

Eleventh International Nuclear Regulatory Inspection Workshop

Experience from the Inspection of Ageing and Equipment Qualification, of Competency of Operators, and of Licensee's Oversight of Contractors

Workshop Proceedings
Baden, Switzerland
21-24 May 2012

Appendix of Responses



Unclassified

NEA/CNRA/R(2012)6/ADD1

Organisation de Coopération et de Développement Économiques
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**NUCLEAR ENERGY AGENCY
COMMITTEE ON NUCLEAR REGULATORY ACTIVITIES**

Eleventh International Nuclear Regulatory Inspection Workshop

**on Experience from the Inspection of Ageing and Equipment Qualification, of Competency of Operators
and of Licensee's Oversight of Contractors**

Appendix: Compilation of Survey Responses

**Hosted by ENSI, the Swiss Federal Nuclear Safety Inspectorate
Baden, Switzerland
21-24 May 2012**

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The Committee on Nuclear Regulatory Activities (CNRA) shall be responsible for the programme of the Agency concerning the regulation, licensing and inspection of nuclear installations with regard to safety. The Committee shall constitute a forum for the exchange of information and experience among regulatory organisations. To the extent practical, the Committee shall review developments, which could affect regulatory requirements with the objective of providing members with an understanding of the motivation for new regulatory requirements under consideration and an opportunity to offer suggestions that might improve them or avoid unwarranted disparities among member countries. In particular, it shall review current management strategies and safety management practices and operating experiences at nuclear facilities with a view to disseminating lessons learnt. In alignment with the NEA Strategic Plan, the Committee shall promote co-operation among member countries to use the feedback from this experience to ensure high standards of safety, to further enhance the efficiency and effectiveness of the regulatory process and to maintain adequate infrastructure and competence in the nuclear safety field.

The Committee shall promote transparency of nuclear safety work and open public communication. The committee shall maintain an oversight of all NEA work that may impinge on the development of effective and efficient regulation.

The Committee shall focus primarily on existing power reactors and other nuclear installations and the construction of new power reactors; it may also consider the regulatory implications of new designs of power reactors and other types of nuclear installations. Furthermore, it shall examine any other matters referred to it by the Steering Committee. The Committee shall collaborate with, and assist, as appropriate, other international organisations for co-operation among regulators and consider, upon request, issues raised by these organisations. The Committee shall organise its own activities. It may sponsor specialist meetings and working groups to further its objectives.

In implementing its programme the Committee shall establish co-operative mechanisms with the Committee on the Safety of Nuclear Installations to work with that Committee on matters of common interest, avoiding unnecessary duplications. The Committee shall also co-operate with the Committee on Radiation Protection and Public Health and the Radioactive Waste Management Committee on matters of common interest.

Foreword

This appendix provides the complete compilation of responses received to the questionnaire issued in conjunction with the workshop announcements. The responses are provided as received, with changes made only to the formatting.

The OECD Nuclear Energy Agency (NEA) Committee on Nuclear Regulatory Activities (CNRA) Working Group on Inspection Practices (WGIP) sponsored the 11th International Workshop on Nuclear Regulatory Inspection Activities. The workshop was hosted by the Swiss Federal Nuclear Safety Inspectorate, ENSI in Baden, Switzerland on 21-24 May 2012.

The three workshops that were addressed were as follows:

- Inspection of ageing and equipment qualification.
- Inspection of competency of operators.
- Inspection of licensee's oversight of contractors.

Each of the respondents was given the following instructions in relation to their response:

- Only one response per country is required. If more than one person from your country is participating, please co-ordinate the responses accordingly.
- Please provide responses on separate sheet and clearly identify the questionnaire part and topic.

For preparation of the workshop, participants are invited to supply their national inspection approaches used in inspection of events and incidents according to the surveys. Actual issues that were discussed during the workshop were generated by the topic leaders based on the responses submitted by participants with their registration forms. This format helps to ensure that issues considered most important by the workshop participants are covered during the group discussions.

Table of Contents

Foreword	5
Topic 1. Experience from Inspection of Ageing and Equipment Qualification	9
Introduction and Questionnaire.....	11
Belgium.....	13
Finland	15
France.....	17
Germany.....	19
India	23
Japan	26
Korea.....	29
Mexico	31
Slovak Republic	33
Spain	35
Sweden.....	38
Switzerland	40
United Kingdom.....	42
USA.....	44
Topic 2. Experience from the Inspection of the Competency of Operators	47
Introduction and Questionnaire.....	49
Belgium.....	51
Canada.....	54
Czech Republic	61
Finland	64
France.....	66
Germany.....	69
India	74
Japan	77
Korea.....	80
Mexico	82
Slovak Republic	89
Spain	91
Sweden.....	95
Switzerland	98
United Kingdom.....	100
USA.....	103

Topic 3. Experience from the Inspection of Licensee’s Oversight of Contractors	107
Introduction and Questionnaire.....	109
Belgium.....	111
Czech Republic	113
Finland	116
France.....	118
Germany.....	119
Japan	123
Korea.....	126
Mexico	129
Slovak Republic	132
Spain	135
Sweden.....	138
Switzerland	140
United Kingdom.....	142
USA.....	145

TOPIC 1.
EXPERIENCE FROM INSPECTION OF AGEING AND EQUIPMENT QUALIFICATION

Introduction

As nuclear facilities age, the continued effectiveness of systems, structures and components (SSCs) affected by ageing mechanisms and equipment qualification must be verified. Of note, based on recent operating experience, these SSCs include equipment with limited access, such as buried piping. This workshop topic is not a new issue, in Regulatory Aspects of Life Extension and Upgrading of Nuclear Power Plants (NPPs) – CNRA Special Issue’s Meeting 2000 Report [NEA/CNRA/R(2001)1 and 2] and in 1999 the WGIP addressed the issue in the topic of Regulatory Inspection Activities related to Older Operating NPPs, NEA/CNRA/R(99)2.

However, much has been learnt since then, more plants have sought the regulatory approval for extended operation and additional science and operating experience have been identified. The CNRA Senior Task Group on long-term operation has also recently completed a look at the regulatory perspective of long-term operation. The focus of this workshop topic is to identify commendable inspection practices for gaining confidence on verifying the licensee’s ability to maintain the effectiveness of ageing SSCs.

Survey Questions

Notes: Only one response per country is required. If more than one person from your country is participating, please co-ordinate the responses accordingly. Submittals should be sent by email to: diane.jackson@oecd.org by Wednesday, 29 February 2012

Questionnaire

For preparation of the workshop, participants are invited to supply their national inspection approaches used according to the following questionnaire “Inspection of systems, structures and components (SSCs) affected by ageing mechanisms and equipment qualification, including equipment with limited access, such as buried piping”.

1. Did/Does the licensee qualify during construction active or passive components to be able to cope with an important event?

Yes	No
-----	----

 - 1.1 Which kind of requirements e.g. ASTM/ASME (ASTM International, formerly known as the American Society for Testing and Materials / ASME, founded as American Society of Mechanical Engineers), standards, codes? To what extent?

• Seismic	Yes	No
• Environmental	Yes	No
 - 1.2 What method was used?

• Test	Yes	No
• Analysis	Yes	No
• Code/calculation	Yes	No
 - 1.3 Did the RB assess and inspect the process?
 - 1.4 Was there any RB approval required?
2. How have the requirements evolved during the past years?
 - 2.1 Have they changed to more or less severe?
 - 2.2 Has the scope (list of the (SSCs) been modified? If the answer is “yes”, please explain the main reasons.
 - 2.3 Does your RB inspect the process to ensure that new requirements are implemented? If the answer is “yes”, briefly describe how.
 - 2.4 Does your RB inspect the process to ensure that if equipment is modified its qualification is also adequately modified? If the answer is “yes”, briefly describe how.

3. Has your RB required the licensee to implement specific ageing program to check whether the SSCs (passive and active) behaviour is in accordance with expectations.
4. Has your licensee or RB identified problems related to obsolescence, unavailability, etc. of qualified SSCs?
5. Does your licensee use new qualified materials, equipment? If the answer is “yes”, briefly describe how the RB is involved in this process?
6. How does your RB manage the lack of conformity (non-conformances) when it is discovered? Can your RB stop the operation of the plant or allow justifications to keep the plant operating for a time with supplementary activities. Please provide any example.
7. Is the licensee’s upgrading non qualified SSCs? If the answer is “yes”, please describe the process.
8. How has operating experience been applied concerning qualified SSCs?
9. Has your RB assessed how to inspect SSCs with limited access?

Survey Responses

BELGIUM

1. Did/Does the licensee qualify during construction active or passive components to be able to cope with an important event?

Yes.

1.1. Which kind of requirements e.g. ASTM/ASME standards, codes?

ASME, 10CFR50, IEEE, RCCM, ...

To what extent?

- Seismic Yes
- Environmental Yes

1.2. What method was used?

- Test Yes
- Analysis Yes
- Code/calculation Yes

1.3. Did the RB assess and inspect the process? Yes

1.4. Was there any RB approval required? Yes

2. How have the requirements evolved during the past years?

2.1. Have they changed to more or less severe?

The requirements related to the ageing mechanisms have evolved since the start-up of the units among others in the framework of the periodic safety reviews. More recently, a full ageing management program (AMP) has been developed for the three oldest units. It is aimed to comply with the requirements of 10CFR54.4. The AMP of the other units will be checked up and completed on the same basis in the framework of the on-going periodic safety reviews.

The requirements of the equipment qualification have not evolved significantly in the past years. It was based on IEEE Std 323-1974, which is more severe than more recent versions of IEEE standards. A more realistic post-accident qualification irradiation has been justified (for ex from 150 to 65 MRads after 1 year).

2.2. Has the scope (list of the SSCs) been modified? If the answer is “yes”, please explain the main reasons.

Yes. The initial scope was settled for the most recent units. The scope of the oldest was extended during their first periodic safety review (ten years after start-up). Scope adaptation to design changes took place since then. A full scope redefinition based on 10CFR54.4 is being established in the framework of the on-going periodic safety reviews.

2.3. Does your RB inspect the process to ensure that new requirements are implemented? If the answer is “yes”, briefly describe how.

Yes. The related RB inspection shall take place as part of the approval process of the periodic safety reviews.

2.4. Does your RB inspect the process to ensure that if equipment is modified its qualification is also adequately modified? If the answer is “yes”, briefly describe how.

Yes. This is part of the evaluation process of the modifications. When a piece of equipment is modified, it is verified (by licensee) and checked (by RB) that the qualification is maintained.

3. Has your RB required the licensee to implement specific ageing program to check whether the SSCs (passive and active) behaviour is in accordance with expectations.

Yes.

4. Has your licensee or RB identified problems related to obsolescence, unavailability, etc. of qualified SSCs?

Yes. Examples are obsolescence of 380V electrical distribution boards, Radiation Monitoring chains, batteries, transducers, ...

5. Does your licensee use new qualified materials, equipment? If the answer is “yes”, briefly describe how the RB is involved in this process?

Yes. New qualified equipments are evaluated mainly in the frame of the modification process. It includes a verification of the qualification program. RB may attend to (some of) the qualification tests.

6. How does your RB manage the lack of conformity (non-conformances) when it is discovered? Can your RB stop the operation of the plant or allow justifications to keep the plant operating for a time with supplementary activities. Please provide any example.

A non conformity has to be justified using a formal process called JCO (Justification for Continued Operation). This JCO is approved by the RB. If considered non satisfactory, the RB has the power to stop the operation of a plant. The JCO process aims at describing the safety issue, the justification for continued operation (if applicable with temporary specific measures), the schedule for going back to full compliance with safety case.

7. Is the licensee’s upgrading non qualified SSCs? If the answer is “yes”, please describe the process.

Yes. A specific qualification programme describes the upgrade with respect to the current qualification requirements. This programme and its implementation are assessed by the RB. Additionally, for mechanical equipment, the approval of an Authorized Inspection Organisation may be required.

8. How has operating experience been applied concerning qualified SSCs?

The licensee has an “Operation feedback” procedure. If a problem is encountered with an SSC at another plant, site or country, the licensee evaluates the applicability of the problem on his plants (this can also lead to the update of Synthetic Qualification Reports). In parallel, the RB performs the same (independent) exercise. The RB asks during inspections if certain experiences have been taken into account.

9. Has your RB assessed how to inspect SSCs with limited access?

This subject was handled during periodic safety reviews. SSCs with limited access (for instance due to radiation protection issue or buried piping) which are subject to ASME XI inspections were evaluated (i.e. they were identified and it was justified and accepted not to test them). The justification is that tests are performed using the sampling principle. The accessible parts of the SSC (e.g. buried piping) are inspected. If no problem is found there, it can be supposed that the buried part is also OK. A counter-example is the identification of corrosion on the non-buried part, and doubts about the situation of the buried parts (also due to potential ground movements). The pipes were unburied and inspected.

FINLAND

1. Did/Does the licensee qualify during construction active or passive components to be able to cope with an important event?

Yes.

1.1 Which kind of requirements e.g. ASTM/ASME standards, codes? To what extent?

- Seismic Yes
- Environmental Yes

1.2 What method was used?

- Test Yes
- Analysis Yes
- Code/calculation Yes

1.3 Did the RB assess and inspect the process?

RB verifies that safety related SCCs have been qualified by analysis, type tests or operating experience under conditions SCCs are designed to serve at the nuclear facility

1.4 Was there any RB approval required?

RB approval is required for SCC design and their qualification procedures when qualification is required

2. How have the requirements evolved during the past years?

More focus has been put on qualification lately, e.g., in the renewed RB guides.

2.1 Have they changed to more or less severe?

Turning more severe, e.g., if SCC qualification is found inadequate during the design review, qualification is required and approval will be based on the qualification results.

2.2 Has the scope (list of the SSCs) been modified? If the answer is “yes”, please explain the main reasons.

No

2.3 Does your RB inspect the process to ensure that new requirements are implemented? If the answer is “yes”, briefly describe how.

See 1.4 and RB also witnesses qualification tests

2.4 Does your RB inspect the process to ensure that if equipment is modified its qualification is also adequately modified? If the answer is “yes”, briefly describe how.

SCC modification is parallel to the approval process of a new SCC. Points 1.4 and 2.3 will apply.

3. Has your RB required the licensee to implement specific ageing program to check whether the SSCs (passive and active) behaviour is in accordance with expectations.

A specific ageing managing program is required.

4. Has your licensee or RB identified problems related to obsolescence, unavailability, etc. of qualified SSCs?

Yes. For example lack of actuator spare parts (obsolescence) and defects causing unavailability of safety valves and emergency diesel generators have been identified.

- 5. Does your licensee use new qualified materials, equipment? If the answer is “yes”, briefly describe how the RB is involved in this process?**

Yes. See 2.1

- 6. How does your RB manage the lack of conformity (non-conformances) when it is discovered? Can your RB stop the operation of the plant or allow justifications to keep the plant operating for a time with supplementary activities. Please provide any example.**

In case of severe non-conformances if nuclear safety is challenged RB can stop the operation. In other cases, deadline is given to the licensee to finalize appropriate corrective actions. OL1/2 primary safety valve disc indications detected during 2011 outage are an example.

- 7. Is the licensee’s upgrading non qualified SSCs? If the answer is “yes”, please describe the process.**

Non-qualified SCCs are not allowed in safety related systems.

- 8. How has operating experience been applied concerning qualified SSCs?**

Operating experience is considered one element of SCC qualifying. It can be the only way to qualify or it can supplement analyses and tests

- 9. Has your RB assessed how to inspect SSCs with limited access?**

More strict design and qualification requirements are set if normal in-service inspections and tests are not possible.

FRANCE

1. **Did/Does the licensee qualify during construction active or passive components to be able to cope with an important event?**

Yes. It is important to note that due to technical difficulties on the qualification programs, French reactors started their operation without all the equipments/components correctly qualified. The qualification of these equipment or components has been achieved completed after the construction of the facilities.

For the new reactor, EPR-Flamanville 3, the appropriate qualification of all SCC must be achieved before the first operation.

1.1 Which kind of requirement e.g. ASTM/ASME standards, codes?

French codes

Règles de conception et de construction des matériels électriques des îlots nucléaires, RCC-E, for electrical components.

Règles de conception et de construction des matériels mécaniques des îlots nucléaires, RCC-M, for mechanical components.

Règles de conception et de construction génie civil des îlots nucléaires, RCC-G, for civil engineering.

To what extend?

Seismic:..... Yes

Environmental:..... Yes

1.2 What method was used?

Test:..... Yes

Analysis: Yes

Code/calculation: Yes

1.3 Did the RB assess and inspect the process?

Yes, the ASN (French regulatory authority) and its technical advisor – IRSN – oversight the process, evaluating the results of the qualification programs given by the licensee. In addition, three meetings of the advisory committee for nuclear reactors took place in 1995, 2003 and 2006 to exam the qualification of the French nuclear reactor.

1.4 Was there any RB approval required?

2. **How have the requirements evolved during the past years?**

Yes.

2.1 Have they changed to more or less severe?

It depends on the SSC. In most of the cases, when the requirements have changed, they are now more severe.

2.2 Has the scope (list of the SSCs) been modified?

Revisions of the first Final Safety Analyses Report have demonstrated that some equipment/components did not have been identified as necessary to qualify or their qualification requirement were insufficient. Thus, they have been added to the list of the qualified SCCs and their qualification has been accomplished.

Does your RB inspect the process to ensure that new requirements are implemented?

Yes. Usually, the implementation of new requirements needs a design modification. In France, all design modifications need the RB authorisation before their implementation. Through the technical instruction of these design modification, the ASN ensure the correct application of the requirements.

Sometimes, the application of new requirements need to updated the final safety analyses report. This new version must be submitted to the approval of the ASN.

- 2.3 Does your RB inspect the process to ensure that if equipment is modified its qualification is also adequately modified? If the answer is “yes”, briefly describe how.

As explained before, the French licensee must submit for approval both important and minor modification before their implementation. The technical evaluation of the design modification, lead by the technical support of the ASN, IRSN, let ensure the appropriated qualification of the SCC after the modification.

3. **Has your RB required the licensee to implement specific ageing program to check whether the SSCs – passive and active – behaviour is in accordance with expectations?**

Yes. French licensee checks the ageing of the SCCs through, mainly, two programs:

- Programme d’investigation complémentaire.
- Examen de conformité, ECOT.

4. **Has your licensee or RB identified problems related to obsolescence, unavailability, etc. of qualified SSCs?**

Yes, it is a current problem in French nuclear reactors.

5. **Does your licensee use new qualified materials, equipment? If the answer is “yes”, briefly describe how the RB is involved in the process.**

Yes. The ASN is involved through the technical evaluation of the design modification. If the modification is major, the technical evaluation is deeper, covering from the qualification program of the new material/equipment, the results of this qualification, the fabrication and the inspection pre-service program after the installation of the new item-

How does your RB manage the lack of conformity – non-conformance – when it is discovered? Can your RB stop the operation of the plant or allow justifications to keep the plant operating for a time with supplementary activities. Please provide any example.

Most of the times, justifications are allowed. However, the ASN can, if necessary, stop the operation of a reactor if a real danger exists due to its operation.

The licensee must open a “non-conformance situation” and perform analyses on the impact of this non conformity on the safety of the plant. Depending on the results of these analyses, the licensee would declare a safety related important event or incident.

6. **Is the licensee’s upgrading non qualified SSCs? If the answer is “yes”, please describe the process.**

No, French licensee does not upgrade non qualified SCCs.

7. **How has operating experience been applied concerning qualified SSCs?**

8. **Has your RB assessed how to inspect SSCs with limited access?**

GERMANY

1. **Did/Does the licensee qualify during construction active or passive components to be able to cope with an important event?**

Yes. The plant has been planned and built according to the relevant regulations by the licensee. For safety critical plant components and systems these regulations require the ability to cope with external hazards such as seismic events, explosion pressure waves, flooding, etc.

1.1 Which kind of requirements e.g. ASTM/ASME standards, codes? To what extent?

The requirements are based on national and international standards. Among them are the KTA rules, which include standards covering various factual issues. Every KTA rule is reviewed periodically, at the latest after five years, if it conforms to the current state of the art.

Seismic events are covered in KTA rule 2201. This rule incorporates a recommendation of the Reactor Safety Commission (RSK) of 27 May 27 2004 and considers the following international standards:

- IAEA (International Atomic Energy Agency) - Safety-Guide NS-G 1.2 (11/2001)
- IAEA Safety Guide NS-G-3.3 (12/2002) und new drafts DS422
- U.S. NRC, RG 1.2008 (03/2007)
- STUK, YVL 2.6 (12/2001)
- Guide de l'ASN 2/01 (05/2006)

The KTA rule 2201 is subdivided as follows:

- 2201.1: Design of NPPs against Seismic Events;
Part 1: Principles
- 2201.2: Design of NPPs against Seismic Events;
Part 2: Subsurface Materials (Soil and Rock)
- 2201.3: Design of NPPs against Seismic Events;
Part 3: Design of Structural Components
- 2201.4: Design of NPPs against Seismic Events;
Part 4: Requirements for Procedures for Verifying the Safety of Mechanical and Electrical Components against Earthquakes
- 2201.5: Design of NPPs against Seismic Events;
Part 5: Seismic Instrumentation
- 2201.6: Design of NPPs against Seismic Events;
Part 6: Post-Seismic Measures

Environmental influences are also considered in the relevant regulations. For all SSCs relevant to safety the KTA rules include requirements concerning materials, layout and design. These requirements are to ensure that all environmental aspects like stresses and strains during the SSC life cycle are included in the design considerations. As an example, the following KTA rule may be mentioned:

- 3211.2: Pressure and Activity Retaining Components of Systems Outside the Primary Circuit; Part 2: Design and Analysis, Section 4.1: "All relevant effects on the components due to mechanical and thermal loadings, corrosion and erosion shall be taken into account in the design and calculation."

Specific regulations concerning in-service inspections and operation monitoring of SSCs are contained in additional KTA-rules, e.g.:

- 3201.4: Components of the Reactor Coolant Pressure Boundary of Light Water Reactors;
Part 4: In-service Inspections and Operational Monitoring

- 3211.4: Pressure and Activity Retaining Components of Systems Outside the Primary Circuit; Part 4: In-service Inspections and Operational Monitoring

Furthermore, it should be noted, that there is a specific KTA rule concerning general ageing management in Germany:

- 1403: Ageing-Management in Nuclear Power Plants

1.2 What method was used?

For the safety demonstration against extreme events like seismic hazards, etc., verifications by calculations as well as by tests and engineering judgements are envisaged. In general, the verification process is adapted according to the role played by the component in the overall safety concept.

1.3 Did the RB assess and inspect the process?

The licensing authority inspects the design basis in the context of design approvals, if necessary by consulting authorized experts.

1.4 Was there any RB approval required?

Installing of SSCs has to be approved by the licensing authority at the request of the licensee.

2. **How have the requirements evolved during the past years?**

In 2010, a new KTA rule 1403 dealing with ageing management in NPPs was put in force. Until then, ageing management was only included implicitly in design requirements, e.g. in the form of margins to account for abrasion and corrosion. Monitoring of ageing was carried out in the context of quality assurance, using several kinds of periodic inspection techniques such as visual inspections, functional checks, non-destructive testing, etc., to ensure the specified quality standards.

2.1 Have they changed to more or less severe?

Ageing management was mentioned in detail above. Moreover, the requirements for periodic inspection techniques for SSCs were sharpened; however, the quality requirements for SSCs have not changed significantly.

2.2 Has the scope (list of the SSCs) been modified? If the answer is “yes”, please explain the main reasons.

With the implementation of KTA 1403 all safety relevant SSCs must be included in the ageing management process. Moreover, a categorisation of the SSCs (technical facilities including consumables and operating supplies) was introduced:

- Category M1 comprises all components and component parts whose “failure are impermissible”.
- Category M2 comprises all other safety relevant components not assigned to category M1. Here preventive maintenance is carried out. For this reason, periodic test programs now include a larger number of SSCs as well as additional tests. According to KTA 1403, new findings about ageing phenomena must be considered, and, if appropriate, measures must be taken (e.g. in the form of additional tests).

Example

In 2010, a small leak was found in a steam generator drain pipe in a German NPP. As the cause of the leak stress corrosion cracking was determined in the welding filler material Inconel 82, which is susceptible to this failure mode, in combination with discontinuities originating from construction. Since this failure mode was considered transferable, all similar connections in the plant (other steam generators, main coolant lines, etc.) were visually checked, and periodic visual inspections were scheduled.

2.3 Does your RB inspect the process to ensure that new requirements are implemented? If the answer is “yes”, briefly describe how.

Yes. As an example, within the KTA 1403 put in force in 2010 a specific reporting system was introduced. The licensee is required to submit a Basis report concerning the implementation of the ageing management program in his plant to the supervisory authority, and furthermore status reports in yearly intervals.

2.4 Does your RB inspect the process to ensure that if equipment is modified its qualification is also adequately modified? If the answer is “yes”, briefly describe how.

If safety relevant SSCs are to be modified the licensing authority is informed in advance. In the context of a formalized revision procedure the compliance with quality requirements is assessed by the authority, which may consult external experts for this purpose.

3. **Has your RB required the licensee to implement specific ageing program to check whether the SSCs (passive and active) behaviour is in accordance with expectations.**

The supervisory authorities have prompted the licensees to implement an ageing management system conforming to KTA 1403. By various inspection and test procedures it is checked whether the specified requirements are met.

4. **Has your licensee or RB identified problems related to obsolescence, unavailability, etc. of qualified SSCs?**

If deviations from the specified quality requirements are detected the supplier is assessed in the context of an audit. If the countermeasures accomplished by the supplier turn out to be ineffective, it is excluded from further dealings. However, licensees are reporting an increasing difficulty to find vendors which are able to meet the stringent requirements. Moreover, due to the quite specific requirements and small quantities rising costs are becoming a problem. This development is aggravated due to the phase out of nuclear power enacted in Germany. The licensees therefore aim for new contracts with suppliers, valid e.g. until the end of life of the NPPs.

5. **Does your licensee use new qualified materials, equipment? If the answer is “yes”, briefly describe how the RB is involved in this process?**

In principle also newly approved materials and components can be used, based on the current state of the scientific and technical knowledge. Particularly, new components and materials are used if the ones previously used become unavailable. In general, changes are dealt with in supervising procedure.

6. **How does your RB manage the lack of conformity (non-conformances) when it is discovered? Can your RB stop the operation of the plant or allow justifications to keep the plant operating for a time with supplementary activities. Please provide any example.**

The supervisory authority may order that a situation be discontinued which is contrary to the provisions of the Atomic Energy Act or of the statutory ordinances issued hereunder, or to the terms and conditions of the notice granting the licence or general approval. In particular, the supervisory authority may order that certain protective measures shall be taken,

Examples

- Finding at a ventilation pipe of the main steam system of a German NPP: local wall thickness degradation due to abrasion by the insulation cassettes caused by vibration. Measures taken: the affected section was strengthened by a pipe clamp and will be replaced in the next planned outage.
- Incorrectly mounted dowels in a German NPP: plant shutdown. (Generally, the licensee shuts the plant down before an official order is issued.)

7. Is the licensee's upgrading non qualified SSCs? If the answer is "yes", please describe the process.

If an SSC is upgraded to become a safety related item, documents required for its safety evaluation are to be supplied by the licensee.

8. How has operating experience been applied concerning qualified SSCs?

As soon as deviations from the nominal condition are identified, an evaluation is initiated. Depending on its result, optimisations and remedial actions are taken. One aspect of these evaluations is the transferability of the findings to other SSCs or facilities not directly affected, for which then measures and actions are derived. According to the level of safety relevance the deviations found are reported to other licensees and, in the context of the German reporting system, to the competent supervisory authority.

Furthermore, the German central expert organisation GRS (Gesellschaft für Anlagen- und Reaktorsicherheit) analyses the reportable events generated in German as well as foreign nuclear installations for transferability and, if appropriate, notifies licensees and competent supervisory authorities about its findings. These notifications are analysed by the licensee for a possible transferability to his plant.

9. Has your RB assessed how to inspect SSCs with limited access?

As a matter of principle, all SSCs are to be designed for testability or to be preventively exchanged.

In recent years, more and more areas which are not accessible or difficult to access have been included in periodic inspections. The requirements how to deal with are included in the respective KTA-rules concerning in-service inspections, already mentioned in answer 1.1:

- 3201.4: Components of the Reactor Coolant Pressure Boundary of Light Water Reactors; Part 4: In-service Inspections and Operational Monitoring.
- 3211.4: Pressure and Activity Retaining Components of Systems Outside the Primary Circuit; Part 4: In-service Inspections and Operational Monitoring

Among the examples are underground service water lines in the outdoor area. In the context of re-evaluations and replacements of line sections (e.g. the section penetrating the annulus to the outside), inspections for corrosion in several representative locations were carried out on the inside as well as the outside of the line. Moreover, in several locations periodic inspections were introduced to monitor deterioration processes.

INDIA

1. Did/Does the licensee qualify during construction active or passive components to be able to cope with an important event?

Yes. As per the requirement, licensee should qualify the equipment such that it is capable of meeting throughout its design life, the requirements for performing safety functions while subject to the environmental conditions prevailing at the time of need. These environmental conditions shall include normal operation, Accidental Operational Occurrences and Design Basis Accidents.

1.1 Which kind of requirements e.g. ASTM/ASME standards, codes? To what extent?

Seismic qualification and environmental qualification are required to be addressed during design stage of the project. The standards and codes used in design are ASME Section III Division 1, subsection NB, NC, ND, NE and NF and section VIII Division 1 and 2 for mechanical equipment, IEEE standards for electrical, control and instrumentation systems and equipments besides relevant AERB (India's regulatory authority) codes and guides. The following codes/standards have been referred while preparing in-service inspection programme of NPPs.

- CAN/CSA-N 285.4-94-Periodic Inspection of CANDU NPPs components.
- AERB Safety Guide SG/O2.
- ASME section III, V, XI.
- Safety reports and design manuals of the NPPs.

1.2 What method was used?

- Test Yes
- Analysis Yes
- Code/calculation Yes

A combination of the above three methods are used.

1.3 Did the RB assess and inspect the process?

No. RB did not inspect the process.

RB reviews the qualification procedures and test results/analysis submitted by the licensee. If required, the opinion of an independent expert is also taken for making decisions. Licensee has to comply with the AERB guidelines with respect to the contents of seismic qualification report and the acceptance criteria.

1.4 Was there any RB approval required?

Licensee undertakes the analysis/studies of safety systems and components to address the requirements of regulatory body. In specific cases, licensee seeks prior concurrence from the regulatory body for undertaking analysis/studies using particular methodology. RB reviews seismic qualification reports submitted by the utility for checking adherence to AERB codes & guides.

2. How have the requirements evolved during the past years?**2.1 Have they changed to more or less severe?**

The requirements with respect to ageing management and equipment qualification are covered in AERB codes and guides. These requirements have not undergone significant changes. Based on the operating experience, certain equipments and systems have been included in the inspection programme and in-service inspection frequency for some systems/equipments has been revised.

2.2 Has the scope (list of the SSCs) been modified? If the answer is “yes”, please explain the main reasons.

SSCs important to safety are identified and classified on the basis of their function and significance with regard to safety. Scope of SSCs has changed over the years based on the design changes, new safety requirements, reactor type, operating experience etc. For example, inspection of pipelines prone to flow accelerated corrosion has been started in view of the national and international experiences.

2.3 Does your RB inspect the process to ensure that new requirements are implemented? If the answer is “yes”, briefly describe how.

No. RB does not inspect the process for implementation of new requirements. However, the procedures and test reports carried out by the utility for implementation of the new requirements are reviewed by RB.

2.4 Does your RB inspect the process to ensure that if equipment is modified its qualification is also adequately modified? If the answer is “yes”, briefly describe how.

No. RB does not inspect the process of equipment qualification.

Modifications in any safety systems/equipments require prior approval of the regulatory body. Licensee submits a detailed safety proposal to the regulatory body for carrying out any modification in the safety systems. The equipment qualification requirements form part of the proposal. The procedures and test report for the modified equipment/systems are reviewed by RB.

3. Has your RB required the licensee to implement specific ageing program to check whether the SSCs (passive and active) behaviour is in accordance with expectations.

As per the AERB codes and guides, the licensee should have an ageing management and equipment qualification programme. This programme should be used to obtain information on behaviour of the systems, structures and components under reactor environment and to undertake necessary studies/experiments with respect to residual life assessment. Based on the guidelines given by the RB, NPPs have developed a comprehensive list of SSC/equipments with the dominant ageing phenomenon for ageing management programme.

4. Has your licensee or RB identified problems related to obsolescence, unavailability, etc. of qualified SSCs?

The problem of obsolescence has been identified by the licensee in control and instrumentation and electrical equipments. These are being replaced in a planned manner after detailed review as per current regulatory requirements. Some examples are (a) replacements/modification in computer based systems (b) replacement of electrical switchgears (c) replacement of control motor generator sets with Control Un-interrupted Power Supply (CUPS).

5. Does your licensee use new qualified materials, equipment? If the answer is “yes”, briefly describe how the RB is involved in this process?

New materials, equipment have been used by the licensee. The use of new equipments/materials is permitted by the regulatory body after detailed review and assessments. As described above, any change in equipment or material in safety systems requires submission of safety proposal. This proposal contains the results of the required tests/analysis, which are reviewed by the RB before granting permission. Some of the examples are (a) Use of canned rotor pumps in moderator system (b) use of chrome-molly steel in pipelines for prevention of flow accelerated corrosion.

- 6. How does your RB manage the lack of conformity (non-conformances) when it is discovered? Can your RB stop the operation of the plant or allow justifications to keep the plant operating for a time with supplementary activities. Please provide any example.**

Licensee is required to have a system for non-conformance control, corrective and preventive actions for NPPs in accordance with the AERB safety guide. If non-conformance is detected at any stage, it is to be reported to RB as per the existing guidelines. The non-conformity is assessed with respect to immediate and long-term safety implications. RB can ask a licensee to stop operation of the plant and carry out required corrections if the non-conformity is of severe nature. If immediate corrective actions are not possible, then licensee needs to submit justification to keep the plant operating with the existing non-conformance. NPPs can be operated with identified non-conformance only after regulatory review. For example detailed reviews and assessments were done after utility discovered low wall thickness in one of the coolant channel in RAPS-6.

- 7. Is the licensee's upgrading non qualified SSCs? If the answer is "yes", please describe the process.**

The older plants, which are built to earlier standards, have undertaken detailed review of equipment qualification and ageing management studies. This process involves preparation of a list SSC, the required qualification of the SSCs, modifications done in the past and status of subsequent qualifications. The identified SSC, if found not meeting the qualification requirements, are being qualified through tests/analysis/vendor certification etc. If a component has become obsolete and also does not meet the qualification requirements, then such components are chosen for up-gradation/replacement. For example after detailed seismic evaluations of older NPPs, actions were taken to strengthen battery stands, panels, walls etc.

