

Twelfth International Nuclear Regulatory Inspection Workshop

Experience from the Inspection of Licensees' Outage Activities, Including Fire Protection Programmes, Event Response Inspections, and the Impact of the Fukushima Daiichi NPP Accident on Inspection Programmes

Workshop Proceedings
Chattanooga, Tennessee
United States
7-10 April 2014

Appendix: Compilation of Survey Responses

Unclassified

NEA/CNRA/R(2014)8/ADD1

Organisation de Coopération et de Développement Économiques
Organisation for Economic Co-operation and Development

16-Oct-2014

English text only

**NUCLEAR ENERGY AGENCY
COMMITTEE ON NUCLEAR REGULATORY ACTIVITIES**

Cancels & replaces the same document of 16 October 2014

**Twelfth International Nuclear Regulatory Inspection Workshop on
Experience from the Inspection of Licensees' Outage Activities, Including
Fire Protection Programmes, Event Response Inspections, and the Impact
on Inspection Programmes of the Fukushima Daiichi NPP Accident**

Appendix: Compilation of Survey Responses

**Hosted by the United States Nuclear Regulatory Commission
Chattanooga, Tennessee, United States
7-10 April 2014**

JT03364190

Complete document available on OLIS in its original format

This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.



NEA/CNRA/R(2014)8/ADD1
Unclassified

English text only

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

The OECD is a unique forum where the governments of 34 democracies work together to address the economic, social and environmental challenges of globalisation. The OECD is also at the forefront of efforts to understand and to help governments respond to new developments and concerns, such as corporate governance, the information economy and the challenges of an ageing population. The Organisation provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and work to co-ordinate domestic and international policies.

The OECD member countries are: Australia, Austria, Belgium, Canada, Chile, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Republic of Korea, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The European Commission takes part in the work of the OECD.

OECD Publishing disseminates widely the results of the Organisation's statistics gathering and research on economic, social and environmental issues, as well as the conventions, guidelines and standards agreed by its members.

*This work is published on the responsibility of the OECD Secretary-General.
The opinions expressed and arguments employed herein do not necessarily reflect the official
views of the Organisation or of the governments of its member countries.*

NUCLEAR ENERGY AGENCY

The OECD Nuclear Energy Agency (NEA) was established on 1 February 1958. Current NEA membership consists of 31 countries: Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Luxembourg, Mexico, the Netherlands, Norway, Poland, Portugal, the Republic of Korea, the Russian Federation, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The European Commission also takes part in the work of the Agency.

The mission of the NEA is:

- to assist its member countries in maintaining and further developing, through international co-operation, the scientific, technological and legal bases required for a safe, environmentally friendly and economical use of nuclear energy for peaceful purposes;
- to provide authoritative assessments and to forge common understandings on key issues, as input to government decisions on nuclear energy policy and to broader OECD policy analyses in areas such as energy and sustainable development.

Specific areas of competence of the NEA include the safety and regulation of nuclear activities, radioactive waste management, radiological protection, nuclear science, economic and technical analyses of the nuclear fuel cycle, nuclear law and liability, and public information.

The NEA Data Bank provides nuclear data and computer program services for participating countries. In these and related tasks, the NEA works in close collaboration with the International Atomic Energy Agency in Vienna, with which it has a Co-operation Agreement, as well as with other international organisations in the nuclear field.

This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Corrigenda to OECD publications may be found online at: www.oecd.org/publishing/corrigenda.

© OECD 2014

You can copy, download or print OECD content for your own use, and you can include excerpts from OECD publications, databases and multimedia products in your own documents, presentations, blogs, websites and teaching materials, provided that suitable acknowledgment of the OECD as source and copyright owner is given. All requests for public or commercial use and translation rights should be submitted to rights@oecd.org. Requests for permission to photocopy portions of this material for public or commercial use shall be addressed directly to the Copyright Clearance Center (CCC) at info@copyright.com or the Centre français d'exploitation du droit de copie (CFC) contact@cfcopies.com.

COMMITTEE ON NUCLEAR REGULATORY ACTIVITIES

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 12th International Workshop on Nuclear Regulatory Inspection Activities. The workshop was hosted by the U.S. NRC, in Chattanooga, Tennessee, United States of America on 7 -10 April 2014.

The three workshop topics that were addressed were as follows:

- Inspection of Outage Activities Including Fire Protection Programmes.
- Event Response Inspections.
- The Impact of Inspection Programmes of the Fukushima Daiichi NPP Accident.

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 A. Inspection of Licensee’s Outage Activities Including Fire Protection Programmes	9
Introduction and Questionnaire.....	10
Belgium.....	13
Canada.....	17
Czech Republic.....	23
Finland.....	28
France.....	33
Germany.....	38
Hungary.....	45
India.....	49
Japan.....	53
Korea.....	59
Mexico.....	63
Slovak Republic.....	68
Slovenia.....	73
Spain.....	77
Sweden.....	81
Switzerland.....	85
United Kingdom.....	90
USA.....	95
Topic B. Event Response Inspections	102
Introduction and Questionnaire.....	103
Belgium.....	105
Canada.....	107
Czech Republic.....	112
Finland.....	115
France.....	118
Germany.....	121
Hungary.....	126
India.....	129
Japan.....	131
Korea.....	134
Mexico.....	136
Slovenia.....	139
Spain.....	143
Sweden.....	145
United Kingdom.....	149
USA.....	153

Topic C. The Impact on Inspection Programmes of the Fukushima Daiichi NPP Accident	158
Introduction and Questionnaire.....	159
Belgium.....	161
Canada.....	164
Finland	168
France.....	171
Germany.....	175
India	179
Japan	183
Korea.....	187
Mexico	190
Russian Federation.....	194
Slovenia.....	197
Spain	204
Sweden.....	206
Switzerland	208
United Kingdom.....	211
USA.....	214

**TOPIC A.
INSPECTION OF LICENSEE'S OUTAGE ACTIVITIES INCLUDING FIRE PROTECTION
PROGRAMMES**

Introduction

Outages are an important opportunity for licensees to undertake plant maintenance, inspections, modifications and other activities necessary to ensure the continued safety of NPPs. Fire protection is one of the important aspects to be considered in the frame of this topic because of the increase of the fire risk and maintenance on fire protection systems.

The scope of the workshop is limited to planned NPP routine outages and will include: the consideration of NPP outage work scope; Regulatory body (RB) inspection scope; nuclear and fire risk minimisation; resolution of outage findings that may affect start-up; and arrangements for restart of the NPP. The scope of questions relating to fire protection includes both nuclear and conventional fire safety. The focus of this workshop topic is to identify commendable inspection practices by the RB for gaining confidence that safety will be maintained during an outage, return to service and the following operating cycle of the NPP.

Questionnaire

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

1. Regulatory requirements

- a. What are the regulatory requirements governing the outage of NPPs?
- b. What are the regulatory requirements relating to fire protection at NPPs during outages?

2. Outage scope and content

The following questions concern the review of outage scope and content by the RB with the licensee prior to the outage.

