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from :	General Secretariat of the Council
to :	COREPER
No. prev. doc. :	13789/00 ATO 74 ELAR 210
Subject :	Report on Nuclear Safety in the Context of Enlargement

On 6 December 2000, the Working Party on Atomic Questions (AQG) submitted to Coreper a report (doc. 13789/00) providing relevant methodology and documents on how to evaluate legislation in the nuclear sector, the organisation and management of regulatory authorities and the level of safety of nuclear installations in each of the Candidate States.

Coreper agreed

- to endorse the methodology proposed in that report as a means of defining the EU positions on a "high level of nuclear safety" in the Candidate States for nuclear installations covered by the Convention on Nuclear Safety;

- to set up a Working Party on Nuclear Safety (WPNS), which would meet as an ad hoc formation of the AQG, to carry out the evaluation for each candidate State, as described in that report;

- to ask the AQG to develop recommendations on how best to address the request for a “high level of nuclear safety” in Candidate States for other types of nuclear installations (namely research reactors, fuel cycle, including spent fuel, and radioactive waste management facilities) in line with the enlargement time-frame.

The AQG agreed to follow the same approach for the other types of nuclear installations as had been agreed for nuclear power plants. The choice of the relevant documents on which the evaluation of other nuclear installations is based, had however to be adapted.

Coreper will find attached the report which reflects the work of the Working Party on Atomic Questions and its ad hoc formation, the Working Party on Nuclear Safety. The report is thus divided into three parts: one general part, and two specific parts, one dealing with civil nuclear power plants - this part being elaborated by the WPNS, and one dealing with other nuclear installations (namely research reactors, fuel cycle, including spent fuel, and radioactive waste management facilities) - this part being elaborated by the AQG.

The AQG is prepared to assist in any future follow-up and review of its recommendations, that the Coreper may wish to request.

REPORT ON NUCLEAR SAFETY IN THE CONTEXT OF ENLARGEMENT

TABLE OF CONTENTS:

The Addendum to the report comprises the following appendices:

I. Scope

The report evaluates legislation in the nuclear sector, the organisation and management of regulatory authorities and the level of safety of the installations in each of the Candidate States with a view to defining the Union's position on a "high level of nuclear safety" to be requested in those countries. The report covers:

- Nuclear Installations as defined in the Convention on Nuclear Safety, that is civil nuclear power plants (NPP); therefore only the seven countries having NPPs are covered here: Bulgaria, Czech Republic, Hungary, Lithuania, Romania, Slovak Republic and Slovenia.

- Research reactors, fuel cycle, including spent fuel, and radioactive waste management facilities.

It is recalled that several aspects (e.g. radiation protection or environmental conventions on transboundary effects), although they have some bearing on nuclear safety (dealt with under chapter 14 “Energy”), are addressed under chapter 22 “Environment” in the agreed framework for the Accession Conferences with Candidate States. As these aspects are covered by the *acquis,* they are subject to the regular screening process and are consequently not included in this report.

II. Evaluation methodology and process

II.1 General observations

The methodology for the evaluation process is universal with respect to Candidate States. This means that :

a) it is not limited to Candidate States with nuclear power programmes in operation,

b) it is applicable to all types of reactor designs and other nuclear installations and to the varied regulatory environments encountered in the Candidate States.

It was pointed out already in the original mandate[1] given by Coreper to AQG that the demands made to the Candidate States to achieve the expected "high level of nuclear safety" ought not to be stricter than the requirements in force in the EU.

[1] Doc 10658/00 ELARG 105

Furthermore, it is understood that this exercise does not lead to any transfer of competences from the Member States to the Community and that the competence and responsibilities relating to the safety of the design, construction, operation and decommissioning of a nuclear installation and for the safe management of radioactive waste, lie with the State which has jurisdiction for the installation concerned.

A comparative evaluation

Reviewing the practices and regulations in force in Candidate States as compared to those in force in all Member States, taking into account all relevant documents[2], were considered as the adequate methodology in order to define a "high level of nuclear safety" to be achieved by the Candidate States in the context of enlargement and to formulate observations and recommendations to that effect. These observations and recommendations were made on the understanding that commitments to close nuclear power plants will be fulfilled.

Additional factual information was requested from Candidate States; those requests for updated information were conveyed to the Candidate States through channels agreed with the Commission.

As safety improvement programmes are continuously being implemented in Candidate States, an appropriate follow-up and evaluation mechanism will have to be foreseen. This follow-up and evaluation should take place, on a regular basis, in the normal course of the accession process and includes the reporting requirements following from the recommendations under section III.1 and 2. To be effective, without implying any transfer of competences from the Member States to the Community, this follow-up and evaluation should make use of appropriate expertise from Member States and the Commission in the fields of nuclear safety and its regulation.

[2] For NPPs, see details in doc. 13789/00; for other nuclear installations, see doc. SN 1664/01.

II.2 Nuclear Power Plants

The main topics that are covered by the evaluation are those covered by articles 6 to 19 of the Convention on Nuclear Safety[3].

With regard to nuclear power plants, it is very important to point out that a high degree of convergence on the substance of technical and organisational requirements and good practices has been achieved in the EU, within the framework of national responsibilities for nuclear safety regulation. This has been developed through voluntary co-operation between Member States and in various international fora. In several areas these in substance convergent requirements go further than those contained in international instruments. This common EU perspective has been reflected in the evaluation with regard to nuclear power plants. In this context the WPNS wishes to point out that there is a wide range of designs among the existing power reactors in the EU, and that the regulatory authorities in EU member states, in their regulatory decisions, consider that the safety objectives characterising a "high level of nuclear safety" from an EU perspective could be achieved in several ways. This has been taken into account in the evaluation.

Work has been conducted according to guidelines set up by the Presidency. For each Candidate State, the WPNS produced a list of safety issues and aspects where clear deviations were identified from requirements and practices widely applied in the EU. Only deviations with a detrimental effect on safety were considered. Moreover, the WPNS evaluated in a step-wise process the significance of each identified deviation with regard to achieving a "high level of nuclear safety" as referred to in doc.13789/00. The results of these evaluations have lead to *two types of recommendations*:

[3] which address "Legislative and regulatory framework" (Art. 7), "Regulatory body" (Art. 8), "Responsibility of licence holder" (Art. 9), "Priority to safety" (Art. 10), "Financial and human resources" (Art. 11), "Human factors" (Art. 12), "Quality assurance" (Art. 13), "Assessment and verification of safety" (Art. 14), "Radiation protection" (Art. 15), "Emergency preparedness" (Art. 16), "Siting" (Art. 17), "Design and construction" (Art. 18), and "Operation" (Art. 19), and also the application of those articles to "Existing nuclear installations" (Art. 6).

– *Type I Recommendations,* defined as recommendations with the highest priority for consideration in the accession negotiations and which should result in firm commitments by Candidate States with regard to improvements and other necessary measures that are to be implemented in a specified and limited time-frame in the context of the enlargement process.[4]

– *Type II Recommendations,* defined as recommendations of improvements and other necessary measures which should be implemented by Candidate States, but in a more flexible time-frame than Type I Recommendations.

These recommendations are found in section III.1, starting with three general recommendations applicable to all Candidate States with nuclear power reactors, and followed by country-specific recommendations given in separate sections for each Candidate State. Each such section starts with a short overview with observations on the current situation and perspective with regard to a " high level of nuclear safety " in the Candidate States.
The use of technical terms has been kept to the necessary minimum. However despite its efforts and in order to make the observations and recommendations reasonably specific, the WPNS could not avoid wordings mainly aimed at specialists in nuclear safety.