- 8. How has operating experience been applied concerning qualified SSCs?**

The operating experience is utilised in identifying weaknesses in the qualified SSCs. These are then addressed in every NPP by the licensee.

- 9. Has your RB assessed how to inspect SSCs with limited access?**

The equipments/systems with limited access are qualified through part inspections and analysis. The limited inspections, inspection on sample basis, opportunity based inspections are utilised for finding out the condition of SSCs with limited access. Suitable preventive measures are taken if degradations are observed. For example underground fire water pipelines experiencing biological corrosion are being brought above ground for ease of inspection and monitoring.

JAPAN

1. Did your licensees qualify during construction active or passive components to be able to cope with an extreme event* as well as for normal operation?

In Japan, licensees have not qualified active or passive components during construction.

Measures including regulatory actions having been taken for severe accident so far are as follows;

The Japan Nuclear Safety Commission has issued a report, "Accident Management(AM) as Severe Accident Measures for Light Water Nuclear Power Reactor Facilities (AM guide)" on 28 May 1992 (partially revised on 20 October 1997) in order to make the probability of reactor facilities causing a severe accident as small as possible and to mitigate the consequence even when a severe accident is caused, as well as to encourage licensees in voluntarily preparing effective accident management to perform the management appropriately in an emergency.

In response to the report, the former Ministry of International Trade and Industry (MITI) issued an instruction, "Approach of Accident Management Measures" in July of the same year. The instruction required licensees to study on AM technical requirements and AM implementation in the periodic safety review etc. using the probabilistic safety assessment (PSA).

In October 2002, METI evaluated "Reports on Preparatory Status of Accident Management" and others of 52 NPPs in operation submitted by licensees in response to METI request.

However, the accident management has been positioned as licensees' self-controlled safety preservation activities.

After the Fukushima accident, on 30 March 2011, the Nuclear and Industrial Safety Agency (NISA) directed licensees to take emergency safety measures for avoiding a severe accident caused by tsunami, and on 7 June of the same year, directed licensees to take emergency safety measures for severe accident including hydrogen explosion which should be taken immediately, and the measures to be taken by licensees have been investigated by NISA.

At present, amendment of legal system is proceeding in Japan.

1.1 Which kind of requirements e.g. ASTM/ASME standards, codes? To what extent?

As explained before, the accident management has been positioned as licensees' self-controlled safety preservation activities until now. And the scope of application was limited to matters corresponding to internal events.

Moreover, the requirements to be applied have been developed independently although various standards and codes have been referred to.

At present, amendment of legal system is proceeding in Japan.

1.2 What method was used?

The probabilistic safety assessment has been performed although it has been positioned as licensees' self-controlled safety preservation activities.

1.3 Did the RB assess and inspect the process?

Although it has been positioned as licensees' self-controlled safety preservation activities, the RB has evaluated their activities.

1.4 Was there any RB approval required?

Since it has been positioned as licensees' self-controlled safety preservation activities, the approval has not been required.

2. **How have the requirements evolved during the past years?**

After the Fukushima accident, laws and regulations are to be revised to make accident management measures as requirements provided in laws and regulations. And utilising PSA and re-examining design requirements, accident management measures which can prevent a severe accident effectively are to be prepared. (Summary of report to IAEA)

2.1 Have they changed to more or less severe?

Laws and regulations are to be revised to make accident management measures as requirements provided in laws and regulations. And utilising PSA and re-examining design requirements, accident management measures which can prevent a severe accident effectively are to be prepared. (Summary of report to IAEA)

2.2 Has the scope (list of the SSCs) been modified? If the answer is “yes”, please explain the main reasons.

Laws and regulations are to be revised to make accident management measures as requirements provided in laws and regulations. And utilising PSA and re-examining design requirements, accident management measures which can prevent a severe accident effectively are to be prepared. (Summary of report to IAEA)

2.3 How does your RB get enough confidence that the licensees are implementing this process?

Although, amendment of legal system is proceeding in Japan at present, on 30 March 2011, the Nuclear and Industrial Safety Agency (NISA) directed licensees to take emergency safety measures for avoiding a severe accident caused by tsunami, and on 7 June of the same year, directed licensees to take emergency safety measures for severe accident including hydrogen explosion which should be taken immediately, and now, the measures to be taken by licensees (utilities) are being confirmed by the operational safety inspection and the survey.

2.4 How does your RB get enough confidence that if equipment is modified its qualification is also adequately modified? If the answer is “yes”, briefly describe how.

Fundamentally, modifications are verified by application for alteration in establishment license and pre-service inspection.

3. **Has your RB required the licensee to implement specific ageing programmes to check whether the SSCs (passive and active) behaviour is in accordance with expectations?**

The ageing program is essential to licensees as a regulatory requirement, and the results are submitted to RB as an application of alteration license of safety preservation rule. And the rule will be approved if the content is appropriate.

4. **Has your licensee or RB identified problems related to equipment obsolescence, closure of suppliers, unavailability etc, of qualified SSCs?**

Licensees are required to determine how to acquire technical information for safety preservation, which is necessary for installed equipment to be maintained and operated appropriately as a regulatory requirement. The information on termination of equipment manufacturing etc. is also required to be acquired from suppliers.

5. **Does your licensee use new to the market (unique) qualified materials or equipment? If the answer is “yes”, briefly describe how the RB is involved in this process?**

Although it is licensees' judgment to adopt new material or equipment, but the adoption including alteration of material is required to be approved by RB if the equipment is important safety related equipment required by RB. Moreover, it is necessary to undertake inspections by RB before usage of equipment.

6. How does your RB manage the lack of conformity (non conformances) when it is discovered? Can your RB stop the operation of the plant or allow justifications to keep the plant operating for a time with supplementary activities. Please provide any example.

When RB discovers a licensee's non-conformity, RB requires the licensee to investigate the cause of non-conformity and to take corrective actions. Especially, when a safety-significant non-conformity is discovered, it is directed by a written form to perform root cause analysis, to study organisational factors, and to report the results and measures.

Especially, for a safety-significant non-conformance, it is possible to order to stop plant operation, etc.

Besides, since RB takes actions based on the regulatory system, it is not allowed to justify plant operation only with additional measures.

As an example of plant shutdown order, it was executed when a wrong leak test of the primary containment was revealed.

7. Are the licensees providing justification for upgrading non qualified SSCs for safety purposes? What oversight does the RB has.

Licensees are confirming the integrity of SSCs by the periodic operator's inspection etc., and it is required to take measures required by the regulation when a non-conformance is discovered. Licensees exchange equipment, parts etc. when a non-conformance is discovered, but, if it falls to important safety related equipment required by regulation, application of an alteration license of construction plan, etc. is necessary. Moreover, RB inspects it in order to confirm licensed conditions prior to usage of equipment.

8. How has OPEX been applied concerning qualified SSCs?

Since licensees are required by regulation to perform quality assurance activities, experiences of non-conformance generated in their facilities and other facilities should be reflected to their facilities or activities. Moreover, it is required to share non-conformance information among licensees and to correct and improve the non-conformance by regulatory requirements.

RB confirms these licensees' activities by the operational safety inspection etc.

In addition, the "clearing house", which is a program to arrange and analyse operating experiences of incidents, troubles and others to feedback to safety regulation, is being prepared and advanced. The causes and measures of accident and trouble which are reported based on regulations are arranged for feedback if needed. And under cooperation of JNES (technical support organisation), regulatory information on incidents, troubles etc. of foreign countries are collected and analysed to be reflected to Japanese regulations. Moreover, it is planned to advance full reinforcement of functions to feedback of operating experiences to systematically compile and analyse troubles etc. which are not required by regulation in order to extract knowledge and lessons.

9. Has your RB assessed how to inspect SSCs with limited access e.g. buried pipelines?

Specific inspection methods are left to the study by licensees, and RB is not inquiring.

Besides, licensees submit to RB the maintenance program describing inspection methods of each component at the maintenance management, etc. and RB confirms its appropriateness.

KOREA

1. Did/Does the licensee qualify during construction active or passive components to be able to cope with an important event?

Yes

1.1 Which kind of requirements e.g. ASTM/ASME standards, codes? To what extent?

- Seismic Yes (IEEE 344, Full extent).
- Environmental Yes (IEEE 323, Full extent).

1.2 What method was used?

- Test Seismic shaking test, hot chamber test, etc.
- Analysis Structural analysis, stress analysis, etc.
- Code/calculation ANSYS code calculation, etc.

1.3 Did the RB assess and inspect the process? Yes.

1.4 Was there any RB approval required? Yes.

2. How have the requirements evolved during the past years?

2.1 Have they changed to more or less severe?

Yes, the requirements become more severe.

2.2 Has the scope (list of the SSCs) been modified? If the answer is “yes”, please explain the main reasons.

No, but requirement of qualification test was modified to be more severe.

2.3 Does your RB inspect the process to ensure that new requirements are implemented? If the answer is “yes”, briefly describe how.

Yes, RB visits the qualification test facility and inspects the qualification process.

2.4 Does your RB inspect the process to ensure that if equipment is modified its qualification is also adequately modified? If the answer is “yes”, briefly describe how.

Yes, RB visits the qualification test facility and inspects to ensure the qualification process is adequately modified.

3. Has your RB required the licensee to implement specific ageing program to check whether the SSCs (passive and active) behaviour is in accordance with expectations.

Yes, RB requires the licensee to implement specific ageing program through the regulatory system of Periodic Safety Review.

4. Has your licensee or RB identified problems related to obsolescence, unavailability, etc. of qualified SSCs?

Yes, for example, feeder thinning in CANDU reactors

5. Does your licensee use new qualified materials, equipment? If the answer is “yes”, briefly describe how the RB is involved in this process?

Yes, the licensee submits application to RB to use new qualified materials and RB reviews the adequacy of the new materials.

6. How does your RB manage the lack of conformity (non-conformances) when it is discovered? Can your RB stop the operation of the plant or allow justifications to keep the plant operating for a time with supplementary activities. Please provide any example.

RB requires the licensee to take corrective actions. RB can also stop the operation of the plant depending on the severity of the problem.

7. **Is the licensee's upgrading non qualified SSCs? If the answer is "yes", please describe the process.**

Yes, the licensee submits application to RB to upgrade non qualified SSCs and RB reviews the adequacy of upgrading non-qualified SSCs.

8. **How has operating experience been applied concerning qualified SSCs?**

The operating experience has been applied through the corrective actions for inspection findings and the regulatory system of Periodic Safety Review.

9. **Has your RB assessed how to inspect SSCs with limited access?**

RB inspects sample parts taken off from the SSCs with limited access, such as buried piping.

MEXICO

1. Did your licensees qualify during construction active or passive components to be able to cope with an extreme event as well as for normal operation?

Yes

1.1 Which kind of requirements e.g. ASTM/ASME standards, codes? To what extent?

IEEE Standards, ASME CODE, ANSI Standards

- Seismic Yes.
- Environmental Yes.

1.2 What method was used?

- Engineering judgment Yes.

1.3 Did the RB assess and inspect the process?

Yes, the regulatory body assesses and inspects the process.

1.4 Was there any RB approval required?

Yes, approval by the regulatory body was required.

2. How have the requirements evolved during the past years?

The requirements were (and are being) updated according to the technological advances in materials and calculation methodologies by using computational tools (Codes).

2.1 Have they changed to more or less severe?

Mostly the changes have been more restrictive and conservative.

2.2 Has the scope (list of the SSCs) been modified? If the answer is “yes”, please explain the main reasons.

Yes, the list of SCCs has been modified due to the implementation of design changes.

2.3 How does your RB get enough confidence that the licensees are implementing this process?

By means of inspections to:

1. Maintenance (mechanical, electrical, I&C).
2. In-service Inspection.
3. Maintenance Rule areas.

2.4 How does your RB get enough confidence that if equipment is modified its qualification is also adequately modified? If the answer is “yes”, briefly describe how.

As in the previous question, inspecting Maintenance (mechanical, electrical, I&C), in-service inspection and maintenance rule areas.

Inspectors include in their checklists, requirements reviewed by the regulatory body and derived from assessments. Topics such as characteristics and component replacement frequency, seals, lubricants and packaging are verified during the maintenance of SCCs.

3. Has your RB required the licensee to implement specific ageing programmes to check whether the SSCs (passive and active) behaviour is in accordance with expectations?

In response to regulatory body requirements related with ageing effects on the behaviour of SCCs, the licensee has implemented, the RMC (Qualification Maintenance Requirements) Programme. This Programme contains guidelines and requirements to keep qualifications through inspection and assessment e.g. “Replacement of spare parts and organic components” (Oils and O-rings are included).

Furthermore, in order to determine the ageing effects on the reactor vessel materials, there is a laboratory testing programme (Surveillance Sample Holders Programme).

4. **Has your licensee or RB identified problems related to equipment obsolescence, closure of suppliers, unavailability etc, of qualified SSCs?**

Yes, the regulatory body has identified problems related to the obsolescence of components, for example:

Recorders and indicators located on the Main Control Room. This problem was detected and corrected during the Detailed Main Control Room Review Process of Laguna Verde NPP.

The Fire detection system at Laguna Verde NPP was replaced due to obsolescence with the added problem that the original supplier of the system went out of business.

5. **Does your licensee use new to the market (unique) qualified materials or equipment? If the answer is “yes”, briefly describe how the RB is involved in this process?**

No, there is not a unique qualified material or equipment.

6. **How does your RB manage the lack of conformity (non conformances) when it is discovered? Can your RB stop the operation of the plant or allow justifications to keep the plant operating for a time with supplementary activities. Please provide any example.**

The regulatory body manage the lack of conformity by issuing findings.

Yes, the regulatory body has the faculty to stop plant operation if needed, and also allows for justification to keep the plant operation, depending on the severity of the findings or events.

For example, the regulatory body can stop the operation of the plant or declare the associated system inoperable, if it detects that the snubbers were installed with lubricant different to that recommended by the manufacturers and/or approved under the Qualification Maintenance Requirements Programme.

7. **Are the licensees providing justification for upgrading non qualified SSCs for safety purposes? What oversight does the RB has.**

At this time, the regulatory body has not received application for approval for upgrading non-qualified SSCs for safety purposes.

However the licensee considers the Commercial Grade materials qualification in order to obtain safety related materials or components. The regulatory body performs a biennial inspection to this licensee process.

8. **How has OPEX been applied concerning qualified SSCs?**

The licensee has implemented a programme of operational experience (OPEX) by the establishment of procedures; this programme is inspected by the regulatory body mainly for qualified SSCs.

9. **Has your RB assessed how to inspect SSCs e.g. buried pipelines?**

For SCCs with limited access, at this time, the regulatory body has not required the completion of a physical inspection of these components. The regulatory body has been using and requiring indirect methods to determine the integrity and tightness of these SCCs, for example Chemical analysis of water or pressure measurements on accessible sections.

SLOVAK REPUBLIC

1. **Did/Does the licensee qualify during construction active or passive components to be able to cope with an important event?** Yes
- 1.1 Which kind of requirements e.g. ASTM/ASME standards, codes?
To what extent?
- *Seismic* Yes
 - *Environmental* Yes
- 1.2 What method was used?
- *Test* Yes
 - *Analysis* Yes
 - *Code/calculation* Yes
- 1.3 Did the RB assess and inspect the process?
Yes, the regulatory body randomly inspect the process.
- 1.4 Was there any RB approval required?
The licensee has to submit the component whole documentation and apply for RB approval.
2. **How have the requirements evolved during the past years?**
Yes, the all design changes during the construction have to be submitted to regulatory body.
- 2.1 Have they changed to more or less severe?
The changes were more severe.
- 2.2 Has the scope (list of the SSCs been modified? If the answer is “yes”, please explain the main reasons.
The list of SSC was modified several times. The reason was the change of fuel, change of equipments or change of horizontal acceleration.
- 2.3 Does your RB inspect the process to ensure that new requirements are implemented? If the answer is “yes”, briefly describe how.
Yes, regulatory body inspects all changes evoked by changing the SSC list. The licensee has to submit the new quality plans for new decision issue. The measures and modifications which come from quality plans changing are inspected on nuclear power station by inspectors.
- 2.4 Does your RB inspect the process to ensure that if equipment is modified its qualification is also adequately modified? If the answer is “yes”, briefly describe how.
Yes, the RB inspects the change of equipment qualification in cases when the equipment is modified. The change of qualification can be submitted by analyses, in some cases also by tests results, which were carried out at changed conditions.
3. **Has your RB required the licensee to implement specific ageing program to check whether the SSCs (passive and active) behaviour is in accordance with expectations.**
Yes, the regulatory body has the legal requirement to implement the ageing program on NPPs and according on this program is evaluated the residual lifetime of monitored components.
4. **Has your licensee or RB identified problems related to obsolescence, unavailability, etc. of qualified SSCs?**
Yes, the vendor some time disappear from market and the components have to be changed due to lack of spare parts and also the obsolescence of control systems, pumps and cables are the objects of changes.

5. **Does your licensee use new qualified materials, equipment? If the answer is “yes”, briefly describe how the RB is involved in this process?**

Yes, for example Teleperm, control system is the newest for new unit construction or in the case of new fuel or other cases, the regulatory body is involved in process through quality plans. These plans are submitted together with application and the regulatory body has 2 months for review and decision issue.

6. **How does your RB manage the lack of conformity (non-conformances) when it is discovered? Can your RB stop the operation of the plant or allow justifications to keep the plant operating for a time with supplementary activities. Please provide any example.**

In the lack of conformity discovered during the review, the whole process is stopped with requirement to amend the existing documentation. There was no situation, when regulatory body stopped the operation. If there is some lack of conformity during the operation, the operator is required to perform necessary measures. The way how the operator will proceed is consulted by regulatory body.

7. **Is the licensee’s upgrading non qualified SSCs? If the answer is “yes”, please describe the process.**

If the licensee is upgrading the non qualified SSC, it is enough to have the agreement of particular commission which work at NPP. There is enough only to inform the regulatory body about the changes.

8. **How has operating experience been applied concerning qualified SSCs?**

There is the periodic assessment each ten years and the licensee have to submit the report to RB for renewing the license. This report reflects operating experience concerning qualified SSCs. In the case of some lack, the operator suggests measures, which are monitored by regulatory body.

9. **Has your RB assessed how to inspect SSCs with limited access?**

Each SSC has its check period. The components with limited access is inspected during outages.

SPAIN

1. **Did your licensees qualify during construction active or passive components to be able to cope with an extreme event as well as for normal operation?**

Yes. The Spanish NPPs are required by the licensee's conditions to demonstrate the environmental and seismic qualification of SSCs, Structures, Systems, and Components important to safety, in order to fulfil its safety function under the environmental and seismic conditions resulting from normal operation, operational transients and design basis accidents.

Consequently, all NPPs have carried out a seismic and structural analysis, and applied a seismic/environmental Qualification Program for mechanical, electrical and I&C components, which justifies the qualification of active and passive equipments.

1.1 Which kind of requirements e.g. ASTM/ASME standards, codes? To what extent?

- *Seismic* Yes
- *Environmental* Yes

The environmental qualification programs of the Spanish NPPs have been developed following the criteria and general requirements set forth in 10CFR50.49. Nevertheless some specific standards have been used based on the date of construction of the NPP, such as NUREG 588, IEEE-323-1971 and 1974 editions, ASME III, ACI-318, etc.

1.2 What method was used?

- *Test* Yes
- *Engineering judgment* Yes
- *Code/calculation* Yes

The methods used for seismic qualification of mechanical equipment and structures were essentially based on calculation codes (static and dynamic analysis), supplemented in some cases with static or dynamic tests on shaking tables and, in some cases, using the process of dedication, engineering judgments by similarity analysis.

Equipment with safety function in harsh environment has been qualified by the test method or by combined method (analysis and test data).

1.3 Did the RB assess and inspect the process?

The seismic and environmental qualification program of each nuclear power plant were initially evaluated by the RB, and periodic inspections are carried out on engineering firms, manufacturers and NPPs during the operating life of the installation.

1.4 Was there any RB approval required?

For granting of operating permits, initially through requests for license renewal to operate and then, every 10 years during the Periodical Safety Reviews, it has been always required the prior approval of the program on seismic and environmental qualification of the NPP.

RB has also required the evaluation and approval of the seismic analysis and the impact of the analysis on the Environmental Qualification Program in case of some major design modifications such as the replacement of steam generators.

2. **How have the requirements evolved during the past years?**

2.1. Have they changed to more or less severe?

Environmental qualification requirements required of the different Spanish plants were initially established based on the dates of their construction permits. Initially, for some NPPs, the CSN (Spanish regulatory authority) accepted "old" standards requirements. After the appearance in 1984 of 10CFR50.49, the CSN has required all Spanish NPPs to adapt its evaluations to the new requirements developed in detail in NRC RG 1.89, rev. 1.

As for the seismic qualification, CSN regulatory policy has evolved in terms of advances in seismic regulations, for instance from IEEE 344 -1971 till IEEE 344 - 1987 and RG 1.100 - 2009.

- 2.2 Has the scope (list of the SSCs) been modified? If the answer is “yes”, please explain the main reasons.

The CSN requires that the qualification program of each plant includes a “Master List” of qualified SSCs. These lists have been modified by the licensee, mainly, as the result of design modifications.

- 2.3 How does your RB get enough confidence that the licensees are implementing this process?

NPPs every Periodic Safety Review, as well as per specific periodic qualification reports, inform the CSN on the status and modifications of the seismic and environmental qualification of SSCs. The RB checks the contents of these reports through regular targeted inspections.

- 2.4 How does your RB get enough confidence that if equipment is modified its qualification is also adequately modified? If the answer is “yes”, briefly describe how.

The new equipment and parts installed must be qualified in accordance with the requirements of NRC 10CFR50.49. In the periodic qualification report is included a technical information for each component which summarises its qualification data and identifies the supporting documentation of the applied qualification process.

Therefore, the main changes in the qualification program can be checked by reviewing the periodic report. Additionally the RB has carried out inspections on existing or new qualified components in order to check the Environmental Qualification Program. Similarly, for seismic qualification of SSCs, new requirements according to the RG 1.100 - 2009 and IEEE-344 - 1987, are being checked and inspected regularly by the RB.

Any design modification must identify changes to be qualified, both seismic and environmental, as well as the maintenance of the qualification.

3. **Has your RB required the licensee to implement specific ageing programmes to check whether the SSCs (passive and active) behaviour is in accordance with expectations?**

The CSN, in accordance with the Safety Instruction IS-22, requires to all NPPs the application of Life Management Plans. The scope of these programs, according to 10CFR54, includes only passive SSCs. The licensee must identify the significant ageing mechanisms and assign them proven ageing management programs. For active components, as well as for safety-related structures, apply the requirements defined in the CSN Safety Instruction IS-15, on the application of the maintenance rule, according to the 10CFR50.65.

4. **Has your licensee or RB identified problems related to equipment obsolescence, closure of suppliers, unavailability etc, of qualified SSCs?**

In all Spanish NPPs have been replaced in some cases, safety-related equipment, obsolete, and other similar third-party, qualified seismic and/or environmentally.

With respect to qualified equipment spare parts (gaskets, O-rings, lubricating oils) in some cases these processes were obtained by applying dedication process, but always justifying the qualification required.

5. **Does your licensee use new to the market (unique) qualified materials or equipment? If the answer is “yes”, briefly describe how the RB is involved in this process?**

At the moment there is no enough operating experience about this matter.

6. **How does your RB manage the lack of conformity (non conformances) when it is discovered? Can your RB stop the operation of the plant or allow justifications to keep the plant operating for a time with supplementary activities. Please provide any example.**

The nonconformities detected during inspections of seismic and/or environmental qualification, have been, in most of the cases, deficiencies in the documentation supporting the qualification of some

equipment, or minor deficiencies in the application of the maintenance requirements of the qualification. Licensees, in such cases, has justified the operability of the equipment or structure and proposed corrective actions, including an assessment in the documentation or further testing qualification.

7. **Are the licensees providing justification for upgrading non qualified SSCs for safety purposes? What oversight does the RB has.**

Only in the case of older plants upgrading programs have been applied for non qualified components.

With regard to the environmental qualification, some nonqualified components were identified and changed with new equipment qualified. The CSN reviewed the qualification process for such equipment.

Some seismic re-evaluations were conducted on structural-mechanical components and some SSCs were supplemented by seismic tests. Old NPPs like Zorita (currently in the process of dismantling) and Santa María de Garona conducted a review process of the seismic qualification in accordance with the methodology SQUG. These processes were evaluated and inspected by the CSN.

8. **How has OPEX been applied concerning qualified SSCs?**

In some cases OPEX has been used as a complement to the test method or to justify the qualification of equipment in mild environment, however OPEX has been applied in some cases of seismic qualification, as most current legislation allows, along with the other supported methods. In addition and as routine practice, the Spanish plants analyse operational experience to assess their potential impact on the qualification of SSCs.

9. **Has your RB assessed how to inspect SSCs with limited access e.g. buried pipelines?**

For SSCs (electric cables) requiring environmental qualification CSN has requested the implementation of surveillance programs in accordance with NRC GL-2007 and NRC RG 1.211.

Following the incident in 2005 in NPP Vandellós II, the CSN has required a specific monitoring program to all the Spanish NPPs on pipes and other non-accessible SSCs. Consequently, for seismically qualified equipment and structures, particularly for underground pipes and tunnels, water conveyance circulation or cooling systems, all the Spanish plants carry out ageing management programs specific to these components, which regulate the methods of inspection, frequency and other related aspects.

SWEDEN

1. Did/Does the licensee qualify during construction active or passive components to be able to cope with an important event?

Yes. However, some types of polymeric materials, included in mechanical components, may not be fully environmentally qualified.

Note: "During construction" is interpreted to also include plant modifications, as well as original construction.

1.1 Which kind of requirements e.g. ASTM/ASME standards, codes? To what extent?

The RB regulations stipulate withstand capability of SSCs for natural and other events including environmental conditions.

The RB regulations recommend environmental qualification for SSCs, specifically pointing out for electrical equipment RG 1.89, IEEE 323 and IEC 60780. In connection with this, acceleration factors for thermal ageing exceeding 250 times, ionising radiation lasting less than 10 days or a dose speed greater than 5 Gy/h should be avoided, or the applicability of the results should be specially justified.

For qualification of mechanical SSCs the RB regulations recommend the use of:

- The Common position of European regulators on qualification of non-destructive testing (NDT) systems for pre- and in-service inspection of light water reactor components. EUR 16802, Revision 1, 1997.
- The ENIQ recommended practice 1-5, EUR 18101/1998, EUR 18100/1998, EUR 18099/1998, EUR 18685/1999, EUR 18686/1999.

Licensees in general adopt these recommendations and also qualifies SSCs for seismic events.

- Seismic Yes
- Environmental Yes

1.2 What method was used?

- Test Yes
- Analysis Yes
- Code/calculation Yes

1.3 Did the RB assess and inspect the process?

Yes. Inspections are made but only as sample checks. However, for mechanical SSCs, a third-party (accredited) organisation is used to inspect the application of the process on a regular basis.

1.4 Was there any RB approval required?

No but inspections by the RB may identify lack of compliance.

2. How have the requirements evolved during the past years? The process required by the RB has been strengthened as well as recommendations of newer standards in the RB regulations. Backfitting and application of newer RB regulations on all plants are mandatory.
2.1 Have they changed to more or less severe?

More severe.

2.2 Has the scope (list of the SSCs been modified? If the answer is "yes", please explain the main reasons.

Yes. The licensees lists of SSCs have been amended with PAM related equipment. However, the RB has no detailed requirements or recommendation regarding the scope of the lists.

2.3 Does your RB inspect the process to ensure that new requirements are implemented? If the answer is “yes”, briefly describe how.

Yes but inspections are only made as sample checks.

2.4 Does your RB inspect the process to ensure that if equipment is modified its qualification is also adequately modified? If the answer is “yes”, briefly describe how.

No but inspections by the RB (with another prime focus) may identify lack of compliance in the process.

3. **Has your RB required the licensee to implement specific ageing program to check whether the SSCs (passive and active) behaviour is in accordance with expectations. “YES” by requiring an AMP.**

4. **Has your licensee or RB identified problems related to obsolescence, unavailability, etc. of qualified SSCs?**

Yes. Both the licensee and the RB.

5. **Does your licensee use new qualified materials, equipment? If the answer is “yes”, briefly describe how the RB is involved in this process?**

Yes. However, inspections by the RB are only done as sample checks.

6. **How does your RB manage the lack of conformity (non-conformances) when it is discovered? Can your RB stop the operation of the plant or allow justifications to keep the plant operating for a time with supplementary activities. Please provide any example.**

Yes. The RB can stop operation (though not known to have happened yet due to ageing related qualification non-conformances) or require supplementary activities (e.g. specifying modifications to equipment to be performed within a limited time). For mechanical SSCs, the third-party (accredited) organisation may identify lack of conformity as well as the licensee.

7. **Is the licensee’s upgrading non qualified SSCs? If the answer is “yes”, please describe the process.**

Yes. The process of upgrading is governed by the process of plant modification, which includes notification to the RB (and subsequent RB actions as appropriate).

8. **How has operating experience been applied concerning qualified SSCs?**

Deficiencies in materials and qualifications, based on a national operating perspective, are as a rule always acted on by all licensees and focused on by the RB.

9. **Has your RB assessed how to inspect SSCs with limited access?**

No but the third-party (accredited) organisation has done some assessments for mechanical SSCs.

SWITZERLAND

1. **Did your licensees qualify during construction active or passive components to be able to cope with an extreme event as well as for normal operation?**

No.

1.1 Which kind of requirements e.g. ASTM/ASME standards, codes? To what extent?

- Seismic No
- Environmental No

1.2 What method was used?

- Test No
- Engineering judgment No
- Code/calculation No

1.3 Did the RB assess and inspect the process?

Not applicable

1.4 Was there any RB approval required?

Not applicable

2. **How have the requirements evolved during the past years?**

New requirements regarding external design base events (even before Fukushima: Pegasos, after Fukushima: flooding).

2.1 Have they changed to more or less severe?

To more severe

2.2 Has the scope (list of the SSCs) been modified? If the answer is “yes”, please explain the main reasons.

No

2.3 How does your RB get enough confidence that the licensees are implementing this process?

Confidence is assured by Swiss legislation, e.g. Nuclear Energy Ordinance of 10 December 2004 (NEO)

2.4 How does your RB get enough confidence that if equipment is modified its qualification is also adequately modified? If the answer is “yes”, briefly describe how.

As usual, it is assured by licensee’s quality management handbook

3. **Has your RB required the licensee to implement specific ageing programmes to check whether the SSCs (passive and active) behaviour is in accordance with expectations?**

NPPs in Switzerland are required to execute and document a systematic Ageing Management Program (AMP) according to guideline ENSI-B01. The principle requirements of AMP are:

- Identification of relevant ageing mechanism on System, Structure and Components (SSC) within the scope of ENSI-B01. Therefore relevant internal & external operating experience has to be traced and documented.
- Verify that in-service inspection program (ISI) and maintenance program already in place is capable to avoid corresponding ageing related damages. Possible gaps have to be identified.
- Take complementary measures to close gaps.

4. **Has your licensee or RB identified problems related to equipment obsolescence, closure of suppliers, unavailability etc., of qualified SSCs?**

There were selected problems reported related to procuring original spare and replacement parts, especially if the original manufacturer is not available anymore. In this context also the increased requirements on formal specification work are an issue.

5. **Does your licensee use new to the market (unique) qualified materials or equipment? If the answer is “yes”, briefly describe how the RB is involved in this process?**

Not applicable

6. **How does your RB manage the lack of conformity (non conformances) when it is discovered? Can your RB stop the operation of the plant or allow justifications to keep the plant operating for a time with supplementary activities. Please provide any example.**

RB can stop the operation of the plant as stipulated in the Nuclear Energy Ordinance of 10 December 2004 (NEO).

7. **Are the licensees providing justification for upgrading non qualified SSCs for safety purposes? What oversight does the RB has.**

Yes, applicable for design changes.

8. **How has OPEX been applied concerning qualified SSCs?**

9. **Has your RB assessed how to inspect SSCs with limited access e.g. buried pipelines?**

The guidelines NE-14 and ENSI-B06 define the scope and frequency of inspection and maintenance work to be performed on nuclear safety classified components (safety class 1 to 4). All applied inspection techniques must be qualified according to ENSI-B07 including a performance demonstration based on realistic flaws scenarios (e.g. pitting, MIC, SCC). There are no specific nuclear codes and standards related to pipelines buried in Switzerland.

The primary steel containment in Swiss NPP is partly embedded in a layer of concrete. In the area of the concrete layer no direct access to the inner and outer surface of the steel containment is possible. There are feasibility studies on-going to evaluate the potential of suitable NDE techniques in order to inspect the hidden area. So far the guided waves technique has been identified as a promising method.

UNITED KINGDOM

1. Did/Does the licensee qualify during construction active or passive components to be able to cope with an important event?

The inclusion of design against earthquakes for nuclear structures in the United Kingdom did not become commonplace until the early 1980s. As a result the justification for seismic loading for the majority of UK NPPs was undertaken significantly after construction as part of the subsequent Plant Review Safety (PSR) process.

However, for Heysham 2, Torness and Sizewell B, there was provision for earthquakes in the original design of the systems structures and components. This reflects the relative inherent low level of seismic hazard in the United Kingdom. For the remaining stations, post construction evaluations of the hazard and withstand were undertaken as part of the PSRs. This has been an ongoing process from the late 1980s to date and considerable effort has been made to improve the robustness against seismic loading during this time. This initially focussed on an understanding of the most safety-critical SSCs and has progressively been refined to reach the position of a stable safety justification. Improvements to the robustness of safety-critical SSCs have been undertaken, where it has been demonstrated ALARP (as low as reasonably practical) to do so.

1.1 Which kind of requirements e.g. ASTM/ASME standards, codes? To what extent?

- Seismic Yes
- Environmental Yes

1.2 What method was used?

- Test Yes
- Analysis Yes
- Code/calculation Yes

1.3 Did the RB assess and inspect the process? Yes

1.4 Was there any RB approval required? No

2. How have the requirements evolved during the past years?

2.1 Have they changed to more or less severe?

The requirements have been modified by the licensees over the years to reflect modern standards as appropriate.

2.2 Has the scope (list of the SSCs been modified? If the answer is “yes”, please explain the main reasons.

In general, the scope of the SSCs has not been significantly modified.

2.3 Does your RB inspect the process to ensure that new requirements are implemented? If the answer is “yes”, briefly describe how.

Yes, the RB routinely inspects the licenses’ application of its arrangements and in addition through the PSR process to ensure that new requirements are met and implemented where appropriate.