- a. What types of pre-outage interactions (e.g. meetings, reports) are held between the RB and the licensee?
- b. What documentation is supplied and what discussions are held in pre-outage interactions (e.g. test plan, modifications, regulatory commitments, in-service inspection, quality assurance, fire safety, etc.)?
- c. What influence does the RB have on the scope, content and planning of NPP outages? Is there a formal approval required from the RB on the outage scope?
- d. Does the RB define preconditions for restart?

3. RB outage inspection scope

The following questions concern the scope and resourcing of inspections carried out by the RB during an NPP outage.

- a. Does the RB explicitly define by internal procedure a list of topics that it will inspect during an outage and if so what are they?
- b. Which of the following topics are typically inspected by the RB?
 - safety culture
 - operating experience
 - qualification of licensee staff/contractors
 - fire protection
 - radiological protection

- control of foreign material (FME)
 - housekeeping
 - industrial safety (personal safety)
 - working time
 - management of contractors
 - security
 - environmental issues
 - modifications
 - quality assurance
 - in-service inspections (periodic tests)
 - pressure boundaries
 - outage management
 - maintenance activities
 - handling of fuel elements
 - specific technical areas (e.g. structural integrity, electrical, etc.).
- c. What type and how much inspection resource is utilised (e.g. RB inspection staff, RB specialist, and technical support organisation manpower)?
- d. What inspections are undertaken by the RB to evaluate that the licensee has minimized nuclear safety risks during the outage?

4. Fire safety

The following questions concern fire safety maintenance programmes, the impact of outage activities on fire safety and arrangements for response to a fire.

- a. What inspections are undertaken by the RB regarding oversight of the maintenance of fire protection systems during an outage?
- b. What inspections are undertaken by the RB of the licensee's ability to control fire risks arising during an outage (e.g. hot work, fire loading, etc.)?
- c. How does the RB evaluate that the licensee's arrangements for response to fire during an outage are adequate?

5. Outage findings

The following questions concern RB follow-up on outage findings¹ (e.g. test results, in-service inspection (ISI) results) and events (e.g. leaks, fire, workforce accidents, reportable and non-reportable events) and their resolution.

- a. How is the RB informed of any findings and events arising during the outage?
- b. How does the RB respond to findings and events (e.g. specific resources, specific inspections)?
- c. Is the RB routinely informed of all fire occurrences?
- d. How does the RB assess that any findings are evaluated in a timely manner?

¹ Identified either by the RB or the licensee

6. Outage key stages, restart, and post outage actions

The following questions concern the monitoring of progress by the RB during an NPP outage, RB witness points, authorisation for restart, post outage review and relevant post outage testing

- a. What arrangements does the RB have to monitor progress with the outage program (e.g. daily reports, routine meetings, database access)?
- b. Does the RB define any formal witness or hold points during the outage and if so what are they?
- c. Does the licensee require formal authorisation from the RB before restart, and if so what is the RB decision making process to allow the restart?
- d. What type activities (if any) are undertaken by the RB after restart (e.g. inspection of physics tests, review of licensee lessons learned, etc.)?

7. Are there any other important topics that you would like to be considered at the workshop?

BELGIUM

1. Regulatory requirements

- a. *What are the regulatory requirements governing the outage of NPPs?*

There is no specific regulatory requirement.

- b. *What are the regulatory requirements relating to fire protection at NPPs during outages?*

There is no specific regulatory requirement.

2. Outage scope and content

The following questions concern the review of outage scope and content by the RB with the licensee prior to the outage.

- a. *What types of pre-outage interactions (e.g. meetings, reports) are held between the RB and the licensee?*

Licensee is asked to transmit the list of the “main tasks and modifications” that are planned.

Some specific meetings are held (for instance in order to have an approval on the scope of the Steam Generators tubes inspection).

- b. *What documentation is supplied and what discussions are held in pre-outage interactions (e.g. test plan, modifications, regulatory commitments, in-service inspection, quality assurance, fire safety, etc.)?*

All modifications to the structures, systems and components that are safety related are to be approved by RB before being implemented and require approval by RB before being put into service.

RB verify (on a sampling basis) that the licensee complies with requirements of the Technical Specifications (related to in-service inspection, periodical testing,...).

- c. *What influence does the RB have on the scope, content and planning of NPP outages? Is there a formal approval required from the RB on the outage scope?*

Except for the modifications (see answer 2.b) and for some In-Service-Inspections, there is no formal approval from the RB on the outage scope and planning. This scope is nevertheless examined by RB (see answers 2.a and 2.b) and specific topics may be discussed with licensee.

- d. *Does the RB define preconditions for restart?*

In most of the cases, there are no preconditions defined by RB, except for the modifications (see answer 2.a). In some cases, when technical issues are raised during the outage, some “preconditions” may be defined.

The conditions for restart are those linked to the compliance with the Technical Specifications (including those related to the approval of the new fuel cycle – see answer 6.c).

3. RB outage inspection scope

The following questions concern the scope and resourcing of inspections carried out by the RB during an NPP outage.

- a. *Does the RB explicitly define by internal procedure a list of topics that it will inspect during an outage and if so what are they?*

An internal procedure defines a list of topics that can be checked on a sampling basis:

- Planning of the outage,
- Organization of the licensee during the outage,
- Modifications (with a special focus on the modifications that were planned and that are postponed or abandoned),
- Repair & Replacement activities,
- Actions planned by the licensee to close temporary modifications,
- In-Service-Inspections (safety valves, steam generator tubes, etc.),
- Preventive maintenance (with focus on the planned preventive maintenance that is postponed),
- Radiation protection (estimation of the collective doses, measures taken by the licensee to reduce the doses, etc.),
- Physics tests at the restart (considering the fact that RB gives a formal approval for the new fuel cycle).

b. Which of the following topics are typically inspected by the RB?

- *safety culture*
- *operating experience*
- *qualification of licensee staff/contractors*
- *fire protection*
- *radiological protection*
- *control of foreign material (FME)*
- *housekeeping*
- *industrial safety (personal safety)*
- *working time*
- *management of contractors*
- *security*
- *environmental issues*
- *modifications*
- *quality assurance*
- *in-service inspections (periodic tests)*
- *pressure boundaries*
- *outage management*
- *maintenance activities*
- *handling of fuel elements*
- *specific technical areas (e.g. structural integrity, electrical, etc.)*

The RB typically inspect: safety culture, fire protection, radiological protection, housekeeping, modifications, in-service inspections (periodic tests), maintenance activities, handling of fuel elements and specific technical areas (on an ad hoc basis).

c. What type and how much inspection resource is utilised (e.g. RB inspection staff, RB specialist, and technical support organisation manpower)?

The inspections are made by the resident inspector, with a support from RB specialists the case being. During an outage, the resident inspector is on site about 2 to 5 days per week (depending on the activities performed by the licensee).

d. What inspections are undertaken by the RB to evaluate that the licensee has minimized nuclear safety risks during the outage?

See answer 3.a.

4. Fire safety

The following questions concern fire safety maintenance programmes, the impact of outage activities on fire safety and arrangements for response to a fire.

- a. *What inspections are undertaken by the RB regarding oversight of the maintenance of fire protection systems during an outage?*

RB performs, for each licensee, so called “thematic inspections” on a yearly basis in the area of fire safety. This gives the RB a general oversight on the area, including maintenance of fire protection systems, organization and processes developed by the licensee to carry on its activities.