II.3 Other Nuclear Installations

The evaluation of the safety of other types of nuclear installations in the context of enlargement has been made by the AQG in plenary, using, where appropriate, conclusions and recommendations made by the WPNS in their evaluation, e.g. with regard to the legal and regulatory infrastructure in Candidate States. It was decided to focus the evaluation on a limited number of key nuclear safety aspects related to these installations as general radiation protection and environmental protection aspects are already covered by the normal screening of the *acquis*. Among these key safety aspects the quality of the national legal and regulatory framework and its actual implementation were considered the most important when regarding how to achieve a "high level of nuclear safety" at these types of installations in the context of enlargement. In this regard, EU Member States share a number of fundamental principles as to national legal and regulatory framework. Compared to the situation with regard to nuclear power reactors, there is however less of a special EU perspective with regard to more specific technical safety requirements for research reactors, and fuel cycle, including spent fuel, and

[4] In this context the formulation "short term priority" appearing in the recommendations under section III.1 is used to convey the same degree of priority as has been used in the Candidate States' National Programmes for the Adoption of the Acquis or the Council Decisions on the principles, priorities, intermediate objectives and conditions contained in the Accession partnership with these Candidate States.

radioactive waste management facilities. Also, due to the physical characteristics of these installations, the characteristics of the associated accident risks, although by no means negligible, are typically less severe than for nuclear power reactors. Therefore, it seemed reasonable to focus mainly on key aspects related to the legal, regulatory and organisational framework .

Using the relevant general obligations to be complied with by State Parties to the Convention on Nuclear Safety and to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management as guidance, the evaluation of the Candidate States has thus focussed on the following areas:

- Legislative and regulatory framework
- Organisational framework for operation of research reactors, and fuel cycle, including spent fuel, and radioactive waste management facilities
- Provision of adequate financial resources to support the safety of facilities for spent fuel and radioactive waste management during their operating lifetime and for decommissioning;
- Existing installations – status and plans
- Other safety aspects, e.g. emergency planning

The observations and recommendations arrived at by the AQG are found in section III.2, starting with some general observations and one general recommendation applicable to all Candidate States. This is followed by country-specific recommendations given in separate sections for each Candidate State. Each such section starts with a short overview with observations on the current situation and perspective with regard to a " high level of nuclear safety " in the Candidate State. The recommendations are designated as Type I or Type II recommendations according to the same definitions as in section II.2 above. A summary description of installations and the legal, regulatory and organisational framework in Candidate States is presented in Appendix 1 of the Addendum.

III. The technical opinion

III.1 Observations and Recommendations concerning the safety of nuclear power plants and the related regulatory framework in the context of enlargement (WPNS)

1. General observations and recommendations

1.1 General observations on the evaluation process

The evaluation was made in two main steps:

- In the first step the WPNS formed three "country groups", with an agreed distribution of Candidate States between the groups. The groups, working independently, made a comprehensive inventory of deviations from nuclear safety requirements and good practices widely applied within the Union. The starting point was the available information as referenced in doc. 13789/00. The groups used the check-list presented in Annex 2 to ensure that topical areas relevant to nuclear safety were checked for possible deviations. Only deviations found detrimental with regard to safety were further considered. The WPNS is at the same time well aware that some of the reactors also have design features that compare favourably from a safety point of view with corresponding design features of many reactors within the EU[5]. The country groups made provisional evaluations of the significance of each identified deviation with regard to achieving a "high level of nuclear safety", with a view to develop, for each Candidate State, a table of safety-related issues and associated improvement measures that merit special attention in the context of enlargement, for further consideration by the WPNS in plenary. Records of the tables developed in the first step have been kept [6]

- The second step consisted in a thorough review of the tables from the country groups in plenary WPNS sessions, taking into account additional information provided by the Candidate States and using the expertise of the WPNS as a whole to develop and refine the observations and recommendations on safety improvement measures reported in the following sections. Priorities were assigned to the recommended improvement measures according to the definitions of type I and type II recommendations in section II.2 above, with due regard to requirements and good practices widely applied within the EU

The fact that certain items related to safety have been identified as meriting special attention in the context of enlargement does not prejudice anyone's right to address these and other items in the context of bilateral and multilateral fora, for example the review meetings under the Convention on Nuclear Safety.

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[5] More detailed description of the safety properties of the reactors can be found in the proceedings of the IAEA International Conference on Strengthening Nuclear Safety in Eastern Europe, Vienna, 14-18 June 1999; and also in the appendices to the WENRA report from October 2000

[6] see doc. WD 001/01 for a record of the first step

1.2 General observations on safety improvement programmes

All Candidate States have safety improvement programmes in place, covering plant-specific improvements as well as, in most cases, plans to improve the legal and regulatory framework. These programmes are largely based on IAEA programmes on the safety of Soviet designed pressurized water reactors (type VVER-440 and VVER-1000) and graphite moderated pressure tube reactors (RBMK)[7], as well as on country- and site-specific findings and recommendations developed in bilateral and multilateral co-operation activities, many of these run by the Commission or by Member States of the Union. On request, the Candidate States have made available updated information on the current status of implementation of their safety improvement programmes, allowing the WPNS to base the present report, including the sections for each Candidate State, on developments up to March 2001.

1.3 General recommendations related to safety improvement programmes

The WPNS recognises the considerable safety improvements that Candidate States have implemented to date within the framework of these safety improvement programmes. Indeed, the WPNS finds that these ongoing and currently planned safety improvement programmes in Candidate States and their timely completion under due regulatory supervision are one of the most essential elements with regard to achieving a "high level of nuclear safety" as referred to in doc.13789/00. Where the improvement programmes are not sufficient in the opinion of the WPNS, this is reflected in the country-specific recommendations. Therefore, the WPNS makes three *General recommendations* with regard to these programmes and applicable *mutatis mutandis* to all the Candidate States with nuclear power plants.

First general recommendation - type I:

All Candidate States with nuclear power plants should complete their plant-specific safety improvement programmes according to the presented plans.

[7] VVER and RBMK safety issues have been compiled in databases by the IAEA. These databases also contain information on the current status of improvement measures as far as this information has been made available to the IAEA.

Moreover, the WPNS finds it essential that the safety improvement programmes of Candidate States, including the plant-specific safety improvement programmes as well as the regulatory framework, contain certain measures that have been found in the evaluation to be of generic safety relevance for all Candidate States with nuclear power plants, and considered as good practices within the EU. The WPNS is aware that such measures are included in the safety programmes of Candidate States, with variations from state to state with regard to extent of coverage and degree of implementation. The WPNS also presumes that safety aspects related to the capabilities and limitations of human performance are duly taken into account in these safety programmes. These observations have formed the basis for the second and third general recommendation by the WPNS. The grouping into type I and type II recommendations has been made with due regard to requirements and good practices widely applied within the EU

Second general recommendation - type I:
While the WPNS recognises that Candidate States may already have implemented these measures to varying degrees, all Candidate States with nuclear power plants should , as a short term priority, ensure that their nuclear safety programmes include the following measures considered as good practices within the EU:

- **Regarding full safety analysis reports and related safety improvement measures:** Completion, including regulatory reviews and approval, of plant-specific, in-depth safety analysis reports to Western standards that cover:
  - all relevant operating modes
  - all relevant internal and external hazards (e.g. seismic) using up to date plant and site data;
  - plant-specific severe accident vulnerability analyses including all levels of defence in depth

  taking the results of all analyses made into due account in the development and implementation of plant-specific safety improvement measures.
- **Regarding safety reassessment practices**: Implementation of national safety re-assessment practices on a recurrent basis, co-ordinated, as appropriate, with national licence renewal schedules and with on-going plant-specific safety improvement programmes
- **Regarding emergency operating procedures:** Implementation of modern Emergency Operating Procedures, including appropriate guidance on management of beyond design basis accidents
- **Regarding feedback of experience**: Continued implementation of systematic analysis of operating experience and new research information both at the nuclear power plants and at the regulatory authorities, to ensure continued learning and improvement as an element of a national safety culture.
- **Regarding resources of the regulator**: Adequate human and financial resources for the regulatory authority, including in particular access to independent technical support