2.4 Does your RB inspect the process to ensure that if equipment is modified its qualification is also adequately modified? If the answer is “yes”, briefly describe how.

Yes, the RB routinely inspects the licensees’ process. The licensees’ arrangements require them to take account of all relevant hazards in determining the levels of qualification required for the affected SSCs.

3. Has your RB required the licensee to implement specific ageing program to check whether the SSCs (passive and active) behaviour is in accordance with expectations.

Yes, the RB has required the licensees’ to implement specific ageing and obsolescence programmes through the PSR process and as a consequence of plant failure linked to ageing aspects.

4. **Has your licensee or RB identified problems related to obsolescence, unavailability, etc. of qualified SSCs?**

The licensees' have identified problems related to obsolescence and unavailability of qualified SSCs through its maintenance regimes and PSR process; licensees have implemented arrangements for the identification and control of ageing and obsolescence of SSCs.

5. **Does your licensee use new qualified materials, equipment? If the answer is "yes", briefly describe how the RB is involved in this process?**

The licensee does use new qualified materials and equipment as appropriate and this is managed through the licensees' existing processes. The RB routinely inspects the implementation of these processes.

6. **How does your RB manage the lack of conformity (non-conformances) when it is discovered? Can your RB stop the operation of the plant or allow justifications to keep the plant operating for a time with supplementary activities. Please provide any example.**

Licensees have arrangements in place that should identify lack of conformity. The RB routinely inspects the implementation of these arrangements. The licensees' are required to inform the RB of identified non-conformances and provide the appropriate justification for continued operation. If an adequate safety case cannot be made then the RB could stop the operation of the plant.

7. **Is the licensee's upgrading non qualified SSCs? If the answer is "yes", please describe the process.**

8. **How has operating experience been applied concerning qualified SSCs?**

The licensees have taken account of national and international operational experience in relation to qualified SSCs particularly through their PSR process. Recent examples include the approach adopted to the inspections of buried and inaccessible systems.

9. **Has your RB assessed how to inspect SSCs with limited access?**

The licensees have arrangements and processes in place for the routine inspection of SSCs with limited access.

USA

1. **Did your licensees qualify during construction active or passive components to be able to cope with an extreme event as well as for normal operation?**

Yes. Both active and passive components are designed to be able to withstand design basis events (e.g., high winds, earthquakes)

All passive components were assumed to not fail during the initial 40 years of operation (initial licensing period); for those safety-related piping which were observed to degrade (e.g., service water piping) during the initial licensing period, due to external or internal [MIC corrosion and biological (Asiatic clams and zebra mussels)], we required licensee to conduct inspections on piping to ensure that they remained operable.

Additionally, if the licensee was renewed for additional 20 years, we required licensees to commit to additional inspections of passive systems and components.

We are also conducting inspections (TI-2515/182 and 2515/185) to verify that the licensees are satisfactorily implementing a voluntary industry initiative in the buried piping and tank area to ensure that the licensee are taking prompt actions to ensure that radioactive fluid leaks are identified in a timely manner to minimise the potential for radioactive fluid to leak to areas outside the owner controlled area (local private wells).

1.1 *Which kind of requirements e.g. ASTM/ASME standards, codes?*

Criterion 2 of Appendix A to Title 10 Code of Federal Regulations titled “Design bases for protection against material phenomena,” states in part that “structures, systems and components important to safety shall be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami, and seiches without loss of capability to perform their safety functions (see weblink below for more information).

<http://www.nrc.gov/reading-rm/doc-collections/cfr/part050/part050-appa.html>

Licensees generally use calculations as a method to meet the requirements specified in Criterion 2 of Appendix A.

1.2 *Did the RB assess and inspect the process?*

Yes. NRC inspected the design process and results during new construction and continues to perform verification that the licensee meets all their licensing requirements which require that the safety systems, both active and passive, are protected against natural phenomenon.

1.3 *Was there any RB approval required?*

Yes. The Nuclear Regulatory Commission approved the license of the facility and description of specific natural phenomenon to which the plant are protected against are described in the plant’s Final Safety Analysis Report (FSAR). FSAR is considered a part of the licensee’s licensing basis.

2. **How have the requirements evolved during the past years?**

In general, the initial design requirements have not changed for most facilities. However, as new and more current information becomes available through other U.S. Agencies (e.g., new seismology analysis for the East Coast of the United States which became available few years back), the NRC may request licensees to perform an evaluation using the new data and determine whether the plants is still adequately protected against natural phenomenon.

2.1 *Have they changed to more or less severe?*

Not sure... depends on the facility

2.2 *Has the scope (list of the SSCs) been modified? If the answer is “yes”, please explain the main reasons.*

No, in general in the U.S., we have not increased the number of SSCs which must be treated as important to safety.

2.3 *How does your RB get enough confidence that the licensees are implementing this process?*

We conduct several inspections over a period of three years to verify that the licensee is maintained their design of their facility consistent with their design basis. These inspections are part of our baseline inspection program (meaning performed at each plant at their prescribed frequency). These inspections are Component Design Bases Inspection (IP 71111.21); Evaluations of Changes, Tests, or Experiments and Permanent Plant Modifications (IP 71111.17); and Fire Protection (IP 71111.05T)

2.4 *How does your RB get enough confidence that if equipment is modified its qualification is also adequately modified? If the answer is “yes”, briefly describe how.*

We verify all risk significant aspects of modifications performed on safety-related system using the CDBI, the Mod or the Fire Protection inspection. This includes verification that the modified system will function as designed during the design bases accident (i.e., qualification of safety-related system remains valid)

3. **Has your RB required the licensee to implement specific ageing programmes to check whether the SSCs (passive and active) behaviour is in accordance with expectations?**

Yes, see Title 10 of the *Code of Federal Regulation (10 CFR)*, Part 54, “Requirements for the Renewal of Operating Licenses for Nuclear Power Plants”

4. **Has your licensee or RB identified problems related to equipment obsolescence, closure of suppliers, unavailability etc, of qualified SSCs?**

Yes. Licensee still needs to maintain safety-related equipment consistent with its design basis... U.S. licensee are dealing with issues related to equipment obsolescence, closure of safety-grade component suppliers, etc. through their commercial grade dedication process or by wholesale replacement of systems which is currently available through qualified vendors (e.g., analogue to digital reactor protection system replacement)

5. **Does your licensee use new to the market (unique) qualified materials or equipment? If the answer is “yes”, briefly describe how the RB is involved in this process?**

We periodically verify that the licensee’s commercial dedication process is adequate using a baseline inspection procedure IP 71111.17.

We may choose to conduct special inspections for large scale replacements (e.g., IP 52003, “Digital Instrumentation and Control Modification Inspection”)

6. **How does your RB manage the lack of conformity (non conformances) when it is discovered? Can your RB stop the operation of the plant or allow justifications to keep the plant operating for a time with supplementary activities. Please provide any example.**

All non-conformances to design are required to be evaluated by both the licensee and the NRC. Licensees are required to make prompt operability determinations for degraded conditions (non conformances) which are identified. Based on these operability determinations, licensees will follow the requirements stated in their Technical Specifications, which includes unit shutdown.

NRC resident inspectors review and follow-up on nearly all operability calls which are made by the licensee (see IP 71111.15, “Operability Determinations.”); Regional management are aware of nearly all operability determinations made by the licensee and provide feedback to the licensee on the quality of the licensee’s operability determinations.

If a non-forming condition is determined to affect operability of a safety-related system, the resident inspectors, NRC Office of Reactor Regulation technical staff and regional management will ensure that the licensee complies with the requirements of their Technical Specifications on how long the plant can remain at power with the non-conforming condition.

Example #1: San Onofre Unit 3 shutdown on 1/31/2012 due to primary-to-secondary leak (steam generator primary to secondary leak) of 30 gallons per hour.

Example #2: During part of a regularly scheduled Component Design Basis Inspection (CDBI) at the Fort Calhoun Station in September 2009, the CDBI team identified that the licensee had failed to ensure that their procedures were adequate to safely shut down the plant with flooding at the site's probable maximum flood elevation. The licensee's Updated Safety Analysis Report (USAR), technical specifications, and station procedures stated that protection of the raw water pumps against flooding up to the probable maximum flood height would be accomplished by sandbag berms and flood gates. During an intake structure walkdown, the team observed two unsealed, 14-inch diameter fire protection piping penetrations in the outer wall, with the bottom of the penetration nearly a foot below the probable maximum flood elevation. The penetrations had an air gap of about ½-inch between the wall and the pipe. The team determined that the unsealed penetrations would not be sealed during flooding conditions.

7. **Are the licensees providing justification for upgrading non qualified SSCs for safety purposes? What oversight does the RB has.**

No. Licensees rarely upgraded non-qualified SSCs so they can take credit as safety-related; implies that their design is deficient.

8. **How has OPEX been applied concerning qualified SSCs?**

See IMC 2523. "NRC Application of Operating Experience in the Reactor Oversight Process."

9. **Has your RB assessed how to inspect SSCs with limited access e.g. buried pipelines?**

See TI 2515/182 (<http://www.nrc.gov/reading-rm/doc-collections/insp-manual/temp-instructions/>) for NRC inspections of selected buried pipes containing radioactive fluids.

See also Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment" (<http://www.nrc.gov/reading-rm/doc-collections/gen-comm/gen-letters/1989/gl89013.html>); This Generic Letter, in part, requires licensees to perform the following:

- Ensure by establishing a routine inspection and maintenance program for open-cycle service water system piping and components that corrosion, erosion, protective coating failure, silting, and bio-fouling cannot degrade the performance of the safety-related systems supplied by service water. The maintenance program should have at least the following purposes:
 - A. To remove excessive accumulations of bio-fouling agents, corrosion products, and silt.
 - B. To repair defective protective coatings and corroded service water system piping and components that could adversely affect performance of their intended safety functions.

TOPIC 2.
EXPERIENCE FROM INSPECTION OF COMPETENCY OF OPERATORS

Introduction

The competency of the licensee's operators to perform required tasks and understand the status of the plant during various plant operations is vital to the safe operation of a nuclear facility. The focus of this workshop topic is to identify commendable inspection practices for gaining confidence on operator performance during plant operations. The operations include normal, outage, and off normal conditions. Most regulatory bodies have requirements for training and licensing control room operators. However, experience continues to show that poor operator performance may challenge safe plant operations. Therefore, it is important to have a strong inspection process that identifies problems in this area early. This topic was chosen in spring 2010, however the reliance of the actions and knowledge of the operators during the Fukushima accident demonstrates that vigilance in the area is essential.

Questionnaire

For preparation of the workshop, participants are invited to supply their national inspection approaches used according to the following questionnaire:

Inspection of Control Room Operator Competencies

1. Field observations

- a. Does your RB perform field observations and inspections during control room operations?
 - i. *If not, how does your RB get confidence that the plant is being operated safely?*
 - ii. *If "yes", what is included in the inspections?*
- b. Describe how your RB assesses human performance in the control room.
 - i. *Does the operator have guidance for expected behaviour of control room operators (other than operating procedures)? If so, describe your RB's inspection activities in this area.*
 - ii. *Do operators have strict requirements for whom and how many people are in the control room at any given time?*
 - iii. *Does your RB evaluate shift turnover?*
 - iv. *Does your RB inspect operational activities outside of the control room (e.g., accompany auxiliary operators on their rounds)?*
- c. How does your RB inspect the control room operator's performance?
 - i. *Normal operations*
 - ii. *Outage operations*
 - iii. *Unplanned and infrequent events (e.g., plant trips, loss of safety equipment, etc.)*
- d. How do inspectors ensure that they do not interfere with or distract operators during normal operation and unplanned and infrequent events?
 - i. *Does your RB have written guidance for the inspectors?*
 - ii. *Does the operator discuss its expectations with the inspectors?*

The following two questions are background questions to assist the Workshop participants in understanding the regulatory and inspection requirements associated with operator licensing.

2. Control room operator initial training and qualification

- a. Does the operator have a programme to train and qualify control room operators? If "yes", is the programme approved by the RB?
- b. Briefly describe the operator's initial qualification process.
 - i. *What types of operational scenarios are included in the training (e.g., are emergency operating procedures (EOPs) and severe accident management guidelines (SAMGs) included, are administrative procedures included)?*
 - ii. *Length of simulator training?*

BELGIUM

1. Field observations

- a. Does your RB perform field observations and inspections during control room operations? Yes.
 - i. *If not, how does your RB get confidence that the plant is being operated safely?*
 - ii. *If “yes”, what is included in the inspections?*
 Verification of logbooks;
 Verification of the operator’s overview of the state of the unit taken into account the operator response to status lights/ alarms
 Discussion with reactor operators and senior reactor operators (SRO) about foreseen operations (including the risks), ...
 Verification of unavailability of safety equipment and the correct application of the TS-actions
 Verification of Temporary Configurations and their impact on plant safe operation.
- b. Describe how your RB assesses human performance in the control room.
 - i. *Does the operator have guidance for expected behaviour of control room operators (other than operating procedures)?*
 Yes, the management expectations in the matter of human behaviour and performance are clearly described.

If so, describe your RB’s inspection activities in this area.
 See below
 - ii. *Do operators have strict requirements for whom and how many people are in the control room at any given time?*
 The minimum presence is described in the SAR (TS). When too many people are present and the serenity in the control room is not guaranteed anymore the SRO is expected to exclude people that are not necessary.
 - iii. *Does your RB evaluate shift turnover?*
 We usually do not interfere with this important activity.
 - iv. *Does your RB inspect operational activities outside of the control room (e.g., accompany auxiliary operators on their rounds)?*
 RB performs inspections in the field but do not accompany auxiliary operators. During the inspections, certain activities/tests can be observed by the RB.
- c. How does your RB inspect the control room operator’s performance?
 - i. *Normal operations*
 - ii. *Outage operations*
 - iii. *Unplanned and infrequent events (e.g., plant trips, loss of safety equipment, etc.)*
 During the inspections the overview that the operators have is verified by the verification of the meaning of status lights and discussion about activities that are performed or planned (e.g. avoid Inoperability of more than 1 redundancy, ...)

 When incidents have occurred, an analysis of the operator performance is performed and when a lack in this domain is identified, it is discussed with the utility and corrective actions (included in the domain of training and competence) are taken.
- d. How do inspectors ensure that they do not interfere with or distract operators during normal operation and unplanned and infrequent events?
 - i. *Does your RB have written guidance for the inspectors?*
 No (except for QS procedures, giving general guidance and rules about processes)

ii. *Does the operator discuss its expectations with the inspectors?*

Yes. This is discussed during so called “thematic inspections” with the head of department in charge of the conduct of operations.

The following two questions are background questions to assist the workshop participants in understanding the regulatory and inspection requirements associated with operator licensing.

2. **Control room operator initial training and qualification**

- a. Does the operator have a programme to train and qualify control room operators? If “yes”, is the programme approved by the RB?

Yes. Not formally approved, but the compliance with the SAR (giving general rules) is checked.

- b. Briefly describe the operator’s initial qualification process.

Reactor physics (14 days theory and 3 days simulator training).

Module 1: preparation (93 days totally).

Control systems, circuits (primary, secondary) (25-day course, 10-day self-study + 2-day evaluation).

Radiation Monitoring.

Protections and Electrical systems (12 days).

Functional simulator (Electrical systems, turbine, criticality, volumetrical and chemical control).

Fire (detection and extinction systems).

Module 1: full scope simulator operation in normal conditions (14 days + 5-day preparation = self-study).

Module 2: preparation.

Control Systems (3 days).

Incident procedures (3 days).

Class 2 accidents (2 days).

Module 2: full scope simulator operation in incident conditions (10 days + 10-day preparation = self-study + 1-day evaluation).

Module 3: preparation.

Design basis accidents (4 days).

Accident procedures: EOP and FRG (3.5 days).

Defence in depth (1 day).

Module 3: full scope simulator operation in accident conditions (10 days + 10-day preparation = self-study + 1 day evaluation).

Module 4: preparation.

Emergency systems and sequences (external accidents) (4 days).

Accident procedures: EOP for shutdown states (0.5 day).

Defence in depth (1 day).

Module 4: full scope simulator operation after external accident and in plant states with reduced primary coolant inventory (8 days + 10-day preparation = self-study).

Severe accidents and SAMGs (1 day).

Installation modifications (1 day).

Safety report and Technical Specifications (1 day).

Administrative procedures (work order system and tag-out process included) 5 days.

- i. *What types of operational scenarios are included in the training (e.g., are EOPs and SAMGs included, are administrative procedures included)?*

LOCA, FWLB, SLB, SGPR, external accident (see also above).

ii. *Length of simulator training?*

See above.

iii. *Length of course work?*

See above.

iv. *Length of on-the-job training?*

Four months (after passing licensing exam).

v. *Is there a minimum level of education required to become a control room operator?*

Yes. Technical secondary school (English) or technical high school (American).

c. What role does the RB have in the process (e.g., do the inspectors observe portions of the training, who issues the license or authorization to the operator)?

To obtain a license, the future operator has to pass an exam. The examination committee is composed by two inspectors of the RB, the service head of operations of the unit and the service head of the Health Physics department. After a successful examination, the future operator has to perform the on the job training. The president of the examination committee is the head of the Operations Department, who issues the license after a successful evaluation of the on the job training. Observations during the training are usually not performed by the RB.

3. **Control room operator requalification and refresher training**

a. Does the operator have a programme to maintain and re-qualify control room operators?

If “yes”, is the programme approved by the RB?

Yes. Not formally approved, but the compliance with the SAR is checked.

b. What role does the RB have in the requalification process (e.g., do the inspectors observe portions of the training)?

Every 2 years, a formal requalification of each operator is performed. Therefore, the RB evaluates the individual training files of the operators and discusses the deviations with regard to the training program with the licensee. After this, a formal relicensing committee (same participants as for the examination committee) is held and the operators are re-qualified (eventually with limiting conditions or need for additional training). Eventually the license can be refused.

CANADA

1. Field observations

- a. Does your RB perform field observations and inspections during control room operations?
- i. *If not, how does your RB get confidence that the plant is being operated safely?*
 - ii. *If “yes”, what is included in the inspections?*

Yes, monthly Main Control Room (MCR) and Control Equipment Room (CER) inspections are performed as part of Canadian Nuclear Safety Commission (CNSC) compliance activities for NPPs. CNSC NPP site inspectors perform these compliance inspections using a MCR/CER inspection guide providing the following coverage:

- Asking certified staff questions on awareness of the plant status.
- Verifying that MCR Panel Checks and Safety System Tests have been completed to standard.
- Verifying that certified staff is attentive and responsive to plant parameters and conditions.
- Verifying that certified staff’s conduct of operations is done in a professional manner.
- Verifying that clear and accurate information and instructions are communicated amongst certified staff.
- Verifying that certified staff is wearing the proper dress attire as per the licensee dress code expectations.
- Verifying that certified staff use approved procedures and place keeping when performing operations on the control panels.

Other inspection activities as part of the MCR/CER inspection guide outside the scope of operator performance also contribute to ensuring the overall safe operation of the plant. These activities include but are not limited to:

- Performing panel and equipment checks using the site specific appendix (or other methods) to verify the selected Operating Policies and Principles (OP&Ps) are meeting requirements and are in a proper configuration.
- Verifying housekeeping conditions in the MCR to ensure the general state of the work environment in the MCR is acceptable.
- Verify that operating documents are stored in the MCR in their designated storage locations and the numbers of copies available as specified by local station procedures.

- b. Describe how your RB assesses human performance in the control room.

- i. *Does the operator have guidance for expected behaviour of control room operators (other than operating procedures)? If so, describe your RB’s inspection activities in this area.*

Each licensee possesses an operation standards and expectations document which establishes the operation’s division tools for ensuing safe, reliable and consistent plant operation. The standards established within this document are used for all operational activities and are applicable for both plant operation and simulator operation. They also provide direction to other departments that provide support to the operation’s division in operating the plants. Supporting procedures and processes are also referenced in this document.

Typical MCR related standards and expectations referenced in this document include (but are not limited to) the following procedures:

- Main Control Room Operation.
- Main Control Room Access.
- Main Control Room Behaviour.
- Monitoring System Parameters and Equipment Status.
- Control Manipulation.
- Annunciation Management.
- Transient Response.

- Logging.
- Operator Behaviour.

The MCR inspection activities listed in question a) above are intended to assess licensee compliance against the MCR related procedures of the operation standards and expectations document.

ii. *Do operators have strict requirements for whom and how many people are in the control room at any given time?*

Absolutely, the minimum shift complement is a license requirement documented in the Power Reactor Operating licence (PROL) which specifies what and how many certified staffs are required in the control room and facility at all times.

As an example, for a multi-unit NPP (4 units), the minimum shift complement is defined as follows: *At all times, the licensee shall have:*

- *in the nuclear facility at least one shift manager, one control room shift supervisor, two unit 0 control room operators and the following number of authorized nuclear operators for the specified number of reactor units with fuel in the core:*
 - (a) *Three authorized nuclear operators for two fuelled units.*
 - (b) *Four authorized nuclear operators for three fuelled units.*
 - (c) *Six authorized nuclear operators for four fuelled units.*
- *in the main control room an authorized nuclear operator in direct attendance at the control panels of each reactor unit with fuel in the core.*
- *in the main control room, a minimum of one unit 0 control room operator, except for brief absences to respond to security alerts or to determine the origin of fire alarms.*

As part of the monthly MCR inspections, confirmations is made upon arrival to the MCR by the site inspectors of the presence of at least the minimum complement staff in the MCR and in attendance at each unit. An actual method of confirming minimum shift complement might be to ask for the Duty Roster Sheet.

iii. *Does your RB evaluate shift turnover?*

Yes, as part of the monthly MCR inspection activities, CNSC NPP site inspectors would observe the licensee conduct turnovers by monitoring for the following:

- The conduct was performed as per station expectations.
- The use of clear and concise 3 way communications was observed.
- Incoming staff were punctual.
- Staff involved in the shift turnover appropriately signed-off the shift logs.

iv. *Does your RB inspect operational activities outside of the control room (e.g., accompany auxiliary operators on their rounds?)*

On occasion, CNSC NPP site inspectors will observe the performance of operators conducting field activities consisting of plant equipment manipulation and routine operations and testing. Typical operator behaviour and practices monitored include (but not limited to) the following:

- Procedure & operational aids use and adherence.
- Proper use of Personnel Protective Equipment.
- Proper use of Dosimetry.
- Clear and Accurate Communications (3-way, phonetic).
- Adequate peer checking.

c. How does your RB inspect the control room operator's performance?

i. *Normal operations*

ii. *Outage operations*

iii. *Unplanned and infrequent events (e.g., plant trips, loss of safety equipment, etc.)*

Simply through observations using the MCR/CER inspection guide described in question a) above.

The CNSC NPP site inspectors may/may not go to the MCR and observe operator action in unplanned events, depending on the level of involvement of the certified crew in resolving the plant disturbance(s).

Additional certified staff performance data:

As part of the NPP licensee regulatory requirements associated with the maintenance of certification, certified staff shall be immediately removed from the position if:

- *The person has failed a requalification tests;*
- *The person, while temporarily assigned to another position at the NPP, has not acted as a responsible operator or supervisor in the position for which the person holds a certification for the minimum number of complete shifts;*
- *In the opinion of the licensee, the person is not capable, for any reason, of performing the duties of the position for which the person holds a certification, including a limitation identified by the fitness-for-duty program.*

Any of the instances listed above will trigger a mandatory report by the licensee which will be communicated and subsequently reviewed by the CNSC. In addition, the licensee is requested to provide a report to the CNSC on a quarterly basis which documents the shift performance of certified staff during that quarter (i.e. number of shifts performed for every certified staff). These reports are also assessed by the CNSC for conformity with the applicable regulatory requirements.

- d. How do inspectors ensure that they do not interfere with or distract operators during normal operation and unplanned and infrequent events?

CNSC NPP site inspectors approach the MCR by asking permission for entry as per the relevant NPP procedure using the following guidelines:

- If MCR staff is not available, site inspectors may press the issue and tell them they are coming in for an observation. On the other hand, if site inspectors feel MCR staff does not need a distraction, they would simply wait until they could be accommodated.
- Once site inspectors enter the MCR, they wait by the door until they are addressed by MCR staff. Site inspectors never interrupt MCR staff.
- Once MCR staff agree to speak with the site inspectors, site inspectors make the point of reinforcing the expectation that MCR staff's main responsibility is to the unit, not to site inspectors.
- If MCR staff is required to attend any matter related with the operation of the reactor, they would simply advise site inspectors to standby and move out of the way.

- i. *Does your RB have written guidance for the inspectors?*

Yes, the MCR/CER inspection guide discussed in question a) above.

- ii. *Does the operator discuss its expectations with the inspectors?*

Yes, on a regular basis. If the NPP site inspectors do not adhere to certain station expectations (i.e. 3- way communications, phonetic alphabet, etc.), they will be coached by the certified staff in attendance. At some of the NPP in Canada, site inspectors have taken part in the initial training for certified staff which provides them with a sound understanding of the relevant station expectations.

2. Control room operator initial training and qualification

- a. Does the operator have a programme to train and qualify control room operators? If "yes", is the programme approved by the RB?

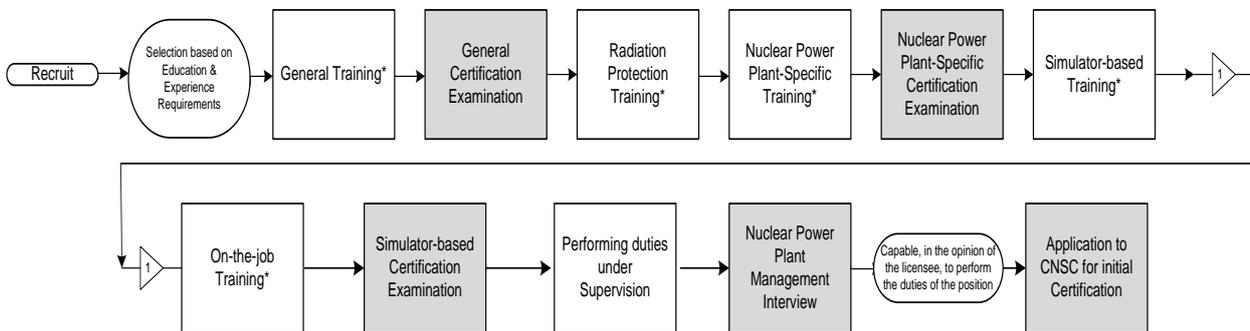
The CNSC has established a clear and well-defined regulatory framework under which initial and renewal of certification is performed. The CNSC has the authority to certify and decertify workers who are employed in nuclear facilities or who use nuclear substances. CNSC Regulations state that the requirements for the qualifications, training and examinations for personnel requiring certification at nuclear facilities are to be specified in the operating licences of these facilities.

For NPPs, the PROLs require the certification of each person who is assigned to the position of a Reactor Operator, a Plant Shift Supervisor, and, at certain NPPs, a Unit 0 Operator and a Control Room Shift Supervisor. The PROLs further require that licensees follow the certification processes for personnel assigned to these positions as specified in the CNSC Regulatory Document RD-204, *Certification of Persons Working at Nuclear Power Plants*.

The Regulatory Document RD-204 places the onus for the initial and renewals of certification processes fully on the licensees. Specifically, RD-204 states that NPP licensees are held entirely responsible for training and testing their workers to ensure that they are fully qualified to perform the duties of their position.

Using this well-defined regulatory framework, the CNSC certifies and renews the certification of licensee personnel based on the licensee's training and testing programs and based on the results of CNSC oversight activities of the personnel certification processes.

The following figure depicts a generic model of the initial certification process



b. Briefly describe the operator's initial qualification process.

The initial certification process begins with a licensee selecting a candidate that meets the entry level education and experience requirements. In-class training programs are then completed to provide the candidate with in-depth knowledge in the areas of science fundamentals for nuclear reactors, radiation protection, and the design, operation and interaction of the plant systems. Following the successful completion of the in-class training, the candidate then applies their knowledge in a hands-on simulator-based training program and an on-the-job (OJT) training program which cover the operation and monitoring of the plant systems under normal, abnormal and emergency conditions.

To ensure that all of the training programs adequately impart the required knowledge and skills to the candidates, these training programs are required to be based on a systematic approach to training (SAT). A SAT is a methodology that provides a logical progression from the identification of the competencies required to perform a job to the development and implementation of training to achieve these competencies, and the subsequent evaluation of this training. This methodology minimizes the risk that important elements of training are omitted and ensures that successful candidates possess all of the required competencies.

In addition to successfully completing the SAT-based in-class and hands-on training programs, the candidate is required to successfully complete knowledge-based written certification examinations and a performance-based simulator certification examination. Licensees administer these certification examinations in accordance with the CNSC examination requirements documents CNSC-EG1, *Requirements and Guidelines for Written and Oral Certification Examinations for Shift Personnel at Nuclear Power Plants*, and CNSC-EG2, *Requirements and Guidelines for Simulator-based Certification Examinations for Shift Personnel at Nuclear Power Plants*. These knowledge-based and simulator-based examinations are designed to ensure that a successful candidate has the required knowledge and skills to perform the duties of a certified worker.

The candidate is then required to put into practice all of the training that they received by performing a number of hours on shift under the supervision of a certified worker. Following the completion of these hours on shift, NPP management reviews the training and examinations that the candidate has completed and interviews the candidate to confirm that they have the knowledge and skills required to perform the duties of a certified position.

Following the selection of the candidate, it takes approximately 4 years for a candidate to complete all of the training programs and examinations required in the initial certification process.

- i. *What types of operational scenarios are included in the training (e.g., are EOPs and SAMGs included, are administrative procedures included)?*

Simulator training for reactor operators (as an example) takes place during three program phases as follow:

- **Station Systems Training Phase:**
The station training phase is based on station operating documents. The scope of this training includes operating policies and principles, system testing, chemistry control, system interconnections, normal and non-standard operation of systems or equipment in the following areas:
 - MCR instrumentation and controls.
 - Normal operating state line-ups and transfers.
 - Design features such as automatic actions.
 - System availability requirements and operating constraints.
- **Integrated Plant Operation Training Phase:**
The integrated plant operation course addresses the operation and response of the unit and station under all conditions and states defined within operating manuals, abnormal incident manuals, emergency operating procedures and the operating policies and principles. The program gives each candidate knowledge and skills to be able to respond to any credible minor and major plant malfunction or upset. The scope of this training includes:
 - MCR instrumentation and controls.
 - Normal operating state line-ups and transfers.
 - Units start-ups and shutdowns.
 - Design features such as automatic actions.
 - System availability requirements, operating constraints and procedure rationale.
 - Basic response to system specific malfunctions.
 - System monitoring and surveillance.
 - Administrative knowledge requirements.
- **MCR Skills Training Phase:**
This phase is simulator-based, comprising a series of exercises, which require individual and/or team response. Each candidate practices and responds to normal, transient, and abnormal operations and conditions, in the role of a reactor operator. Each of the events is practiced in combination with other equipment malfunctions or abnormal conditions as well as routine operations; e.g. raising reactor power, changing duty of pumps, etc.

- ii. *Length of simulator training?*

Typical simulator training program length for reactor operators spans over 10-12 months (based on data from a typical reactor operator certification application at a multi-units plant).

- iii. *Length of course work?*

The term “course work” is interpreted as in-class training (knowledge-based training).

Typical **general’s training program** length for reactor operators spans over 4 months (based on data from a typical reactor operator certification application at a multi-units plant).

Typical **station specific training program** length for reactor operators (including radiation protection training) spans over 12-14 months (based on data from a typical reactor operator certification application at a multi-units plant).

Total: 16-18 months (Reactor Operator)

Note: For shift supervisors, the station specific training takes roughly an additional 2 months to complete due to additional topic coverage requirements – Typical station specific training program length for shift supervisors (including radiation protection training) therefore spans over 14-16 months.

Total: 18-20 months (Shift Supervisor)

iv. *Length of on-the-job training?*

Typical OJT program length for reactor operators spans over 2.5 months (based on data from a typical reactor operator certification application at a multi-units plant).

v. *Is there a minimum level of education required to become a control room operator?*

Yes, the initial certification process begins with a licensee selecting a candidate that meets the entry level **education** and **experience** requirements. As an example, for reactor operators:

- Education
The person must have a high school diploma obtained from a recognized educational institution that includes course credits in both science and mathematics.
- Experience
The person must have a minimum of two years of plant experience at the NPP where certification is sought, or an acceptable alternative to this experience. Acceptable alternatives are:
 - Two years of plant experience at a similar NPP on the same site and at least six months of additional plant experience at the NPP where certification is sought; or
 - Two years of plant experience at any NPP of the same type and at least one year of additional plant experience at the NPP where certification is sought; or
 - Two years of plant experience at an NPP of a different type and at least one year and a half of additional plant experience at the NPP where certification is sought.

c. *What role does the RB have in the process (e.g., do the inspectors observe portions of the training, who issues the license or authorization to the operator)?*

The CNSC performs oversight activities on the following program elements to ensure that NPP licensees are implementing certification examination programs for their workers in accordance with applicable regulatory requirements:

- Initial Training Programs.
Evaluations to ensure initial training programs (generals, station specific and simulator training programs) are based on a SAT.
- Examination and Testing Programs.
Evaluations of design, development, conduct and grading of knowledge-based and performance-based certification examinations.
- Supporting Processes.
Evaluations of programs and processes supporting initial certification of workers (e.g. formal evaluations, co-piloting, management interview).

The licensee submits an application for certification to the CNSC on behalf of the candidate that documents that the candidate has satisfied all of the applicable regulatory requirements and that states the licensee is fully confident that the candidate is capable of performing the duties of the certified position. Once an application for certification is received by the CNSC, CNSC staff assesses the application and the supporting information using the results of CNSC oversight activities of the personnel certification processes to determine whether the person satisfies the regulatory requirements.

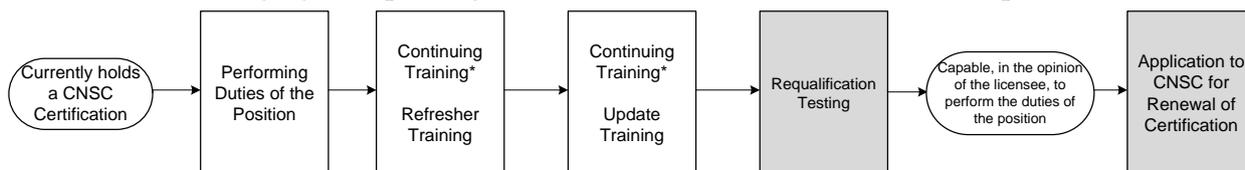
The Designated Officer (an officer who has been designated by the CNSC to make certification decisions) then renders a decision to either certify the candidate or to refuse their certification. If certified, the candidate is issued a 5-year certificate for a specific position at a specific facility.