During operation and outage, “routine inspections” are performed by resident inspectors. Specific inspections related to fire protection can also be done with RB specialists in this field. These inspections are opportunities for in the field verifications. In this framework, the knowledge of the planning and foreseen maintenance activities are assets for RB: he can thus focus its routine or specific inspections on specific activities.

- b. *What inspections are undertaken by the RB of the licensee’s ability to control fire risks arising during an outage (e.g. hot work, fire loading, etc.)?*

See answer 4.a.

- c. *How does the RB evaluate that the licensee’s arrangements for response to fire during an outage are adequate?*

We have no precise answer to this question.

5. Outage findings

The following questions concern RB follow-up on outage findings¹ (e.g. test results, in-service inspection (ISI) results) and events (e.g. leaks, fire, workforce accidents, reportable and non-reportable events) and their resolution.

- a. *How is the RB informed of any findings and events arising during the outage?*

RB published a list of events that licensees are required to notify either without delay or within the first workday (reactor trip, non-compliance with the technical specifications, radiation protection issue, etc.).

RB also receives information (reports of daily meetings), may assist to some of the licensee’s daily meetings and is often present in the installation (main control room, etc.).

- b. *How does the RB respond to findings and events (e.g. specific resources, specific inspections)?*

The response is commensurate with the safety significance of the event and can go up to putting seals on the installation.

- c. *Is the RB routinely informed of all fire occurrences?*

No.

- d. *How does the RB assess that any findings are evaluated in a timely manner?*

One of the “thematic inspections” periodically performed by RB is related to Operating Experience, with an assessment of the process and its efficiency. Furthermore, regular routine inspection is a mean to closely follow the licensee’s response to findings.

¹ Identified either by the RB or the licensee

6. Outage key stages, restart, and post outage actions

The following questions concern the monitoring of progress by the RB during an NPP outage, RB witness points, authorisation for restart, post outage review and relevant post outage testing

- a. *What arrangements does the RB have to monitor progress with the outage program (e.g. daily reports, routine meetings, database access)?*

RB receives the licensee's internal daily reports. He can also assist as observer to the licensee's daily meetings.

- b. *Does the RB define any formal witness or hold points during the outage and if so what are they?*

The formal holdpoints are related to the safety related modifications (see answer 2.b) and to the physics tests. RB also receives results of In-Service-Inspections (steam generator tubes, reactor vessel, etc.), etc.

- c. *Does the licensee require formal authorisation from the RB before restart, and if so what is the RB decision making process to allow the restart?*

There is not "as such" a formal authorisation from the RB before restart. Nevertheless, RB has to formally approve the new fuel cycle and results of the physics tests.

- d. *What type activities (if any) are undertaken by the RB after restart (e.g. inspection of physics tests, review of licensee lessons learned, etc.)?*

For the physics tests, see answer 6.c.

A specific meeting between RB and licensee is held within the 3 months after the restart. This meeting aims at giving an overview of the outage and licensee lessons learned.

7. Are there any other important topics that you would like to be considered at the workshop?

/

CANADA

1. Regulatory requirements

a. What are the regulatory requirements governing the outage of NPPs?

The CNSC does not have any specific regulatory requirements governing outages. However, regulatory requirements do exist for specific areas inspected during outages. These regulatory criteria can be found in a slew of documents such as:

- Power Reactor Operating License (PROL),
- License Condition Handbook (LCH), a companion document to the PROL containing clarification of requirements and additional guidance,
- CSA N286-05, Management Systems Required for NPPs,
- CSA N293-07, Fire Protection for CANDU NPPs,
- CNSC S-210, Maintenance Programs for NPPs,
- Licensee procedures.

b. What are the regulatory requirements relating to fire protection at NPPs during outages?

The licensee shall implement and maintain a fire protection program in accordance with CSA standard N293 FIRE PROTECTION FOR CANDU NUCLEAR POWER PLANTS.

National Fire Protection Association (NFPA) standards are referenced in N293. CNSC document RD-353, Testing the Implementation of Emergency Measures.

2. Outage scope and content

The following questions concern the review of outage scope and content by the RB with the licensee prior to the outage.

a. What types of pre-outage interactions (e.g. meetings, reports) are held between the RB and the licensee?

Due to a lack of a formalized approach, CNSC pre-outage interactions/practices vary among the 5 site offices. However, each site office meets with the licensee well in advance of a planned outage as well as throughout the outage.

Practices include:

1. Routine CNSC/licensee meetings during the planning stage of the outage. Discussions during these meetings are centered on:
 - Outage organization and staffing, with key contacts identified;
 - Licensee goals (criteria for success identified) for the outage:
 - Environmental – conventional safety incidents, reportable spills,
 - Conventional Safety – medical attention occurrences, first aid occurrences, fire events,
 - Radiation Protection – unplanned radiation exposures, total dose, internal dose,
 - Work Protection – work protection level 1 and 2 events,
 - Nuclear Safety – Level 1 or 2 public safety events, OP&P Licence Violations, Nuclear Safety Event- Free Day resets, Non-Legacy S-99 reportable events (human performance), unplanned reactor trips or transients, unplanned risk level changes;
 - Major planned work, work scope and scope changes;
 - Level 1 and 2 logistics;
 - Licensee Regulatory Commitments.
2. Attend licensee pre-outage planning meetings.

- b. *What documentation is supplied and what discussions are held in pre-outage interactions (e.g. test plan, modifications, regulatory commitments, in-service inspection, quality assurance, fire safety, etc.)?*

Documentation required by the CNSC during the pre-outage interactions is at the discretion of the inspector and varies depending on the outage activities. Again, there is no formalized approach, which means that the inspectors determine, to the best of their abilities, what information they require to complete the outage inspection. In addition to the answers in question 2a, documentation that may be requested include:

- Work Packages,
- ALARA plans,
- Hazardous & Operability Analysis (HAZOP).

- c. *What influence does the RB have on the scope, content and planning of NPP outages? Is there a formal approval required from the RB on the outage scope?*

The CNSC has very little influence on the scope, content and planning of NPP outages, seeing as these areas are not governed by regulatory requirements. Formal approval of the outage scope by the CNSC is not required.

However, the CNSC may require a licensee to correct deficiencies identified by inspectors. Inspectors also monitor additions & deletions to the outage scope, ensuring that vital activities not be dropped and that safety is considered in the decision making process.

- d. *Does the RB define preconditions for restart?*

Licensees must complete their regulatory commitments to the satisfaction of the CNSC. In the event where a commitment cannot be completed, the licensee must provide a rational and seek CNSC approval before restart.

3. RB outage inspection scope

The following questions concern the scope and resourcing of inspections carried out by the RB during an NPP outage.

- a. *Does the RB explicitly define by internal procedure a list of topics that it will inspect during an outage and if so what are they?*

The CNSC does not have a formalized approach for outage inspections. Thus topics inspected may vary from site office to site office.

An Outage Inspection Guide is being developed and will soon be formally approved for use at all Canadian NPPs. The goal is consistent outage inspection practices from site office to site office.