Third general recommendation - type II
While the WPNS recognises that Candidate States may already have implemented these measures to varying degrees, all Candidate States with nuclear power plants should ensure that their nuclear safety programmes include the following measures considered as good practices within the EU:

- **Regarding probabilistic safety assessments:** Measures to conclude comprehensive, plant-specific probabilistic safety assessments to Western standards as a tool to support the identification and prioritisation of issues arising from the safety analysis reports and the periodic reassessments of safety
- **Regarding regulatory quality management:** Measures to implement a modern, well documented quality management system for the regulatory authority

With the three general recommendations made above as a basis, specific issues and measures included in the safety improvement programmes are not commented on further in the country-specific sections of this report unless the WPNS finds that they represent deviations of particular safety significance with regard to requirements and practices widely applied within the Union, or the measures are regarded as inadequate, time schedules are regarded as unduly extended or the funding is judged to be insufficient. Thus the country-specific recommendations made in the following should be read in conjunction with the three general recommendations made above.

2. Observations and recommendations for each Candidate State

When making specific recommendations for Bulgaria, Lithuania and Slovakia, their closure commitments were duly taken into account. The time frame for implementing type II recommendations for units with closure commitments should take into account the need to ensure that the implementation of these recommendations benefit operational safety in due time before closure.

The WPNS strongly underlines that the numbering of the recommendations does not imply any degree of prioritisation within each category (Type I or II). The numbering has only been made in order to facilitate references.

BULGARIA

Bulgaria has six operating nuclear power reactors at the site of Kozloduy. Units 1-4 are of the original design VVER-440/230 but units 3 and 4 have some safety features of the later 213 model. Units 5-6 are of the original design VVER-1000/320. Bulgaria has undertaken to close units 1-2 before 2003. The closure dates for units 3-4 has not been fixed yet, but the Commission's understanding is that the closure will be undertaken before 2006. A decision for definitive closure dates for units 3 and 4 is expected to be taken by Bulgaria in 2002.

In the early 1990-ties, the utility developed a programme of short term safety upgrading measures on units 1-4. This programme was implemented over the following years. In 1997 the utility developed an extensive upgrading programme. It was peer-reviewed by international experts and amended. It is known now as PRG 97-2000. Its implementation is presently not as far advanced as in similar plants in other candidate countries. However, most of the major safety improvement measures are scheduled to be implemented in 2002.

Regarding Kozloduy 1-4 and related closure commitments the WPNS notes that, due to the deficiencies of the original design and the delayed implementation of the upgrading programme, there remain significant deviations from safety requirements and practices for light water reactors of the same vintage in operation in the EU. In addition, for units 1-2 it is considered unrealistic to carry out many upgrading measures before their closure in 2002. Therefore for units 1-2 only a strictly limited operated time could be justified from the point of view of the WPNS. These observations underline the need to closely monitor the closure commitments and to give special attention during the remaining operation time to measures aimed at ensuring a high level of operational safety (see recommendation Type I: 4 below).

For units 3-4, it is only by the early and satisfactory completion of the planned upgrading programme that the existing deviations from safety requirements and practices widely applied within the EU can be limited to such an extent that the continued operation of units 3 and 4 for a limited time, with firm closure commitments, could be justified from the point of view of the WPNS. These observations underline the safety aspects of the closure commitments and the need to monitor them closely.

An extensive “Modernization programme" for the safety upgrading of **Kozloduy units 5 and 6** is at an early stage and scheduled to be implemented within five years. The timely completion of this programme and its regulatory approval is essential for the Kozloduy 5 and 6 reactors to achieve a "high level of nuclear safety" as referred to in doc.13789/00.

The following recommendations are to be read in conjunction with the above considerations and observations, especially those on closure commitments, and taking into account the general recommendations already made that are applicable to all Candidate States with nuclear power reactors.

***Recommendations of type I**:*
Bulgaria should, as a short term priority

1. **Regarding the nuclear legislation:** Implement the proposed revision of the nuclear law, *inter alia* to improve the independence and financial situation of the regulatory body (CUAEPP).

2. **Regarding resources of the Regulator:** Develop and implement an action plan to ensure that the regulatory body (CUAEPP) has adequate resources to carry out all its duties and responsibilities and resources to recruit and retain qualified staff in adequate numbers and to obtain the necessary independent technical support. The action plan should be based on an appropriate analysis of the regulatory needs involved.

3. **Regarding the safety documentation:** Complete full Safety Analysis Reports for Kozloduy 3-4 and update the Safety Reports (also known as the Safety Substantiation Reports) for Kozloduy 5-6 to full Safety Analysis Reports in compliance with widely applied practice within the EU, including regulatory reviews and approvals of these reports.

4. **Regarding the operational safety of Kozloduy 1-2 until final closure:** Develop and implement an action plan, including measures to ensure staff motivation, with a view to ensuring high operational safety for the remaining operating time. The action plan should be based on an appropriate analysis of the safety issues involved.

5. **Regarding safety upgrading of Kozloduy 3-4:** In particular implement the following safety improvements
   - Demonstrate that the capability of the reactor protection system complies with requirements widely applied within the EU or improve or replace the protection system.
   - Install a third leak detection system with adequate capability to allow application of the leak before break concept for large high energy pipes.
   - Implement the planned confinement improvement measures, reduce the leak rate, and verify the confinement function by appropriate analysis of all design basis accidents.

6. **Regarding safety upgrading of Kozloduy 5-6:** In particular implement the following measure
   - Ensure that the safety case demonstrating appropriate protection against high energy pipe breaks, and consequential failures at the steam- and feed water lines, complies with requirements and practices widely applied within the EU and that an appropriate combination of measures are in place.

Recommendations of type II

Bulgaria should report on progress in the following

1. **Regarding the increasing number of operational events at the Kozloduy units:** Measures to investigate the root causes of operational events at Kozloduy and to decrease the occurrence of such events significantly.

2. **Regarding the Reactor Pressure Vessel surveillance programme for Kozloduy 3-4:** Measures to ensure that the reactor pressure vessel surveillance programme and the supporting analysis provides adequate safety margins with respect to reactor pressure vessel structural integrity for all design basis events over the designed life time of the plant.

3. **Regarding the Reactor Pressure Vessel surveillance programme for Kozloduy 5-6:**. Measures to ensure that the reactor pressure vessel surveillance programme and the supporting analysis provides adequate safety margins with respect to reactor pressure vessel structural integrity for all design basis events over the designed life time of the plant

4. **Regarding management of large modifications in Kozloduy 5-6:** Measures for proper plant configuration management in order to ensure safe implementation of the planned large modifications, in particular modifications involving different technologies and vendors, such as replacement of the instrumentation and control system.

5. **Regarding national emergency exercises:** Measures to conduct and evaluate full-scope national emergency exercises on a regular basis in order to verify the adequacy of the planned emergency arrangements.

CZECH REPUBLIC

The Czech Republic has four operating nuclear power reactors of the original design VVER-440/213 at the site of Dukovany. At the site of Temelin there are two nuclear power reactors of the original design VVER-1000/320. Unit 1 at Temelin is under commissioning (testing operations programme) and unit 2 in the final stages of construction with a view to start commissioning in the end of 2001.