3. Control room operator requalification and refresher training

- a. Does the operator have a programme to maintain and re-qualify control room operators? If “yes”, is the programme approved by the RB?

See answer in question 2 a)

The following figure depicts a generic model of the renewal of certification process



- b. What role does the RB have in the requalification process (e.g., do the inspectors observe portions of the training)?

The CNSC performs oversight activities on the following program elements to ensure that NPP licensees are implementing requalification testing programs for their workers in accordance with applicable regulatory requirements:

- Continuing Training Programs.
Evaluations to ensure continuing training programs (refresher and update training programs) are based on a Systematic Approach to Training (SAT).
- Examination and Testing Programs.
Evaluations of design, development, conduct and grading of knowledge-based and performance-based requalification tests.
- Supporting Processes.
Evaluations of programs and processes supporting certification of workers (e.g. formal evaluations, minimum shift performance, removals/re-instatements from/to shift duties).

The licensee submits an application for renewal of certification to the CNSC on behalf of the candidate that documents that the candidate has satisfied all of the applicable regulatory requirements and that states the licensee is fully confident that the candidate is capable of performing the duties of the certified position. Once an application for renewal of certification is received by the CNSC, CNSC staff assesses the application and the supporting information using the results of CNSC oversight activities of the personnel certification processes to determine whether the person satisfies the regulatory requirements.

The Designated Officer (an officer who has been designated by the CNSC to make certification decisions) then renders a decision to either renew the certification of the candidate or to refuse their renewal. If certified (i.e. certification renewed), the candidate is issued a 5-year certificate for a specific position at a specific facility.

CZECH REPUBLIC

1. Field observations

- a. Does your RB perform field observations and inspections during control room operations?

Yes.

- i. *If not, how does your RB get confidence that the plant is being operated safely?*
- ii. *If “yes”, what is included in the inspections?*

The following is included in the programme of inspections at main control room (MCR):

- Status of SSCs - OLCs adherence - checks of information available at MCR I&C systems, clarification by MCR staff if needed
- Behaviour of MCR staff - adherence to operational procedures, communication, quality of records, shift turnovers, adequate knowledge of current status of SSCs including deviations from nominal status (if any) and causes of deviations, control of maintenance and testing activities by MCR staff.

- b. Describe how your RB assesses human performance in the control room.

- i. *Does the operator have guidance for expected behaviour of control room operators (other than operating procedures)? If so, describe your RB’s inspection activities in this area.*

There are a number of documents describing the MCR operators’ behaviour in the licensee’s integrated management system. Detailed requirements such as conservative decision making, three way communication, STAR (stop, think, act, review) method, pre-job briefing, post-job debriefing, etc., are included in these documents.

RB inspectors observe MCR staff activities and compare the real behaviour of MCR staff with requirements in the above mentioned licensee’s documents.

- ii. *Do operators have strict requirements for whom and how many people are in the control room at any given time?*

1. Requirements for whom – there is written list of people, who are permitted to enter MCR. Also depends on level of authority:

- Independent entry.
- Accompanied entry.
- Entry with authorization of head of MCR (he can decide what the acceptable number of people at MCR at is given situation.).

2. Requirements how many people – it depends of status of people:

- Accompanied excursion – max. 6 people.
- Inspecting officers and relevant staff – head of MCR decide what the acceptable number of people at MCR at is given situation.

There is clearly defined place in the MCR for non MCR staff, access to other parts of MCR has to be agreed by head of MCR.

- iii. *Does your RB evaluate shift turnover?*

Yes. Randomly through routine inspection.

- iv. *Does your RB inspect operational activities outside of the control room (e.g., accompany auxiliary operators on their rounds)?*

Yes.

- c. How does your RB inspect the control room operator’s performance?

- i. Normal operations

During routine inspections performed by in-site inspectors.

- ii. Outage operations

RB has the same approach to evaluate operator's performance in outage as in normal operation

- iii. Unplanned and infrequent events (e.g., plant trips, loss of safety equipment, etc.)

Depends on situation. When it is possible, in-site inspectors observe such situations. Approach is the same as the previous.

RB inspectors also check compliance with reporting obligations.

- d. How do inspectors ensure that they do not interfere with or distract operators during normal operation and unplanned and infrequent events?

- i. Does your RB have written guidance for the inspectors?

Only site-inspectors perform inspections in MCR. Behaviour in the MCR is topic of site inspectors training. Furthermore site inspectors proceed in accordance with internal document: Code of Inspector.

Site inspectors have on-line access to electronic written records kept by operators; they can check MCR personnel records without entering the MCR.

- ii. Does the operator discuss its expectations with the inspectors?

Yes, discussions take place at the following working levels:

- site inspectors – head of operations of NPP.
- head of site inspectorate - head of operations of NPP, director of NPP.
- director of RB – director of NPP, director of division of licensee – at regular meeting.
- chairman of RB – general head of licensee – at regular meeting.

Previous two questions are background questions to assist the Workshop participants in understanding the regulatory and inspection requirements associated with operator licensing.

2. Control room operator initial training and qualification

- a. Does the operator have a program to train and qualify control room operators? If "yes", is the program approved by the RB?

Yes, such program is implemented and is approved by RB.

- b. Briefly describe the operator's initial qualification process.

- i. *What types of operational scenarios are included in the training (e.g., are EOPs and SAMGs included, are administrative procedures included)?*

Operational procedures and administrative documents for normal operation, abnormal operation and emergency situations (EOPs) are included in the initial qualification program. SAMGs aren't oriented basically for operators, but for their technical support service. Operators carry out activities according to their instructions.

- ii. *Length of simulator training?*

1 week – initial, familiarization training + **2 weeks** – normal operation + **3 weeks** – abnormal operation and emergency situation (EOP)

- iii. *Length of course work?*

Approximately 2 years.

- iv. *Length of on-the-job training?*

On the job training is to some extent included in the programme of initial training. On the job training at the final stage of initial training is 4 – 8 weeks.

- v. *Is there a minimum level of education required to become a control room operator?*

Technical university, MSc. Degree.

- c. What role does the RB have in the process (e.g., do the inspectors observe portions of the training, who issues the license or authorization to the operator)?

Observations of training are not systematically used by RB. License is issued by RB based on the state exam which is comprised of SW test, exam at the simulator and oral exam.

3. **Control room operator requalification and refresher training**

- a. Does the operator have a program to maintain and re-qualify control room operators? If “yes”, is the program approved by the RB?

Refreshing training and requalification training is implemented and is approved by RB.

- b. What role does the RB have in the requalification process (e.g., do the inspectors observe portions of the training)?

Observations of training are not systematically used by RB. License for operators of MCR position is issued by RB based on the state exam which is comprised of SW test, exam at the simulator and oral exam.

FINLAND

1. Field observations

- a. Does your RB perform field observations and inspections during control room operations?
 - i. *If not, how does your RB get confidence that the plant is being operated safely?*
No formal inspections. Mainly by assessing operational events, if they show any weaknesses in operator performance. Operator licensing process and requalification give basic confidence for operator performance.
 - ii. *If “yes”, what is included in the inspections?*
- b. Describe how your RB assesses human performance in the control room.
 - i. *Does the operator have guidance for expected behaviour of control room operators (other than operating procedures)? If so, describe your RB’s inspection activities in this area.*
Basic expectations and safety culture are communicated. As part of training there is control room operations to teach and emphasis standard practice to operate.
 - ii. *Do operators have strict requirements for whom and how many people are in the control room at any given time?*
Overall access is limited, no strict requirements, only internal “guidance”. Operators may empty the control room, if they want or manage the excess personnel otherwise. Outage training for other personnel group include rules for control room visits.
 - iii. *Does your RB evaluate shift turnover?*
Yes, sometimes.
 - iv. *Does your RB inspect operational activities outside of the control room (e.g., accompany auxiliary operators on their rounds)?*
Yes, not very often.
- c. How does your RB inspect the control room operator’s performance?
 - i. Normal operations **Periodic inspection program inspection (not every year).**
 - ii. Outage operations **Oversight, control room visits, may be included into inspection.**
 - iii. Unplanned and infrequent events (e.g., plant trips, loss of safety equipment, etc.) **Event reports assessment.**
- d. How do inspectors ensure that they do not interfere with or distract operators during normal operation and unplanned and infrequent events?
 - i. Does your RB have written guidance for the inspectors? **No. Good behaviour is explained and expected.**
 - ii. Does the operator discuss its expectations with the inspectors? **Not usually. If necessary they give feedback to regulator if they encounter unjustified behaviour.**

The following two questions are background questions to assist the Workshop participants in understanding the regulatory and inspection requirements associated with operator licensing.

2. Control room operator initial training and qualification

- a. Does the operator have a programme to train and qualify control room operators? If “yes”, is the programme approved by the RB? Yes, but not approved by RB
- b. Briefly describe the operator’s initial qualification process.
Theoretical training, on the job training, simulator training, demonstration of skills in the simulator and oral test. PWR (pressurized water reactor) total approx.2,5-3 years, BWR (boiling water reactor) total approx 2-2.5 years
 - i. What types of operational scenarios are included in the training (e.g., are EOPs and SAMGs included, are administrative procedures included)? “yes” to all

- ii.* Length of simulator training? 2 – 4 months
 - iii.* Length of course work? 1 year (self studies included)
 - iv.* Length of on-the-job training? 12 - 18 months
 - v.* Is there a minimum level of education required to become a control room operator?
Engineering background, usually Bachelor degree
- c. What role does the RB have in the process (e.g., do the inspectors observe portions of the training, who issues the license or authorization to the operator)?
RB inspect the process, confirm written test results, take part in the oral test, issue a license.

3. **Control room operator requalification and refresher training**

- a. Does the operator have a programme to maintain and re-qualify control room operators? If “yes”, is the programme approved by the RB?

They have, RB do not approve the program.
- b. What role does the RB have in the requalification process (e.g., do the inspectors observe portions of the training)? Take part in the oral test

FRANCE

1. Field observations

a. Does your RB perform field observations and inspections during control room operations?

- i. *If not, how does your RB get confidence that the plant is being operated safely?*
- ii. *If “yes”, what is included in the inspections?*

The French RB (the French Safety Authority – ASN) ask the licensee to have a very rigorous professional skills management system, including determination of needs, both in respect of manpower qualification and numbers, and a programme of specialised training and qualification through experience. The ASN monitor the competencies management system for all operators working on the facilities (internal and external workers). Specifically, the objectives of the inspections of control room operator competencies are to assess:

- the control room operator initial training and qualification;
- the initial training and qualification of the operators making the periodic test;
- the shift changeover.

To monitor the control room operator competencies, the ASN carry out inspections during control room operations by performing field observations and by interviewing operators.

b. Describe how your RB assesses human performance in the control room.

- i. *Does the operator have guidance for expected behaviour of control room operators (other than operating procedures)? If so, describe your RB’s inspection activities in this area.*
- ii. *Do operators have strict requirements for whom and how many people are in the control room at any given time?*

“yes”. The technical specifications set the competencies and the minimum required manpower for the nuclear power plant operations, whatever its operation mode (normal, outage or accidental conditions).

- iii. *Does your RB evaluate shift turnover?*

“yes”. One of the objectives of the control room operator competencies monitoring is to assess the shift turnover, that is the period in continuous shift-work during which one shift takes over from another with no stoppage of the work process between shifts. Allowing that the shift changeover is a critical moment (co-activity, increase of workload, risk of non-transmission of relevant information, etc.), the inspectors perform field observations of the communications between the operators (which instructions are verbally given on what happens during the last shift) and look at the operator shift log book, which is in digital form, but also still today usually in paper form.

- iv. *Does your RB inspect operational activities outside of the control room (e.g., accompany auxiliary operators on their rounds)?*

“yes”. The ASN inspectors monitor several kinds of operational activities. For example, the inspectors accompany auxiliary operators on their rounds, they observe automation electricity or welding operators in their maintenance operations, and sometimes they perform field observation of simulator training.

c. How does your RB inspect the control room operator’s performance?

- i. *Normal operations*
- ii. *Outage operations*
- iii. *Unplanned and infrequent events (e.g., plant trips, loss of safety equipment, etc.)*

The inspectors have the same written guidance for the different type of operations (normal, outage, unplanned and infrequent events, accidental conditions). The inspectors assess the competencies management system and organisation, the evolution of the referential and its local declension, how are the competencies needed detected, how are the competencies renewed, the access for the operators of and the content of the different training process

(simulator training, course work and on-the-job training), how are the trainers recruited and how are the competencies evaluated, and the knowledge after the training process. The inspectors assess the qualification process too.

The only difference is that for the inspection with normal operations topic, the inspectors observe a periodic test and for the inspection with outage operations topic, the inspectors observe the way the operators use mobile equipment (against fire, for example).

- d. How do inspectors ensure that they do not interfere with or distract operators during normal operation and unplanned and infrequent events?

Yes, the inspectors ensure that they do not interfere with or distract operators during normal and unplanned and infrequent events. They do not interview the operators during their activity in the control room. They can however interview the operation manager.

- i. *Does your RB have written guidance for the inspectors?*

Yes. This written guidance is actually reworked.

- ii. *Does the operator discuss its expectations with the inspectors?*

Yes, the operators discuss their expectations with the inspectors, but generally out of the control room in order to not disturb the activity of nuclear power plant control.

The following two questions are background questions to assist the Workshop participants in understanding the regulatory and inspection requirements associated with operator licensing.

2. Control room operator initial training and qualification

- a. Does the operator have a programme to train and qualify control room operators? If “yes”, is the programme approved by the RB?

Yes, the licensee has a programme to train and qualify control room operators. This training and qualify programme is not approved by the ASN.

- b. Briefly describe the operator’s initial qualification process.

- i. *What types of operational scenarios are included in the training (e.g., are EOPs and SAMGs included, are administrative procedures included)?*

- ii. *Length of simulator training?*

- iii. *Length of course work?*

- iv. *Length of on-the-job training?*

- v. *Is there a minimum level of education required to become a control room operator?*

To be recruited, the operators must have a master degree. The operator’s initial training last two years: about 6 months on theoretical training on physical principles and phenomena and on normal operations, outage operations, unplanned and infrequent events and accidental conditions; about 6 months of simulator training; about one year of on-the-job training; and about two years qualified but with a specific supervision by more expert colleague.

- c. What role does the RB have in the process (e.g., do the inspectors observe portions of the training, who issues the license or authorization to the operator)?

The ASN has no role in the process of training and qualification. The inspectors do not observe portions of the training and the ASN does not issue any authorisation to the operators.

3. Control room operator requalification and refresher training

- a. Does the operator have a programme to maintain and re-qualify control room operators? If “yes”, is the programme approved by the RB?

Yes. The licensee has a programme to maintain and re-qualify control room operator. This programme is based on simulator training and theoretical lectures every two years for the operating procedures for accidental conditions and more regularly for the sensitive transient conditions.

The ASN doesn’t approve the programme to maintain and re-qualify control room operators.

- b. What role does the RB have in the requalification process (e.g., do the inspectors observe portions of the training)?

The ASN has no role in the process of requalification.

GERMANY

1. Field observations

- a. Does your RB perform field observations and inspections during control room operations?
- i. If not, how does your RB get confidence that the plant is being operated safely?
 - ii. If “yes”, what is included in the inspections?
Yes. The supervisory authority and its authorized experts check the control room operations within the framework of their regular onsite inspections. This includes, among others:
 - Interview of the shift supervisor about the actual status of the plant.
 - Checking of the shift log.
 - Checking of the protocols of the alarm and malfunction system.
 - Discussion with the shift supervisor concerning actual in service inspections, maintenance activities and disabled systems.
 - Documentation of radioactive releases (water, air).
 - Compliance with operating regulations concerning shift activities (regular inspections and walk downs, e.g. use of safety relevant keys).
 - Review of work documents.
 - Completeness of shift personnel.
 - Human performance.

- b. Describe how your RB assesses human performance in the control room.

- i. *Does the operator have guidance for expected behaviour of control room operators (other than operating procedures)? If so, describe your RB’s inspection activities in this area.*

Yes. “Qualification” comprises knowledge, skills and attitudes. Therefore, in addition to technical measures, personnel and organisational measures have also been investigated and implemented. This includes, among others:

- To promote optimum work procedures and professional actions/performance, the personnel are additionally instructed correspondingly by so-called markers in the form of small index cards or pocket books, for example. These markers shall enhance professional action and thus a strong safety culture. Their implementation allows for a high level of safety and the availability of the installations. They define the expectations in terms of the staff’s professional performance.
- Application of criteria for leadership behaviour and general behavioural codes.
- Application of the three-way communication for ordering switching operations.
- Application of well-considered working practices and processes to fulfil the requirements regulated in the operating manual, e.g. the use of electronic information systems, visualization of important information etc.
- Limitation of the number of personnel (other than the control room operators) at the control room to allow a quiet work environment.

The supervisory authority was involved in the process of the development of new elements for the behaviour of control room operators. The assessment of the supervisory body includes also a review of the respective training material. Furthermore, as part of their onsite inspections, the supervisory authority checks if the expected behaviour of control room operators is really practiced.

- ii. *Do operators have strict requirements for whom and how many people are in the control room at any given time?*

Yes. The requirements are prescribed in detail in the so-called “Control room and shift regulation”, which is part of the safety specifications in operating manual.

- iii. *Does your RB evaluate shift turnover?*
Yes. Shift turnover is reviewed within the framework of the regular onsite inspections of the control room operation. It includes all items already prescribed in answer 1a, e.g. on the basis of a checklist.
- iv. *Does your RB inspect operational activities outside of the control room (e.g., accompany auxiliary operators on their rounds)?*
Yes. This is part of the of the regular onsite inspections of the supervisory authority or their authorized experts. As an example, auxiliary operators are accompanied or observed during their plant walk down.
- c. How does your RB inspect the control room operator's performance?
- i. *Normal operations*
During normal operations, the control room operator's performance is inspected and reviewed by all items already prescribed above, see e.g. answer 1a.
- ii. *Outage operations*
In principle, the inspection in outage operations does not differ from the inspection of "normal operations". In Germany, preventive maintenance and testing of safety systems during power operation is allowed under specific requirements. However, the intensity of the inspections during outage operations is much higher, due to the huge maintenance programme of the operator, including large number work sheets for in-service inspections in the facility, switching operations and isolating operations of safety relevant components and systems.
- iii. *Unplanned and infrequent events (e.g., plant trips, loss of safety equipment, etc.)*
In the case of unplanned and infrequent events the supervisory authority is informed by the operator. This has to be done within the framework of the German Nuclear Safety Officer and Reporting Ordinance, if the respective reporting criteria are met, and sometimes in important cases also below the threshold of these criteria. The supervisory authority gets all information needed to review these events, if necessary directly from the shift supervisor. The supervisory may inspect the control room, e.g. for interviewing of the shift supervisor or checking the documents.
- d. How do inspectors ensure that they do not interfere with or distract operators during normal operation and unplanned and infrequent events?
- i. *Does your RB have written guidance for the inspectors?*
No, there is no special written guidance concerning this special topic.
- ii. *Does the operator discuss its expectations with the inspectors?*
Yes. In management level meetings and discussions the mutual expectations and the occurred problems, if so, are discussed.
It has to be noted, that in principle, according to Section 19 (2) of the Atomic Energy Act, the inspectors of the supervisory authority have access to the control room at all times. They are authorized to carry out all examinations which are necessary for them. Furthermore, they may request the control room operators, especially the shift supervisor, to provide them with the information they require. However, in case of unplanned and infrequent events, the main function of the control room operators is to ensure a safe condition and operation of the NPP. It is a common understanding, that control room operators should not be disturbed in doing their job, especially in such circumstances, and the inspectors keep this in mind, of course. At last, against this background, the shift supervisor has to decide from his point of view if a communication between himself or the other the control room operators and the inspectors is possible or has to be postponed for a moment.

The following two questions are background questions to assist the Workshop participants in understanding the regulatory and inspection requirements associated with operator licensing.

2. Control room operator initial training and qualification

- a. Does the operator have a programme to train and qualify control room operators? If “yes”, is the programme approved by the RB?

Yes. Due to the high demand for training, there is an own training concept for each plant. This is generally implemented with highly qualified and experienced shift supervisors who organise the training programmes and, in parts, also carry them out themselves. Where necessary, specialists within the technical departments or external specialists, e.g. from universities, plant manufacturers or the Simulator Centre will be involved. As for all responsible personnel of a NPP, the measures for initial training and qualification of control room operators are specified in the training manuals. So, e.g., the control room operators must have passed the examination of technical qualification by the time they first act in the respective function.

The overall programme of the operator, including measures for acquisition, maintenance and verification of the technical qualification of control room operators, is based on the following regulatory guidelines:

- Guideline Relating to the Proof of the Technical Qualification of NPP Personnel, 14 April 1993, Status December 2001, Handbook of Nuclear Safety and Radiation Protection (RSH 3-2), http://www.bfs.de/de/bfs/recht/rsh/volltext/A1_Englisch/A1_2_96.pdf
- Guideline Relating to Programs for the Preservation of Technical Qualification of Responsible Shift Personnel at NPPs, 1 September 1993, Status December 2001, (RSH 3-38), http://www.bfs.de/de/bfs/recht/rsh/volltext/A1_Englisch/A1_4_96.pdf
- Guideline Relating to the Content of the Examination of the Technical Qualification of Responsible Shift Personnel at NPPs, 23 April 1995, Status December 2001, (RSH 3-39), http://www.bfs.de/de/bfs/recht/rsh/volltext/3_BMU/3_39.pdf

The supervisory body reviews the overall programme of the plant operator to ensure adequate staffing on the basis of reports submitted. The programme is reviewed for compliance with the requirements of the respective guidelines mentioned above. For control room operators, the supervisory authority requires the submission of documents which verify the necessary technical qualification and practical experience prior acting on the job. One premise is that the control room operators have passed the examination of technical qualification.

- b. Briefly describe the operator’s initial qualification process.
- i. *What types of operational scenarios are included in the training (e.g., are EOPs and SAMGs included, are administrative procedures included)?*
 - Normal operation, e.g. field tours, in-service inspections, reactor control procedures, including especially such activities which are not carried out often at plant operation like starting up and shutting down of the reactor or control actions etc.
 - Abnormal operation, especially potential and actual component and system failures.
 - Design basis accidents.
 - Beyond design basis accidents. Preventive and mitigative accident management procedures are laid down in an Accident Management Manual. In Germany, SAMGs are under development, but not yet established.
 - Emergency drills.
 - Alarm, fire protection, respiratory protection, first aid and radiation protection exercises.
 - ii. *Length of simulator training?*
 - Pressurized Water Reactor (DWR): eight weeks.
 - Boiling Water Reactor (SWR): seven weeks.

iii. *Length of course work?*

Within the guidelines quoted in answer to question 2a, there are a lot of requirements, especially concerning the content of the programme to train and qualify control room operators. However, there are no specific requirements concerning the overall length of the courses. For so-called responsible control room staff (reactor operators and shift supervisor or deputy) the length of the simulator training (see 2b ii) and the length of the on-the-job training (see 2b iv) are prescribed.

iv. *Length of on-the-job training?*

- Reactor operators: at least two years of practical experience at different relevant stages in the operation of a NPP (including training time), of which at least half a year of practical experience on shift at the operators NPP.
- Shift supervisor or deputy: at least three years of practical experience at a NPP (including training time), of which at least half a year of practical experience on shift at the operators NPP.

v. *Is there a minimum level of education required to become a control room operator?*

- Reactor operators: Training in nuclear engineering and a furnish proof as a technician with a state or state-approved final examination or qualification as master craftsman or at least a journeyman's certificate as defined in the German Handicrafts Regulation or a completed training as skilled worker in a technical field or in nuclear engineering.
- Shift supervisor: Training in nuclear engineering and furnish proof of graduation from a state or state-approved university, professional college or engineers' college in a corresponding field.
- Shift supervisor deputy: Training in nuclear engineering and furnish proof of training as a technician with a state or state-approved final examination or the qualification as master craftsman in a corresponding field.

c. What role does the RB have in the process (e.g., do the inspectors observe portions of the training, who issues the license or authorisation to the operator)?

As already described in answer 2a, the supervisory authority reviews the overall programme of the operator. For control room operators, it requires the submission of documents which verify the necessary technical qualification and practical experience prior acting on the job. One premise is that the control room operators have passed the examination of technical qualification. A representative of the competent licensing and supervisory authority is member of the Examination Board. Finally, the supervisory authority issues an authorization for responsible control room operators on the basis of the operator's application to admit the person to the intended function, as far as he has passed the examination and has met all other requirements for such admission.

3. Control room operator requalification and refresher training

a. Does the operator have a programme to maintain and re-qualify control room operators? If "yes", is the programme approved by the RB?

Yes. The operator has to submit a three-year programme to maintain the qualifications of control room operators to the supervisory authority. Furthermore, at the end of each year, the scope and outcome of this programme has to be reported to the supervisory authority:

- Summarising the individual in-house measures implemented, indicating the topics covered, the implementation method and the amount of time spent. Lists of participants with the participants' signatures and, optionally, those of the instructors shall be documented in an appendix and submitted to the authority on request.
- Summarising the individual external measures, indicating the topics covered, the amount of time spent and the participants' names. Confirmation of participation shall be documented in the appendix and submitted to the authority on request.

- Overall outcome of systematic monitoring and in-house assessment of the preservation of technical qualification and proper use of skills.
- In addition to the above, to be submitted annually, the outcome of overall measures to preserve technical qualification following each three-year program in respect of each participant has to be reported to the competent supervisory authority by submitting assessments.

A formal requalification/relicensing of control room operators including examinations is not required. However, a minimum time for refresher training is prescribed, for example the training time on simulators, namely 20 days for PWR and 15 days for BWR personnel in a 3-year framework. This is, among others, reviewed by the supervisory authority.

- b. What role does the RB have in the requalification process (e.g., do the inspectors observe portions of the training)?

The RB is involved in the overall process to maintain the qualifications of control room operators. The three-year programme of the operator has to be submitted to the competent supervisory authority. At the end of each year, the scope and outcome of this programme has to be reported, and in addition, the outcome of overall measures to preserve technical qualification following each 3-year program in respect of each participant has to be reported by submitting assessments.

- c. Is there anything else you would like to learn from or discuss from this Workshop Session?

There are two points which are not yet required in Germany and may be discussed:

- Using of simulators in the examination
- A formal requalification/relicensing of control room operators including examinations by the RB

INDIA

1. Field observations

a. Does your RB perform field observations and inspections during control room operations?

- i. *If not, how does your RB get confidence that the plant is being operated safely?*
- ii. *If “yes”, what is included in the inspections?*

Regulatory inspection of NPPs is carried out twice in a year. During these inspections, the scheduled activities such as refueling operations, surveillance tests, equipment changeover, collections of plant data etc. are observed. In addition to the above, inspections are also planned when some important tests or activities, such as reactor building containment leak rate test, ECCS (emergency core cooling system) integrity test, biennial shutdown etc., are undertaken by the NPPs.

b. Describe how your RB assesses human performance in the control room.

- i. *Does the operator have guidance for expected behaviour of control room operators (other than operating procedures)? If so, describe your RB’s inspection activities in this area.*

The operator’s expectation towards safe operation is brought out in the Safety and Quality policy of the organisation. Training on safety culture, error reduction techniques, operating experience feedback etc. are arranged by the Operating Organisation.

The RB oversight in this area is through field observations during regulatory inspections, review of the low level incidents & near miss accident reports and review of event and significant event reports etc.

- ii. *Do operators have strict requirements for whom and how many people are in the control room at any given time?*

The technical specifications of NPPs give the minimum required manpower to be maintained in the control room at all times. This is generally (a) one shift charge engineer (b) one assistant shift charge engineers (c) three control engineers for main plant operation for twin unit control room. In addition minimum qualified staff requirements are specified for undertaking on-line refueling operations from control room in PHWR (pressurized heavy water reactor) NPPs.

- iii. *Does your RB evaluate shift turnover?*

Observation on Shift turnover is made during routine and special regulatory inspections.

- iv. *Does your RB inspect operational activities outside of the control room (e.g., accompany auxiliary operators on their rounds)?*

Operational activities outside the control room are inspected only if an important activity is being undertaken during the regulatory inspection period. Plant areas are visited by the RB inspectors along with the plant personnel and observations on the operational activity outside the control room, if going on at that time, are made.

c. How does your RB inspect the control room operator’s performance?

- i. *Normal operations*

Control room activities are observed during regulatory inspection period. Any deviation from the expected behaviour, if noticed during the inspection, is discussed with the plant management for taking corrective actions. Control room log books are reviewed to judge control room operator’s performance.

- ii. *Outage operations*

If regulatory inspection is scheduled during the outage period of the NPP, then observations are made on the aspects related to operator performance during plant outage. This include adherence to procedures while issuing work permit, adherence to radiological procedures

during routine and maintenance activities etc. Recently inspectors have been deployed during biennial shutdown of the NPPs to check compliance with the regulatory guidelines. If some special activity is planned during the outage, then RB may plan an inspection to witness this activity.

iii. *Unplanned and infrequent events (e.g., plant trips, loss of safety equipment, etc.)*

Since inspectors are not posted at the NPPs, this aspect is not covered. However, if the incident/event is considered to be important from safety point of view, a special inspection of the NPP is undertaken as soon as possible after the event to gather first hand information of the operator and equipment behaviour. The human performance is also judged during the review of the event in RB.

d. How do inspectors ensure that they do not interfere with or distract operators during normal operation and unplanned and infrequent events?

i. *Does your RB have written guidance for the inspectors?*

Yes. The safety manual “Regulatory Inspection and Enforcement in Nuclear Power Plants and Research Reactors” (AERB/NPP&RR/SM/G-1) covers the methodology of carrying out regulatory inspections. The manual gives detailed guidelines on the qualification of inspectors, composition of the team, areas to be covered during inspection, checklist for carrying out observations, report preparation and procedure for communication & response from the utility.

ii. *Does the operator discuss its expectations with the inspectors?*

Each inspector of the regulatory team, assigned to cover particular section of the plant, has an identified counterpart to assist him during regulatory inspection. Regulatory Inspection team is briefed about the plant status, the expectations of the plant management and introduced to the counterparts of each inspector during the introductory meeting with the senior plant personnel in the beginning of the inspection. Major part of the discussions is held with the counterpart and, if required, opinion of the on-duty operator is also sought.

The following two questions are background questions to assist the Workshop participants in understanding the regulatory and inspection requirements associated with operator licensing.

2. **Control room operator initial training and qualification**

a. Does the operator have a programme to train and qualify control room operators? If “yes”, is the programme approved by the RB?

Yes, the licensee has a well defined program for licensing and qualification of control room operators. The program is based on the guidelines given in AERB “safety guide” AERB/SG/O-1 (Staffing, Recruitment, Training, Qualification & Certification of operating personnel of NPPs). Based on these guidelines the operator has prepared “Licensing and qualification procedure for main plant and fuel handling operations personnel”, which has been approved by RB.

b. Briefly describe the operator’s initial qualification process.

i. What types of operational scenarios are included in the training (e.g., are EOPs and SAMGs included, are administrative procedures included)?

ii. Length of simulator training?

iii. Length of course work?

iv. Length of on-the-job training?

v. Is there a minimum level of education required to become a control room operator?

The initial qualification process of control room operator is as follows:

i. A control room operator should be minimum an engineering graduate or equivalent to be eligible for control room operator. The personnel with diploma in engineering and in the grade of scientific officer-B are also considered for this post.

- ii. The personnel should have relevant years of experience (3years for graduate engineer and 9 years for diploma engineers). This includes on-job-training & experience programme in round the clock shift. On-job-training and experience are structured and guided with the help of task based checklist.
 - iii. The eligible personnel need to be trained on main plant simulator/ fuel handling simulator (as applicable) as per the lesson plans based on the approved guidelines. The training on simulator is of six weeks.
 - iv. The personnel should have undergone authorisation based training i.e. radiation protection training, standard protection code (for industrial safety) and electrical authorisation training.
 - v. The personnel should pass written examination papers.
 - vi. The candidate should pass the final assessment interview, which is conducted at the station with members from RB, design office and plant management.
- c. What role does the RB have in the process (e.g., do the inspectors observe portions of the training, who issues the license or authorization to the operator)?

The licensing programme is reviewed & approved by the RB. Personnel from the RB are members of the final assessment interview. RB ensures that the candidate has met all the requirements (as brought out in 2) before the interview is conducted. The RB reviews the bio-data (i.e. educational qualification, experience, mandatory training imparted, results of written examination, medical fitness etc.) before final assessment interview.

3. **Control room operator requalification and refresher training**

- a. Does the operator have a programme to maintain and re-qualify control room operators? If “yes”, is the programme approved by the RB?

Yes. “Licensing and qualification procedure for main plant and fuel handling operations personnel”, which has been approved by RB, covers the requirements for requalification of control room operators. The requalification of control room operators is required to be carried out after every three years. The pre-requisites for appearing in re-qualification interview include mandatory medical fitness and required re-training.

- b. What role does the RB have in the requalification process (e.g., do the inspectors observe portions of the training)?

The RB ensures that the personnel nominated by the utility meet the pre-requisites for appearing in the re-qualification interview. The representative of RB is a mandatory member of the committee for licensing/re-licensing committee.

JAPAN

1. Field observations

a. Does your RB perform field observations and inspections during control room operations?

- i. *If not, how do you get confidence that the plant is being operated safely?*
- ii. *If “yes”, what is included in the inspections?*

In Japan, resident inspectors perform field observations, everyday, including control room. When the resident inspectors patrol control room, they check operating records and ask operational status to the shift supervisor. If plant status is change, such as plant start and stop, resident inspectors are present at control room and perform inspection of operations. And if necessary, they are present at surveillance test and perform inspection of significant installation, such as EDG (emergency diesel generator).

b. Describe how your RB assesses human performance in the control room.

- i. *Does the operator have guidance for expected behaviour of control room operators (other than operating procedures)? If so, describe your inspection activities in this area.*

The operator has guidance for expected behaviour of control room operators, such as “conduct code of operation members”. If a resident inspector discovers the act which is contrary to this “conduct code of operation members” by daily observation, it will become a comment, but the inspection which is dedicated to operator behaviour is not carried out.

- ii. *Do operators have strict requirements for whom and how many people are in the control room at any given time?*

Operators have defined the number of the qualified operation member needed according to the operation situation of a plant, such as stat-up, cold shutdown, hot stand-by, fuel exchange, etc., for each control room in operational safety program.

- iii. *Does your RB evaluate shift turnover?*

If necessary, Japanese inspectors are present at shift turnover, and check the contents of it.

- iv. *Does your RB inspect operational activities outside of the control room (e.g., accompany auxiliary operators on their rounds)?*

Resident inspectors perform observations of operational activities outside of the control room. For example, when surveillance test of EDG is performed, resident inspectors observe operational activities of auxiliary operators in outside of the control room as well as operational activities of control room operators.

c. How does your RB inspect the control room operator’s performance?