- b. *Which of the following topics are typically inspected by the RB?*

- *safety culture*
- *operating experience*
- *qualification of licensee staff/contractors*
- *fire protection*
- *radiological protection*
- *control of foreign material (FME)*
- *housekeeping*
- *industrial safety (personal safety)*

- *working time*
- *management of contractors*
- *security*
- *environmental issues*
- *modifications*
- *quality assurance*
- *in-service inspections (periodic tests)*
- *pressure boundaries*
- *outage management*
- *maintenance activities*
- *handling of fuel elements*
- *specific technical areas (e.g. structural integrity, electrical, etc.).*

Given that no formalized outage inspection procedure exists, topics covered during an outage inspection not only vary from site office to site office, but can change from outage to outage.

The following topics are usually covered during an outage inspection. These topics are also inspected during normal operation (i.e. at power):

- safety culture
- operating performance
- fire protection
- radiological protection
- control of foreign material (FME)
- housekeeping
- industrial safety (personal safety)
- environmental issues
- quality assurance
- in-service inspections (periodic tests)
- pressure boundaries
- outage management
- maintenance activities.

Other topics that are covered during an outage but are not in the list provided are:

- Guaranteed Shutdown State
- Outage Heat Sinks
- Reportable events.

- c. *What type and how much inspection resource is utilised (e.g. RB inspection staff, RB specialist, and technical support organisation manpower)?*

Management assigns a Lead Inspector to an outage inspection. He/she is responsible for coordinating compliance inspection activities, which usually involves the participation of other site inspectors. On occasion, the Lead Inspector may request assistance from specialists or licensing staff located at the head office.

Licensing issues that arise during an outage inspection are normally handled by staff at the head office (Regulatory Program Officers - RPO). For example, an RPO would discuss preliminary periodic inspection finding with specialists.

- d. *What inspections are undertaken by the RB to evaluate that the licensee has minimized nuclear safety risks during the outage?*

No formal inspections are undertaken by CNSC inspectors to evaluate that licensees have minimized nuclear safety risks during an outage.

However, CNSC staff continuously verifies the minimization of nuclear safety risks by conducting surveillance & monitoring, inspections and desktop reviews which touch on 14 different safety & control areas (SCA). Moreover, a risk-informed approach (or risk-informed decision making) is used in planning compliance inspections and assessments.

4. Fire safety

The following questions concern fire safety maintenance programmes, the impact of outage activities on fire safety and arrangements for response to a fire.

- a. *What inspections are undertaken by the RB regarding oversight of the maintenance of fire protection systems during an outage?*

There is no formal requirement to inspect oversight of the maintenance of fire protection systems during an outage. However, this topic is covered by a separate inspection for which an inspection guide exists, "Fire Protection Inspection at an NPP".

- b. *What inspections are undertaken by the RB of the licensee's ability to control fire risks arising during an outage (e.g. hot work, fire loading, etc.)?*

Whether at outage or at power, site inspectors routinely conduct field walkdowns throughout the NPP, during which time fire risks are noted, assessed and if need be, communicated to the licensee. Site inspectors may choose to follow-up on specific work and conduct a field walkdown to verify proper permits, fire picket, removal of combustibile material, additional extinguishers in place, etc.

- c. *How does the RB evaluate that the licensee's arrangements for response to fire during an outage are adequate?*

Regulatory requirements pertinent to a licensee's arrangements for response to a fire during an outage are identical to those for any mode of operation. Several CNSC inspection guides touch on this topic.

Inspection activities vary from site office to site office, and include:

- Review Fire Impairment Reports,
- Review Transient Material Permits,
- Perform Field Walkdowns,
- Verify Emergency Response Team minimum shift complement is met.

Any questions arising as to the nature of a licensee's ability to respond would be brought to the attention of Fire Protection specialists.

Moreover, the licensee shall arrange for third party audits of one industrial fire brigade fire drill once every two years. The purpose of a Third Party Audit is to provide an in-depth analysis of the Industrial Fire Brigade's (IFB) fire response performance against applicable regulatory criteria. A fire response is a planned, coordinated and controlled activity to provide emergency response to a fire. The audit is to analyze and ensure competencies of the IFB against CSA N293 standard and the referred NFPA 600 and 1081 standards. The resulting audit report must be submitted to CNSC staff for review.

5. Outage findings

The following questions concern RB follow-up on outage findings¹ (e.g. test results, in-service inspection (ISI) results) and events (e.g. leaks, fire, workforce accidents, reportable and non-reportable events) and their resolution.

- a. *How is the RB informed of any findings and events arising during the outage?*

The CNSC is informed of findings and events through the following:

- Site inspectors routinely attend licensee outage meetings where findings and events are discussed.
- Site inspectors review licensee's shift logs and Corrective Action Program database on a daily basis.
- Licensee staff routinely meets with CNSC site inspectors to communicate findings and events.
- CNSC document S-99, Reporting Requirements for Operating NPPs.

- b. *How does the RB respond to findings and events (e.g. specific resources, specific inspections)?*

There are two categories of findings:

- Findings from a compliance activity (e.g. surveillance & monitoring, inspections, compliance desktop reviews, focused inspections, follow-ups).
- Findings from a licensing activity (e.g. assessment/review).

Of a compliance nature: It is left to the site inspectors and their supervisor to determine if a finding or an event requires additional resources or a special inspection. Other inspectors or specialists may be called in to assist.

Of a licensing nature: Staff at the head office takes over.

Findings and events are documented in an inspection report which is sent to the licensee. Each finding and event is rated with respect to safety significance, and when necessary, remedial actions are raised within the report. The licensee must correct all remedial actions.

- c. *Is the RB routinely informed of all fire occurrences?*

Yes

- d. *How does the RB assess that any findings are evaluated in a timely manner?*

CNSC does not systematically verify that findings are evaluated in a timely manner.

- Verification of the licensee's Corrective Action Program database.
- Meetings with licensee staff.

6. Outage key stages, restart, and post outage actions

The following questions concern the monitoring of progress by the RB during an NPP outage, RB witness points, authorisation for restart, post outage review and relevant post outage testing

- a. *What arrangements does the RB have to monitor progress with the outage program (e.g. daily reports, routine meetings, database access)?*

Practices may vary from site office to site office, but generally include:

- Site inspectors attend daily outage meetings.
- Site inspectors routinely meet with licensee staff.

¹ Identified either by the RB or the licensee

- Site inspectors review station logs and the Corrective Action Program database daily.
- Site inspectors have access to the daily Outage Package, which includes:
 - Safety Review – nuclear, conventional, radiation,
 - Radiation – airborne and contamination survey results, and summary of performance review (weekly),
 - Tritium hazards and summary of performance review (weekly),
 - Unit Status including Reactor Safety Assessment,
 - Housekeeping issues,
 - Action logs.

b. *Does the RB define any formal witness or hold points during the outage and if so what are they?*

Formal witness and hold points are not mandated. However, regulatory commitments must be completed before restart.

c. *Does the licensee require formal authorisation from the RB before restart, and if so what is the RB decision making process to allow the restart?*

Formal authorisation for restart is not mandated. However, there is a license condition that requires restart approval after an actual or potential serious process failure. Moreover, the License Condition Handbook (LCH) states that the licensee must send the CNSC an "Outage Completion Assurance Statement", which includes a list of major work completed and those which are still in progress but will be completed prior to restart.

d. *What type activities (if any) are undertaken by the RB after restart (e.g. inspection of physics tests, review of licensee lessons learned, etc.)?*

Activities undertaken after restart are focused on compliance and licensing issues that came up during the outage. As these issues vary from outage to outage and from NPP to NPP, follow-up activities may vary. Activities usually include:

- Review licensee's outage report.
- Send CNSC inspection report to licensee.
- Follow-up on remedial actions raised in the CNSC inspection report.
- Follow-up meetings with the licensee.