The Czech Republic has developed and is implementing a major modernisation and safety improvement programme for the **Dukovany units** (the MORAVA programme). All safety improvement measures included in this programme, except installation of digital instrumentation and control systems, will be completed in 2004.

The safety improvement programme for the **Temelin units** has been the most comprehensive so far for this reactor type.

Completion of these programmes at Dukovany and Temelin is essential to remove the few remaining deviations at these plants with regard to achieving a "high level of nuclear safety" as referred to in doc.13789/00.

The following recommendations are to be read in conjunction with the above considerations and observations and taking into account the general recommendations already made that are applicable to all Candidate States with nuclear power reactors.

Recommendations of type I

The Czech Republic should, as short term priority

1. **Regarding protection against high energy pipe breaks in Temelin 1-2:** Ensure that the safety case demonstrating appropriate protection against high energy pipe breaks, and consequential failures of the steam- and feed water lines, complies with requirements and practices widely applied within the EU and that an appropriate combination of measures are in place.

Recommendations of type II

The Czech Republic should report on progress in the following

1. **Regarding the bubbler condenser systems of Dukovany 1-4**: Measures to complete the regulatory review regarding full verification of the performance of the containment bubbler condenser system for all design basis accidents.

2. **Regarding qualification of Safety and Relief valves in Temelin 1-2:** Measures to complete the demonstration of reliable function of key steam safety and relief valves in Temelin 1-2 under dynamic load with mixed steam-water flow.

HUNGARY

Hungary has four operating reactors of original design VVER-440/213 at the site of Paks. Hungary has performed several safety improvement programmes for Paks, the most significant being the AGNES project launched in 1994. A few remaining measures are scheduled to be completed by the end of 2002. Completion of this programme is essential to remove the few remaining deviations with regard to achieving a "high level of nuclear safety" at Paks as referred to in doc.13789/00.

The following recommendations are to be read in conjunction with the above considerations and observations and taking into account the general recommendations already made that are applicable to all Candidate States with nuclear power reactors.

Recommendations of type I

Hungary should, as short term priority:

1. **Regarding the independence of the Regulator**: Formally, in the legal framework, complete the on-going process of strengthening the independence of the regulatory body (HAEA/NSD) in relation to persons, bodies or organisations that are related to promotion of nuclear energy or operation of nuclear facilities.

Recommendations of type II

Hungary should report on progress in the following

1. Regarding the bubbler condenser systems of Paks 1-4: Measures to complete the regulatory review regarding full verification of the performance of the containment bubbler condenser system for all design basis accidents.

LITHUANIA

Lithuania has two operating reactors of original design RBMK-1500 at the site of Ignalina. Lithuania has undertaken to close unit 1 before 2005. Lithuania intends to define the closure date for Ignalina 2 in the revised National Energy Strategy due in 2004. Thus Lithuania has so far committed to the closure of the Ignalina NPP, as such, but not yet to a specific date with regard to unit 2. The EU has expressed its expectation that its closure should occur by 2009 at the latest. It is noted that there is also a commitment by Lithuania to close the units earlier if gap closure [8] occurs.

As a consequence of the Chernobyl accident in 1986 safety improvements were performed on all RBMK reactors. These improvements mainly addressed core stability properties and the performance of the reactor shut-down system. As a result the likelihood of a reactivity-induced accident similar to the one at Chernobyl was significantly reduced. A first short-term safety improvement programme specifically directed at the Ignalina plant was carried out 1993-96. A second major safety improvement programme (referred to as SIP-2), including measures planned for 1997-2005, is under implementation. These two programmes have been peer-reviewed and amended by international experts. Considerable safety improvements have been achieved through these programmes as compared to the original design of the plant.
As regards closure commitments, the WPNS notes that in spite of the safety improvements achieved, there remain substantial deviations from widely applied requirements within the EU, mainly with respect to the last barrier for protection of the environment, the confinement system.

[8] Closure of the designed gaps between the zircalloy pressure tubes enclosing the fuel in the core and the surrounding graphite moderator blocks due to impact of the neutron irradiation

This is especially the case regarding certain types of accidents, which were considered as beyond the design basis for RBMK reactors by their Russian designers. It is not technically realistic to eliminate these deviations to the extent necessary to achieve the "high level of nuclear safety" expected within the EU. Thus, only a strictly limited remaining operating time could be justified from the point of view of the WPNS. These observations underline the safety aspects of the closure commitments and the need to monitor them closely. They also underline that special attention needs to be given to measures aimed at improving the prevention of accidents during the remaining operating time, such as installation of an additional independent and diverse shutdown system at unit 2 and measures to ensure a high level of operational safety.

The following recommendations are to be read in conjunction with the above considerations and observations, especially those on closure commitments, and taking into account the general recommendations already made that are applicable to all Candidate States with nuclear power reactors.

Recommendations of type I:

Lithuania should, as a short term priority

1. **Regarding resources of the Regulator:** Develop and implement an action plan to ensure that the regulatory body (VATESI) has adequate resources to carry out all its duties and responsibilities, and resources to obtain the necessary independent technical support. The action plan should be based on an appropriate analysis of the regulatory needs involved.

2. **Regarding the responsibility of the Operator:** Complete the legal amendments necessary to assign the operating organisation of Ignalina NPP full responsibility to handle all management issues in line with EU practice.

3. **Regarding the financial situation of the Operator:** Improve the financial situation of Ignalina NPP in order to make it possible to prioritise safety as planned, including to implement the safety improvement measures according to issued plans.

4. **Regarding the operational safety of Ignalina 1 until final closure:** Develop and implement an action plan, including measures to ensure staff motivation, with a view to ensuring high operational safety for the remaining operating time. The action plan should be based on an appropriate analysis of the safety issues involved and should also include measures for unit 2 which might be necessary as a result of the analysis.

5. **Regarding the reactor protection system of Ignalina 2:** Ensure that the planned measures to improve the capability of the reactor protection system at Ignalina 2 by installing an additional independent and diverse shut down system (referred to as DSS), are implemented during 2003 at the latest. [9]

[9] This installation is not realistic for unit 1 due to the limited remaining operating time.

6. **Regarding the core characteristics of Ignalina 1 and 2:** Decrease the potential for significant positive reactivity insertion, resulting from voiding of the control and protection system (CPS) cooling circuit, in connection with installation of the DSS at unit 2 and in the same time schedule. (e.g. by installation of cluster control rods). Implement any measures to this effect at unit 1 which are practical in view of the limited remaining operating time.

7. **Regarding the safety documentation:** Complete the development of a full Safety Analysis Report for Ignalina 2 in compliance with widely applied practices within the EU, including regulatory review and approval of the report.

Recommendations of type II:

Lithuania should report on progress in the following

1**. Regarding safety management and safety culture at Ignalina 1-2:** Measures to complete the development of safety management, including the implementation of the new management procedures to promote safety culture.

2. **Regarding the integrity of the primary circuit piping of Ignalina 1-2:** Measures to further confirm the control of intergranular stress corrosion cracking (IGSCC) in the primary circuit.

3**. Regarding confinement performance of Ignalina 1-2:** Measures to complete the verification of the confinement performance (referred to as ALS) for design basis events and measures to enhance the leaktightness of the ALS especially at unit 1.

4. **Regarding information agreements with Latvia and Belarus:** Measures to conclude agreements with Latvia and Belarus on information about emergency planning and information in case of an accident at the Ignalina plant.