- i. *Normal operations*

Resident inspectors perform field observations, everyday, including control room. When the resident inspectors patrol control room, they check operating records and operator’s performance. And if necessary, they are present at surveillance test and perform inspection of significant installation, such as EDG, ECCS (Emergency Core Cooling Systems),etc.,

- ii. *Outage operations*

Resident inspectors perform field observations everyday also in outage period, including control room. When the resident inspectors patrol control room, they check operating records and operator’s performance. And if necessary, they are present at surveillance test which is needed in outage period and perform inspection of significant installation, such as EDG, ECCS (Emergency Core Cooling Systems),etc.,

And When plant is starting, resident inspectors are present at control room and perform inspection of significant operations, such as control rods drawing-out start, reactor criticality, and power generation start, etc., .

iii. *Unplanned and infrequent events (e.g., plant trips, Loss of safety equipment, etc.)*

When deviation from Limiting Conditions for Operation and plant trips occur, resident inspectors are checking the plant status in the control room and also observing the attitude of operation members.

d. How do inspectors ensure that they do not interfere with or distract operators during normal operation and unplanned and infrequent events?

i. *Do you have training and written guidance for the inspectors?*

ii. *Does the operator discuss its expectations with the inspectors?*

The regulatory body has enacted the guideline for operational safety inspection. This guideline indicates that inspectors must take care so that their performance do not interfere with or distract operators work, but does not indicate concrete contents. However, every inspectors know that they must not unduly interfere with operators performance from actual inspection experience, and such interfere has not yet arisen. These issues were discussed with operators' representatives around 2008 when adding the inspection concerning significant operation in safety and inspectors' site patrol.

The following two questions are background questions to assist the Workshop participants in understanding the regulatory and inspection requirements associated with operator licensing.

2. **Control room operator initial training and qualification.**

a. Does the operator have a programme to train and qualify control room operators? If "yes", is the programme approved by the RB?

The operator has a programme to train and qualify control room operators. The programme is approved by the Regulatory Body and the resident inspector checks the track record of programme in operational safety inspection every year.

b. Briefly describe the operator's initial qualification process

i. *What types of operational scenarios are included in the training (e.g., are EOPs and SAMGs included, are administrative procedures included)?*

Main operational scenarios are Accident Operating Procedures which include every Design Base Accident. And the initial qualification training includes introduction of Emergency Operating Procedures and Severe Accident Management Guidelines.

ii. *Length of simulator training?*

Length of control room operator initial simulator training is around 40 days. It depends on trainee's operating experience and training organisation.

iii. *Length of course work?*

Length of control room operator initial course work is 10 to 60 days. It depends on trainee's operating experience and training organisation.

iv. *Length of on-the-job training?*

The initial class operation member can give reactor operator qualification, after ending predetermined training. Then the initial class operation member who got the qualification performs on-the-job training. The Length of on-the-job training is 10 to 120 days. After this OJT, Electric company actually nominates reactor operator out of qualified persons. The Length of OJT depends on trainee's operating experience and electric company.

v. *Is there a minimum level of education required to become a control room operator?*

Japan has two training organisations which train nuclear reactor control room operators. One is NTC (Nuclear Training Center), which trains PWR plant control room operators, The other is BTC (Boiling water reactor Training Center), which trains BWR plant control room operators.

The minimum level of education required to become a control room operator is finishing "NTC's initial training course" or "BTC's initial training course". This initial course is simulator training and the length is around 40 days.

- c. What role does the RB have in the process (e.g., do the inspectors observe portions of the training, who issues the license or authorization to the operator)?

The resident inspector checks the plan of control room operators' training and its track record in operational safety inspection.

After NTC or BTC issued a certification of the initial training course, each electric company itself qualify the certificated initial operator as reactor operator through the required qualification process.

3. **Control room operator requalification and refresher training**

- a. Does the operator have a programme to maintain and requalify control room operators? If "yes", is the programme approved by the RB?

The operator has a programme to maintain control room operators' competency, and actually perform required re-training, such as refresh training course and operator continuing training course. Also the operator has a programme to re-qualify shift supervisors, but has not a programme to re-qualify reactor operators. The resident inspector checks the plan of control room operators' re-training and its track record in operational safety inspection.

- b. What role does the RB have in the requalification process (e.g., do the inspectors observe portions of the training)?

The operator has a programme to re-qualify shift supervisors, but has not a programme to re-qualify reactor operators. Regulatory body participates in requalification process of the shift supervisor. The resident inspector checks the plan of control room operators' re-training training and its track record in operational safety inspection.

- c. Is there anything else you would like to learn from or discuss from this Workshop Session?

- Classification of control room operators in each country.(Reactor operator, Senior reactor operator, etc.)
- How is the regulatory body concerned with certifying examination of each class operator?

KOREA, REPUBLIC

1. Field observations

- a. Does your RB perform field observations and inspections during control room operations?
- i. *If not, how does your RB get confidence that the plant is being operated safely?*
 - ii. *If “yes”, what is included in the inspections?*
Control room observation is carried out by the resident inspectors who check the status of the reactor and observe the operator activities.
- b. Describe how your RB assesses human performance in the control room.
- i. *Does the operator have guidance for expected behaviour of control room operators (other than operating procedures)? If so, describe your RB’s inspection activities in this area.*
No guidance other than procedures
 - ii. *Do operators have strict requirements for whom and how many people are in the control room at any given time?*
Yes, there should be at least one senior reactor operator, two reactor operators and two auxiliary operators in the control room.
 - iii. *Does your RB evaluate shift turnover?*
No, shift turnover is done by the shift operators.
 - iv. *Does your RB inspect operational activities outside of the control room (e.g., accompany auxiliary operators on their rounds)?*
Yes, during the surveillance inspection, the resident inspectors observe the activities of the local operators working outside of the control room.
- c. How does your RB inspect the control room operator’s performance?
- i. *Normal operations*
RB does not directly inspect the control room operator’s performance.
Korean RB reviews and approves the training program for the control room operators. The control room operators are periodically trained at the simulator facilities in a circular shift fashion.
 - ii. *Outage operations*
Same as above.
 - iii. *Unplanned and infrequent events (e.g., plant trips, loss of safety equipment, etc.)*
For those events, RB investigates the operator actions taken during the event.
- d. How do inspectors ensure that they do not interfere with or distract operators during normal operation and unplanned and infrequent events?
- There is a line on the control room floor to limit the access of person other than operators.
- i. *Does your RB have written guidance for the inspectors?* No
 - ii. *Does the operator discuss its expectations with the inspectors?* No
- The following two questions are background questions to assist the Workshop participants in understanding the regulatory and inspection requirements associated with operator licensing.

2. Control room operator initial training and qualification

- a. Does the operator have a programme to train and qualify control room operators? If “yes”, is the programme approved by the RB?
- Yes, the operators have a training program approved by the RB.

- b. Briefly describe the operator's initial qualification process.
- i. *What types of operational scenarios are included in the training (e.g., are EOPs and SAMGs included, are administrative procedures included)?*
 Simulator training program for operator includes various transient and accident scenarios.
 - ii. *Length of simulator training?*
 70 hours of simulator training per year.
 - iii. *Length of course work?*
 50 hours of course work per year.
 - iv. *Length of on-the-job training?*
 Around 40 hours of on-the-job training per year covering plant design, severe accident, emergency control, fire protection, radiation protection, etc.
 - v. *Is there a minimum level of education required to become a control room operator?*
 Yes, the national qualification for the reactor operator examination requires minimum one year of experience (6 months for those who graduated nuclear engineering dept.) in reactor operation after graduation from science or engineering department in the university. For senior reactor operator, minimum two years of experience is required after qualified for the reactor operator.
- c. What role does the RB have in the process (e.g., do the inspectors observe portions of the training, who issues the license or authorization to the operator)?
 RB conducts the national examination for operator's license and issues the license. RB reviews and approves the licensee's training program for the operators.

3. **Control room operator requalification and refresher training**

- a. Does the operator have a programme to maintain and re-qualify control room operators? If "yes", is the programme approved by the RB?
 After qualified by the national examination for operator's license conducted by RB, the operators have an annual training program to maintain the skill needed for operation.
- b. What role does the RB have in the requalification process (e.g., do the inspectors observe portions of the training)?
 RB conducts the national examination for operator's and senior operator's license. RB reviews and approves the licensee's training program.

MEXICO

1. Field observations

- a. Do you perform field observations and inspections during control room operations?

Yes, this activity is carried out mainly by resident inspectors over a sustained period of time throughout the year, and once a year for one week by inspectors from the Commission's headquarters. The above is applicable during normal operation of the Nuclear Power Plant.

In the case of abnormal operation of the NPP are resident inspectors who carry out observations in the field and inspection in the control room.

During outage periods resident inspector is supported by the inspectors of the Commission's headquarters to conduct field observations and inspections at control room.

The previous inspection scheme can provide an opportunity for both the resident inspector and off-site inspectors to independently evaluate the performance of the licensee in the control room and plant over a sustained period of time. The resident inspector get their own point of view supported by the daily observation of control room activities, while the independent view of inspectors from the Commission's headquarters for a short period of time is useful to reaffirm or change the resident inspector point of view.

- i. *If not, how do you get confidence that the plant is being operated safely?*
 ii. *If "yes", what is included in the inspections?*

During the course of inspections by both resident inspectors and inspectors from the Commission's headquarters should be evaluated the following conditions or practices as appropriate:

- Operators are attentive and responsive to the parameters and conditions of the plant. Operators are aware of the reasons that the annunciators are in alarm condition.
- Plant evolutions and testing are planned and properly authorized. When a more complex special evolution or non-routine evolution takes place, a pre-evolution briefing of the shift crew and other personnel affected by the evolution may be appropriate.
- Procedures are used and followed as required by plant policy.
- Equipment status changes are appropriately documented and communicated to appropriate shift personnel, when they occur.
- The operating conditions of plant equipment are effectively monitored, and appropriate corrective action is initiated when required.
- Backup instrumentation, measurements, and readings are used as appropriate when normal instrumentation is found to be defective or out of tolerance. Equipment out of service controls is adequate.
- Log keeping is timely, accurate, and adequately reflects plant activities and status.
- Operators follow good operating practices and maintain shift professionalism in conducting plant operations.
- Operators are aware of ongoing plant activities and surveillance testing.
- Administrative controls are adequate to ensure in-plant work activities are being performed with the knowledge of control room personnel.
- The control room environment is adequate for conduct of duties; i.e. lighting, noise levels, traffic volume, number of alarms, ventilation, heating and cooling are acceptable.
- Communication between workers and first line supervisors, as well as interdepartmental communications, are appropriate and follow any plant specific communications procedures.
- Shift turnovers are professional and provide the oncoming shift an adequate update from the last time they were on shift.

- Blocking/tagging and valve lineups are conducted in accordance with plant procedures and are adequate to provide isolation or proper system lineup for existing plant conditions.
- The administrative burden on the control room supervisor does not prevent adequate supervision of shift activities.
- Manipulation of plant controls that may affect reactivity changes is performed by licensed operators.
- Overall material condition of the plant does not hinder the effectiveness of the operators in conducting normal plant evolutions as well as non-routine evolutions.
- Technical Specification limiting conditions for operation are satisfied. Entry into limiting condition for operation (LCO) action statements are controlled and tracked. Additional surveillance activities required by action statements are performed and tracked.
- Abnormal conditions and equipment problems are evaluated promptly to determine the impact on plant safety, equipment operability, and reportability. Plant management is informed of abnormal conditions as required by plant policies.

b. Describe how you assess human performance in the control room

The inspectors from the Commission's headquarters assesses the human performance in the control room by using the directions established in the Nuclear Regulatory Commission of U.S.A, Inspection Manual, Inspection Procedure 71715 "Sustained control room and plant observation". Such procedure provides guidance to observe operational activities conducted by the licensee. The inspector should obtain the licensed operators' views on what detracts from their ability to monitor and operate the plant.

i. *Does the operator have guidance for expected behaviour of control room operators (other than operating procedures)? If so, describe your inspection activities in this area.*

In addition to the plant procedures the both control room operators and auxiliary field operators have the "Manual of Conducting Operations" which sets out the principles and operating expectations and standards to be applied during operation of the Unit. The Manual of Conducting Operations sets the standards to be applied by the operating staff (operators control room operators and field assistants) for the following activities:

- Shift turnover.
- Attention to people in other areas.
- Communication with other areas.
- Access to the main control room.
- Pre-job meetings.
- Group of urgent reparations.
- Management of inoperability.
- Management of anomalies.
- Management of tagging and clearance.
- Analysis of transient events.
- Configuration control of CNLV.
- Decision making conservative.
- Group maintenance.
- Behaviour during transients.
- Putting in service of equipment and systems after a post-maintenance testing.
- Working meeting with other areas.
- Field tours.
- Aids to the operators.
- Management of reactivity.
- Behaviour of the operator to alarms.

- Recruitment for Shift Manager.
- Guide to determine if the fault was corrected and documented physical.
- Establishment and training of operating crews.

ii. *Do operators have strict requirements for whom and how many people are in the control room at any given time?*

The Manual of Conducting Operations in Chapter 4 “Accessing the Main Control Room and Zone of Control Panels”, establishes that access to the control room for non-operating personnel will be made through the white cabinet where the Shift Supervisor grant access to the controlled area, and are the reactor operators who allow access to the control area bounded by the red stripe on the floor (limited area). The number of people outside the duty must be controlled so as not to reduce the level of personal attention of personnel crew. The maximum number of non-operating personnel that can remain in the controlled area and limited area is of four people to perform scheduled activities (instrument calibration, surveillance testing of controls and lights, etc.).

Field Operators on duty or in the process for the shift changing will have direct access to the Field Operator Room’s (without going through the cabinet white) and then to the main board area or control room, as long as they have authorization from the Shift Supervisor or Operator Reactor on duty.

In case of operations, events or transient anyone outside the group operation in duty must leave the limited area.

iii. *Do you evaluate shift turnover?*

Yes, during shift turnover the inspectors should assess that the staff on duty:

- Leave his post until relieved adequately.
- Comply with the working time period carefully.
- Be informed at the beginning of the turn of the status of the plant.
- Be informed at the beginning of the turn of the plant evolutions on progress.
- Read the operations logs (which be applicable according with the shift position) from the last day he was missed.
- Read the work orders and special instructions which are applicable for the shift turn.

iv. *Do you inspect operational activities outside of the control room (e.g., accompany auxiliary operators on their rounds)?*

Yes, during the annual inspection to the Operations Department the inspectors from the Commission’s headquarters accompany the field operators during the plant walkthrough to verify:

- The extent of the plant walkthrough.
- The attention to details during the verification of the house-keeping and condition of structures, systems and components.
- Labelling of system components.
- Correctness of local readings of key parameters for the operation of the plant.
- Report of results from plant walkthrough to the reactor operator.
- Condition reports or anomalies as result of plant walkthrough.
- Care and compliance with the controls for radiation protection.
- Care and compliance with industrial safety controls.

c. How do you inspect the control room operator’s performance?

i. *Normal operations*

Inspectors conducting inspections in the main control room during normal operation have an opportunity to observe plant parameters and conditions that, although not necessarily directly

related to the primary purpose for their inspection, can provide valuable information concerning licensee performance. In particular, the inspector should look for system components that are in an unexpected configuration or parameters that are at unexpected values based on the operational mode of the plant. Note any adverse plant parameter trends and whether the licensee is aware of the trends. Note whether the plant is in any technical specification (TS) action statement, whether the TS action statements are being met, and whether TS requirements and license conditions are being met. Review visible portions of radiation monitor indications that could provide indication of an apparent uncontrolled release. Review control room logs and equipment out-of-service or clearance logs and verify that these logs appropriately reflect the plant status observed during the control board walk-down. Ensure that control room operators can explain lit annunciators. Verify that alarms with multiple inputs have a reflash capability to preclude masking a potential degraded condition. Verify that operators implement appropriate compensatory measures for inoperable alarms or alarms without reflash capability.

ii. *Outage operations*

Inspectors conducting inspections in the main control room during outage operations have an opportunity to verify that the control room operators:

- Always remain in his role during refuelling activities and have an overview of the operation of the unit.
- For the approval of work in main control room the Shift Supervisor will be supported by the SRO assigned to the centre of work authorization (CENAT).
- Ensure that communications are clear, concise and three-way.
- Ensure the use and adherence to procedures and compliance with the outage plan.
- The SRO should refrain from handling unit equipment.
- Drive carefully control room environment to minimize distractions of control room staff on duty, such as: a) excessive workload, b) avoid simultaneous operations that could affect the operator to fulfil its primary task of monitoring the reactor and its support systems, c) unnecessary assignments that have nothing to do with the outage activities of the unit, and d) receive support from other operators when required by the testing activities of the unit equipment as result of TS testing or maintenance activities.
- Always keep in mind that the decisions taken should be conservative to safety and reliability of the central.
- Defence in depth is maintained.
- Residual heat removal is maintained (reactor vessel and fuel pool).

iii. *Unplanned and infrequent events (e.g., plant trips, loss of safety equipment, etc.)*

Inspectors conducting inspections in the main control room during unplanned and infrequent events have an opportunity to verify that the control room operators comply with the following:

- The transient's response must be as soon as possible and in an orderly manner following the guidelines applicable on procedures: response to alarms, abnormal operation and emergency operation.
- Taking immediate action from the beginning of the transient will avoid a degradation of more serious events.
- If during the shift change a transient is occurring then shift change should be stopped immediately and the initial crew will give response to the transient, with support from the incoming crew. Once the transient has been controlled and the unit is in a stable condition, it continues the shift change.
- During the transient should be given the required information, highlighting the data and parameters outside the normal range of operation. Crew should also report on the trend of these parameters: rising, falling, stabilizing and normalization. This information is vital for the care and effective control of the transient.

- Through the Shift Supervisor and/or Shift Technical Assistance will be establish the unique command channel to sort the sequential manoeuvres to remedy initial anomaly or failure. The Shift Supervisor will establish from the beginning of the transient the general plan of response actions or modifying enriched with new ideas derived from the “Team-back”.
 - Reactor Operators monitor the key parameters of the transient, identifying and announcing in a loud and clear voice, significant changes thereof. Should follow-up on the parameters trend in more than one instrument and/or device, visualizing possible in SPDS (Safety Parameters Display System) screens.
- d. How does the regulatory body ensure that inspectors do not unduly interfere with or distract operators during normal operation and unplanned and infrequent events?

On normal operations resident inspectors (2 inspectors) and the inspectors from the Commission’s headquarters have access to the main control room area with authorization of Shift Supervisor, just observing whit not interaction with personnel of the plant. The same is for unplanned and infrequent events; in this case they interview the personnel when the plant is in stable conditions.

i. *Do you have training and written guidance for the inspectors?*

No, we don’t have any training and written guidance for such concern.

ii. *Does the operator discuss its expectations with the inspectors?*

Yes, during the inspections performed by both resident inspectors and inspectors from the Commission’s headquarters an entrance meeting is carried on in order to expose the inspection plan, and one point for discussion is the manner on how to access to the controlled and limited zones by inspectors. For accessing controlled zone all inspectors need authorization of Shift Supervisor, and once inside the inspectors should perform their duties without distract control room operators.

The following two questions are background questions to assist the workshop participants in understanding the regulatory and inspection requirements associated with operator licensing.

2. **Control room operator initial training and qualification**

- a. Does the operator have a programme to train and qualify control room operators? If “yes”, is the programme approved by the RB?

Yes, the Mexican Official Standard NOM-034-NUCL-2009 “Requirements for selection, qualification and training of personnel of nuclear power plants”, in Section 4.5.1.1 establishes that *“The training programs for licensed personnel (Senior Reactor Operator and Reactor Operators) and simulator instructors must be evaluated and approved by the CNSNS before their implementation and must meet at least as indicated in Appendix A of this standard”*.

- b. Briefly describe the operator’s initial qualification process

The Mexican Official Standard NOM-034-NUCL-2009 establishes the requirements for selection, qualification and training of control room operators. Such requirements are spread in the procedure EP-9152 “Licensing personnel training”. The candidates to control room operators must:

- Possesses a degree in engineering or related sciences.
- Possesses a power plant experience of two years, of which one year must be at nuclear power plants (including six months in site performing activities as field operator).
- Approved of Generic Fundamentals Examination applying by the CNSNS (Mexican regulatory authority).

Once such requirements are met, the candidates are included in the initial training programme which includes the following training courses:

- Selection Level “A” (80 hours).
- Guidance on Laguna Verde (16 hours).

- Nuclear basics (480 hours).
- Laguna Verde Technology (4 months).
- Field observation (6 months-performing duties as a field operator).
- Plant components (116 hours).
- BWR simulator (632 hours).
- Observation on main control room (12 weeks).
- Heat transfer, fluid mechanics and thermodynamics (80 hours).
- Transient analysis (40 hours).
- Mitigation of core damage (80 hours).
- Internal emergency plan (4 hours).
- Emergency operating procedures (80 hours).
- Technical specifications (40 hours).
- Procedures and instructions related to the area work (40 hours).
- Internal and external operating experience (40 hours).

After the initial training for control room operator is provided the candidates are examined by the CNSNS examiners via the administration of writing exam, administrative topics, plant walkthrough, Job Performance Measure and operational exams. The last two exams are applied on full scope simulator. If all these exams are successfully approved by candidates then the license for control room operator is issued. The license is valid for a period of two years. After such time, the candidates should be proposed by the plant for the license renewal.

- i. *What types of operational scenarios are included in the training (e.g., are Emergency Operating Procedures and Severe Accident Mitigation Guidelines included, are administrative procedures included)?*

The scenarios for the initial training for control room operators include the start and stop of plant systems, instrumentation failures, start-up and shutdown of the unit, reactivity manipulations, and technical specifications testing. All these by using plant procedures. In addition, abnormal plant evolutions and emergency operating evolutions are included as part of the scenarios in which shall be used the abnormal and emergency operating procedures. The plant does not have SAMG.

- ii. *Length of simulator training?*

The length of simulator training is of 4.5 months.

- iii. *Length of course work?*

Eleven months

- iv. *Length of on-the-job training?*

The length of on-the-job training is 9 months

- v. *Is there a minimum level of education required to become a control room operator?*

Yes, the candidates to control room operators must possess a degree in engineering or related sciences.

- c. *What role does the RB have in the process (e.g., do the inspectors observe portions of the training, who issues the license or authorization to the operator)?*

The CNSNS must approve the candidates to control room operators (education, initial training and experience requirements are evaluated). After that the CNSNS specialists (examiners) prepare, administrate and evaluate the results of the candidate's examinations. If the examination results are satisfactory then the General Director of CNSNS grants the license as a control room operator for each candidate.

3. Control room operator requalification and refresher training

- a. Does the operator have a programme to maintain and requalify control room operators? If “yes”, is the programme approved by the RB?

Yes, the Operators retraining should be initiated at least one month after his license was granted. The Retraining Program must be approved by CNSNS before be implemented and must be carried out in a period of two years to keep the licenses current. The content of the Retraining Programme is specified in the Mexican Official Standard NOM-034-NUCL-2009 “Requirements for selection, qualification and training of personnel of nuclear power plants”, in section 4.5.1.1.

- b. What role does the RB have in the requalification process (e.g., do the inspectors observe portions of the training)?

The inspectors from the Commission’s headquarters who are the responsible for the administration of the new license and renewal license process for control room operators attend the cycles of operators’ retraining programme on a quarterly basis. In one hand, the examiners are provided with refresh retraining same as the control room operators. And, in the other hand, they have the opportunity to verify the control room operator’s performance, the quality of training delivering, the knowledge and skills of simulator instructors and adherence to the operators retraining programme. In addition, on annual basis is performed an inspection to the Training Center by the inspectors from the Commission’s headquarters. In such inspection are reviewed the training records of the control room operators to verify the compliance with the annual program of retraining for licensed personnel consisting of a minimum of 60 hours per year of classroom lessons, of which 20 hours may be in self-study, and 40 hours of simulator retraining.

A license for a control room operator is valid for a period of 2 years. So, every 2 years the CNSNS examiners administrate an operational examination on the full-scope simulator for a sample of control room operators (usually one shift crew) for the licenses renewing for all the control room operators, even if someone not were part of the sample. But, in a period of six years all the control room operators shall have been part of the sample.

- c. Is there anything else you would like to learn from or discuss from this Workshop Session?

Not yet.

SLOVAK REPUBLIC

1. Field observations

- a. Does your RB perform field observations and inspections during control room operations?
 - i. *If not, how does your RB get confidence that the plant is being operated safely?*
 - ii. *If “yes”, what is included in the inspections?*
Yes, the regulatory body perform field observation and inspection in control room on daily basis by site inspectors and in the case of surveillance tests by inspection team composed from site inspectors and inspector specialists.
- b. Describe how your RB assesses human performance in the control room.
 - i. *Does the operator have guidance for expected behaviour of control room operators (other than operating procedures)? If so, describe your RB’s inspection activities in this area.*
Yes, the operator has the guidance for operator’s behaviour. RB does not assess human performance in CR.
 - ii. *Do operators have strict requirements for whom and how many people are in the control room at any given time?*
Yes, there is a strict requirement to regulate the presence of people in control room and also the access area is for this person is limited. The door to control room has card access.
 - iii. *Does your RB evaluate shift turnover?*
Yes, this competence have the site inspectors, the periodicity is prescribed in inspection manual for control room control.
 - iv. *Does your RB inspect operational activities outside of the control room (e.g., accompany auxiliary operators on their rounds)?*
Yes, the inspection check list is valid for all control rooms, also in auxiliary buildings. The site inspectors accompany also the auxiliary operator staff on their rounds.
- c. How does your RB inspect the control room operator’s performance?
 - i. *Normal operations*
The site inspectors have special check list for inspection of operator control room.
 - ii. *Outage operations*
The site inspectors check list is also valid for outage operation.
 - iii. *Unplanned and infrequent events (e.g., plant trips, loss of safety equipment, etc.)*
The site inspectors have special check list for inspection and reporting such events.
- d. How do inspectors ensure that they do not interfere with or distract operators during normal operation and unplanned and infrequent events?
 - i. *Does your RB have written guidance for the inspectors?*
The inspector has the check list for inspection and this is a part of inspection guidance for site inspectors.
 - ii. *Does the operator discuss its expectations with the inspectors?*
Operator is in touch with inspector or inspector group and both parts discuss their expectations during the inspection. The inspection is usually starting with common meeting with operator and the partial or final findings are discussed with operator.

The following two questions are background questions to assist the Workshop participants in understanding the regulatory and inspection requirements associated with operator licensing.

2. Control room operator initial training and qualification

- a. Does the operator have a programme to train and qualify control room operators? If “yes”, is the programme approved by the RB?

Yes, the initial training program and retraining program is approved by regulatory body and it is a part of qualification and training of personnel in NPP.

- b. Briefly describe the operator’s initial qualification process.

- i. *What types of operational scenarios are included in the training (e.g., are EOPs and SAMGs included, are administrative procedures included)?*

Normal operation, abnormal operation, EOPs are included into simulator scenarios. SAMGS are not included due to simulator capability.

- ii. *Length of simulator training?*

The basic simulator training is 5 weeks, the additional two weeks in the case of function change and 1 week retraining for crew each half year.

- iii. *Length of course work?*

Not limited.

- iv. *Length of on-the-job training?*

From 5 to 10 weeks, depend on results of simulator end oral tests.

- v. *Is there a minimum level of education required to become a control room operator?*

The minimal level is the technical or university education and psychological ability.

- c. What role does the RB have in the process (e.g., do the inspectors observe portions of the training, who issues the license or authorization to the operator)?

The regulatory body inspects the whole process and the selected experienced and trained people are designated as testing commission chairmen. The license for operators is issued by regulatory body.

3. Control room operator requalification and refresher training

- a. Does the operator have a programme to maintain and re-qualify control room operators? If “yes”, is the programme approved by the RB?

Yes. The operator has a program for operators retraining and also for operator’s re-qualification. The program is submitted to regulatory body for review and approving.

- b. What role does the RB have in the requalification process (e.g., do the inspectors observe portions of the training)?

Yes. The inspectors monitor the whole requalification process.

SPAIN

1. Field observations

- a. Do you perform field observations and inspections during control room operations?
 - i. *If not, how do you get confidence that the plant is being operated safely?*
 - ii. *If “yes”, what is included in the inspections?*

The inspection activities of the resident inspectors (RI) in the control room are mainly related to the following areas:

- Review of plant configuration: Alarm status, alignment equipment, indicators and verification records, etc.
- Review of data record: Control room logs, test results, work orders, etc.
- Review risk monitor: In order to verify that risk management is being taken into account in the maintenance.
- Verification that performed tasks, works and the results are in accordance with the established procedures.
- Check leak monitoring in the reactor coolant system.
- Meetings with the licensee to be informed of the routine operational incidents.
- To be present during non-routine operations: Start-up and Shutdown of the plant, components alignments, transient response, etc.

To carry out these inspections, the RI has one of a number of complementary procedures.

The CSN procedure PT.IV.221 “Plant status and monitoring of activities” include visits to the Control Room. The main purpose of these visits is to be informed of the status of the plant as well as identify unexpected conditions that guarantee additional inspection under the inspection base program. Within the activities of inspection, this monitoring will aim to gather information to assess the state of systems important to safety such as:

- Oversight the status of valves, pumps and other SSCs and its alignments, as well as alarms through direct observation of control room panels and check the parameters of the plant, indicators, and recorders and auxiliary computer (SPDS).
- Identify SSCs that are in unexpected configurations as well as parameter that are not expected under the operation mode of the plant. Also, check whether there are adverse trends in plant parameters and the Licensee is aware of these trends. Identify whether the plant meets the limit conditions of operation (LCO) of the Technical Specifications (TS), and whether the actions, licensing requirements and conditions of the TS are being met. Determine whether the plant is operating with multiple or repetitive, or unplanned TS actions, and whether Licensees are assessing and managing risk in accordance with the procedure “Risk assessments of activities maintenance and control of emerging work” and verify also that degraded conditions of SSCs are incorporated into the corrective action plan.
- Verify that the licensee is operating within licensed power levels.
- Control radiation monitors and other indicators which might provide information on the radiological status of the Central.
- Review the control room logs, SSCs out of service or clearance logs, inoperable systems, chemistry data, work orders, planned or not, of different shifts, operation of equipment and thermal power, several times a week, to be informed of potentially significant problems for the risk that may arise regarding the previous revision. Determine whether the logs appropriately reflect the plant status by observing the control panels and TS are being met.
- Verify that plant operations are performed in accordance with procedures and assess the degree of skill and training of operators in the use of procedures.

On the other hand the CSN procedure PT.IV.212. “Performance of operators during the evolution of non-routine events and incidents” is set to inspect the systematic performance of licensed personnel (supervisors and operators) during the evolution of events and incidents. The main aim is to identify the contribution of human factors to the risk of the plant during actions putted in place after initiating events. With this objective in establishing the performance of the following inspection activities:

- Observe shift operation dealing with incidents, events and transients. To the extent that conditions permit, this observation will be encouraged to be direct. The samples selected for review must include some non-routine scheduled activity. Assess the initiating causes of unplanned activities and the contribution of individual staff errors in these activities.
- Review those incidents where actions of staff have been identified as the initiating cause of the event.
- Review the response of licensed personnel and their contribution to reactor trips that require a response higher than expected or that may involve errors of licensed personnel.

In addition the unannounced inspections procedure sets the systematic follow to carry out unannounced inspections and outside working hours. The nature of these inspections will require staff of the plant does not have prior knowledge of its implementation, so that it will be carried out without any prior communication to the NPP staff.

- b. Describe how you assess human performance in the control room
- i. *Does the operator have guidance for expected behaviour of control room operators (other than operating procedures)? If so, describe your inspection activities in this area.*
 - ii. *Do operators have strict requirements for whom and how many people are in the control room at any given time?*
 - iii. *Do you evaluate shift turnover?*

The CSN Inspection Manual for Resident inspectors in NPPs indicates to observe, eventually, during walk downs, control room shifts.

- iv. *Do you inspect operational activities outside of the control room (e.g., accompany auxiliary operators on their rounds)?*

The CSN procedure “Alignment Equipment” defines the systematic to be follow in conducting the inspection of components alignment. With a frequency of three times of each calendar quarter, check the alignment of a system/redundant train significant for safety, or a system/train significant risk that has been recently realigned after a period of inactivity such as an outage, maintenance, modification or testing.

The procedure “Surveillance Testing” defines the routine to be followed by inspectors to carry out inspections of monitoring testing requirements. The sample to be inspected includes the verification that operating and engineering personnel have knowledge of the impact of tests on the safety of the plant, that the tests were performed in accordance with applicable written procedure and the sequence as established, and that after completing the tests, that the equipment is returned to the position/condition required to perform its safety function.

- c. How do you inspect the control room operator’s performance?
- i. *Normal operations*
 - ii. *Outage operations*
 - iii. *Unplanned and infrequent events (e.g., plant trips, Loss of safety equipment, etc.)*

The inspections related to activities of licensed personnel in the control room are made based on the procedures related in previous questions.

- d. How does the regulatory body ensure that inspectors do not unduly interfere with or distract operators during normal operation and unplanned and infrequent events?
- i. *Do you have training and written guidance for the inspectors?*
 - ii. *Does the operator discuss its expectations with the inspectors?*

Although there is no training program established for this purpose, this is one of the topics more discussed during meetings of RI. At these meetings there are guidelines to ensure that the inspector should be able to obtain maximum information from the control room with the least possible interference. For this, the inspector should plan their inspections trying to resolve his doubts in advance to the realization of the activity being inspected, or after the same has been made. Also resident inspectors should not access consoles in the surrounding area of the control room without first having requesting permission from the shift manager. During transients and tests the RI must remain at a distance that allows the operating shift to manage the incident but also enable the inspectors to evaluate the actions of the shift staff.

Experience has shown that this is a difficult issue, the relationship and interaction inspector to the inspected is strongly conditioned by two factors: The first is the character and empathy of the people who interact. The second is the result of the inspection, no problem when the outcomes are good but when there is some mistakes, the operator try to blame the RI.

The following two questions are background questions to assist the Workshop participants in understanding the regulatory and inspection requirements associated with operator licensing.

2. Control room operator initial training and qualification

- a. Does the operator have a programme to train and qualify control room operators? If “yes”, is the programme approved by the Regulatory Body (RB)?

Yes, all control room operators must follow a training and qualification program that is supervised by the regulator. The CSN imposes an instruction that contains the basis of that program.

Technicians working in the control room are divided between operators and supervisors (senior operator). In both cases it requires a university degree. The operator may not have previous experience and must pass a thirty-month process of formation, while the supervisor has to have three years experience as an operator and overcome, in addition, a training program for 10 months.