7. Are there any other important topics that you would like to be considered at the workshop?

How are other RBs doing in the way of consistent outage inspection practices from NPP to NPP?

CZECH REPUBLIC

1. Regulatory requirements

- a. *What are the regulatory requirements governing the outage of NPPs?*
- b. *What are the regulatory requirements relating to fire protection at NPPs during outages?*

Answer related to a):

Atomic Act No.18/1997**Chapter 3, Section 17: General obligations of Licensee**

d) comply with technical and organisational conditions for safe operation of nuclear installations, ionising radiation sources and workplaces with ionising radiation source as laid down in an implementing regulations, comply with the approved quality assurance programme and adhere to specific requirements for uniformity and correctness of measurements and measuring devices to the extent laid down in an implementing regulation;

- **Regulation of the SUJB No. 106/1998 Coll., on Nuclear Safety and Radiation protection Assurance during Commissioning and Operation of Nuclear Facilities**

Section 15, Maintenance

(1) The maintenance, testing and inspections of all systems and equipment important from the viewpoint of nuclear safety are performed according to the operating instructions, procedures and programs and they have such technical level and frequency so that it would be assured, that the reliability and the function of these systems and equipment are in accordance with the special Regulation and with the design, and that all activities perform in accordance with the limits and conditions of safe operation.

- **Regulation of the SUJB No. 132/2008 Coll., on Quality Assurance system in carrying out activities connected with utilization of nuclear energy and radiation protection and Quality assurance of selected equipment in regard their assignment to classes of nuclear safety**

Section 6**Processes and Activities**

- (1) Planning, control, verification, performance and evaluation of processes and activities within the quality assurance system shall be carried out by persons having qualification corresponding to the type and significance of the activity carried out by them.
- (2) Processes and activities shall be planned and performed under the following conditions:
 - a) documented procedures and working documents related to the item affecting nuclear safety or radiation protection are available,
 - b) performance of processes and activities is in compliance with the requirements of the documented procedures and working documents for processes and activities,
 - c) equipment suitable for performance of processes and activities is used and necessary working conditions and environment for their execution are provided,
 - d) characteristics of the item affecting nuclear safety or radiation protection are monitored and checked,
 - e) production, monitoring, measuring or testing equipment is maintained in condition enabling to document achievement of permanent compliance of the item affecting nuclear safety or radiation protection with the requirements imposed thereon; procedures, which shall ensure

that the uncertainty of measurement corresponds with the required measuring capability, shall be worked out for check, calibration and maintenance of monitoring, measuring and testing equipment, and

- f) processes and activities are changed only on the basis of a proposal justified and evaluated from the viewpoint of purpose of the change and its impact on nuclear safety or radiation protection, and demonstration of impact of the change on the level of nuclear safety and radiation protection after its implementation.

- (3) Each process within the quality assurance system shall be evaluated from efficiency point of view. Efficiency of process shall be evaluated by comparing process outputs with the requirements imposed thereon in the documentation of the quality assurance system.

2. Outage scope and content

The following questions concern the review of outage scope and content by the RB with the licensee prior to the outage.

- a. *What types of pre-outage interactions (e.g. meetings, reports) are held between the RB and the licensee?*

SÚJB obtains detail outage time- schedule with specification of substantial outage activities and list of performed modifications, those modifications which are submitted to SÚJB for approval are documented with adequate details. Outage activities are incorporated into daily operation plans which are available for resident inspector and stored on internal SÚJB network.

Between the RB and licensee are held regular morning briefings, extraordinary meeting regarding to specific unplanned issues and specific meetings during performing of various SÚJB inspections during outage.

- b. *What documentation is supplied and what discussions are held in pre-outage interactions (e.g. test plan, modifications, regulatory commitments, in-service inspection, quality assurance, fire safety, etc.)?*

See previous answer.

- c. *What influence does the RB have on the scope, content and planning of NPP outages? Is there a formal approval required from the RB on the outage scope?*

There is no formal approval requirement of the RB on the outage scope. In case of urgent resolving of problem potentially causing decreasing of nuclear safety, RB can enforce implementing desired action during planned outage.

- d. *Does the RB define preconditions for restart?*

According to the Atomic Act No 18/1997, RB issues permission for restart of reactor after refuelling outage.

3. RB outage inspection scope

The following questions concern the scope and resourcing of inspections carried out by the RB during an NPP outage.

- a. *Does the RB explicitly define by internal procedure a list of topics that it will inspect during an outage and if so what are they?*

Yes, these inspections are performed in compliance with SÚJB internal documents VDS 008 and VDS078.

b. *Which of the following topics are typically inspected by the RB?*

- safety culture X
- operating experience X
- qualification of licensee staff/contractors X
- fire protection X
- radiological protection X
- control of foreign material (FME) X
- housekeeping X
- industrial safety (personal safety) X (especially industrial safety of equipment)
- working time
- management of contractors X
- security X
- environmental issues
- modifications X
- quality assurance X
- in-service inspections (periodic tests) X
- pressure boundaries X
- outage management X
- maintenance activities X
- handling of fuel elements X
- specific technical areas (e.g. structural integrity, electrical, etc) X

c. *What type and how much inspection resource is utilised (e.g. RB inspection staff, RB specialist, and technical support organisation manpower)?*

Routine and specialized inspections are performed by ordinary SÚJB staff, currently technical support organizations are not utilized..

d. *What inspections are undertaken by the RB to evaluate that the licensee has minimized nuclear safety risks during the outage?*

Each outage and according to real equipment configuration - adequate risk profile including instantaneous risk contributors are evaluated by means of respective PSA application – risk monitor and this PSA application (risk monitor) is also available in residential office of SÚJB in off-line mode.

4. Fire safety

The following questions concern fire safety maintenance programmes, the impact of outage activities on fire safety and arrangements for response to a fire.

a. *What inspections are undertaken by the RB regarding oversight of the maintenance of fire protection systems during an outage?*

Routine inspections focused on preventive and corrective maintenance activities of fire equipment including periodic or post maintenance testing performing according to testing programme.

What inspections are undertaken by the RB of the licensee's ability to control fire risks arising during an outage (e.g. hot work, fire loading, etc.)?

Specialized SÚJB inspections are focused on:

- compliance with described fire protection measures or respective compensatory measures implemented on the temporary basis and derived from utility fire fighting strategy .
- capability of firefighting brigade on site, including training, fire fighting practice and fire drills.
- system communication between unit control rooms and fire fighting communication response centre
- during patrolling on site – fire barrier closures (fire doors and dampers), storing of combustible materials and ignition sources, etc.

b. *How does the RB evaluate that the licensee's arrangements for response to fire during an outage are adequate?*

See previous answer.