ROMANIA

Romania has one nuclear power reactor in operation at the Cernavoda site. It is a CANDU 6 reactor, licensed according to Canadian criteria and similar to those in operation at Gentilly 2 and Point Lepreau in Canada. The CANDU design has not been subjected to any systematic safety review within the EU. However, it has been noted in the framework of the review procedure under the Convention on Nuclear Safety that the Canadian regulatory authority applies similar safety objectives with regard to the prevention and mitigation of accidents as the regulatory authorities within the EU.

Moreover, it should be noted that Romania operates the only CANDU reactor in Europe. Therefore it is essential for Romania to maintain effective co-operation on both technical and regulatory matters with countries operating CANDU reactors, especially Canada.

During the construction design improvements were introduced similar to those already implemented in the twin plants of Wolsung (South Korea), Point Lepreau and Gentilly 2 in Canada as result of their operating experience. At present in Cernavoda there is a continuous programme of plant modifications based on operational feedback. For the future, it is essential that the safety improvements measures implemented in Canada for this type of CANDU design are duly considered and, if applicable, implemented at Cernavoda. However, the improvement programme may be adversely affected by the financial situation of the Cernavoda plant.

The following recommendations are to be read in conjunction with the above considerations and observations and taking into account the general recommendations already made that are applicable to all Candidate States with nuclear power reactors.

Recommendation of type I

Romania should, as a short term priority

1. **Regarding the capability and resources of the Regulator:** Develop and implement an action plan for the regulatory body (CNCAN), including in particular a training programme and technical support, in order to strengthen the independent assessment capability of CNCAN, its inspection practice and emergency preparedness organisation. To that effect the resources of CNCAN should be increased.

2. **Regarding the financial situation of the Operator:** Continue to improve the financial situation of Cernavoda NPP in order to ensure the implementation of safety related improvement programmes and maintenance activities, as well as to assure access to the necessary technical support

3. **Regarding on-site emergency operating centre at Cernavoda:** Establish an on-site emergency operating centre, well separated from the main control room, in compliance with widely applied practices within the EU.

Recommendations of type II

Romania should report on progress in the following

1. **Regarding safety improvements implemented in Canada:** Measures to ensure that the safety improvements which are implemented in Canada for this type of CANDU design are duly considered and, if applicable, implemented at Cernavoda NPP.

2. **Regarding preservation of Operators competence:** Measures to ensure the continued availability at Cernavoda NPP of staff with the necessary qualifications. Since there is no national expertise in plant operations outside the operating organisation, planning arrangements need to be made in order to be able to replace key personnel trained by foreign experts with equivalent qualified persons, if the need arises.

3. **Regarding fire and seismic hazards assessment of Cernavoda NPP:** Measures to complete the fire hazards analysis and the seismic hazards analysis based on seismic characterisation of the site, including a comprehensive regulatory review of these analyses in compliance with widely applied practices within the EU.

SLOVAKIA

The Slovak Republic has six operating nuclear power reactors at the two nuclear sites of Bohunice and Mochovce. Two (Bohunice 1 and 2, also known as Bohunice V1) are of original design VVER-440/230 and four (Bohunice 3 and 4, also known as Bohunice V2, and Mochovce 1 and 2) are of original design VVER-440/213. The Slovak Republic has undertaken to close Bohunice 1 in 2006 and Bohunice 2 in 2008.

Regarding the commitments to close Bohunice 1-2, the WPNS notes that the safety level of those two reactors has been significantly improved since 1991, both with regard to prevention and mitigation of accidents. The Slovak safety improvement programme for Bohunice 1 and 2 is the most comprehensive that has been implemented so far for reactors of the VVER-440/230 type. All issues of the IAEA Issue Book for VVER-440/230 have been satisfactorily dealt with except in a few cases where the intent of the IAEA recommendations were only partly met. However, the safety analysis of the confinement function shows smaller margins than those typically found in the validation of the safety case for EU light water reactors of the same vintage. Consequently, regarding mitigation of accidents, there remain some deviations from safety requirements for light water reactors of the same vintage in operation in the EU. Nonetheless, considering the nature of the remaining deviations and the limited residual lifetime, the operation of Bohunice 1 and 2 for a limited time, according to the closure commitments made, could be justified from the point of view of the WPNS, provided that the recommendations listed below are implemented.

Since 1990, significant improvements have been implemented at **Bohunice 3-4**. A seismic upgrading programme is proceeding and should be completed soon. A further improvement programme planned for 2001-2008 is under development, including in particular a new instrumentation and control system. The completion of this programme at Bohunice 3-4 is essential to remove the remaining deviations with regard to achieving a "high level of nuclear safety" as referred to in doc.13789/00.

For **Mochovce 1-2** several modifications were included at the design stage. A further safety improvement programme was defined in 1995 and is almost completed. Some remaining measures, such as equipment qualification and seismic characterisation are under way. The seismic characterisation of the site is expected to be completed in 2003. Depending upon the results, further upgrading measures could be necessary. The completion of this programme at Mochovce 1-2 is essential to remove the few remaining deviations with regard to achieving a "high level of nuclear safety" as referred to in doc.13789/00.

The following recommendations are to be read in conjunction with the above considerations and observations, especially those on closure commitments, and taking into account the general recommendations already made that are applicable to all Candidate States with nuclear power reactors.

***Recommendations of type I**:*

The Slovak Republic should, as a short term priority:

1. **Regarding the operational safety of Bohunice 1-2 until final closure:** Develop and implement an action plan, including measures to ensure staff motivation, with a view to ensuring high operational safety for the remaining operating time. The action plan should be based on an appropriate analysis of the safety issues involved.

Recommendations of type II

The Slovak Republic should report on progress in the following

1. **Regarding resources of the Regulator:** Measures to develop and implement an action plan to ensure that the regulatory body (ÚJD) has adequate resources to carry out all its duties and responsibilities and resources to maintain the necessary independent technical support. The action plan should be based on an appropriate analysis of the regulatory needs involved.

2. **Regarding the confinement performance of Bohunice 1-2**: Measures to further enhance the performance of Bohunice 1-2 confinement, notably through the implementation of beyond design basis accident management guidelines.

3. **Regarding the bubbler condenser systems of Bohunice 3-4 and Mochovce 1-2**: Measures to complete the regulatory review regarding full verification of the performance of the containment bubbler condenser system for all design basis accidents.

4. **Regarding the seismic qualification of Bohunice 3-4 and Mochovce 1-2:** Measures to complete the seismic qualification of the units, including regulatory review, for the finally decided peak ground acceleration value of the respective sites.

5. **Regarding the national Emergency Response Plan:** Measures to finalise and adopt the national emergency plan and to verify the planned emergency arrangements through full scope exercises on a regular basis.

SLOVENIA

Slovenia has one operating nuclear power reactor at the site of Krško. It is a pressurised water reactor (PWR) of original Westinghouse design, similar to several reactors licensed and operating in the EU. Slovenia completed the final steps of a substantial safety improvement programme during 2000, with a view to ensuring that the safety level of the plant remains in line with similar reactors in the EU.

The following recommendations are to be read in conjunction with the above considerations and observations and taking into account the general recommendations already made that are applicable to all Candidate States with nuclear power reactors.

Recommendations of type I:
Slovenia should, as a short term priority

1. **Regarding the nuclear legislation:** Complete the on-going revision of the 1984 Act on radiation protection and the safe use of nuclear energy in order to make it more clear, in compliance with widely applied EU practice, regarding the safety responsibility of the operator, roles and responsibilities of governmental bodies and possibilities for technical appeals by the licensees.

Recommendations of type II:

Slovenia should report on progress in the following

- **Regarding resources of the Regulator:** Measures to develop and implement an action plan to ensure that the regulatory body (SNSA) has adequate resources to carry out all its duties and responsibilities and resources to obtain the necessary independent technical support. The action plan should be based on an appropriate analysis of the regulatory needs involved.