Operators and control room supervisors must be licensed by the CSN. The evaluation of the CSN to grant such license is held by tests with questions, performance in the simulator and plant performance

- b. Briefly describe the operator’s initial qualification process.

- i. *What types of operational scenarios are included in the training (e.g., are Emergency Operating Procedures and Severe Accident Mitigation Guidelines included, are administrative procedures included)?*

The training includes all types of scenarios, normal operation, emergency operation and severe accident.

- ii. *Length of simulator training?*

240 hours for the operator and 100 for the supervisor.

- iii. *Length of course work?*

The operator license applicants must perform a minimum of 2 400 hours of specific training and applicant supervisors about 1 000 hours.

- iv. *Length of on-the-job training?*

Training in the workplace is about 1 200 hours for the candidate of operator and 500 hours for the candidate of supervisor, always under the supervision and tutelage of person licensed by the CSN as operator or supervisor.

- v. *Is there a minimum level of education required to become a control room operator?*

University degree

- c. What role does the RB have in the process (e.g., do the inspectors observe portions of the training, who issues the license or authorization to the operator)?

The CSN examination board of licenses reviews all training program and requires all candidates the approval of the examination developed by the examination board to obtain the licenses granted by the RB.

3. **Control room operator requalification and refresher training.**

- a. Does the operator have a programme to maintain and requalify control room operators? If “yes”, is the programme approved by the RB?

CSN requires by means of a safety instruction the obligation to maintain the qualification of control room operators and supervisors during the validity period of the license.

Licensee maintains a continuous training program that annually evaluates the operators and supervisors, about 100 hours of training via courses or seminars and 40 hours of training in the simulator, and CSN inspects the entire process, including performance on the simulator, once every two years.

- b. What role does the RB have in the requalification process (e.g., do the inspectors observe portions of the training)?

The answer is included in the above questions.

Operators and supervisors must renew their license every six years.

- c. Is there anything else you would like to learn from or discuss from this Workshop Session?

SWEDEN

1. Field observations

- a. Does your RB perform field observations and inspections during control room operations?

Yes.

- i. *If not, how does your RB get confidence that the plant is being operated safely?*
- ii. *If “yes”, what is included in the inspections?*

Field observations are, to certain degree, performed during normal operations and outages. In these cases samples of documentation are taken, teamwork and communication is observed, operators are interviewed. Systematic inspections are performed of licensee systems for training and qualification, samples are taken from different stages of the process.

- b. Describe how your RB assesses human performance in the control room.

See below. Assessment of performance is based on inspection of documentation and through interviews. No systematic assessment of “live” performance, teamwork is observed regarding communication, control room climate etc. Samples of “house keeping”, timeliness of instructions, shift turnover etc. Expected performance is based on inspection of documentation

- i. *Does the operator have guidance for expected behaviour of control room operators (other than operating procedures)? If so, describe your RB’s inspection activities in this area.*

The operators strive to maintain a good operator workmanship, including teamwork, communication, use of instructions and documentation, leadership etc.

- ii. *Do operators have strict requirements for whom and how many people are in the control room at any given time?*

Yes, the licensees have validated analyses of minimum control room staffing. Typically three persons (four in PWR), of whom at least one must be a reactor operator with immediate overview of the instrumentation (also, 2-3 field technicians). Generally, Swedish licensees are not required to validate the minimum control room staff. However, the licensees are required to base their needs on a systematic method based on task analysis. The licensees have provided an updated and validated analysis on the minimum shift complement for control room staff. The minimum staff level must be documented in the SAR, the RB must be informed in advance of changes in the SAR.

For emergency preparedness, individuals should be appointed by name and should have received training and should have participated in exercises for the emergency preparedness tasks. Swedish licensees are required to use a systematic method to ensure the availability of personnel with adequate competence. The method should be based on task analysis and include evaluation of training. RB inspects how the licensees comply with their demands.

- iii. *Does your RB evaluate shift turnover?*

Not systematically. RB sometimes observe the shift turnover.

- iv. *Does your RB inspect operational activities outside of the control room (e.g., accompany auxiliary operators on their rounds)?*

No.

- c. How does your RB inspect the control room operator’s performance?

- i. *Normal operations*

Yes, see above.

- ii. *Outage operations*

Yes, see above.

iii. *Unplanned and infrequent events (e.g., plant trips, loss of safety equipment, etc.)*

Not systematically. Sweden does not have resident inspectors. In some cases RB launches a rapid inspection team to gather independent information.

d. How do inspectors ensure that they do not interfere with or distract operators during normal operation and unplanned and infrequent events?

Inspectors ask if it is ok and then the inspectors “keep out of the way”, waiting for a good opportunity to ask questions.

i. *Does your RB have written guidance for the inspectors?*

No, not for behaviour in control room. However, an established praxis (see above) is taught through “on the job training”.

ii. *Does the operator discuss its expectations with the inspectors?*

Expectations of inspection? No. In Sweden the RB do not license operators (see below).

2. **Control room operator initial training and qualification**

a. Does the operator have a programme to train and qualify control room operators?

Yes.

If “yes”, is the programme approved by the RB?

No, not per se. In Sweden the RB does not license operators.

SSM (Swedish regulatory authority) does not have specific requirements regarding staffing levels. However, the licensees are required to have an organisation with adequate financial and human resources that is designed to maintain safety. SSM requires the licensees to have systems and procedures in place to identify, define, and fill the need. The licensees are required to consider all operating conditions into consideration that are relevant for each task respectively.

The safety analysis report (SAR) shall contain a description of the principles for facility staffing, as well as the system for training of personnel with tasks of importance for safety in the nuclear activity. In order to ensure that the conditions reported or assumed in the safety report are maintained at the facility, the Operational Limits and Conditions shall contain a specification of the staffing necessary to ensure safe operation during different operational states.

Concerning emergency preparedness, individuals in the organisation should be appointed by name and should have received training and should have participated in exercises for the emergency preparedness tasks. Furthermore, for each task, a number of back-up personnel should exist to ensure that personnel is always available and to ensure that the necessary endurance is ensured in connection with lengthy accident sequences.

b. Briefly describe the operator’s initial qualification process.

Typically, first working as a field operator for at least two years. Then attending a course for turbine operators, approx. 100 days plus working alongside an experienced operator until assessed competent. For reactor operator, work as turbine operator and another 100 days education, plus working alongside etc.

i. *What types of operational scenarios are included in the training (e.g., are EOPs and SAMGs included, are administrative procedures included)?*

Licensees are required to develop their training programmes following SAT. EOPs, SAMGs and administrative procedures important for safety should be included. (see below for re-training/qualification).

ii. *Length of simulator training?*

Depends on role, reactor, turbine, supervisor, see above

iii. *Length of course work?*

Depends on role, reactor, turbine, supervisor, see above

iv. *Length of on-the-job training?*

Depends on role, reactor, turbine, supervisor, see above. Typically, at least one shift period (20 days).

v. *Is there a minimum level of education required to become a control room operator?*

Yes, equal to a standard qualification for admission into a university engineering programme.

c. What role does the RB have in the process (e.g., do the inspectors observe portions of the training, who issues the license or authorization to the operator)?

None, no

3. **Control room operator requalification and refresher training**

a. Does the operator have a programme to maintain and re-qualify control room operators?

Yes.

If “yes”, is the programme approved by the RB?

No, not per se. In Sweden the RB do not license operators. SSM do however set up some rules for the licensees to follow regarding retraining and requalifying control room operators. These include handling of abnormal operating events and accidents; fire and threat; emergency preparedness training; co-operation, management and communication; technical and organisational modifications; modifications of documentation and procedures; refresher courses regarding facility design and operating characteristics. The retraining should involve a minimum of ten days per year, of which five days using a full-scale simulator.

b. What role does the RB have in the requalification process (e.g., do the inspectors observe portions of the training)?

No, seldom.

SWITZERLAND

1. Field observations

- a. Do you perform field observations and inspections during control room operations?

Yes.

- i. *If not, how do you get confidence that the plant is being operated safely?*
ii. *If “yes”, what is included in the inspections?*

The inspections include staffing, entries into the log, housekeeping, tag-out, shift-turnover, etc.

- b. Describe how you assess human performance in the control room

- i. *Does the operator have guidance for expected behaviour of control room operators (other than operating procedures)? If so, describe your inspection activities in this area.*

Yes, each plant has developed a small booklet which is handed out to each operator. This booklet defines expected behaviour on e.g. communication, pre- and post-job briefing, safety oriented behaviour (e.g. STAR), etc. The observed behaviour is part of the annual evaluation of the individuals. This evaluation is part of the regular requalification process. ENSI does not assess the human performance of individuals in its inspections. However, it has insight in the evaluations and inspects the evaluation process of the plant.

- ii. *Do operators have strict requirements for whom and how many people are in the control room at any given time?*

For certain critical actions: Yes.

- iii. *Do you evaluate shift turnover?*

Yes.

- iv. *Do you inspect operational activities outside of the control room (e.g., accompany auxiliary operators on their rounds)?*

Not on a regular base.

- c. How do you inspect the control room operator’s performance?

- i. Normal operations.

No.

- ii. Outage operations

No.

- iii. Unplanned and infrequent events (e.g., plant trips, Loss of safety equipment, etc.)

Mainly based on the basis of reportable events.

- d. How does the regulatory body ensure that inspectors do not unduly interfere with or distract operators during normal operation and unplanned and infrequent events?

- iv. Do you have training and written guidance for the inspectors?

Inspection is a formal process described in ENSI Management Handbook. ENSI has a formal inspection training programme for new inspectors. The technical aspects of the inspection are acquired by an on-the-job training.

- v. Does the operator discuss its expectations with the inspectors?

Yes.

The following two questions are background questions to assist the workshop participants in understanding the regulatory and inspection requirements associated with operator licensing.

2. Control room operator initial training and qualification

- a. Does the operator have a programme to train and qualify control room operators? If “yes”, is the programme approved by the Regulatory Body (RB)?

The content of the programme is described in an ordinance on the qualification of NPP personnel and in a regulatory guideline on training and qualification.

- b. Briefly describe the operator’s initial qualification process

i. *What types of operational scenarios are included in the training (e.g., are Emergency Operating Procedures and Severe Accident Mitigation Guidelines included, are administrative procedures included)?*

All.

ii. *Length of simulator training?*

Basic training: 5-10 weeks, retraining ca. 10 days/year;

iii. *Length of course work?*

Basic course: 15-20 weeks, retraining ca. 1-2 weeks;

iv. *Length of on-the-job training?*

Ca. 7 – 15 weeks.

v. *Is there a minimum level of education required to become a control room operator?*

Yes. The minimum is a successful (exam) completion of a vocational training in a technical area according to the requirements of the Federal Office for Professional Education and Technology (OPET). In addition the plants require an additional exam as Plant Operator (also according the OPET requirements) before they are allowed to start the basic training for reactor operator. After an additional education of 54 weeks in reactor physics, thermodynamics, electrical and mechanical engineering, chemistry, NPP safety completed with an exam gives the basis for the plant-internal training in components, systems and transients.

- c. What role does the RB have in the process (e.g., do the inspectors observe portions of the training, who issues the license or authorization to the operator)?

ENSI does regular inspections of the annual training programme. Additional inspections are focused on specific subjects, e.g. qualification of the trainers, requalification process, initial and continuing training of shift supervisors, etc. After completion of the initial training as control room operator, shift supervisor or pikett-engineer (safety engineer) the license is issued after successful completion of an exam (interview and simulator demonstration). ENSI is part of the examination expert group and a license requires the approval of the ENSI delegates.

3. Control room operator requalification and refresher training

- a. Does the operator have a programme to maintain and requalify control room operators? If “yes”, is the programme approved by the RB?

There is no formal approval. However the programme is inspected annually. In certain intervals, ENSI also inspects the plants internal requalification process.

- b. What role does the RB have in the requalification process (e.g., do the inspectors observe portions of the training)

In certain intervals, training is inspected. The focus of the inspection is on the qualification of the instructors. ENSI, in certain intervals, has insight into the requalification data of licensed personnel.

UNITED KINGDOM

1. Field observations

a. Does your RB perform field observations and inspections during control room operations?

- i. *If not, how does your RB get confidence that the plant is being operated safely?*
- ii. *If “yes”, what is included in the inspections?*

ONR (UK regulatory authority) does not have any written guidance to inspectors regarding the inspection of control room operations, but routine observation of activities in the main/central control room are carried out by ONR inspectors during site visits. These observations would typically include: shift handover, shift briefings and unannounced visits during normal operation, plant manoeuvres and outage. Field observations of control room operations are also incorporated into inspections to check on plant operation within safe limits, availability and line-up. Assessment of the control room team performance during emergency exercise scenarios on the simulator is also undertaken as part of ONR assessment of the overall emergency preparedness

b. Describe how your RB assesses human performance in the control room.

- i. *Does the operator have guidance for expected behaviour of control room operators (other than operating procedures)? If so, describe your RB's inspection activities in this area.*

Nuclear power plant operators in the UK have written arrangements that set out the standards and expectations of operational staff necessary to ensure safety. These standards include:

- Maintenance of the plant within safety limits.
- Reactivity management.
- Command and control.
- Roles and responsibilities of control room staff.
- Use of human performance error prevention tools.
- Record keeping.
- Safety culture.

The nuclear power plant operator's arrangements for control room operations are used by ONR inspectors during observations to check that the required standards are being met. The Operators Conduct of Operations arrangements reflect international operators best practice.

- ii. *Do operators have strict requirements for whom and how many people are in the control room at any given time?*

Yes. Each nuclear power plant will define their minimum manning arrangements for safe compliant operation and to ensure that they can meet the claims in the safety case for operator actions in the event of plant faults and also that the requirements of the emergency scheme are met at all times. The normal control room complement is 3 and for twin reactor desks best practice is to have a 4th trained person available to assist when required. Minimum shift manning levels are dictated by the emergency scheme.

- iii. *Does your RB evaluate shift turnover?*

There is no written guidance to ONR inspectors regarding the evaluation of shift handover and briefing, but this process would be inspected on a sample basis.

- iv. *Does your RB inspect operational activities outside of the control room (e.g., accompany auxiliary operators on their rounds)?*

Yes. ONR inspectors occasionally accompany plant operators on their rounds on a sample basis.

c. How does your RB inspect the control room operator's performance?

- i. *Normal operations*
- ii. *Outage operations*
- iii. *Unplanned and infrequent events (e.g., plant trips, loss of safety equipment, etc.)*

ONR inspectors do not assess the competence of nuclear power plant staff directly, or authorize control room operators. ONR's approach is to seek confidence that suitable arrangements for the training and competence assurance of operators has been put in place and implemented.

Confidence in the competence of operators is gained from the observation of initial and refresher simulator training exercises. ONR inspectors focus on the quality and coverage of the training and the degree of challenge provided by training staff. ONR Human Factors specialists also inspect training and simulator work on a sample basis.

d. How do inspectors ensure that they do not interfere with or distract operators during normal operation and unplanned and infrequent events?

- i. *Does your RB have written guidance for the inspectors?*
- ii. *Does the operator discuss its expectations with the inspectors?*

ONR inspectors do not have any written guidance regarding the distraction of control room operators. Only experienced ONR inspectors are likely to enter the control room unaccompanied and would be acutely aware of the need to avoid interference.

It would be usual for ONR inspectors to request permission to enter the control room and to receive a briefing from the control room supervisor regarding expectations and behaviours, which would be complied with.

The following two questions are background questions to assist the Workshop participants in understanding the regulatory and inspection requirements associated with operator licensing.

2. Control room operator initial training and qualification

a. Does the operator have a programme to train and qualify control room operators? If "yes", is the programme approved by the RB?

Nuclear power plant operators in the UK have detailed training programmes in place to train and qualify control room operators. The programme is not approved by ONR, but the largest power plant operator in the UK has had its training programme for control room operators accredited by an independent body.

b. Briefly describe the operator's initial qualification process.

- i. *What types of operational scenarios are included in the training (e.g., are EOPs and SAMGs included, are administrative procedures included)?*
- ii. *Length of simulator training?*
- iii. *Length of course work?*
- iv. *Length of on-the-job training?*
- v. *Is there a minimum level of education required to become a control room operator?*

It is for the nuclear power plant operator to define the training and experience requirements for reactor operators and for implementing a suitable process for authorisation. A typical UK reactor desk operator training programme is as follows:

- Induction.
- Generic fundamentals.
- Operations fundamentals.
- Plant systems training.
- Fault studies and Technical Specifications.

- Simulator training (unit start-up, normal operations, plant transients, abnormal and emergency operations).
- On job training and performance evaluation.
- Examination, including simulator assessments.
- Authorisation.

Timescales to complete the training may be modified to meet the needs of individual trainees, but the programme is typically completed within 50-70 weeks. Trainees are qualified to at least Higher National Certificate, but are normally qualified to degree level.

- c. What role does the RB have in the process (e.g., do the inspectors observe portions of the training, who issues the license or authorization to the operator)?

ONR inspectors will observe portions of the training programme on a sample basis.

Nuclear power plant operators in the UK are required to put in place arrangements for the appointment of so-called Duly Authorized Persons (DAPs) where they may be in control of operations that have a direct impact on the safety envelope. For the largest power plant operator in the UK such posts include reactor control room operators, control room supervisors, fuel route team leader and shift manager. ONR inspectors will confirm that suitable arrangements for the appointment of DAPs are in place and implemented. This would include sample inspection of control room operator authorisation interviews.

3. **Control room operator requalification and refresher training**

- a. Does the operator have a programme to maintain and re-qualify control room operators? If “yes”, is the programme approved by the RB?

Yes. UK NPP operators have arrangements to re-authorize control room operators. The continuing training programme and re-authorisation process is not approved by ONR.

- b. What role does the RB have in the requalification process (e.g., do the inspectors observe portions of the training)?

ONR inspectors will observe portions of the training programme on a sample basis.

USA

1. Field observations

- a. Do you perform field observations and inspections during control room operations?

Yes

- i. *If not, how do you get confidence that the plant is being operated safely?*
 ii. *If “yes”, what is included in the inspections?*

Inspectors can use one of several Inspection Procedures to inspect various aspects of control room operations (IP 71111.11, Requalification Inspection, looks at control room operations for “conduct of operations” mainly during plant operation; IP 71111.20, Refueling and Other Outage Activities, looks at control room operations during Mid-Loop operations and other outage related evolutions; IP 71715, Sustained Control Room and Plant Observations, looks at all aspects of control room operations such as turnover, procedure use, environment, communications, etc; and, IMC 2515, Appendix D, Plant Status, provides some guidance for control room observations and fatigue management.

- b. Describe how you assess human performance in the control room

- i. *Does the operator have guidance for expected behaviour of control room operators (other than operating procedures)? If so, describe your inspection activities in this area.*

Licensees typically have a “Conduct of Operations” procedure that describes operator responsibilities and expectations. Additionally, guidance may also be found in “night orders” or “special maneuvers” which the licensed operators are required to be familiar with and typically initial in the logs during turnover that they have reviewed since the last time on shift. Inspection activities verify that the licensed operators are adhering to these procedures and guidance.

- ii. *Do operators have strict requirements for whom and how many people are in the control room at any given time?*

10 CFR 50.54.m delineates the minimum staffing for the control room and site. Individual Technical Specifications may require additional personnel (such as a Balance of Plant Operator) to be on-shift and this could be due to Appendix R or Control Room Evacuation requirements. Typically, there is not a specific limit on the number of personnel allowed in the control room, this is left up to the person with “Command and Control” authority to determine if the number of personnel in the control room is becoming a distraction. That is why most licensees now conduct “crew briefings” outside the control room and have instituted the “Work Control” station that is supervised by a Senior Reactor Operator. Additionally, I have seen some licensees that have performed a “habitability study” that does provide a limit for “sustained” operation at higher staff levels, but this is usually in the FSAR.

- iii. *Do you evaluate shift turnover?*

Yes. IP 71715 provides specific guidance to ensure that appropriate information is transferred between shifts. Additionally, the plant specific “Conduct of Operations” procedures contain guidance for proper turnovers for any shift positions.

- iv. *Do you inspect operational activities outside of the control room (e.g., accompany auxiliary operators on their rounds)?*

Yes, there are several inspection procedures such as IP 71111.20 and IP 71111.22, Surveillance Testing that require inspectors to be cognizant of and observe actions in the plant. Additionally, IMC 2515, Appendix D, Plant Status contains specific guidance for inspectors to accompany operators on rounds.

c. How do you inspect the control room operator's performance?

i. *Normal operations*

IP 71111.11 for quarterly control room observation.

IP 71715 for sustained control room observations.

IMC 2515, Appendix D for Plant Status.

ii. *Outage operations*

IP 71111.20 for all outage related activities.

IMC 2515, Appendix D for Plant Status.

IP 71111.11 for biennial requalification inspection or quarterly control room observation.

iii. *Unplanned and infrequent events (e.g., plant trips, Loss of safety equipment, etc.)*

IP 71111.11 for quarterly control room observation.

IP 71153, Follow Up of Events and Notices of Enforcement Discretion.

d. How does the regulatory body ensure that inspectors do not unduly interfere with or distract operators during normal operation and unplanned and infrequent events?

Training is provided to inspectors to be cognizant of how they interact with licensees during normal and abnormal operations.

i. *Do you have training and written guidance for the inspectors?*

Some inspection procedures provide specific guidance regarding interactions with the licensee during abnormal conditions, e.g., IP 71111.11 states "inspectors shall refrain from interfering with the performance of the licensed operators being observed unless interference is warranted due to a significant safety concern."

ii. *Does the operator discuss its expectations with the inspectors?*

Yes, once again some inspection procedures provide specific guidance for discussing observations from the inspector, e.g., IP 71111.11 states "Regarding licensed operator performance, the inspector should, in particular, comment on the licensed operators' adherence to plant procedures, including adherence to the licensees' conduct of operations procedures and policies."

The following two questions are background questions to assist the Workshop participants in understanding the regulatory and inspection requirements associated with operator licensing.

2. Control room operator initial training and qualification

a. Does the operator have a programme to train and qualify control room operators? If "yes", is the programme approved by the Regulatory Body (RB)?

Yes, all licensees have a program to train control room operators. All US plants use the Systems Approach to Training (SAT) to develop the content of the operator license training program. The NRC does not specifically approve each licensees SAT program but the NRC endorses or allows this through 10 CFR 55.31 as long as the licensee certifies that the individual has completed this training and there is a need for the license.

b. Briefly describe the operator's initial qualification process

i. *What types of operational scenarios are included in the training (e.g., are Emergency Operating Procedures and Severe Accident Mitigation Guidelines included, are administrative procedures included)?*

10 CFR 55.41 describes requirements for the Reactor Operator written exam.

10 CFR 55.43 describes requirements for the Senior Operator written exam.

10 CFR 55.45 describes requirements for the Operating Test for operators.

Operators are trained on evolutions that support reactor startup, shutdown, normal operations, abnormal operations, and emergency operations.

Severe Accident mitigation is not a requirement to be tested on but may be in each licensee's procedures and training program so that the operators are exposed to it.

ii. *Length of simulator training?*

For a Reactor Operator or Instant Senior Operator the average training across the industry is anywhere from 18 to 24 months in length. Reactor Operators that are applying for an Upgrade to Senior Operator are typically allowed to skip the systems portion of the training program and enter at a point to be integrated as a crew member so their training may only take a year or less.

iii. *Length of course work?*

On the average the systems portion of the training lasts approximately 12 weeks.

iv. *Length of on-the-job training?*

On the average the OJT portion, or on-shift time, normally runs for 12 weeks. Some licensees place the operators on shift for 3 weeks and then in the simulator for 3 weeks and rotate in this fashion to gain experience operating as a crew.

v. *Is there a minimum level of education required to become a control room operator?*

Yes, the minimum level of education for obtaining an Operator or Senior Operator license is a High School Diploma or GED. But there are additional requirements such as Power Plant Experience, on-site time, and time performing plant operational duties. These requirements are specified in ACAD 10-001, Guidelines for Initial Training and Qualification of Licensed Operators and ANSI/ANS-3.1, 1993, American National Standard for Selection, Qualification, and Training of Personnel for Nuclear Power Plants.

c. What role does the RB have in the process (e.g., do the inspectors observe portions of the training, who issues the license or authorisation to the operator)?

For Initial Operator Licenses, the licensee is allowed to develop and administer the written exam but the NRC must approve and grade the exam. The Operating portion of the examination (simulator scenarios and JPMs) may be developed by the licensee but the NRC administers and grades the operating test. It is expected that the NRC will develop one entire exam in each Region at least once a year to maintain NRC proficiency in this area. The NRC is responsible for issuing all Operator or Senior Operator Licenses.

3. **Control room operator requalification and refresher training**

a. Does the operator have a programme to maintain and requalify control room operators? If "yes", is the programme approved by the RB?

Yes, 10 CFR 55.59 requires all licensing to have a requalification program which must be implemented over a 2 year period. The training is followed by a comprehensive written examination (given once every 2 years) to each operator. Additionally, an annual operating test is administered to each operator consisting of individual JPMs and crew simulator examinations. The program is not specifically approved by the NRC but the licensees are allowed by 10 CFR 55.59 to use a SAT based program for training content and examinations.

b. What role does the RB have in the requalification process (e.g., do the inspectors observe portions of the training)?

For Requalification annual operating test and biannual written examination, the licensee is allowed to develop, administer and grade all portions of the examination in accordance with the SAT process. The NRC monitors this process on a biennial basis in accordance with IP 7111.11. Additionally, the Resident Inspector observes Requalification Training on a quarterly basis, usually watching a scenario, and documents this in the quarterly inspection report. If there are major problems associated with the Training and Qualification of Licensed Operators then the NRC could implement IP 41500, Training and Qualification Effectiveness, to determine if the training program is adequate.

- c. Is there anything else you would like to learn from or discuss from this Workshop Session?

I would mention that steps are being taken to incorporate Severe Accident Mitigation and Beyond Design Basis Mitigation into the regulations and we are working with the Owners' Groups for the various reactors, along with NEI, to provide the best options.

TOPIC 3.
EXPERIENCE FROM THE INSPECTION OF LICENSEE'S OVERSIGHT OF CONTRACTORS

Introduction

A part of the Regulatory Body's activities should be devoted to the inspection of the licensee's oversight of contractors. Some commendable practices in this field were identified during the 8th WGIP Workshop, under the topic of Inspection of Interactions Between the Licensee and its Contractors, which took place in Toronto in 2006 (NEA/CNRA/R(2007)1 and 2). Changes in the nuclear industry sector, including the availability of nuclear expertise, the expansion of the international supply market and the introduction of new technologies have tended to increase the licensee's use of contracted services. These changes have created new or increased challenges for licensees and regulators related to the retention of nuclear expertise, the effective management of the interfaces between the licensees and contractors, and the oversight of contractor manufacturing quality in the context of greater multinational diversity.

Aware of these challenges, the CNRA recently published a regulatory guidance (green) booklet on The Regulator's Role in Assessing the Licensee's Oversight of Vendor and Other Contracted Services [NEA/CNRA/R(2011)4]. This booklet includes a check list of items that should be considered by a Regulatory Body when inspecting this topic. The objective of this workshop for this task is to identify possible new or updated commendable practices related with licensee's oversight of contractors.

Survey Questions

Notes: Only one response per country is required. If more than one person from your country is participating, please co-ordinate the responses accordingly. Submittals should be sent by email to: diane.jackson@oecd.org by Wednesday, 29 February 2012

Foreword

A part of the Regulatory Body's (RB) activities should be devoted to the inspection of the licensee's oversight of contractors. Some commendable practices in this field were identified during the 8th WGIP Workshop, under the topic of Inspection of Interactions Between the Licensee and its Contractors, which took place in Toronto in 2006 [NEA/CNRA/R(2007)1 and (2007)2]. Changes in the nuclear industry sector, including the availability of nuclear expertise, the expansion of the international supply market and the introduction of new technologies have tended to increase the licensee's use of contracted services. These changes have created new or increased challenges for licensees and regulators related to the retention of nuclear expertise, the effective management of the interfaces between the licensees and contractors, and the oversight of contractor manufacturing quality in the context of greater multinational diversity. Aware of these challenges, the CNRA recently published a regulatory guidance (green) booklet on The Regulator's Role in Assessing the Licensee's Oversight of Vendor and Other Contracted Services [NEA/CNRA/R(2011)4]. This booklet includes a check list of items that should be considered by a Regulatory Body when inspecting this topic. The objective of this workshop for this task is to identify possible new or updated commendable practices related with licensee's oversight of contractors.

Questionnaire

For preparation of the workshop, participants are invited to supply their national inspection approaches used according to the following questionnaire:

1. What is your regulatory framework for inspecting the licensee's oversight of contractors (short answer)?
2. Does the licensee use independent inspection agency to assist him in oversight of contractors? Does your RB perform an oversight of this use?
3. Does your RB certify contractors who may work in your country? Does the licensee certify contractors?

4. How does your RB inspect the interfaces between licensee and contractors?
 - a. As a part of inspections on licensee's (Safety) Management System?
 - b. The licensee's processes for selection of contractors (including periodic assessment and follow up of improvements, if needed)?
 - c. The licensee's processes for supervising contractors services?
 - d. The products and the works performed by contractors?
 - e. The retention of contractor's safety related information?
 - f. other?
5. Performance of inspections
 - a. What type of inspections does your RB carry out to verify the results of the licensee's oversight of contractors?
 - b. Does your RB visit contractors or vendor-manufacturers sites? If not, why not? If "yes", what are the main topics you inspect and what are the main benefits you gain?
 - c. Does your RB have the authority to inspect the contractors and subcontractors of licensees? If not, does the licensee have provisions in the contract allowing RB access to contractors and subcontractors premises?
 - d. Does your RB cooperate with other RB for oversight of foreign contractors (reliance on inspections conducted by other RB's, sharing of inspection findings and lessons learnt)?
 - e. Does your RB visit the contractor as an observer of the licensee's inspection or for direct inspection?
 - f. If your RB witnesses activities by contractors, does the RB carry this out systematically following any specific trend or other methods?
 - g. What areas do you actually inspect (e.g., QA, test results, documentation, subcontractor cascade oversight,)?
 - h. How does your RB ensure that the licensee has enough in-house competence to supervise the works/services done by contractors, and that they actually perform that supervision?
 - i. Does your RB inspect licensee's safety performance indicators for the oversight of contractor performance?
6. What problems or trends have you seen in the licensee's use of contractors (e.g., quality of documents, quality of work)? Were they informed by safety performance indicators?
7. Does the licensee include their findings on contractor's performance in their corrective actions process? Does your RB include your inspection findings in your corrective action process?
8. Incidents and events
 - a. What trends has your RB noticed in the incidents / events attributed to the use of contractors?
 - b. How did your RB respond?
9. What does your RB do to make sure that safety related recommendations by contractors (e.g., maintenance programme, experience feedback, such as boiler replacement) are assessed and implemented by licensee if necessary?
10. Are there any other related topics, which you would like to be discussed during the breakout session?

BELGIUM

1. What is your regulatory framework for inspecting the licensee's oversight of contractors (short answer)?

Except for pressure vessels, there is no regulatory framework to support the inspections of contractors.

2. Does the licensee use independent inspection agency to assist him in oversight of contractors? Does your RB perform an oversight of this use?

Yes, in the frame of the application of ASME code.

RB does not perform a direct oversight of this use.

3. Does your RB certify contractors who may work in your country? Does the licensee certify contractors?

RB does not certify contractors. A process has been developed by licensee to certify contractors. This process has been assessed by RB.

4. How does your RB inspect the interfaces between licensee and contractors?

a. *As a part of inspections on licensee's (Safety) Management System?*

Yes.

b. *The licensee's processes for selection of contractors (including periodic assessment and follow up of improvements, if needed)?*

Yes.

c. *The licensee's processes for supervising contractors services?*

Yes.

d. *The products and the works performed by contractors?*

Not specifically.

e. *The retention of contractor's safety related information?*

Not specifically.

f. *Other?*

5. Performance of inspections

a. *What type of inspections does your RB carry out to verify the results of the licensee's oversight of contractors?*

RB performs specific inspections on the processes developed by licensee in order to oversight the use of contractors.

Moreover, RB performs general inspections on the licensee's ability to safely operate its installation (thus including the activities performed by contractors). This gives an opportunity to detect deviations or lacks that could be imputed to contracted activities. The results are used as input for the above mentioned inspections.

b. *Does your RB visit contractors or vendor-manufacturers sites? If not, why not? If "yes", what are the main topics you inspect and what are the main benefits you gain?*

No in most cases. RB sometimes visits manufacturer sites for some specific projects or activities (for instance attendance to qualification tests of new equipments or repairing methods).

c. *Does your RB have the authority to inspect the contractors and subcontractors of licensees? If not, does the licensee have provisions in the contract allowing RB access to contractors and subcontractors premises?*

No.

d. *Does your RB cooperate with other RB for oversight of foreign contractors (reliance on inspections conducted by other RB's, sharing of inspection findings and lessons learnt)?*

No.

e. *Does your RB visit the contractor as an observer of the licensee's inspection or for direct inspection?*

In some cases, licensee invites RB to contractor premises to observe some specific activities. RB then performs an inspection of both the contractor and the ability of licensee to oversight the contractor. In the NPP, RB inspects work performed by contractors the same way and with same criteria as for works performed by licensee itself.

f. *If your RB witnesses activities by contractors, does the RB carry this out systematically following any specific trend or other methods?*

RB inspects activities based on safety relevance and experience feedback, no matter they are performed or not by contractors.

g. *What areas do you actually inspect (e.g., QA, test results, documentation, subcontractor cascade oversight,)?*

All areas may be inspected – keeping in mind that field inspections are also used to assess the effectiveness of the processes developed by licensee.

h. *How does your RB ensure that the licensee has enough in-house competence to supervise the works/services done by contractors, and that they actually perform that supervision?*

RB should develop this area.

i. *Does your RB inspect licensee's safety performance indicators for the oversight of contractor performance?*

Yes, as part of inspection of the processes (see answer to question 5.a).

6. **What problems or trends have you seen in the licensee's use of contractors (e.g., quality of documents, quality of work)? Were they informed by safety performance indicators?**

Specific problems may be encountered for every activity – no trend has been observed that could be linked with the use of contractors.

7. **Does the licensee include their findings on contractor's performance in their corrective actions process? Does your RB include your inspection findings in your corrective action process?**

Licensee has developed a process to evaluate works performed by contractors. This includes a system of suggested or required improvements. No new activity may be performed by the contractor if he has not taken appropriate actions following a report containing required improvements.

