme and results documented in order to detect possible system degradation as early as possible.*

**C. The verification activities performed at the Institute for Medical Research and Occupational Health, Zagreb:**

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

However,

5.8. With regard to 5.7., the team noted that the laboratory operates in very small space, and that there is a lack of room for equipment and storage. The measurement equipment is fairly old, but functional. The laboratory has only one beta measurement system, so a technical malfunction could lead to a long backlog in filter measurements. The team noted also that samples are stored after measurement in a small storage room, but there are no formalised arrangements for sample archiving.

*The verification team recommends the Institute for Medical Research and Occupational Health, Zagreb, in co-operation with the Krško Nuclear Power Plant and the Slovenian Nuclear Safety Administration, to put in place a formalised sample archiving system.*

*As a matter of good laboratory practice, the team suggests removal of outdated equipment and other stored material from the laboratory facilities.*

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

**D. The verification activities performed at the Institute of Occupational Safety, Ljubljana:**

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

5.10. Established that the laboratory is accredited.

However,

5.11. With regard to 5.10., the team noted that only accreditations for gamma spectrometry and thermoluminescence dosimetry are available but accreditation for Sr-90 and radon measurements is planned. Relevant procedures although downloadable from the server were not always locally available in printed form.

*The verification team encourages the planned additional accreditations. This should be accomplished well before participation in a call for tender. It also suggests keeping printed versions of relevant procedures at all workplaces to avoid problems when the server is down for some reason.*

**E. The verification activities performed at the 'Jožef Stefan Institute', Ljubljana:**

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

However,

5.13. With regards to point 5.12. above, the independence for the various monitoring tasks (for the nuclear power plant, the regulator, and the national system) was said to be guaranteed by scientific ethos and budgetary and administrative measures, but without evidence of a formal separation.

*The verification team strongly recommends setting up a system that clearly separates the various contracted tasks by employing administrative and technical measures to build up a reliable and transparent independence.*

5.14. Established that currently only one person is involved in preparing samples for strontium measurement and that the load of such determinations is some 250 samples per year. At the time of verification, the sample planchettes for strontium measurement were not marked. This could lead to errors in identification.

*The verification team recommends ensuring that enough trained persons are available to be able to manage the workload of strontium determinations, at all times. Furthermore, it suggests suitable marking of the planchettes to avoid identification problems.*

5.15. Established that the access to nuclear power plant data on-line is secured by a simple sample coding algorithm only. Taking into account current technical possibilities this does not seem to reliably defend against data base intrusion.

*The verification team suggests improving data base security to block intrusion from outside.*

5.16. Established that there is not yet accreditation according to ISO 17025 for all areas involved in the contracted services for the nuclear power plant and the authorities.

*The verification team supports all efforts for widening the area of accreditation according to ISO 17025, in particular for strontium determination.*

## **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 observations:

- (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 with regard to the surveillance of the Slovenian territory are adequate. The Commission could verify the operation and efficiency of these facilities.
- (2) A few recommendations are formulated, mainly in relation to general quality assurance and control. These recommendations aim at improving some aspects of the environmental surveillance. These recommendations do not detract from the general conclusion that the Slovenian national monitoring system is in conformity with the provisions laid down under Article 35 of the Euratom Treaty.
- (3) A clear separation between measurements carried out for the nuclear power plant and the control measurements implemented by the authorities, as well as considering contracting for longer periods is recommended to guarantee independence of surveillance and continuity in the work. It is also suggested to include into the tendering process a request for accreditation according to ISO 17025 for all analytical tasks associated with the work programme.
- (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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