- **Regarding the seismic qualification of Krško NPP:** Measures to complete the regulatory review, approval process and follow-up of the Krsko seismic case and the associated monitoring programme, taking into account the new available information on seismic site characteristics from the PHARE project as well as the scientific debate on this issue.

- **Regarding the National Emergency Response Plan:** Measures to develop an integrated national emergency plan, taking into account the interface with Croatian authorities, and to verify the planned emergency arrangements through full scope exercises on a regular basis.

III.2 Observations and Recommendations concerning the Safety of Other Types of Nuclear Installations and the related regulatory framework in the context of enlargement (AQG)

1. General observations and recommendations

Most Candidate States have national safety programmes in place with regard to the safety of other types of installations and the related regulatory framework. Many of these programmes are supported by the Community and/or by Member States of the Union. On request, the Candidate States have made available updated information on the current status of implementation of these national safety programmes, allowing the AQG to base the present report, including the sections for each Candidate State, on developments up to March 2001.

The AQG finds these ongoing and currently planned national safety programmes in Candidate States and their timely completion to be one of the most essential elements with regard to achieving a "high level of nuclear safety" as referred to in doc.13789/00. This includes regulatory supervision. Specific issues and measures included in such national safety programmes are therefore not commented upon in the following country-specific sections of this report unless the AQG finds that they represent deviations of particular safety significance with regard to requirements and good practices widely applied within the Union, or the measures are regarded as inadequate, time schedules are regarded as unduly extended or the funding is judged to be insufficient.

With regard to research reactors, the AQG wishes to point out that the basic principles guiding the safe operation of NPPs and their regulatory supervision largely apply also to research reactors, with due regard to their special features. Specific guidance can be found in the relevant IAEA Safety Standards for research reactors .

With regard to the safe management of spent fuel and radioactive waste, the AQG firstly notes that the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management will enter into force in June 2001. Although presently neither ratified by all Member States, nor by all Candidate States, this Joint Convention nevertheless provides the appropriate guidance on internationally widely recognised principles and practices with regard to the safe management of spent fuel and radioactive waste. Secondly, the AQG notes that although technical solutions for the long term management and storage or disposal of high-level radioactive waste, including spent fuel not to be reprocessed, are in advanced stages of development within the Union, progress in selecting, validating and implementing the appropriate national disposal schemes

for such types of waste varies widely between Member States. These two observations should be kept in mind when assessing the situation in the Candidate States, as the demands made to them ought not to be stricter than the requirements in force in the EU. Based on the observations made above the AQG makes the following general recommendation:

General recommendation of type II:

Taking what is already implemented into due account, all Candidate States should continue to develop and implement their national programmes regarding the safe management of spent fuel and radioactive waste, and for decommissioning of nuclear facilities no longer in use, and regarding the safety of their research reactors (if applicable).

The AQG underlines that Candidate States should pay particular attention to the following measures that are typically considered as good practices within the EU, when developing and implementing their national programmes for the safe management of spent fuel and radioactive waste:

- Development of national strategies for the long term safe management of spent fuel and radioactive waste, including appropriate schemes for storage or disposal of all types of radioactive waste and for decommissioning of nuclear facilities no longer in use;
- Provision of adequate facilities for safe interim storage of spent fuel;
- Closure of old facilities for storage and disposal of radioactive waste not in compliance with modern standards, and transfer of waste from these facilities to modern facilities to the extent reasonably feasible;
- Assurance of adequate financial resources to support the safety of facilities for spent fuel and radioactive waste management during their operating lifetime and for decommissioning, based on the principle that the waste producer should pay.

Moreover the AQG makes the following two observations:

- Disused sealed sources left from activities that have now ceased are of considerable concern in several Candidate States. In this regard, the AQG makes the following general remarks. Firstly, the future management of disused sealed sources will basically be covered by the *acquis* on radiation protection. Secondly, under Article 28 of the Joint Convention[10], Contracting Parties are obliged to ensure that safety issues related to disused sealed sources are properly addressed. As already pointed out, this should be considered as good practices

[10] ARTICLE 28. DISUSED SEALED SOURCES
1. Each Contracting Party shall, in the framework of its national law, take the appropriate steps to ensure that the possession, remanufacturing or disposal of disused sealed sources takes place in a safe manner.
2. A Contracting Party shall allow for re-entry into its territory of disused sealed sources if, in the framework of its national law, it has accepted that they be returned to a manufacturer qualified to receive and possess the disused sealed sources.

- Tailings from uranium mining and milling operations are normally not included in the definition of nuclear fuel cycle installations, but are typically dealt with in the general context of hazardous waste from mining and milling operations, with due consideration to the relevant radiation protection issues. Therefore, the AQG did not address tailings from uranium mining and milling operations as a nuclear safety issue in the context of the present report, although the AQG is well aware of the need to address the serious environmental concerns associated with such tailings in several Candidate States[11].

2. Observations and recommendations for each Candidate State

BULGARIA

In addition to the Kozloduy power reactors, Bulgaria has one research reactor in Sofia. It is presently shut down pending decisions on its future. Spent fuel from the power reactors is stored at Kozloduy and spent research reactor fuel at the research reactor. Existing waste treatment and disposal facilities are being upgraded and new ones are planned. A national strategy is under discussion. It foresees the creation of a national agency to manage spent fuel and radioactive waste. A financing system is in operation.

The general observations on good practices as well as the general recommendation of Type II made at the beginning of section III.2 are relevant. In addition, the AQG makes the following specific recommendation:

Recommendation of type I:

Regarding the regulatory framework: Bulgaria should, when implementing the first two country-specific recommendations of type I given in section III.1 above, regarding revised legislation and the independence and the resources of the regulatory authority, ensure that the requirements with respect to regulation of other nuclear installations than nuclear power reactors are also respected.

CYPRUS

Activities in Cyprus relevant in this context are limited notably to the management and disposal of institutional radioactive waste, mainly sealed sources from industrial and medical applications. A number of amendments to existing legislation are under way, mainly aimed at implementation of the *acquis* related to radiation protection.

[11] As background information, summary descriptions of uranium mining and milling operations in Candidate States are nevertheless included in Appendix 1

The general observations on good practices as well as the general recommendation of Type II made at the beginning of section III.2 are relevant, in particular with regard to Cyprus ensuring that the appropriate regulatory oversight is established according to good practices within the EU.

CZECH REPUBLIC

In addition to the Dukovany and Temelin power reactors, the Czech Republic has three operating research reactors. Spent fuel from the power reactors is stored at Dukovany and Temelin and spent research reactor fuel at the research reactors. Existing waste treatment and disposal facilities are being upgraded and extended. A national agency (RAWRA) has been established to manage spent fuel and radioactive waste facilities. RAWRA has elaborated a long term strategy for its activities, including exploration of deep geological disposal concepts. A financing system is in operation.

The general observations on good practices as well as the general recommendation of Type II made at the beginning of section III.2 are relevant.

ESTONIA

Estonia has two radioactive waste storage facilities. One is situated at Paldiski, the site of the now decommissioned ex-Soviet training reactors. The spent fuel from the research reactors has been returned to Russia. The other waste storage facility, at Tammiku, has been closed and the waste is planned to be transferred to the Paldiski site. Options for final repositories are being explored. A state-owned company, ALARA, is responsible for radioactive waste management. A revision of nuclear and radiation protection legislation is under way, *inter alia* to provide better coverage of all types of nuclear activities. Costs for 'historical waste' are paid by the State.