5. Outage findings

The following questions concern RB follow-up on outage findings¹ (e.g. test results, in-service inspection (ISI) results) and events (e.g. leaks, fire, workforce accidents, reportable and non-reportable events) and their resolution.

a. *How is the RB informed of any findings and events arising during the outage?*

By means of regular each morning briefing, event reports and report from event analysis elaborated by operational experience feedback department.

b. *How does the RB respond to findings and events (e.g. specific resources, specific inspections)?*

Adequate enforcement actions (defined legal framework and SÚJB internal procedures) and specialized inspection focused on investigation process of substantial events.

c. *Is the RB routinely informed of all fire occurrences?*

Yes, according to mutual RB and utility agreement “about hotline”.

d. *How does the RB assess that any findings are evaluated in a timely manner?*

Usually, in timely manner.

6. Outage key stages, restart, and post outage actions

The following questions concern the monitoring of progress by the RB during an NPP outage, RB witness points, authorisation for restart, post outage review and relevant post outage testing

a. *What arrangements does the RB have to monitor progress with the outage program (e.g. daily reports, routine meetings, database access)?*

See answer 2a.

b. *Does the RB define any formal witness or hold points during the outage and if so what are they?*

Only in case of extraordinary (substantial) event.

¹ Identified either by the RB or the licensee

- c. *Does the licensee require formal authorisation from the RB before restart, and if so what is the RB decision making process to allow the restart?*

Yes according to Atomic Act No 18/1997.

- d. *What type activities (if any) are undertaken by the RB after restart (e.g. inspection of physics tests, review of licensee lessons learned, etc.)?*

Usually during routine inspection activities - start up process is monitored including selected physics tests. Subsequently results of physics tests are evaluated by SÚJB staff.

7. Are there any other important topics that you would like to be considered at the workshop?

No.

FINLAND

1. Regulatory requirements

a. *What are the regulatory requirements governing the outage of NPPs?*

There is a specific regulatory guide that gives some specific requirements about outages. Of course, other regulatory guides give plenty of relevant requirements that are applied during outages. Basically requirements are that NPP need to plan and organize the outage in safe manner. Specific emphasis shall be given to criticality control, control and make up possibilities of leakages and heat removal functions.

Availability of safety functions shall be planned in connection with scope of work. Availability of safety systems, containment function and overpressure protection,, Electrical and I&C systems, fire safety, physical protection, emergency preparedness and safety HVAC systems. This scheduling of work and cross checking when any changes are made is important activity

b. *What are the regulatory requirements relating to fire protection at NPPs during outages?*

Normal rules for fire safety still apply. Each outage need to have a detailed fire safety plan which has some specifics for organization and actions that are needed during outage. During outage there is a growing need for fire safety provisions.

2. Outage scope and content

The following questions concern the review of outage scope and content by the RB with the licensee prior to the outage.

a. *What types of pre-outage interactions (e.g. meetings, reports) are held between the RB and the licensee?*

Pre-outage meeting is held, where main activities are presented. Also overall check about regulatory approvals which are needed before outage are also tracked. This means mainly regulatory approvals for modifications, repairs, etc.

b. *What documentation is supplied and what discussions are held in pre-outage interactions (e.g. test plan, modifications, regulatory commitments, in-service inspection, quality assurance, fire safety, etc.)?*

- 1 month before outage:

- overall arrangements and organisation,
- scope of work,
- specific arrangements regarding nuclear and radiation safety, security or safeguards during outage.

- 2 weeks before outage:

- availability of safety functions shall be planned in connection with scope of work,
- availability of safety systems, containment function and overpressure protection,
- availability of electrical and I&C systems,
- probabilistic risk assessment for the outage (Outage specific PRA study).

- 1 week before closure of the vessel head:

- reactor and fuel characteristics for approval.

- c. *What influence does the RB have on the scope, content and planning of NPP outages? Is there a formal approval required from the RB on the outage scope?*

There is no formal approval of the overall content. Individual safety related modifications etc. have their own approval process.

- d. *Does the RB define preconditions for restart?*

Yes, there are inspections and review approvals

Reactor pressure vessel closure need to be approved and inspected (core, primary system inspections, safeguards).

NPP need to apply restart permission. Application includes information about the scope of work and any changes. Also most important findings and open issues are presented. (These need to be clarified before restart).

There is the last stage of restart when the NPP need to verify the readiness for restart according to their safety rules and each organizational unit will check their responsibilities. After NPP has made the decision the justification for restart is presented to resident inspector who will make own checks and inspections and issue the inspection protocol for the restart.

3. RB outage inspection scope

The following questions concern the scope and resourcing of inspections carried out by the RB during an NPP outage.

- a. *Does the RB explicitly define by internal procedure a list of topics that it will inspect during an outage and if so what are they?*

Normally no, but nowadays we have a inspection program what is designed to be carried out during the outage. It consists of various topics, such as: fire safety, radiation protection, civil engineering etc.

- b. *Which of the following topics are typically inspected by the RB?*

- *safety culture*
 - o this is carried out by licensee, but STUK is following.
- *operating experience*
 - o licensee has its own group for this, but it shall be inspected by authority also.
- *qualification of licensee staff/contractors*
 - o licensee follows qualifications, but in certain in-service work (NDT) STUK approval is needed before outage.
- *fire protection*
 - o in daily basis resident inspector randomly checks fire doors and fire extinguishers(if they're out of date).
- *radiological protection*
 - o shall be inspected in inspection program what is carried out during the outage.
- *control of foreign material (FME)*
 - o licensee has its own plan how to control this.
- *housekeeping*
 - o licensee controls this.
- *industrial safety (personal safety)*
 - o according to the Finnish law, everybody are responsible to report risks.

- *working time*
 - o licensee is responsible.
 - *management of contractors*
 - o licensee is responsible.
 - *security*
 - o carried out in inspection program during the outage.
 - *environmental issues*
 - o carried out, but not during the outage-> in a certain inspection program.
 - *modifications*
 - o licensee informs authority for biggest and most important modifications (and sends documents for approval) and in outage authority has the possibility to follow these modifications.
 - *quality assurance*
 - o licensee is responsible.
 - *in-service inspections (periodic tests)*
 - o licensee follows, but the results shall be accepted by STUK before the startup of the plant.
 - *pressure boundaries*
 - o shall be inspected(SC1/SC2), depending of the ISI-program.
 - *outage management*
 - o authority participates licensee's meetings 2/week.
 - *maintenance activities*
 - o authority can follow and certain safety class components(SC1 and SC2 mainly) are inspected by us.
 - *handling of fuel elements*
 - o handling can be followed and before outage handling plans are sent to us.
 - *specific technical areas (e.g. structural integrity, electrical, etc.)*
 - o Depends of the inspection plan for the outage.
- c. *What type and how much inspection resource is utilised (e.g. RB inspection staff, RB specialist, and technical support organisation manpower)?*

We have around 20 persons (different areas of expertise) working in the outage including resident inspectors.

- d. *What inspections are undertaken by the RB to evaluate that the licensee has minimized nuclear safety risks during the outage?*

Licensee sends all the most important documents (e.g. decay heat power report, nuclear criticality safety report etc.) to authority for approval before outage. In outage inspectors can check if licensee is acting according to the plans.