8. **Incidents and events**

a. *What trends has your RB noticed in the incidents / events attributed to the use of contractors?*

No specific trend has been identified up to now.

b. *How did your RB respond?*

9. **What does your RB do to make sure that safety related recommendations by contractors (e.g., maintenance programme, experience feedback, such as boiler replacement) are assessed and implemented by licensee if necessary?**

Some recommendations are included in documentation that is established in the frame of modifications and transmitted to licensee (maintenance programme, ...). The modification process includes an independent formal approval by RB that performs in this frame a (sample) verification of the update of documentation. RB should nevertheless further develop this area.

10. **Are there any other related topics, which you would like to be discussed during the breakout session?**

CZECH REPUBLIC

1. **What is your regulatory framework for inspecting the licensee's oversight of contractors (short answer)?**

Regulatory requirements relevant for the licensee's oversight of contractors are set up at general level in the Atomic Act – Act No. 18/1997 Coll. (licensee's ultimate responsibility for nuclear safety) and in the Decree on quality assurance – Decree No. 132/2008 Coll. and other implementing Decrees. Licensee is responsible for the nuclear safety of installations, this responsibility cannot be delegated. Contracts signed between licensee and its contractors and subcontractors must ensure all requirements in the Act and Decrees are fulfilled.

SÚJB (Czech Republic regulatory authority) performs various types of inspections focused on both licensees and its contractors and subcontractors performance.

2. **Does the licensee use independent inspection agency to assist him in oversight of contractors? Does your RB perform an oversight of this use?**

Licensee is required to perform its oversight of contractors and subcontractors mostly without external support. However, licensee is using independent inspection agencies, and also certification and/or authorisation agencies to check ability of contractors to deliver services of appropriate quality. Activities of these agencies are verified by RB.

3. **Does your RB certify contractors who may work in your country? Does the licensee certify contractors?**

SÚJB does not certify contractors. Contractors are certified by independent agencies, licensee performs its own audits and inspections to verify contractor's abilities to perform all relevant activities with required quality. Licensee keeps updated list of authorized contractors, this list is part of integrated management system manual, and this document is approved by RB.

4. **How does your RB inspect the interfaces between licensee and contractors?**

a. *As a part of inspections on licensee's (Safety) Management System?*

Yes.

b. *The licensee's processes for selection of contractors (including periodic assessment and follow up of improvements, if needed)?*

Yes.

c. *The licensee's processes for supervising contractors services?*

Yes.

d. *The products and the works performed by contractors?*

Yes.

e. *The retention of contractor's safety related information?*

No.

f. *Other?*

5. **Performance of inspections**

a. *What type of inspections does your RB carry out to verify the results of the licensee's oversight of contractors?*

Routine inspections performed by resident inspectors focused on contractors and subcontractors activities performed on sites, mainly on maintenance activities.

Periodic inspections at contractors and subcontractors facilities focused mainly on quality assurance of production of SSCs. These inspections cover also activities performed by inspection/certifying agencies.

Planned team inspections focused on licensee's processes as described in the integrated management system manual.

- b. *Does your RB visit contractors or vendor-manufacturers sites? If not, why not? If "yes", what are the main topics you inspect and what are the main benefits you gain?*

Visits at contractors' sites are part of SÚJB inspections. The main areas inspected are quality assurance of all safety relevant activities – design control, work control, control of records, and qualification of personnel. The main benefit gained is complex information on contractor's ability to deliver products of sufficient quality.

- c. *Does your RB have the authority to inspect the contractors and subcontractors of licensees? If not, does the licensee have provisions in the contract allowing RB access to contractors and subcontractors premises?*

SÚJB has authority to inspect contractors and subcontractors.

- d. *Does your RB cooperate with other RB for oversight of foreign contractors (reliance on inspections conducted by other RB's, sharing of inspection findings and lessons learnt)?*

Cooperation with other RBs is not currently formalised in the SÚJB internal documents. There is an intention to develop such approach for oversight of new build project (if construction of new NPP is started in the future).

- e. *Does your RB visit the contractor as an observer of the licensee's inspection or for direct inspection?*

Both approaches are/were used by SÚJB. Direct inspections are prevailing in the current SÚJB inspection practice; observers' status was more frequent when SÚJB inspectors verified quality of complex modernization projects of larger extent, e.g., modernization of NPP Dukovany IaC systems.

- f. *If your RB witnesses activities by contractors, does the RB carry this out systematically following any specific trend or other methods?*

Requirements stipulated in the implementing regulations are basis for inspections. Focus of inspections is modified if safety relevant negative findings occur.

- g. *What areas do you actually inspect (e.g., QA, test results, documentation, subcontractor cascade oversight,)?*

QA, test results and documentation are inspected routinely. Subcontractor cascade oversight is inspected when verifying licensee's integrated management system.

- h. *How does your RB ensure that the licensee has enough in-house competence to supervise the works/services done by contractors, and that they actually perform that supervision?*

Legal requirements related to in-house competence are of a general nature and this topic is difficult to inspect. Licensee performs sample checks of contractors' activities; there is ongoing discussion between regulator and licensee on sufficiency of these checks.

- i. *Does your RB inspect licensee's safety performance indicators for the oversight of contractor performance?*

Use of performance indicators is one of topics of RB inspections; however, licensee's performance indicators are of a general nature. SÚJB recommended to licensee to implement more specific indicators, implementation on licensee side is in progress.

6. **What problems or trends have you seen in the licensee's use of contractors (e.g., quality of documents, quality of work)? Were they informed by safety performance indicators?**

There were identified various difficulties with outsourcing of various activities to contractors and subcontractors in the last 8 years, e.g., insufficient quality of maintenance activities leading to higher

number of safety relevant events, compromised efficiency of licensee's OEF (operating experience feedback) system, need of many modifications in the work control system, etc.

There is currently no specific performance indicators in this area used systematically. However, above mentioned deficiencies resulted in negative trends of top level performance indicators, e.g., number of safety related events, inoperability of ECCs system, etc.

7. Does the licensee include their findings on contractor's performance in their corrective actions process? Does your RB include your inspection findings in your corrective action process?

Yes, at both licensee and RB side.

8. Incidents and events

a. *What trends has your RB noticed in the incidents/events attributed to the use of contractors?*

The ratio of events caused by human factors (HF) of contractors is growing, HF of licensee is decreasing, however; total ratio of events caused by HF is not changed.

b. *How did your RB respond?*

Deficiencies were recorded in inspections reports and corrective actions were required. Negative trend were discussed at various meetings, including the top level annual meeting between RB and licensee.

9. What does your RB do to make sure that safety related recommendations by contractors (e.g., maintenance program, experience feedback, such as boiler replacement) are assessed and implemented by licensee if necessary?

Recommendations by contractors to maintenance program are reported to SÚJB as proposals for in-service inspection program modifications. Operating experience is often a source of modifications; however, there is no systematic process currently implemented to check this activity.

10. Are there any other related topics, which you would like to be discussed during the breakout session?

Regulatory activities related to safety culture of (sub)contractors personnel.

FINLAND

1. What is your regulatory framework for inspecting the licensee's oversight of contractors (short answer)?

RB requires licensee to audit and approve contractors. RB takes part in some licensee's audits in order to evaluate licensee's auditing activities. When applying approving for new SSCs licensee must present information how they have evaluated and approved the contractor if they are manufacturing safety related SSCs.

2. Does the licensee use independent inspection agency to assist him in oversight of contractors? Does your RB perform an oversight of this use?

No. 3rd party certificates for management system audits may be part of the evidence that licensee present to RB when applying approvals for new SSCs.

3. Does your RB certify contractors who may work in your country? Does the licensee certify contractors?

STUK (Finnish regulatory authority) certifies safety related pressure vessel manufacturers. Licensee is always required to approve their own contractors.

4. How does your RB inspect the interfaces between licensee and contractors?

a. *As a part of inspections on licensee's (Safety) Management System?*

Yes

b. *The licensee's processes for selection of contractors (including periodic assessment and follow up of improvements, if needed)?*

No

c. *The licensee's processes for supervising contractors services?*

No

d. *The products and the works performed by contractors?*

Safety Classified components are approved by RB.

e. *The retention of contractor's safety related information?*

No

f. *Other?*

5. Performance of inspections

a. *What type of inspections does your RB carry out to verify the results of the licensee's oversight of contractors?*

Periodic Inspections on Management System

b. *Does your RB visit contractors or vendor-manufacturers sites? If not, why not? If "yes", what are the main topics you inspect and what are the main benefits you gain?*

Quality audits and construction inspections. To verify that actual safety related components are manufactured and tested according to approved documents. This gives higher confidence to the supplier's ability to produce good quality products. Many examples show that manufactures do not always follow the documentation or there have been major flaws or problems that otherwise may have not been noticed.

c. *Does your RB have the authority to inspect the contractors and subcontractors of licensees? If not, does the licensee have provisions in the contract allowing RB access to contractors and subcontractors premises?*

Yes, if they are manufacturers of safety classified SSCs. Usually these inspections are carried out together with the licensee

- d. *Does your RB cooperate with other RB for oversight of foreign contractors (reliance on inspections conducted by other RB's, sharing of inspection findings and lessons learnt)?*
MDEP process
- e. *Does your RB visit the contractor as an observer of the licensee's inspection or for direct inspection?*
Both
- f. *If your RB witnesses activities by contractors, does the RB carry this out systematically following any specific trend or other methods?*
According to safety classification for pressure vessel
- g. *What areas do you actually inspect (e.g., QA, test results, documentation, subcontractor cascade oversight,)?*
QA, test results, documentation
- h. *How does your RB ensure that the licensee has enough in-house competence to supervise the works/services done by contractors, and that they actually perform that supervision?*
Participating licensee's audits.
- i. *Does your RB inspect licensee's safety performance indicators for the oversight of contractor performance?*
No

6. What problems or trends have you seen in the licensee's use of contractors (e.g., quality of documents, quality of work)? Were they informed by safety performance indicators?

They do not have strong enough presence in manufacturing sites. Subcontracting is done without licensee knowledge or oversight.

7. Does the licensee include their findings on contractor's performance in their corrective actions process? Does your RB include your inspection findings in your corrective action process?

Auditing findings are tracked individually by the licensees and only major findings are tracked by the RB with approval/requirement/follow up activities. They have their own "corrective action process", it is not the same that is used during plant operational events.

8. Incidents and events

- a. *What trends has your RB noticed in the incidents / events attributed to the use of contractors?*
Licensee does not rigorously require using nuclear standards in management systems (e.g. GS-R-3 or similar) for manufacturers.
- b. *How did your RB respond?*
Management System Inspections requirements and discussions with the licensees

9. What does your RB do to make sure that safety related recommendations by contractors (e.g., maintenance programme, experience feedback, such as boiler replacement) are assessed and implemented by licensee if necessary?

This source of information is part of regulatory requirements. However it has not been inspected in detail

10. Are there any other related topics, which you would like to be discussed during the breakout session?

There is no participant in break-out session for this topic

FRANCE

1. ASN may inspect, on licensed sites, any activities or documents but enforcement actions are carried out only upon the Licensee. The Licensee remains solely responsible for safety. Naturally, contractors may be inspected as appropriate, but ASN findings are nevertheless reported to the Licensee who is the legal person who needs to undertake all necessary actions.
2. The Licensee may contract independent inspection agencies such as the CEFRI or others.
3. The ASN does not certify contractors. However, the Licensee does certify them and the certification process may be reviewed and inspected by the regulatory body.
4. Interfaces
 - a. Management system is inspected. The cascade of contractors shall not exceed 2.
 - b. Contractor selection process is inspected including periodic review, follow-up, improvement actions, etc.
 - c. Yes.
 - d. Yes and especially final intervention reports.
 - e. No.
 - f. No.
5. Inspection performance
 - a. A few dedicated inspections are performed on this topic looking at work organisation during outages and related QA documents.
 - b. Yes. ASN inspects processes and QA regarding manufacturing. This helps ensure important for safety equipment regulatory control hence better quality of equipment having a role in safety.
 - c. Yes but enforcement actions remain performed upon the Licensee.
 - d. No.
 - e. Yes, either both.
 - f. It's not systematic. It may depend on national experience feedback especially for NPPs.
 - g. All areas may be inspected: QA, test results, filled in documents, workers' qualification and trainings...
 - h. Looking at qualification, training, experience, surveillance programme, contracts...
 - i. Yes but there is no real impact. Only very big problems with a contractor may eliminate such a contractor from the panel where calls for tenders are carried out. Money talks.
6. None. Performance indicators are not helping that much in our French context (see 5.i).
7. Yes. Yes. Dedicated inspections are programmed for the following year depending on findings.
8. Incident, event...
 - a. Contractors are up against difficulties to recruit qualified persons and this trend is going worse. Contractors are no longer keen to move location on regular basis or to be living in caravans.
 - b. No idea. Some meetings are organised on this topic with no proper outcome.
9. Dedicated inspections are organised to check recommendation compliance.
10. No.

GERMANY

1. **What is your regulatory framework for inspecting the licensee's oversight of contractors (short answer)?**

The regulatory framework in Germany provides nuclear safety regulations concerning quality assurance, especially the KTA (Kerntechnischer Ausschuss – Nuclear Safety Standards Commission) safety standard KTA 1401 “Generally Requirements Regarding Quality Assurance”. This safety standard is regularly revised, at least any 5 years.

The licensee is responsible for the safety of its NPP. The responsibility cannot be delegated to contractors. Therefore, the licensee has to ensure by quality assurance measures and by its own oversight that the work and products delivered by contractors fulfil the safety requirements.

The work from the contractors has to be done in accordance to the NPP processes. Thus, the planning, the provisions for performing the work (e.g. radiation protection, fire protection, occupational safety etc.), the internal work oversight, the quality assurance steps (e.g. testing) and the final approval are the same, independent if contractors are involved or not. Within these processes special tasks (e.g. the approval of the planning, the oversight of the correct performance of the work) are reserved to licensee's personnel with specified competence. These processes are the basis for the RB's inspections.

The framework for fabrications outside the NPP is similar. The insertion of a new build component is a modification of the NPP. The modification process requires that the fabrication specifications and the quality assurance measures are fixed in the planning of the modification. Thus, in the plans it is specified which fabrication steps and tests are witnessed by licensee's personnel. For some of these fabrication steps and tests also the witnessing by RB's inspectors is required.

2. **Does the licensee use independent inspection agency to assist him in oversight of contractors? Does your RB perform an oversight of this use?**

No, the licensee does not use an independent inspection agency to assist him in oversight of contractors.

3. **Does your RB certify contractors who may work in your country? Does the licensee certify contractors?**

The RB does not certify contractors. The licensees certify contractors according to the nuclear quality assurance rule KTA 1401. The association of the German and European power plant operators VGB (all German NPP operators are members of VGB) keeps a database in which information about the certification and the licensees' experience with the different contractors is gathered.

4. **How does your RB inspect the interfaces between licensee and contractors?**

a. *As a part of inspections on licensee's (Safety) Management System?*

Yes. The supervision of the Management System (MS) by the RB consists of inspections of some MS processes and discussions with the plant management. In this framework e.g. the strategy for contractors' involvement, the amount of external personnel on the plant, the processes for contracting services and the processes for purchase products etc. are supervised.

b. *The licensee's processes for selection of contractors (including periodic assessment and follow up of improvements, if needed)?*

Yes, the selection of contractors is part of the RB's inspections. E.g. within such inspections the process descriptions and instructions in the Management System, the documents corresponding to these processes etc. are checked.

c. *The licensee's processes for supervising contractors services?*

Yes, e.g. in the framework of inspecting the performance of the work in accordance with the planning and the requirements of the plant process. The performance of the work, the supervision by the dedicated plant personnel, the quality assurance measures etc. are checked.

- d. *The products and the works performed by contractors?*
Yes, e.g. by observing the fabrication steps and tests at the contractor's site as well as by inspections of the receiving controls and the function test in the NPP in the case of delivered components. In the case of on-site work done by contractors the work and products are inspected by e.g. plant walk-downs and inspections of tests.
- e. *The retention of contractor's safety related information?*
Yes, in general the safety related information of work and products delivered by contractor has to be handed over to the licensee. This safety documentation has to be filed and kept by the licensee. Additionally, in many contracts with manufacturing companies the contractor company is obliged to pass safety relevant operation experience over to the licensee. The content and the filing of safety documentation of delivered components is checked by the RB as well as the experience feedback from the manufacturer.
- f. *Other?*
After events, e.g. when in another NPP a safety significant event occurred, the RB inspects if there are sufficient provisions against such an event in the inspected NPP.

5. Performance of inspections

- a. *What type of inspections does your RB carry out to verify the results of the licensee's oversight of contractors?*
Types of inspections (by RB's staff and by authorized experts)
- Plant walk-downs.
 - Audit-type inspections of the (Safety/Quality) Management System and of Management System Processes.
 - Discussions and meetings with plant management to strategic topics and management system review.
 - Focused inspections to specific issues resulting from experience feedback.
 - Inspection of tests performed in the plant and in the manufacturer sites.
 - Inspection of licensee's audits of vendors' quality management system.
- b. *Does your RB visit contractors or vendor-manufacturers sites? If not, why not? If "yes", what are the main topics you inspect and what are the main benefits you gain?*
Yes. Normally authorized experts are assigned to witness fabrication steps and tests which were fixed in advance (e.g. material composition, welding, non-destructive material tests, pressure tests etc.). The main benefit is the verification independent of the licensee and manufacturer. The insight in the manufacturing processes also helps to assess the safety relevance of occurred deviations and the adequacy of proposed corrective actions. Sometimes RB's inspectors or authorized experts accompany the licensee's audits of vendors.
- c. *Does your RB have the authority to inspect the contractors and subcontractors of licensees? If not, does the licensee have provisions in the contract allowing RB access to contractors and subcontractors premises?*
The inspection of the onsite work of contractors and subcontractors is directly within the authority of the RB. In contrast, the RB has no legal authority to inspect contractors and subcontractors premises. Therefore the necessary inspections (witnesses of tests etc.) are fixed in advance and the licensee has to ensure by its contracts that these inspections can be performed.
- d. *Does your RB cooperate with other RB for oversight of foreign contractors (reliance on inspections conducted by other RB's, sharing of inspection findings and lessons learnt)?*
No.
- e. *Does your RB visit the contractor as an observer of the licensee's inspection or for direct inspection?*
In the case of the inspection of predefined fabrication steps and tests, the RB performs a direct inspection (of the quality of the product).

- f. *If your RB witnesses activities by contractors, does the RB carry this out systematically following any specific trend or other methods?*

The main selection criterion for inspection topics is the safety significance of the component and of the fabrication steps/tests.

Another selection criterion used for on-site inspections is the operation experience feedback. Activities which had bad performance in the plant itself or in other NPP are observed in more detail.

- g. *What areas do you actually inspect (e.g., QA, test results, documentation, subcontractor cascade oversight)?*

See 5.a. In the main focus are test results and documentation independent of the level within the subcontractor cascade.

- h. *How does your RB ensure that the licensee has enough in-house competence to supervise the works/services done by contractors, and that they actually perform that supervision?*

By on-site inspections of the work in the NPP and inspections of quality assurance measures in the manufacturer sites which are also supervised by licensee's personnel.

- i. *Does your RB inspect licensee's safety performance indicators for the oversight of contractor performance?*

The RB inspects the licensee's processes (by talking/interviewing personnel, assessing the process documents, checking records etc.). In this framework the RB discusses with the licensee what kind of indicators are used and what kind of results are gained with them.

6. **What problems or trends have you seen in the licensee's use of contractors (e.g., quality of documents, quality of work)? Were they informed by safety performance indicators?**

Problems: deficient production (specific lot of capacitors), application of the wrong documents for the production (ventilation flap), incorrect interpretation of a technical drawing (in the production of control rods), omission of a check in the ordering process, omission of a step in the performance of work, lack of experience in nuclear regulation /nuclear requirements at a manufacturer site (production of a condenser) etc.

The problems or deficiencies were mainly detected during tests before the installations or by in-service inspections.

They seem to be single events and show no trends.

7. **Does the licensee include their findings on contractor's performance in their corrective actions process? Does your RB include your inspection findings in your corrective action process?**

Non-conformities are resolved within the predefined processes of the licensee. In safety-relevant cases the corrective actions of the licensee have to be approved by the RB. An evaluation of the performance of contractors is documented in the VGB database mentioned in the answer to question 3.

Findings from RB's inspections are followed-up within the RB inspection/oversight process. If improvements of the RB's processes seem to be necessary, the issue is handled in the corrective action process of the RB.

8. **Incidents and events**

- a. *What trends has your RB noticed in the incidents / events attributed to the use of contractors?*

- b. *How did your RB respond?*

The number of incidents/events is low, therefore no specific trends. The root causes and the factors which contributed to each single incident/event are analysed. Improvement measures are determined to prevent the occurrence of identical or similar events.

9. **What does your RB do to make sure that safety related recommendations by contractors (e.g., maintenance programme, experience feedback, such as boiler replacement) are assessed and implemented by licensee if necessary?**

No special measures. In the application for a modification the reasons for this modification (e.g. recommendations from the contractor/manufacture) are mentioned. These reasons are sometimes discussed with the licensee personnel. In inspections the experience feedback from contractors and the consequences of the licensee are also checked.

10. **Are there any other related topics, which you would like to be discussed during the breakout session?**

No additional topics.

JAPAN

1. **What is your regulatory framework for inspecting the licensee's oversight of contractors (short answer)?**

There are two kinds of system to inspect and review licensees' activities for administration of contractors' inspection and review (hereinafter called as "inspection and review of activities") and inspection of components, structures and systems in the process of inspection and review of licensees' activities (hereinafter called as "inspection and review of products").

In Japan, licensees' procurement control activities according to their QMS (quality management system) are regulated under the regulatory system comprehensively by confirming licensee's contractor inspection utilizing regulatory processes, such as "Operational Safety Inspection", "Welding Safety Management Review", etc.

2. **Does the licensee use independent inspection agency to assist him in oversight of contractors? Does your RB perform an oversight of this use?**

Licensees may entrust their inspections to independent inspection bodies.

The regulatory body examines licensees' inspection and review including independent inspection bodies' inspections entrusted by licensees.

3. **Does your RB certify contractors who may work in your country? Does the licensee certify contractors?**

The regulatory body does not certify licensees' contractors. However, through confirmation of licensees' implementation status of procurement control according to licensees' QMS, appropriateness of licensees' contractors is confirmed.

Licensees perform contractor's evaluation and registration according to their QMS.

4. **How does your RB inspect the interfaces between licensee and contractors?**

a. *As a part of inspections on licensee's (Safety) Management System?*

The regulatory body confirms that licensees' procurement control process according to their QMSs satisfy regulatory requirements. At the confirmation opportunities licensees' procurement control manuals and related activity records are also confirmed.

b. *The licensee's processes for selection of contractors (including periodic assessment and follow up of improvements, if needed)?*

The regulatory body confirms licensees' implementation of contractor's evaluation and selection as well as periodic assessment at their procurement-control processes by inspection of licensee's manuals, evaluation record etc.

c. *The licensee's processes for supervising contractors services?*

The regulatory body confirms licensees' implementation of contractor's verification of procured items and services at their procurement-control processes by inspection of licensee's manuals, evaluation records, etc. and by attendance to their implementation of verification, if necessary.

d. *The products and the works performed by contractors?*

The regulatory body inspects important safety-related components and fuel.

e. *The retention of contractor's safety related information?*

The regulatory body imposes by a ministerial order on licensees to positively acquire safety information concerning maintenance works performed by licensees' contractors and components supplied by licensees' contractors.

f. *Other?*

5. Performance of inspections

- a. *What type of inspections does your RB carry out to verify the results of the licensee's oversight of contractors?*

The regulatory body, in order to confirm licensees' activities according to their QMSs, performs inspections of activities during operation and inspection of important pressurized components.

- b. *Does your RB visit contractors or vendor-manufacturers sites? If not, why not? If "yes", what are the main topics you inspect and what are the main benefits you gain?*

The regulatory body performs inspections by visiting manufacturing sites including contractor's factories. For example, "Pre-operational Inspection", "Fuel Assembly Inspection", etc. are performed.

These inspections are performed for each manufacturing process specified by the Act, which makes it possible for the regulatory body possible to directly contact with quality control at manufacturing factories etc.

- c. *Does your RB have the authority to inspect the contractors and subcontractors of licensees? If not, does the licensee have provisions in the contract allowing RB access to contractors and subcontractors premises?*

The regulatory body is authorized to enter into licensees' contractors' factories and places of business for inspections and reviews specified by the Act.

- d. *Does your RB cooperate with other RB for oversight of foreign contractors (reliance on inspections conducted by other RB's, sharing of inspection findings and lessons learnt)?*

At present, cooperation with overseas regulatory bodies for inspection activities is not performed. It is being explored as one of OECD/NEA MDEP activities.

- e. *Does your RB visit the contractor as an observer of the licensee's inspection or for direct inspection?*

The regulatory body visits factories etc. in order to examine inspections performed by licensees and/or to inspect products.

- f. *If your RB witnesses activities by contractors, does the RB carry this out systematically following any specific trend or other methods?*

The regulatory body does not perform any inspection and review aiming at supervision of contractor's activities.

Therefore, licensees' contractors' trends are not monitored. But, when a contractor's unsuitable practice is found at the inspection and review the regulatory body issues a "Nonconformance Findings Report" etc. to share the information within the regulatory body and to follow the findings at the related inspection and review.

- g. *What areas do you actually inspect (e.g., QA, test results, documentation, subcontractor cascade oversight,)?*

Although the regulatory body does not inspect licensees' contractors directly, licensee's procuring activities are reviewed by inspecting documented procedures, records, testing and inspection reports, order specifications, contracts, etc. determined by licensees' QMSs.

- h. *How does your RB ensure that the licensee has enough in-house competence to supervise the works/services done by contractors, and that they actually perform that supervision?*

The regulatory body confirms licensees' performing verification of their procured items and services at their procurement-control processes by inspecting licensees' manual, activity records etc, and by attendance to their implementation of verification, if necessary.

- i. Does your RB inspect licensee's safety performance indicators for the oversight of contractor performance?

The regulatory body evaluates licensee's activities including licensees' contractors' performance by supervising and evaluating various kinds of information of inspections, reviews, non-conformances, etc., as well as various kinds of licensees' performance indicators.

6. **What problems or trends have you seen in the licensee's use of contractors (e.g., quality of documents, quality of work)? Were they informed by safety performance indicators?**

Although some deficiencies in implementation of licensee's inspection, records etc. have been found, none of them was safety-significant practice directly performed by licensees' contractors.

In addition, there is a tendency that some licensees leave matters to their contractors' technical capabilities.

7. **Does the licensee include their findings on contractor's performance in their corrective actions process? Does your RB include your inspection findings in your corrective action process?**

Licensees perform non-conformance control including contractors' non-conformance which are generated in their plant sites.

The regulatory body does not put non-conformances discovered by inspection into his non-conformance control process, but does control as what should be corrected.

8. **Incidents and events**

- a. What trends has your RB noticed in the incidents/events attributed to the use of contractors?

There is a tendency that some licensees leave matters to their contractors' technical capabilities. As an example the following deficiency was generated recently.

A licensee entrusted implementation of "Licensee's Welding Inspection" which is a legal self-inspection to an independent organisation.

The "Licensee's Welding Inspection" is required to be performed for each process determined by the Act. But the independent inspection body has reported successful completion of the inspection to the licensee omitting inspections of some steps of process. The licensee did not aware of the omission and directed implementation of inspection of the next step.

- b. How did your RB respond?

The regulatory body required intensive administration to licensees and severer review of release points of inspections performed by the regulatory body.

9. **What does your RB do to make sure that safety related recommendations by contractors (e.g., maintenance programme, experience feedback, such as boiler replacement) are assessed and implemented by licensee if necessary?**

The regulatory body imposes by a ministerial order on licensees to positively acquire safety information concerning maintenance works performed by licensees' contractors and components supplied by licensees' contractors, and the regulatory body confirms the status.

KOREA, REPUBLIC

1. What is your regulatory framework for inspecting the licensee's oversight of contractors (short answer)?

The Presidential Decree on Nuclear Safety Act Article 31, QA inspection, defines that the Nuclear Safety and Security Committee (NSSC) may conduct the quality assurance to verify whether the licensee carries out the quality assurance activities according to the quality assurance program (QAP). In accordance with the NSSC Ordinance Article 7, the applicant shall describe in the QAP the overall quality assurance controls including qualification, surveillance and audit of contractors.

2. Does the licensee use independent inspection agency to assist him in oversight of contractors? Does your RB perform an oversight of this use?

Yes. The licensee uses inspection companies as his designee for inspection on the contractual basis. The RB performs oversight of the licensee and its inspection designee. The RB oversees the activities of the designated inspection agency. Besides, the authorized inspection agency (AIA) performs the independent inspections of the pressure retaining components pursuant to the nuclear industry codes and standards (KEPIC and ASME).

3. Does your RB certify contractors who may work in your country? Does the licensee certify contractors?

The RB does not certify contractors but the licensee qualifies them.

4. How does your RB inspect the interfaces between licensee and contractors?

- a. *As a part of inspections on licensee's (Safety) Management System?*
- b. *The licensee's processes for selection of contractors (including periodic assessment and follow up of improvements, if needed)?*
- c. *The licensee's processes for supervising contractors services?*
- d. *The products and the works performed by contractors?*
- e. *The retention of contractor's safety related information?*
- f. *Other?*

The RB inspects the interfaces between licensee and contractors. The scope of this regulatory inspection covers (a) through (e) above. But in case of (d), the extent of KINS (Korean regulatory authority) regulatory inspection is limited to the pressure retaining components of NSSS and ESF.

5. Performance of inspections

- a. *What type of inspections does your RB carry out to verify the results of the licensee's oversight of contractors?*

The quality assurance inspection verifying whether the licensee oversees contractors in accordance with the quality assurance program approved by the RB.

- b. *Does your RB visit contractors or vendor-manufacturers sites? If not, why not? If "yes", what are the main topics you inspect and what are the main benefits you gain?*

Yes. The RB inspectors visit contractors or vendor-manufacturers sites to conduct the quality assurance inspection. The aim of this inspection on visit is to determine the licensee's contractor oversight activities conform to the QAP and applicable QA standards through identification of objective evidence. During the visits, the inspectors witness selected manufacturing operations to assure the conformity of the components under manufacturing process with the applicable design codes and standards.

- c. *Does your RB have the authority to inspect the contractors and subcontractors of licensees? If not, does the licensee have provisions in the contract allowing RB access to contractors and subcontractors premises?*

Yes. The licensee has provisions in the contract allowing the RB inspector access to contractors and subcontractors premises.

- d. *Does your RB cooperate with other RB for oversight of foreign contractors (reliance on inspections conducted by other RB's, sharing of inspection findings and lessons learnt)?*

Yes. KINS cooperate with the US NRC for oversight of common vendors and share related information such as inspection issues, major findings. For instance KINS and US NRC conducted a parallel inspection in 2008, observed each other's inspection in 2009 and 2010, conducted a joint inspection (lead by KINS) at a vendor in Korea in 2011, and plan to conduct a joint inspection (lead by US NRC) at a vendor in the US in 2012.

- e. *Does your RB visit the contractor as an observer of the licensee's inspection or for direct inspection?*

The RB of Korea visits the contractor supplying design service and/or components of NSSS and ESF for direct inspection.

- f. *If your RB witnesses activities by contractors, does the RB carry this out systematically following any specific trend or other methods?*

Yes, if many design deficiencies were found, KINS inspects the design company.

- g. *What areas do you actually inspect (e.g., QA, test results, documentation, subcontractor cascade oversight,)?*

KINS inspects overall QA controls covering design, procurement, manufacturing, inspection, testing, non-conformance control, corrective action, audit, recording etc.

- h. *How does your RB ensure that the licensee has enough in-house competence to supervise the works/services done by contractors, and that they actually perform that supervision?*

The RB verifies the implementation of QA program including inspection procedure, inspection and audit personnel qualification, inspection and audit accomplishment of the licensee to ensure that the licensee has enough competence to supervise the works/services done by contractors, and that they actually perform that supervision.

- i. *Does your RB inspect licensee's safety performance indicators for the oversight of contractor performance?*

No. RB does not inspect licensee's safety performance indicators, but inspects both licensee's activities to control purchased items and services and the QA activity on the performance of contractor supplying NSSS and ESF components.

6. **What problems or trends have you seen in the licensee's use of contractors (e.g., quality of documents, quality of work)? Were they informed by safety performance indicators?**

Recent trend in international supply chain is joining of new vendors who do not have experience in manufacturing of nuclear components and modularization of products. In Korea, the domestic nuclear industry grew continuously during decades, however recent product modularizing trend increases possibility of inclusion of CFSI (Counterfeit, Fraudulent and Suspect Items) in the nuclear installations.

7. **Does the licensee include their findings on contractor's performance in their corrective actions process? Does your RB include your inspection findings in your corrective action process?**

No. The quality assurance criterion 16 (Corrective Action) requires the licensee to impose corrective action criteria to contractors when purchasing safety related items or services. Therefore the licensee issues finding notices to contractors when the inspector identified non-conformance during inspection of contractors so that they can translate them to their non-conformance report or corrective action report to take corrective and preventive actions in accordance with their quality assurance program. The corrective action process for the regulatory inspections is similar.

8. **Incidents and events**

a. *What trends has your RB noticed in the incidents / events attributed to the use of contractors?*

Some of the SAR commitments (specific design data in detail) are found not to be met by contractors due to insufficient communication between the licensee and contractors.

b. *How did your RB respond?*

The RB issued a special report and requested the licensee to take corrective action and to establish and implement preventive measures.

9. **What does your RB do to make sure that safety related recommendations by contractors (e.g., maintenance programme, experience feedback, such as boiler replacement) are assessed and implemented by licensee if necessary?**

In Korea, such recommendation by contractor is issued as documented Supplier Deviation Disposition Request (SDDR). During the quality assurance inspection, the RB reviews the appropriateness of the licensee's and/or his designee's disposition on SDDR and implementation of feedback as deemed necessary.

10. **Are there any other related topics, which you would like to be discussed during the breakout session?**

MEXICO

1. **What is your regulatory framework for inspecting the licensee's oversight of contractors (short answer)?**

Since the inception of Laguna Verde Nuclear Power Station (LVNPS) Project, government authorities decided that, in addition to applying the regulations of the IAEA, the regulations of the nuclear steam supply system supplier's country of origin would be equally applied. This requirement is stated in Condition No. 3 of the Commercial Operation License for both LVNPS Units. For this reason, Title 10 "Energy" of the United States of America (US) Code of Federal Regulations (CFR), and all industry standards and guidelines issued from this title were established as a regulatory requirement. Similarly the Regulatory Guidelines issued by the US Nuclear Regulatory Commission (NRC) have been adopted. For that reason for inspecting the licensees of contractors is used Appendix B 10CFR50 VII "Control of purchased Material, Equipment, and Services"

2. **Does the licensee use independent inspection agency to assist him in oversight of contractors?**

No, the licensee does not use independent inspection agency to assist him, it uses the Quality Assurance department to oversight contractors.