The general observations on good practices as well as the general recommendation of Type II made at the beginning of section III.2 are relevant, in particular with regard to the revision of the legislative framework.

HUNGARY

In addition to the Paks nuclear power station, Hungary has two operating research and training reactors. Spent fuel from the power rectors is stored at Paks and at spent research reactor fuel at the research and training reactors. There are waste treatment and storage facilities at Paks. A waste treatment and disposal facility has been operated at Püspökszilágy since 1976 and is now being upgraded to comply with stricter national standards. Site explorations for a new repository is under way. Preliminary geological investigations for a repository for spent fuel and high level waste are also carried out. There is a national agency, PURAM, that is responsible for the management of spent fuel and radioactive waste. There is a financing system in operation since 1998.

The general observations on good practices as well as the general recommendation of Type II made at the beginning of section III.2 are relevant. In addition, the AQG makes the following specific recommendation:

Recommendation of type I:

Regarding the independence of the regulatory authority: Hungary should, when implementing the country-specific recommendation of type I given in section III.1 above, regarding further strengthening of the independence of the regulatory authority (the NSD and GSD departments of the Hungarian Atomic Energy Authority) in particular address the arrangement that the head of the national waste management agency (PURAM) reports to the Director General of the Hungarian Atomic Energy Authority.

LATVIA

Latvia has two research reactors at Salaspils. Both are shut down, the last in 1998. Spent fuel is stored at the reactors. There is an old waste disposal facility at Baldone, also containing old military waste. The future of Baldone is under review. New disposal facilities are planned. There is a new state enterprise, RAPA Ltd, which is responsible for management and disposal of radioactive waste and management and monitoring of the Salaspils facility. There is a financing system to cover costs for management and disposal of new waste, but the state has to cover costs for 'historical waste', including decommissioning of old facilities.

The general observations on good practices as well as the general recommendation of Type II made at the beginning of section III.2 are relevant

LITHUANIA

Spent fuel from the Ignalina power reactors is stored on site in the fuel pools and in a separate dry storage facility. There are waste treatment and storage facilities at Ignalina. An old disposal facility at Maišiagala was closed in 1988. A national Radioactive Waste Management Agency is to be established in 2001 according to a law from 1999. A national strategy for spent fuel and radioactive waste management is expected to be adopted in 2001. A decommissioning fund for Ignalina has been set up, receiving payments through an electricity levy. Substantial international contributions are also foreseen. A special fund will be set up to finance other radioactive waste management activities. Measures have been announced to strengthen regulatory capacity in the areas of radioactive waste management and decommissioning.

The general observations on good practices as well as the general recommendation of Type II made at the beginning of section III.2 are relevant. In addition, the AQG makes the following specific recommendation:

Recommendation of type II:

Regarding the resources of the regulatory authority: Lithuania should, when implementing the second country-specific recommendation of type I given in section III.1 above, regarding the resources of the regulatory authority, continue to ensure that adequate resources are provided for the regulation of the safe management of spent fuel and radioactive waste, including future decommissioning of the Ignalina reactors.

MALTA

Activities in Malta relevant in this context are limited notably to the management of institutional radioactive waste, mainly sealed sources from industrial and medical applications. By 2002, a number of amendments to existing legislation are foreseen to have been adopted and entered into force, mainly aimed at implementation of the *acquis* related to radiation protection. A specific and independent regulatory system will also be set up by the end of 2002. In May 2001, an Integrated Solid Waste Management Plan, commissioned by DG Environment will be finalized. According to information provided by Malta, this will cater for the proper collection and disposal of hazardous waste, including radioactive waste.

The general observations on good practices as well as the general recommendation of Type II made at the beginning of section III.2 are relevant, in particular with regard to Malta ensuring that the appropriate regulatory oversight is established according to good practices within the EU..

POLAND

Poland has at present one operating research reactor and two that are shut down. Two older research reactors are decommissioned. The spent fuel from the research reactors is stored on site. A dry interim storage facility is under investigation. At the research reactor site at Swierk, there are facilities for treatment and storage of radioactive waste. The waste disposal facility at Rozan has operated since 1961. A new modern repository is needed, and the site selection process has started. A strategic programme has been completed investigating long-term solutions for the nuclear waste disposal, particularly for the spent fuel from the research reactors. A revised Atomic Energy Law covering all types of nuclear installations and activities was enacted by the Parliament of Poland in November 2000 and will fully enter into force on 1 January 2002. According to the new law, a state-owned public utility to handle management and disposal of all nuclear waste will start operating at the Swierk site from January 2002. The majority of the funding for waste management is provided by the State, the rest being paid by the waste producers.

The general observations on good practices as well as the general recommendation of Type II made at the beginning of section III.2 are relevant.

ROMANIA

In addition to the Cernavoda power reactor, Romania has one dual core research reactor in operation in Pitesti. A research reactor in Magurele, Bucharest was shut down in 1997. There is also a fuel manufacturing plant at Pitesti. Spent fuel from the power reactor is stored at Cernavoda. Spent fuel from the operating research reactor is returned to the USA, but there is some spent fuel in storage at the shut down research reactor. There are waste treatment and storage facilities at Cernavoda, Pitesti and Magurele. There is a national waste repository in an abandoned uranium mine at Baita Bihor. A repository is also planned near the Cernavoda site. New legislation is in preparation providing for the establishment of a national Radioactive Waste Management Agency and a fund to cover costs for the management and disposal of radioactive waste and for decommissioning.

The general observations on good practices as well as the general recommendation of Type II made at the beginning of section III.2 are relevant. In addition, the AQG makes the following specific recommendation:

Recommendation of type II:

Regarding the resources of the regulatory authority: Romania should, when implementing the first country-specific recommendation of type I given in section III.1 above, regarding the resources of the regulatory authority, ensure that adequate resources are also provided for the regulation of other nuclear installations than nuclear power reactors.

SLOVAKIA

In addition to the Bohunice and Mochovce operating nuclear power reactors there is a prototype gas cooled heavy water moderated reactor (Bohunice A1) that was shut down in 1977 and is now being decommissioned. Spent power reactor fuel is stored on site in Bohunice and Mochovce. The spent fuel from the A1 reactor has been returned to Russia. There are waste treatment facilities at Bohunice and Mochovce, and a new shallow land repository under active commissioning tests at Mochovce, where waste from both Mochovce and Bohunice will be deposited. The development of a deep underground repository for high level waste and spent fuel is at present at the start of the site selection process. Management and final disposal of spent fuel and radioactive waste is presently the responsibility of a branch of the utility, Slovak Electric. A State fund was set up in 1995 for financing of future costs for management and disposal of spent fuel and radioactive waste, including decommissioning. The nuclear utility pays a fee per kWh produced.

The general observations on good practices as well as the general recommendation of Type II made at the beginning of section III.2 are relevant. In addition, the AQG makes the following specific recommendation:

Recommendation of type II:

Regarding the resources of the regulatory authority: Slovakia should, when implementing the first country-specific recommendation of type II given in section III.1 above, regarding the resources of the regulatory authority, ensure that adequate resources are also provided for the regulation of the safe management of spent fuel and radioactive waste,

SLOVENIA

In addition to its power reactor at Krško, Slovenia has a research reactor at Brinje. Spent fuel from the research reactor is routinely returned to the USA. Spent fuel from the power reactor is stored on site at Krško. There are radioactive waste storage facilities at Krško, Brinje and Zavratec. There is a national Agency for Radwaste Management (ARAO) responsible for the management and final disposal of all types of radioactive waste in Slovenia. A strategy for low and intermediate level waste management has been submitted by ARAO to the Slovenian government for review and approval. There are as yet no waste disposal facilities in Slovenia, but the proposed strategy foresees a repository to be ready by 2007, or at the latest by 2010. In 1996 the Slovenian Government has adopted a long-term strategy for the spent fuel management that will be revised every three to five years. According to the current strategy, it is planned to dispose spent fuel by year 2050. A Fund for decommissioning and waste disposal was established in 1994. [...]