4. Fire safety

The following questions concern fire safety maintenance programmes, the impact of outage activities on fire safety and arrangements for response to a fire.

- a. *What inspections are undertaken by the RB regarding oversight of the maintenance of fire protection systems during an outage?*

If there are maintenance works concerning fire protection systems during the outage, plans are sent to us for approval. During outage there is an inspection where fire protection systems are under supervision.

- b. *What inspections are undertaken by the RB of the licensee's ability to control fire risks arising during an outage (e.g. hot work, fire loading, etc.)?*

This is inspected in a certain inspection and also resident inspectors randomly checks risks in this area in their daily walk in the plant.

- c. *How does the RB evaluate that the licensee's arrangements for response to fire during an outage are adequate?*

Licensee sends their plan (response to fire) before outage to us for approval.

5. Outage findings

The following questions concern RB follow-up on outage findings¹ (e.g. test results, in-service inspection (ISI) results) and events (e.g. leaks, fire, workforce accidents, reportable and non-reportable events) and their resolution.

- a. *How is the RB informed of any findings and events arising during the outage?*

RB takes part or approves most important inspections, other inspection results are presented as a summary. Deviations and findings are then resolved according to the safety classification and subject. Regulatory reporting requirements provide notifications for events. Non reportable events are known by interaction and by RB's participation in the NPP's outage meetings.

- b. *How does the RB respond to findings and events (e.g. specific resources, specific inspections)?*

Findings are resolved by additional actions before restart can be approved. Events are investigated and reported and immediate actions are done before restart. OEF process will then take over.

- c. *Is the RB routinely informed of all fire occurrences?*

For actual fires yes, but not every ignition or mishap that involves fire rules. Outage inspection is done and status of fire protection systems and events are dealt with in an inspection.

- d. *How does the RB assess that any findings are evaluated in a timely manner?*

Many inspections are done or approved/ by the RB. Others are presented for information. This set of ISI and periodic test information is so large that safety relevant information is assessed by the RB before restart permission can be granted. The restart permission first by the NPP and then by the RB provides so strong hold point that assures that safety related findings are dealt with.

6. Outage key stages, restart, and post outage actions

The following questions concern the monitoring of progress by the RB during an NPP outage, RB witness points, authorisation for restart, post outage review and relevant post outage testing

- a. *What arrangements does the RB have to monitor progress with the outage program (e.g. daily reports, routine meetings, database access)?*

Daily reports, routine meetings, data base access, direct co-operation between RB inspectors and NPP persons for activities that have regulatory aspects involved.

¹ Identified either by the RB or the licensee

- b. *Does the RB define any formal witness or hold points during the outage and if so what are they?*

Hold points are:

- closure of the RPV head (reactor and primary circuit inspections need to be ok)
- restart permission (open regulatory items between NPP and RB need to be clarified)
- restart inspection by the resident inspector (NPP has verified safety of the restart and RB inspectors at site do not have any open items).

- c. *Does the licensee require formal authorisation from the RB before restart, and if so what is the RB decision making process to allow the restart?*

See above. RPV head closure and restart inspection are done at the site by the inspector. Restart permission involves the whole RB staff and director need to give the permission based on the application and RB's own inspections.

- d. *What type activities (if any) are undertaken by the RB after restart (e.g. inspection of physics tests, review of licensee lessons learned, etc.)?*

Scram and physics tests are witnessed and sometimes some other startup tests.

Lessons learned meeting between RB and NPP is usually held quite soon after restart (days/weeks). There are discussions from both sides.

There is also outage report after 3 months about the main work done during outage.

- 7. Are there any other important topics that you would like to be considered at the workshop?**

FRANCE

1. Regulatory requirements

a. What are the regulatory requirements governing the outage of NPPs?

At the moment, it is in a letter sent by ASN to EDF (the French licensee) where you can find ASN requirement during outages. It is through this letter that the licensee has to ask ASN an authorisation before achieving core criticality.

In the next months, this letter will be cancelled: ASN is preparing official regulatory requirements concerning reactor outages. They will be validated by ASN commissioners before summer 2014.

b. What are the regulatory requirements relating to fire protection at NPPs during outages?

There is no specific regulatory requirement relating to fire protection at NPP's during outages. It's the general requirements which applies. However, a particular attention is concerned this period by the regulatory body during the inspections.

2. Outage scope and content

The following questions concern the review of outage scope and content by the RB with the licensee prior to the outage.

a. What types of pre-outage interactions (e.g. meetings, reports) are held between the RB and the licensee?

Pre-outage meeting is held, where main activities are presented. Also overall check about regulatory approvals which are needed before outage are also tracked. This means mainly regulatory approvals for modifications, repairs etc.

b. What documentation is supplied and what discussions are held in pre-outage interactions (e.g. test plan, modifications, regulatory commitments, in-service inspection, quality assurance, fire safety, etc.)?

4 months before the outage, the licensee sends to ASN an outage program. In the program, licensee indicates:

- the outage planning, with the date of the most important operation (disconnection of the grid, pressure vessel opening, beginning of fuel unloading, beginning of fuel loading, pressure vessel closure, core criticality, ...)
- the most important maintenance operations that will be performed on safety related structures, systems and components (SSC) during the outage ;
- the list of the safety-related modifications licensee will make in the plant during the outage ;
- the list of material non-compliances of the installation and identification of those that will be solved during the outage,
- the objective of the outage concerning radioprotection.

3 months before the outage, a meeting takes place between the licensee, ASN and IRSN (ASN Technical support organisation (TSO)). During this meeting, the licensee presents the outage program and ASN and IRSN asks their question concerning this program to the licensee. Most of the questions are related to feedback from events that took place in other power plants.

- c. *What influence does the RB have on the scope, content and planning of NPP outages? Is there a formal approval required from the RB on the outage scope?*

2 months before the outage, taking into account the program and the conclusion of the meeting, ASN sent to the licensee a letter. In this letter, ASN gives its opinion to the licensee concerning the outage program; ASN can ask, by example, the licensee to perform additional controls or additional maintenance operations.

- d. *Does the RB define preconditions for restart?*

No, ASN doesn't define condition for restart, but for ASN, licensee has to have perform at least everything that is written in the program before restart.

3. RB outage inspection scope

The following questions concern the scope and resourcing of inspections carried out by the RB during an NPP outage.

- a. *Does the RB explicitly define by internal procedure a list of topics that it will inspect during an outage and if so what are they?*

ASN inspectors can use for the inspection during outage a guide written by ASN headquarters. In this guide they can find ideas of topics that can be inspected during outages and for each topic, a list of things that can be checked.

- b. *Which of the following topics are typically inspected by the RB?*

- safety culture
- operating experience
- ~~qualification of licensee staff/contractors~~
- fire protection
- radiological protection
- control of foreign material (FME)
- housekeeping
- industrial safety (personal safety)
- working time
- management of contractors
- ~~security~~
- environmental issues
- modifications
- quality assurance
- in-service inspections (periodic tests)
- pressure boundaries
- outage management
- maintenance activities
- handling of fuel elements
- specific technical areas (e.g. structural integrity, electrical, etc.).