Does your RB perform an oversight of this use?

Not applicable

3. **Does your RB certify contractors who may work in your country? Does the licensee certify contractors?**

No, the regulatory body does not certify contractors; the licensee is responsible for the overall safety of the contracted service and the work done by contractors at Laguna Verde Nuclear Power Plant.

4. **How does your RB inspect the interfaces between licensee and contractors?**

- a. *As a part of inspections on licensee's (Safety) Management System?*
- b. *The licensee's processes for selection of contractors (including periodic assessment and follow up of improvements, if needed)?*
- c. *The licensee's processes for supervising contractors services?*
- d. *The products and the works performed by contractors?*
- e. *The retention of contractor's safety related information?*
- f. *Other?*

We inspect the licensee's processes for selection of contractors (including periodic assessment and follow up of improvements), the licensee's processes for supervising contractor's services and the works performed by contractors.

5. **Performance of inspections**

- a. *What type of inspections does your RB carry out to verify the results of the licensee's oversight of contractors?*

By carrying out periodical inspection, mainly during outages, to the process of contracting and supervising of contractors, during this inspections it is verified the contractor work specification, the contractor qualifications and the communication and interface between the contractor and the area requiring the contractor services.

- b. *Does your RB visit contractors or vendor-manufacturers sites? If not, why not? If "yes", what are the main topics you inspect and what are the main benefits you gain?*

Yes, when significance problems occurred or there are new designs are implemented, for new designs the main benefit was assessing the methodologies and the proprietary information which reduce the evaluation time.

- c. *Does your RB have the authority to inspect the contractors and subcontractors of licensees? If not, does the licensee have provisions in the contract allowing RB access to contractors and subcontractors premises?*

The regulatory body has the authority to inspect local contractors and subcontractors but for international contractors the licensee make provisions in the contract allowing regulatory body access to contractors and subcontractors facilities.

- d. *Does your RB cooperate with other RB for oversight of foreign contractors (reliance on inspections conducted by other RB's, sharing of inspection findings and lessons learnt)?*

Yes, we have an agreement with NRC to review any nuclear safety concern for this case we keep track of 10CFR21 reports.

- e. *Does your RB visit the contractor as an observer of the licensee's inspection or for direct inspection?*

It is possible to visit the contractor as an observer of the licensee's inspection, but until now we do not make these kinds of inspection, but we would like to know the advantage of these kinds of inspections in order to make our manager aware of these.

- f. *If your RB witnesses activities by contractors, does the RB carry this out systematically following any specific trend or other methods?*

If the contractor works in a safety related component, it would be witness by the inspectors. The only trend that the regulatory body follows after the last outages is related with works in radiological areas because during these outages the collective doses increased due contractors work.

- g. *What areas do you actually inspect (e.g., QA, test results, documentation, subcontractor cascade oversight,)?*

The areas under inspections are: the contractor work specification, the contractor qualifications and the communication and interface between the contractor, the area requiring the contractor services, test results and QA records and registers.

- h. *How does your RB ensure that the licensee has enough in-house competence to supervise the works/services done by contractors, and that they actually perform that supervision?*

By inspecting Quality assurance department

- i. *Does your RB inspect licensee's safety performance indicators for the oversight of contractor performance?*

No, the licensee does not have any safety performance indicators for the oversight of contractor performance.

6. **What problems or trends have you seen in the licensee's use of contractors (e.g., quality of documents, quality of work)? Were they informed by safety performance indicators?**

The main problem with contractors is related with the full fitness of the radiological controls and sometimes with the quality of the work.

The contractors only make some specific works, so there is not necessary to elaborate performance indicators.

7. **Does the licensee include their findings on contractor's performance in their corrective actions process? Does your RB include your inspection findings in your corrective action process?**

Yes, the corrective actions programme include the findings on contractor's performance; the regulatory body follow these findings during the inspections to the affected area, during the corrective action inspection or if the findings affected the safety with a reactive inspection.

8. **Incidents and events**

- a. *What trends has your RB noticed in the incidents/events attributed to the use of contractors?*

The trends are based in the following indicators: (1) unplanned scrams per 7 000 critical hours; (2) unplanned scrams with loss of normal heat removal, and (3) unplanned power changes per 7 000 critical hours; change their performance behaviour band affected by failures in the equipment installed by the contractor.

- b. *How did your RB respond?*

The regulatory body carry out a: (1) regulatory performance meeting, (2) reactive inspection, and (3) oversight monthly meeting.

9. **What does your RB do to make sure that safety related recommendations by contractors (e.g., maintenance programme, experience feedback, such as boiler replacement) are assessed and implemented by licensee if necessary?**

Following the safety related recommendations during the inspections to the affected area, or during the corrective action inspection.

10. **Are there any other related topics, which you would like to be discussed during the breakout session?**

Not yet.

SLOVAK REPUBLIC

1. What is your regulatory framework for inspecting the licensee's oversight of contractors (short answer)?

Only in special cases as I&C, the regulatory body is observer of fabric tests together with licensee. We do not have the legal basis for licensee's contractor's oversight.

2. Does the licensee use independent inspection agency to assist him in oversight of contractors? Does your RB perform an oversight of this use?

Yes, the licensee use independent inspection agency to assist him in oversight of contractors only in special cases e.g. at fuel fabrication or software validation. The licensee performs audits of external organisations based on contract and quality plan. There is also possibility for regulatory body to be present, but it must put into the contract between the licensee and contractors in advance.

3. Does your RB certify contractors who may work in your country? Does the licensee certify contractors?

The regulatory body does not certificate the contractors. The licensee performs certification of contractors based on contractor quality programs. These quality programs have to fulfil particular RB decrees.

4. How does your RB inspect the interfaces between licensee and contractors?

a. *As a part of inspections on licensee's (Safety) Management System?*

The license quality program for selection

The licensee has the yearly inspection program to inspect the contractors. The regulatory body inspectors inspect if the licensee carry out inspection in accordance with the licensee's quality programs approved by regulatory body.

b. *The licensee's processes for selection of contractors (including periodic assessment and follow up of improvements, if needed)?*

The licensee's processes for selection of contractors are also regulated by quality documents approved by regulatory body. This process is inspected by inspectors.

c. *The licensee's processes for supervising contractors services?*

The licensee's processes are not a subject of inspection process.

d. *The products and the works performed by contractors?*

The products and the works performed by contractors are inspected by inspectors and have to fulfill the requirement laid down in quality plans.

e. *The retention of contractor's safety related information?*

There is a regulatory body decree for reporting safety related information. If that obligation is breached the RB impose penalty against licensee.

f. *Other?*

5. Performance of inspections

a. *What type of inspections does your RB carry out to verify the results of the licensee's oversight of contractors?*

These inspections are team or special and are planned in annual inspection program.

b. *Does your RB visit contractors or vendor-manufacturers sites? If not, why not? If "yes", what are the main topics you inspect and what are the main benefits you gain?*

The RB very rarely visits the contractors or vendors. These visits are performed only in case when the contract between license and subject contain also requirements of presence of regulatory body inspectors besides the licensee auditors. The atomic act and decrees do not contain requirements for contractor's oversight. The main topic is the factory tests for I&C cabinets at contractor.

- c. *Does your RB have the authority to inspect the contractors and subcontractors of licensees? If not, does the licensee have provisions in the contract allowing RB access to contractors and subcontractors premises?*

Yes, but in contract have to be a provision to allowing RB access to the contractors and subcontractors. This provision is used e.g. at I&C vendors.

- d. *Does your RB cooperate with other RB for oversight of foreign contractors (reliance on inspections conducted by other RB's, sharing of inspection findings and lessons learnt)?*

No, RB does not cooperate with other regulatory body in the case of foreign contractors.

- e. *Does your RB visit the contractor as an observer of the licensee's inspection or for direct inspection?*

The RB observes the licensee audits only in the cases when the contract has the provision for such activity.

- f. *If your RB witnesses activities by contractors, does the RB carry this out systematically following any specific trend or other methods?*

The witness's activities of RB are based on the licensee contract and vendor. The RB is present together with licensee personnel.

- g. *What areas do you actually inspect (e.g., QA, test results, documentation, subcontractor cascade oversight,)?*

The main areas are the tests results, quality programs of contractor or subcontractors.

- h. *How does your RB ensure that the licensee has enough in-house competence to supervise the works/services done by contractors, and that they actually perform that supervision?*

The licensee's quality system and programs are submitted to RB for review and approval. These documents have to contain all requirements from atomic act and decrees.

- i. *Does your RB inspect licensee's safety performance indicators for the oversight of contractor performance?*

All licensees' safety performance indicators are quarterly reported to RB, the indicators for oversight of contractor performance are not inspected regularly.

6. **What problems or trends have you seen in the licensee's use of contractors (e.g., quality of documents, quality of work)? Were they informed by safety performance indicators?**

RB does not monitor what problem and trends are between licensee and contractor. There is a free market and main criterion for contractor selection is price but licensee evaluates the contractors and they can be deleted from vendor list.

7. **Does the licensee include their findings on contractor's performance in their corrective actions process? Does your RB include your inspection findings in your corrective action process?**

Yes, licensee evaluates the contractors and they can be deleted from vendor list. RB does not inspect this process.

8. **Incidents and events**

- a. *What trends has your RB noticed in the incidents / events attributed to the use of contractors?*

The trends concerning contractors is not monitored, the responsibility for event is only on operator.

- b. *How did your RB respond?*

The significant events related to nuclear safety are investigated by inspection group. Depends on results are imposed measures to operator, which may have impact also on contractors.

9. **What does your RB do to make sure that safety related recommendations by contractors (e.g., maintenance programme, experience feedback, such as boiler replacement) are assessed and implemented by licensee if necessary?**

Each application for a change which has nuclear significance has to be followed by original contractor writing position.

10. **Are there any other related topics, which you would like to be discussed during the breakout session?**

No

SPAIN

1. **What is your regulatory framework for inspecting licensee's oversight of contractors and chain of subcontractors (short answer)?**

Article 44 of RINR (Spanish Nuclear Regulation) establishes that holders of II.NN are required to facilitate access of inspectors to workplaces of suppliers of equipment and services related to the safety of the installation

2. **Does the licensee use independent inspection agency to assist him in oversight of contractors? Do you (as RB) perform an oversight of this use?**

Licenseses when so required, use inspection agencies as support for the supervision of contractors, which are not involved as independent inspection agencies (3rd party inspection) but on behalf of the owner, therefore, inspection agencies act as contractors and CSN monitoring, sampling, the work done by these contractors

3. **Does your RB certify or issue approval to top tier/main contractors that may work in your country? Does licensee certify or issue approval to top tier/main contractors?**

The CSN does neither certify nor approve the contractors who perform work in the II.NN

4. **How do you inspect the interfaces between licensee and contractors? Which topics?**

- a. As a part of inspections on licensee's (Safety) Management System?
- b. The licensee's processes for selection of contractors? (including periodic assessment and follow up of improvements if needed)
- c. The licensee's processes for supervising contractors services?
- d. The products and the works performed by contractors?
- e. Retention of contractor's safety related information/records/knowledge?

The CSN inspects the interfaces between owners and contractors as part of the inspection of quality assurance system of the headlines. The areas inspected are: Process of selection of contractors, process control and supervision of work performed by contractors, the presence of some work done by contractors at the plant, work records, personnel qualifications contractor, etc. In the case of supplies of equipment checks are performed on the approval of the suppliers, the technical specifications for purchase of equipment, evaluation of bids, the award of supply, the deviations from the requirements of the technical specification of equipment, the manufacturing PPI and its results, manufacturing nonconformities and their resolution, records of inspections of receipt of the plant equipment, etc.

5. **Performance of inspections**

- a. *What type of inspections does your RB carry out to verify the results of the licensee's oversight of contractors?*

The CSN carry out inspection on the activities performed by the owners to control and monitor the work of contractors. These inspections are usually made in the facilities of the licensee.

- b. *Do you visit contractors or vendor-manufacturers sites? If not, why not? If "yes", what are the main topics you inspect and what are the main benefits you gain?*

The CSN does not routinely visit the sites of contractors, except in the following cases:

- Approval of major design modifications that require authorisation from CSN. In this case some inspections are usually performed to the engineering involved in the design modification as well as those engineering involved in the manufacturing of components installed by the modification, mainly when the modification affects main circuit components primary as the reactor vessel, steam generators, steam dryers, etc.
- Production of nuclear fuel.
- Manufacturing of containers for storage and transport of spent fuel

- c. *Does your RB have the authority to inspect the contractors and subcontractors of licensees? If not, does the licensee have provisions in the contracts allowing RB access to contractors and subcontractors premises?*

See answer to question 1

- d. *Do you cooperate with other RBs (including non-nuclear RBs) for oversight of foreign contractors (reliance on inspections conducted by other RBs, sharing of inspection findings and lessons learnt)?*

No. Sometimes the CSN assesses the results of inspections performed by the NRC to the foreign contractors of the licensees.

- e. *Do you visit the contractor as an observer of the licensee's inspection or for direct inspection?*

See answer to question 5b. In cases of inspections identified in the response to this point, the CSN performs direct inspections.

- f. *If you do witness activities by contractors, does the RB carry this out systematically or following any specific event?*

See response to question 4. The work performed by contractor personnel at nuclear facilities may be inspected within any inspection performed by the regulatory body

- g. *What areas do you actually inspect (e.g., QA, test results, documentation, subcontractor cascade oversight,...)?*

Verifications in relation to contractors

- Inclusion in the list of contractors evaluated and accepted.
- Quality Plan for the work.
- Evaluation by the licensee for services rendered.
- Evaluation by the licensee of the qualification and training of personnel provided for the work to do in the outage.
- Test and measurement equipment.
- Approval by the licensee of the procedures of the supplier.
- Verification that the applicable procedures are known and available for the work.
- Planning activities of work: kick-off meeting and other activities.

Control on selected contractors work

- Responsible for the work: qualification, training, and monitoring of work performed.
- Documentation used to do the work.
- Preparation of work: initial meeting (records).
- Control of equipment and tools used.
- Planning of supervision.
- Personnel performing the work: qualification and training
- Staff supervision conducted: qualification and training.
- Records of monitoring.
- Contractor's quality assurance.
- Quality assurance of the licensee.
- Records of work: incidents during the work.
- Records of meetings before and after work.
- Acceptance of the work.

- h. *How do you ensure that the licensee has enough in-house competence to supervise the works/services done by contractors, and that they actually perform that supervision?*

By inspecting the structure of the organisation of the licensee putted in place in order for the control of activities, supervision and acceptance of the work of contractors during the most important aspects of the outage. The most relevant aspects inspected are:

- Responsible for verifying the compliance with contractual requirements by contractors.

- Responsible for planning and preparation work.
- Assignment of tasks to the coordinators of the plant.
- Functions to be performed by the coordinators, office work and presence in the work task.
- Planning of work: Meetings with contractors prior to commencement of work.
- Planning of the activities and work to monitor.
- Identification of supervisors, its qualifications and experience and documentation used during the supervision.
- Meetings before and after work.

i. *Do you inspect licensee's safety performance indicators for the oversight of contractor performance?*

No, but the CSN review the assessments carried out by licensees on the quality of services provided in the previous outages by contractors and the corrective actions arising out of such assessments.

6. **What problems or trends have you seen in the licensee's use of contractors (quality of documents, quality of work,...)? Were they informed by safety performance indicators?**

- Deficiencies in monitoring the status of compliance with contractual requirements by contractors prior to the start of the work of the outage.
- Deficiencies in planning of the supervision made by the line of the work performed by contractors during the outage.
- Deficiencies in establishing written criteria and requirements to follow in the line supervision of the work performed by contractors as well as in meetings before and after work.
- Deficiencies in the preparation of records of the scope and results of the oversight conducted by the line of the work performed by contractors during the outage.
- Deficiencies in verifying the qualifications of the contractors hired to perform work in the outage.

7. **Does the licensee include their findings on contractor's performance in their corrective actions (CA) process? Do you (RB) include your inspection findings in your CA process?**

Yes to both questions.

8. **Incidents and events**

a. *What trends has your RB noticed in the incidents / events attributed to the control of contractors?*

b. *How did the RB respond?*

The CSN does not keep statistics or perform trend analysis on events or incidents due to work performed by contractors. Licensees analyse the causes of reportable events identifying if the causes are due to poor working practices, and NPP perform trend analysis of these nonconformities in the CAP.

9. **What do you do to make sure that safety related recommendations by contractors (maintenance programme, experience feedback such as boiler replacement,...) are assessed and implemented by licensee if necessary?**

The CSN has not issued any rule that specifically requires the licensees to take into account the recommendations of contractors in the maintenance programs or plant procedures, however, the CSN safety instruction 26 provides that the owner of the facility shall prepare, document and implement maintenance programs, testing, monitoring and inspection of structures, systems and components important for safety, in order to ensure that their availability, reliability and operability are maintained in accordance with its design basis for the life installation, and identify, where appropriate, if corrective actions are necessary. Consequently, in the maintenance inspections or in the inspection of reportable events it is assessed whether the recommendations of the manufacturers in maintenance and operation of equipment have been taken into account.

10. **Are there any other related topics or specific aspects, which you would like to be discussed during the workshop?**

SWEDEN

1. What is your regulatory framework for inspecting the licensee's oversight of contractors (short answer)?

Act:

Section 5 of the Act (1984:3) on Nuclear Activities

Regulatory Codes

SSMFS 2008:6 Swedish Radiation Safety Authority's General Recommendations concerning Section 5 of the Act (1984:3) on Nuclear Activities

SSMFS 2008:7 Swedish Radiation Safety Authority's General Recommendations concerning Exemptions from the Requirement for Approval of Contractors

2. Does the licensee use independent inspection agency to assist him in oversight of contractors?

Yes. Certain controls (of for instance construction or installation) have to be carried out by an accredited inspection body, regardless if the work has been done by the licensee or by contractors. Does your RB perform an oversight of this use. The RB participates in an annual oversight of the accredited inspection body along with the RB responsible for accreditations.

3. Does your RB certify contractors who may work in your country? Does the licensee certify contractors?

No.

No

4. How does your RB inspect the interfaces between licensee and contractors?

a. *As a part of inspections on licensee's (Safety) Management System? Yes*

b. *The licensee's processes for selection of contractors (including periodic assessment and follow up of improvements, if needed)? Yes*

c. *The licensee's processes for supervising contractors services? Yes*

d. *The products and the works performed by contractors? No*

e. *The retention of contractor's safety related information? No*

f. *Other?*

Accredited inspection bodies are involved in inspection of certain tests as a result of the RB's regulatory codes.

5. Performance of inspections

a. *What type of inspections does your RB carry out to verify the results of the licensee's oversight of contractors?*

We are mostly looking at the processes for selection and periodic assessment of contractors, spot-checks of documentation and of the Management System.

b. *Does your RB visit contractors or vendor-manufacturers sites? If not, why not?*

No. The Act does not allow it. There is however a revision of the Act going on that might enable the RB to do so in the future.

c. *Does your RB have the authority to inspect the contractors and subcontractors of licensees?*

Yes, when a licensee has applied for approval of a certain contractor – and the RB has given its approval – the RB has the authority to inspect the contractor. Licensees must apply for approval if they want to order a job from a contractor who uses a subcontractor in his turn. No further levels of contractors are permitted.

- d. *Does your RB cooperate with other RB for oversight of foreign contractors (reliance on inspections conducted by other RB's, sharing of inspection findings and lessons learnt)?*
Not usually, but it has happened within Sweden.
- e. *Does your RB visit the contractor as an observer of the licensee's inspection or for direct inspection?*
No not as yet.
- f. *If your RB witnesses activities by contractors, does the RB carry this out systematically following any specific trend or other methods?*
No, but we can talk to contractors or subcontractors on site in order to follow up that the licensee has fulfilled its responsibilities, given the information needed etc. This is not made systematically.
- g. *What areas do you actually inspect (e.g., QA, test results, documentation, subcontractor cascade oversight,)?*
We inspect samples of documentation and interview the licensee and sometimes the contractors on site.
- h. *How does your RB ensure that the licensee has enough in-house competence to supervise the works/services done by contractors, and that they actually perform that supervision?*
The licensee is obliged to have a QA-system. In-house competence to supervise the works/services done by contractors is also stressed in the General Recommendations to The Swedish Radiation Safety Authority's Regulations concerning Safety in Nuclear Facilities. During inspection the RB interviews the licensee.
- i. *Does your RB inspect licensee's safety performance indicators for the oversight of contractor performance?*
We inspect licensee's safety performance indicators but we don't have indicators especially for the oversight of contractors.
6. **What problems or trends have you seen in the licensee's use of contractors (e.g., quality of documents, quality of work)?**
Maybe differences in culture or language have caused problems but it has not been a big item.
Were they informed by safety performance indicators? No.
7. **Does the licensee include their findings on contractor's performance in their corrective actions process? Does your RB include your inspection findings in your corrective action process?**
Yes, they have experience feed back within their organisations, but to different degrees.
All inspection findings are gathered in an experience feedback process.
8. **Incidents and events**
- a. *What trends has your RB noticed in the incidents/events attributed to the use of contractors? -*
- b. *How did your RB respond?*
9. **What does your RB do to make sure that safety related recommendations by contractors (e.g., maintenance programme, experience feedback, such as boiler replacement) are assessed and implemented by licensee if necessary?**
We do not have a system to do so.
10. **Are there any other related topics, which you would like to be discussed during the breakout session?**

SWITZERLAND

1. What is your regulatory framework for inspecting licensee's oversight of contractors and chain of subcontractors (short answer)?

ENSI Regulatory Guideline G07 on the Organisation of NPPs requires that

- NPPs are "intelligent customers", i.e. they have to survey the quality of the delivered products.
- The duties of the contractor (responsibility, content and execution of the duties) have to be defined in the contract.
- External support has to be monitored in a quality assurance process.

2. Does the licensee use independent inspection agency to assist him in oversight of contractors?

No.

Do you (as RB) perform an oversight of this use? ---

3. Does your RB certify or issue approval to top tier/main contractors that may work in your country?

No.

Does licensee certify or issue approval to top tier/main contractors?

Yes, internal approval.

4. How do you inspect the interfaces between licensee and contractors? Which topics?

a. *As a part of inspections on licensee's (Safety) Management System?*

Yes.

b. *The licensee's processes for selection of contractors? (including periodic assessment and follow up of improvements if needed)*

Yes.

c. *The licensee's processes for supervising contractors services?*

Yes.

d. *The products and the works performed by contractors?*

Yes.

e. *Retention of contractor's safety related information/records/knowledge?*

???

f. etc

5. Performance of inspections

a. *What type of inspections does your RB carry out to verify the results of the licensee's oversight of contractors?*

Team inspections for inspection of processes. Team or individual inspections for the inspection of products. Use of an external specialized company for inspection of pressurized components.

b. *Do you visit contractors or vendor-manufacturers sites? If not, why not? If "yes", what are the main topics you inspect and what are the main benefits you gain?*

In some cases. Quality audits, inspections during manufacturing process.

c. *Does your RB have the authority to inspect the contractors and subcontractors of licensees? If not, does the licensee have provisions in the contracts allowing RB access to contractors and subcontractors premises?*

Yes.

d. *Do you cooperate with other RBs (including non-nuclear RBs) for oversight of foreign contractors (reliance on inspections conducted by other RBs, sharing of inspection findings and lessons learnt)?*

No.

e. *Do you visit the contractor as an observer of the licensee's inspection or for direct inspection?*

As observer.

f. *If you do witness activities by contractors, does the RB carry this out systematically or following any specific event ?*

Both.

g. *What areas do you actually inspect (e.g., QA, test results, documentation, subcontractor cascade oversight,...)?*

h. *How do you ensure that the licensee has enough in-house competence to supervise the works/services done by contractors, and that they actually perform that supervision?*

See answer to question 1. Sporadic inspections on the subject or planned inspections in projects.

i. *Do you inspect licensee's safety performance indicators for the oversight of contractor performance?*

No.

6. **What problems or trends have you seen in the licensee's use of contractors?**

Quality of documents, quality of work, Performance of the QA process.

Were they informed by safety performance indicators?

No.

7. **Does the licensee include their findings on contractor's performance in their corrective actions (CA) process?**

Yes.

Do you (RB) include your inspection findings in your CA process?

Yes.

8. **Incidents and events**

a. *What trends has your RB noticed in the incidents / events attributed to the control of contractors?*

Increased surveillance of contractors necessary due to globalization.

b. *How did the RB respond?*

Increased inspections or specific team inspection.

9. **What do you do to make sure that safety related recommendations by contractors (maintenance programme, experience feedback such as boiler replacement,...) are assessed and implemented by licensee if necessary?**

10. **Are there any other related topics or specific aspects, which you would like to be discussed during the workshop?**

UNITED KINGDOM

1. What is your regulatory framework for inspecting the licensee's oversight of contractors (short answer)?

Conditions as attached to the Nuclear Site Licence granted to a site operator in accordance with UK legislation. Regulatory inspection of the adequacy of a licensee's arrangements and their implementation with regards to oversight of contractors would normally be carried out under Licence Condition 17 "Management Systems".

2. Does the licensee use independent inspection agency to assist him in oversight of contractors?

Yes for items or services significant to nuclear safety e.g. nuclear steam supply system components.

Does your RB perform an oversight of this use? Yes.

3. Does your RB certify contractors who may work in your country? Does the licensee certify contractors?

No. The licensee may select contractors on the basis of defined criteria for example ability to meet the technical specification, quality performance, previous track record, nuclear safety awareness, safety performance. Currently UK licensees do not certify contractors.

4. How does your RB inspect the interfaces between licensee and contractors?

RB inspections are carried out on a graded basis proportionate to the safety significance of the items or safety services being procured. Initial focus would be on verifying the adequacy of the licensee's purchasing and supply chain arrangements supported by inspection of the application of the arrangements. For items or services significant to safety the RB may choose to inspect the arrangements as follows:

a. *As a part of inspections on licensee's (Safety) Management System?* Yes.

b. *The licensee's processes for selection of contractors (including periodic assessment and follow up of improvements, if needed)?* Yes.

c. *The licensee's processes for supervising contractors services?* Yes.

d. *The products and the works performed by contractors?* Yes

e. *The retention of contractor's safety related information?*

Not directly. However the RB may choose to inspect the licensee's arrangements for verifying the contractor's retention arrangements to allow the licensee to comply with Licence Conditions.

f. *Other?*

5. Performance of inspections

a. *What type of inspections does your RB carry out to verify the results of the licensee's oversight of contractors?*

Inspections focus on verifying the adequacy of a licensee's arrangements for procuring items or services and oversight of contractors. This may include verifying the adequacy of implementation of these arrangements at a contractor's premises.

b. *Does your RB visit contractors or vendor-manufacturers sites? What are the main topics you inspect and what are the main benefits you gain?*

Yes but by arrangement with and usually together with the licensee.

Effectiveness of the licensee's oversight of a contractor, adequacy of the contractor's management system and manufacturing inspection if there is a specific quality concern. RB also focuses on the interactions between the licensee and the contractor with regards to technical queries, non-conformances and any resulting design change and its control.

- c. *Does your RB have the authority to inspect the contractors and subcontractors of licensees? If not, does the licensee have provisions in the contract allowing RB access to contractors and subcontractors premises?*

No. Sometimes.

- d. *Does your RB cooperate with other RB for oversight of foreign contractors (reliance on inspections conducted by other RB's, sharing of inspection findings and lessons learnt)?*

In part. The UK RB does not currently rely on the inspection findings of other country RBs, however there is co-operation and sharing of information/lessons learned through a number of international fora and bi-lateral agreements..

- e. *Does your RB visit the contractor as an observer of the licensee's inspection or for direct inspection?*

As an observer of the licensee's inspection.

- f. *If your RB witnesses activities by contractors, does the RB carry this out systematically following any specific trend or other methods?*

In accordance with guidance produced by the RB.

- g. *What areas do you actually inspect (e.g., QA, test results, documentation, subcontractor cascade oversight,)?*

Mainly contractor oversight by the licensee which includes all of these criteria, QA arrangements and occasionally inspection of QC if a specific issue of concern has been identified.

- h. *How does your RB ensure that the licensee has enough in-house competence to supervise the works/services done by contractors, and that they actually perform that supervision?*

As a condition of the licence, licensees are expected to formally demonstrate that they have sufficient, competent staff to undertake operations which may affect nuclear safety. These arrangements are regularly inspected. In addition, licensees must be able to demonstrate that they have sufficient 'intelligent customer' capability to specify the items or services that they wish to procure and to confirm that they are acceptable on receipt.

- i. *Does your RB inspect licensee's safety performance indicators for the oversight of contractor performance?*

No.

6. **What problems or trends have you seen in the licensee's use of contractors (e.g., quality of documents, quality of work)? Were they informed by safety performance indicators (SPI)?**

Problems tend to be random rather than systematic across the broad range of licensees in the UK.

Problems are usually identified through events rather than SPIs.

7. **Does the licensee include their findings on contractor's performance in their corrective actions process? Does your RB include your inspection findings in your corrective action process?**

No. Findings would only be included in the RB corrective action process if they were related to the ineffectiveness of the licensee's procurement arrangements. We do not record actions relating to individual contractor performance.

8. **Incidents and events**

- a. *What trends has your RB noticed in the incidents / events attributed to the use of contractors?*

See answer to Q6.

- b. *How did your RB respond?*

By reviewing the licensee's event investigation and considering whether or not the remedial actions are appropriate.

9. **What does your RB do to make sure that safety related recommendations by contractors (e.g., maintenance programme, experience feedback, such as boiler replacement) are assessed and implemented by licensee if necessary?**

Contractor recommendations are a matter for consideration between the licensee and its contractors.

10. **Are there any other related topics, which you would like to be discussed during the breakout session?**

No.

USA

1. **What is your regulatory framework for inspecting licensee's oversight of contractors and chain of subcontractors (short answer)?**

Licensees are required to ensure contractors implement a quality program that meets Appendix B, 10 CFR Part 50.

2. **Does the licensee use independent inspection agency to assist him in oversight of contractors? Do you (as RB) perform an oversight of this use?**

Yes. All licensees participate in the oversight of contractors through the Nuclear Procurement Issues Committee (NUPIC). Each utility provides resources and personnel. The results of audits are shared by all members. The NRC staff performs observations of the NUPIC process on a sample basis.

Does your RB certify or issue approval to top tier/main contractors that may work in your country?

No.

3. **Does licensee certify or issue approval to top tier/main contractors?**

Yes. The licensee's auditing organisation (NUPIC) issues a report that must conclude the contractor can meet specified procurement requirements. The contractor is subsequently placed on the licensees' Approved Supplier List.

4. **How do you inspect the interfaces between licensee and contractors? Which topics?**

A list of all applicable inspection procedures is publicly available on the NRC website at <http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html>

a. *As a part of inspections on licensee's (Safety) Management System?*

As quality is expected to relate to all activities affecting safety-related SSCs, nearly all inspection procedures delineate methods to verify, for the associated activity, if the licensee adequately applied its safety management system.

b. *The licensee's processes for selection of contractors? (including periodic assessment and follow up of improvements if needed)*

It is the licensee's responsibility to perform periodic assessments and provide any requisite follow up on contractors. However, the NRC staff does observe the NUPIC process to ensure adequate implementation of the oversight process.

c. *The licensee's processes for supervising contractors services?*

Yes

d. *The products and the works performed by contractors?*

Yes

e. *Retention of contractor's safety related information / records / knowledge?*

Yes

5. **Performance of inspections**

a. *What type of inspections does your RB carry out to verify the results of the licensee's oversight of contractors?*

The NRC staff conducts both routine and reactive inspections that verify adequate vendor performance, which in turn ensures that licensees' oversight has been appropriate.

- b. *Do you visit contractors or vendor-manufacturers sites? If not, why not? If “yes”, what are the main topics you inspect and what are the main benefits you gain?*

Yes, the NRC staff visits vendor sites. The purpose of the inspection may vary and there are several inspection procedures addressing particular areas of focus. See the website provided in Response No. 4, for a list of the various inspection procedures.

- c. *Does your RB have the authority to inspect the contractors and subcontractors of licensees? If not, does the licensee have provisions in the contracts allowing RB access to contractors and subcontractors premises?*

Yes, the NRC staff has regulatory authority to inspect under § 21.41.

- d. *Do you cooperate with other RBs (including non-nuclear RBs) for oversight of foreign contractors (reliance on inspections conducted by other RBs, sharing of inspection findings and lessons learnt)?*

Yes, the NRC participates in the Multi-National Development Evaluation Program (MDEP).

- e. *Do you visit the contractor as an observer of the licensee’s inspection or for direct inspection?*

When licensees are conducting the inspection, the staff is observing.

- f. *If you do witness activities by contractors, does the RB carry this out systematically or following any specific event?*

As previously discussed, both methods are utilized by the NRC staff.

- g. *What areas do you actually inspect (e.g., QA, test results, documentation, subcontractor cascade oversight, ...)?*

This is dependent on the purpose of the inspection and there are several inspection procedures addressing particular areas of focus.

- h. *How do you ensure that the licensee has enough in-house competence to supervise the works/services done by contractors, and that they actually perform that supervision?*

The staff follows the guidance in NRC Inspection Procedure 43005. As part of the observation, the staff would ensure the auditors have the requisite qualifications to conduct the audit.

- i. *Do you inspect licensee’s safety performance indicators for the oversight of contractor performance?*

The staff would ensure the auditors verify all attributes that the audit team uses in accordance with the NUPIC Checklist. Additionally the staff attends meetings conducted by NUPIC to discuss vendor performance indicators.

6. **What problems or trends have you seen in the licensee’s use of contractors (quality of documents, quality of work,...)? Were they informed by safety performance indicators?**

Currently, the most prevalent issue with contractors is in adequately performing commercial-grade dedication.

7. **Does the licensee include their findings on contractor’s performance in their corrective actions (CA) process? Do you (RB) include your inspection findings in your CA process?**

NUPIC tracks and trends contractor corrective actions that address auditor findings. The NRC also tracks and trends contractor corrective actions to inspector findings. Both the licensees and NRC ensure that the contractor’s corrective actions are adequate and closed.

8. **Incidents and events**

- a. *What trends has your RB noticed in the incidents/events attributed to the control of contractors?*

As stated in Response No. 6, the most prevalent issue is in adequately performing commercial-grade dedication.

b. How did the RB respond?

The NRC staff has conducted numerous public meetings stressing the correct method of performing commercial-grade dedication.

9. What do you do to make sure that safety related recommendations by contractors (maintenance programme, experience feedback such as boiler replacement,...) are assessed and implemented by licensee if necessary?

Licensees must implement a program that incorporates operating experience and vendor recommendation into its maintenance programs.

10. Are there any other related topics or specific aspects, which you would like to be discussed during the workshop?

N/A.