EUROPEAN COMMISSION

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

# Main Findings of the Commission's Article 35 verification

# Czech Republic

# Temelín nuclear power plant

**Date**: 14 to 18 March 2005

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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 14 to 18 March 2005:

- The Temelín nuclear power plant (hereafter Temelín NPP) and its surrounding area.
- The laboratory of the State Office for Nuclear Safety (hereafter SONS) Regional Centre, located in České Budějovice.
- The National Radiation Protection Institute (hereafter NRPI), located in Prague.
- The headquarters of the SONS, located in Prague.

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 (Temelín 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.
- The independent environmental radioactivity monitoring programme around the Temelín NPP site as performed by the competent authority.
- The competent authority's analytical laboratory 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 Czech competent authority, the State Office for Nuclear Safety.

## PREPARATORY ACTIVITIES

The Commission's decision to request the conduct of an Article 35 verification was notified to the Mission of the Czech Republic to the European Union by letter TREN.H4 CG/iw D(2004)6152. Subsequently, practical arrangements for the implementation of the verification were made with the SONS at a meeting held at the European Commission, DG TREN H4 offices in Luxembourg (31 January – 01 February 2005).

At this meeting the European Commission delegation presented the scope and conduct of its verification activities. The SONS provided preliminary information on the Czech legislation and its implementation with respect to radiation protection, as well as an overview of the Temelín NPP site. A Memorandum of Understanding, establishing the basis for future Article 35 verifications in the Czech Republic, was signed by the Commission services and the State Office for Nuclear Safety.

## 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 accordance with regulatory obligations.

1.3 Established that the monitoring and sampling facilities are 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 points 1.2 and 1.3 above, for airborne discharges, the verification team noted that the continuity of sampling of aerosols, iodine, H-3 and C-14 is not entirely achieved. During the operation of exchanging the filters and collectors the continuity of the sampling process is necessarily interrupted (for several minutes). The presence of a parallel sampling line and its set of filters and collectors would not only avoid such an interruption (switching over between lines before exchange of filters) but also provide additional redundancy in case of a functional failure.

*It is recommended that the SONS should consider whether requesting the operator to commission parallel and redundant sampling provisions at the Temelín NPP would not be beneficial, especially with regard to fully ensuring the continuity of airborne sampling activities.*

1.6 With respect to points 1.2 and 1.3 above the verification team noted that, in order to determine Kr-85 activity, a single spot sample is collected during steady nominal output of the units (one sample between outages). The analysis of Kr-85 samples is outsourced to the NRPI. The analysis results obtained by the NRPI are extrapolated over the period of the campaign. This discontinuous sampling and the methodology for the balancing of Kr-85 are part of a regulatory requirement. The team however noted that the operator has all the means in place to perform a continuous on-line assessment of this radioisotope. The efforts that are currently made to quantify a radioisotope of minor importance in airborne discharges of a nuclear power station are commendable. If the assessment of Kr-85 should remain a regulatory requirement, the use of the operator's monitoring capabilities should be beneficial (significant enhancement in representativeness of the results obtained).

*It is recommended that the SONS should consider whether the current practice of quantifying Kr-85 in gaseous discharges from the Temelín NPP should be maintained and if in the affirmative, to consider whether the use of the operator's monitoring capabilities would not be the preferred solution, especially with regard to obtaining representative data.*

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

The verification activities performed at the on-site analytical laboratory for liquid and airborne discharges samples, as well as at the off-site laboratory (the Environmental Radiation Monitoring Laboratory - ERML) where a sub-set of the discharge samples are assessed:

2.1 Established that both laboratories are 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 noted that the ERML is in the process of acquiring accreditation.

*The verification team welcomes the efforts made by the Temelín NPP Environmental Radiation Monitoring Laboratory to obtain accreditation. It is suggested that the laboratory be given the means to achieve its accreditation under the best possible conditions.*

2.4 With respect to point 2.2 above, the verification team noted that the transmission procedures for liquid discharge samples between the on-site radiochemical laboratory and the ERML are not duly formalised. The chain of custody is not fully controlled at this point due to the absence of a formal handing-over of responsibility.

*<u>It is recommended</u>, in the framework of general quality assurance and control, that the SONS requires the operator to ensure that the chain of custody for discharge samples, when transferred between the on-site radiochemical laboratory and the Environmental Radiation Monitoring Laboratory, be fully traceable.*

2.5 With respect to point 2.2 above, the verification team noted that the analytical results for liquid discharge samples, when below the detection limit of the measurement devices, are substituted (for balancing purposes) with a zero value.

*It is reminded 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.*

*<u>It is recommended</u> that the SONS considers the benefits of revising its regulatory requirements for substitutions of analytical results below detection limits (for liquid discharge samples) by bringing these requirements in line with Commission Recommendation 2004/2/Euratom and ISO standard 11929-7:2005.*

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

2.6 With respect to point 2.2 above, the verification team noted that:

2.6.1 For the purpose of balancing liquid discharges, volumetric activity concentrations (expressed in Bq/dm³) are multiplied by the respective volumes discharged from the sentencing tanks expressed in cubic meters, without decimals. This rounding to the nearest cubic meter entails a lack of precision.

2.6.2 The methodology used to quantify the volume of aliquots taken from individual samples to prepare bulk samples does not ensure full proportionality with the volumes discharged. The methodology therefore introduces a bias when balancing liquid discharges.

*It is recommended that the SONS ensures that the operator of the Temelín NPP reviews the balancing methodologies it applies to liquid discharges, with the aim to remedy the current overestimations (and or underestimations) these methodologies entail.*

2.6.3 The dose calculation procedures are subject to a high degree of conservatism. The current definition of the critical group leads to an over-estimation of the radiological impact of the Temelín NPP discharges. The team was informed that the regulator was considering a possible revision of the statutory dose assessment procedures.

*The verification team endorses any revision of statutory dose calculation procedures that the SONS will undertake with the aim of reducing the current levels of conservatism and that will result in the obtention of more realistic dose impact assessment values for the population.*

## 3. Main findings with respect to the operators' environmental monitoring programme and related regulatory control.

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

3.1 Confirmed the existence and functionality 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 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.

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

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

The verification activities performed at the off-site Environmental Radiation Monitoring Laboratory (ERML):

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.

4.3 For further information please refer to section 2 above.

## 5. Main findings with respect to the NRPI laboratory.

The verification activities performed at the NRPI laboratory:

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

5.2 Established that the environmental monitoring provisions that are located on the site are functional and adequate for their intended purpose.

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

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

## 6. Main findings with respect to the SONS headquarters.

6.1 The verification team received an extensive presentation on the national Radiation Monitoring Network system structure. Also a comprehensive on-line demonstration of the early warning part of the RMN was given. The verification team had the opportunity to interrogate on-line data (historical and real-time) from various telemetric dose rate probes.

6.2 Furthermore, presentations were given by the Czech Hydrometeorological Institute and by the T.G.M. Water Management Research Institute (on their participation in the Early Warning Network), as well as by the State Veterinary Institute on its gamma spectrometry laboratory.

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

**CONCLUSIONS**

7.1 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 Temelín NPP site are adequate. The Commission could verify the operation and efficiency of these facilities.

7.2 However, some shortcomings were noted that lead to recommendations by the Commission to the Czech competent authority with the aim to achieve improvements. It should be noted that these recommendations do not discredit the fact that radiological environmental monitoring around the Temelín NPP site is in conformity with the provisions laid down in Article 35 of the Euratom Treaty.

7.3 The Commission would appreciate being kept informed about the actions the Czech competent authority may undertake in the framework of the recommendations made.

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

*[signed]*

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