The general observations on good practices as well as the general recommendation of Type II made at the beginning of section III.2 are relevant. In addition, the AQG makes the following specific recommendation:

Recommendation of type II:

Regarding the resources of the regulatory authority: Slovenia should, when implementing the first country-specific recommendation of type II given in section III.1 above, regarding the resources of the regulatory authority, ensure that adequate resources are also provided for the regulation of the safe management of spent fuel and radioactive waste.

LIST OF ACRONYMS USED IN THE REPORT

CNCAN	National Commission for the Control of Nuclear Activities (Romania)
CNS	Convention on Nuclear Safety
CONCERT	Concertation on European Regulatory Tasks
CUAEPP	Committee on the Use of Atomic Energy for Peaceful Purposes (Bulgaria)
FSAR	Final Safety Analysis Report
IAEA	International Atomic Energy Agency
I&C	Instrumentation and Control
IGSCC	Intergranular Stress Corrosion Cracking
INSAG	International Safety Advisory Group
IRRT	International Regulatory Review Team
NEA	Nuclear Energy Agency (OECD)
NPAA	National Programme for the Adoption of the Acquis
NPP	Nuclear Power Plant
NRWG	Nuclear Regulators' Working Group
NSD	Nuclear Safety Directorate (Hungary)
OSART	Operational Safety Review Team
PTS	Pressurised Thermal Shock
PWR	Pressurised Water Reactor
RBMK	Graphite moderated, boiling water cooled channel type reactor
RPV	Reactor Pressure Vessels
RSWG	Reactor Safety Working Group
SAR	Safety Analysis Report
SNSA	Slovenian Nuclear Safety Administration
SÚJB	State Office for Nuclear Safety (Czech Republic)
TSO	Technical support organisation
ÚJD	Nuclear Regulatory Authority (Slovakia)
VATESI	Nuclear Power Safety Inspectorate (Lithuania)
VVER	Water moderated, Water cooled energy reactor (Russian name for PWR)
WENRA	Western European Nuclear Regulators Association

Check-list used to identify safety issues

1. Legislative and regulatory framework (CNS Article 7, 8 and 9)

Status of the legislative framework
- Coverage of the nuclear law in force and latest revision date
- Clarity of assignment of responsibility for safety and definition of safety obligations
- Requirements on licensing system and prohibition to operate without licence
- Formal mandate to regulatory body to issue regulations and inspect facilities
- Ratification of all key conventions related to nuclear safety

Status of the regulatory body and its technical support infrastructure
- Independence (de jure and de facto) from promotion/utilisation and political pressure
- Power to enforce regulations and terms of licenses, including suspension, modification and revocation
- Funding to carry out all regulatory activities including international co-operation
- Staffing in terms of number and competence to carry out all regulatory activities
- Training programmes
- Salaries
- Capacity for independent assessments – access to independent technical support
- Access to supporting safety research
- Participation in international co-operation

Status of regulatory activities
- Quality of regulations addressing design, operation and safety verification
- Coverage and quality of licensing and associated safety reviews
- Regulatory control over plant modifications
- Coverage and criteria for periodic safety reviews
- Coverage and quality of inspections of technical issues as well as of safety management
- Reporting system and methods for screening and analysis of operational events
- Coverage and degree of up to date internal quality management system
- International peer reviews

2. Design and construction of NPPs (CNS Article 17 and 18)

Design basis aspects
- Selection of design basis events (what the plant is designed to cope with)
- Capability to withstand rupture of the largest pipe connected with the RPV
- Capability to withstand fire, flooding, earthquakes and other site-related factors
- Capability to withstand a single failure in combination with design basis events
- Capability to withstand a combination of external and internal events
- Capability to withstand additional failure assumptions, such as station black out, ATWS multiple SG tube rupture, loss of main heat sink and loss of required safety system in the long run

Core characteristics
- Complexity of the core
- Power density
- Requirements on control- and protection systems and calculation tools for transient analysis

Inherent safety characteristics
- Degree of reliable, stable and easily manageable operation

Reactor pressure vessel and primary pressure boundary
– General status of the primary pressure boundary integrity including Reactor Pressure Vessel (taking into account known degradation mechanisms)
– Use of the leak-before-break (LBB) concept

Confinement/Containment
– Verified capability to handle design basis accidents
  – Structural integrity (including steam condensation capacity and combustible gas control)
  – Release mitigation
– Leak rate

Safety systems
– Capability of the reactor protection system
– Capability of the ECCS and long term residual heat removal system
– Capability of the emergency power supply
– Capability of the fire protection system and mobile fire fighting resources
– Degree of redundancy and separation

Instrumentation & Control (I&C) systems
– General reliability of the I&C systems
– Degree of redundancy and separation
– Adequacy of control room and man-machine interface
– Emergency back-up for main control room

Environmental qualification of safety- and I&C systems
– Extent of environmental qualification
– Extent of seismic qualification based on site characterisation

Beyond design basis accidents and severe accidents
– Extent of analysis of beyond design basis accidents, including severe accidents
– Degree of implementation of symptom-based emergency operating procedures and accident management guidelines and associated special instrumentation
– Measures to mitigate radiological consequences (containment/confinement function in severe accidents)

3. Assessment and verification of Safety (CNS Article 14)

Safety assessments and documentation
– Deterministic safety assessments
  – Quality of assessment methods and codes
  – Use of conservative and best estimate approaches
– Quality and update of related safety documentation (FSAR)
– Probabilistic safety assessments
  – Levels and types of events covered; design- or plant-specific
– Periodic reassessments of safety
– Extent of independent reviews

Verification of safety by inspection and testing

- Adequacy of inspection and testing programmes to monitor ageing and material degradation in primary circuit
- Adequacy of inspection and testing programmes to verify functioning of key safety systems, including containment/confinement
- Adequacy of programmes to control ageing of electric and electronic components

4. Operational safety (CNS Article 11, 12 and 19)

Organisation, procedures, operation and maintenance

- Adequacy of corporate structure and financing
- Access to competence for technical and engineering support
- Adequacy of staffing in terms of number and competence
  - Training programmes, including simulator training
  - Salaries
- Adequacy of maintenance programmes
- Tech specs and procedures for operation, including emergency operating procedures

Operational experience

- Adequacy of systems for analysis and feed back of operating experience
- Event trends

5. Safety culture and management, quality assurance (CNS Articles 10 and 12)

- Safety management approach and adequate addressing of safety culture issues
- Adequacy of quality management system
- Existence and adequacy of internal safety committees
- Use of independent peer reviews
- Special safety management programmes implemented at units planned to be shut down

6. Emergency preparedness (CNS Article 16)

Governmental emergency preparedness

- Coverage of off-site emergency plan
- Definition of responsibilities and tasks between national and local authorities and NPP
- Communication means
- Information about the national emergency planning provided to neighbouring countries
- Conduct of drills and exercises, including participation in international exercises

NPP emergency preparedness

- Adequacy of on-site emergency plans (latest update)
  - Adequacy of accident classification and alarm criteria
  - Adequacy of emergency operating centre, including technical support and communications
- Drills and exercises

7. Improvements at existing installations (CNS Article 6)

- Adequacy of coverage and objectives of decided safety improvement programmes from the EU safety perspective
- Adequacy of financing
- Implementation status and outlook (including planned shut-downs)