- c. *What type and how much inspection resource is utilised (e.g. RB inspection staff, RB specialist, and technical support organisation manpower)?*

ASN doesn't have any resident inspector. During the outages, it is the inspectors from ASN regional offices who perform the inspection. IF needed, they can ask IRSN (ASN TSO) to come with them. For very specific activities, inspectors from ASN headquarters can come.

During the shorter outages (these outages are more or less 3 weeks and a half), ASN inspectors have to perform 2 inspections.

During the more important outages (more or less 6 weeks), they have to perform 3 inspections.

Every ten years, each power plant stops for a long time (3 months at least). During these outages, lots of maintenance activities are performed, the primary circuit is pressure tested, and the installation are modified to take into account the periodic safety review. During these outages, ASN performs at least 5 inspections.

This number of inspection doesn't take into account the inspections dedicated to worker safety; for this subject, the inspections are performed by a dedicated labor inspector.

- d. *What inspections are undertaken by the RB to evaluate that the licensee has minimized nuclear safety risks during the outage?*

During the inspection during the outages, ASN pays a specific attention to risk prevention, by analysing the maintenance operation schedule, the quality of the maintenance operation and of the tests performed after maintenance operation to check the availability of the SSC. By sampling, ASN inspects some maintenance activities and checks the quality of the risk analysis of the operation and the quality of the information given to the operator to make the activity.

Moreover, ASN often performs inspections dedicated to safety management during outages. This kind of inspections are not performed during the outage but before (to check the organisation of the licensee before an outage or the licensee organisation to prepare the maintenance operation) or after the outage (to check that the licensee analysed the safety related events that occurred during the outage).

4. Fire safety

The following questions concern fire safety maintenance programmes, the impact of outage activities on fire safety and arrangements for response to a fire.

- a. *What inspections are undertaken by the RB regarding oversight of the maintenance of fire protection systems during an outage?*

The national safety authority regularly proceeds to announced or unannounced inspections of the basic nuclear installations to check the adequacy of the measures of prevention and fire fighting to the regulations in force.

In particular, during outages, the inspectors attempt to verify the controls and the statutory periodic tests of the devices of prevention and fire fighting. They check the programs of preventive maintenance scheduled during the outages.

- b. *What inspections are undertaken by the RB of the licensee's ability to control fire risks arising during an outage (e.g. hot work, fire loading, etc.)?*

The national safety authority regularly proceeds to announced or unannounced inspections of the basic nuclear installations to check the adequacy of the measures of prevention and fire fighting to the regulations in force.

During outages, considering the additional risks represented by maintenance works, the inspectors check the licences of fire during the visit of the installation.

- c. *How does the RB evaluate that the licensee's arrangements for response to fire during an outage are adequate?*

The national safety authority regularly proceeds to announced or unannounced inspections of the basic nuclear installations to check the adequacy of the measures of prevention and fire fighting to the regulations in force.

Considering the specific risks connected to the outages, in particular the increase of the storages and the calorific loads, the inspectors proceed to exercises of situation scenario of fire to observe the answer of the licensee regarding fire fighting.

5. Outage findings

The following questions concern RB follow-up on outage findings¹ (e.g. test results, in-service inspection (ISI) results) and events (e.g. leaks, fire, workforce accidents, reportable and non-reportable events) and their resolution.

- a. *How is the RB informed of any findings and events arising during the outage?*

During an outage, each day, a phone call takes place between the licensee and the inspector in charge of the outage (this inspector is from an ASN regional office). During this phone call, the licensee informs ASN about the operations performed during the past 24 hours and give the inspector the provisional date for the next outage's milestones. If some significant events occur or if any significant finding is discovered, the licensee inform ASN during this phone call. This phone call doesn't exempt the licensee to send to ASN for each significative event a specific letter, to explain what happened (accordingly to the "General Rules for Nuclear Installation Order" (order of February 7th 2012).

Each week, ASN received a list of the findings discovered since the beginning of the outage, and can ask for specific additional information concerning any of this findings.

- b. *How does the RB respond to findings and events (e.g. specific resources, specific inspections)?*

For each outage, ASN designates an inspector dedicated to the outage, from the preparation to the end of the outage. It is him who is in the charge of the technical assessment of the findings and events. ASN uses sampling for this assessment. If needed, the inspector can ask IRSN for technical support. Concerning inspections, the inspector can decide to perform an inspection dedicated to findings or events, if he thinks the inspection will allow a better understanding of the event.

- c. *Is the RB routinely informed of all fire occurrences?*

Yes, the regulatory body is immediately informed by the licensee of all fire occurrences. If the fire occurrence has real or potential consequences on the nuclear safety, the licensee has to declare, besides, a significant event to the regulatory body.

- d. *How does the RB assess that any findings are evaluated in a timely manner?*

3 days before achieving core criticality, the licensee sends ASN an outage report. In this report, all the findings must be listed and evaluated by the licensee. ASN checks in the report the evaluation performed by the licensee.

¹ Identified either by the RB or the licensee

6. Outage key stages, restart, and post outage actions

The following questions concern the monitoring of progress by the RB during an NPP outage, RB witness points, authorisation for restart, post outage review and relevant post outage testing

- a. *What arrangements does the RB have to monitor progress with the outage program (e.g. daily reports, routine meetings, database access)?*

During an outage, each day, a phone call takes place between the licensee and the inspector in charge of the outage (this inspector is from an ASN regional office). During this phone call, the licensee informs ASN about the operations performed during the past 24 hours and give the inspector the provisional date for the next outage's milestones. If some significant events occur or if any significant finding is discovered, the licensee inform ASN during this phone call.

Each week, ASN received a list of the findings discovered since the beginning of the outage, an update of the schedule of the outage, and a report concerning radioprotection.

- b. *Does the RB define any formal witness or hold points during the outage and if so what are they?*

During outage, ASN doesn't define witness or hold point.

- c. *Does the licensee require formal authorisation from the RB before restart, and if so what is the RB decision making process to allow the restart?*

At the end of the outage, the licensee needs ASN approval before achieving core criticality. 3 days before this milestone, the licensee sends to ASN a report, and ASN assess this report before allowing it. In this report, the licensee present the different findings and what has been done for each of this findings. If some operation presented to ASN in the outage program haven't been performed, the licensee has to explain why and why is it acceptable. This report is presented to ASN and IRSN during a specific meeting where ASN and IRSN can ask their question.

The authorisation given by ASN can contain a list of condition which must take into account by the licensee (specific additional controls during the next outage, specific additional tests to perform during operation...)

- d. *What type activities (if any) are undertaken by the RB after restart (e.g. inspection of physics tests, review of licensee lessons learned, etc.)?*

1 month after achieving core criticality, the licensee sends ASN a report concerning physics tests and other tests performed after this milestone. This report is presented to ASN and IRSN during a dedicated meeting; during this meeting, procedures filled during the tests can be accessed. After this meeting, ASN can send ask additional information or additional test to the licensee.

4 months after achieving core criticality, licensee sends ASN an outage conclusion report. In this document, licensee mentions:

- The list of the main maintenance activities performed during the outage.
- The list of the findings discovered during the outage and for the findings not fully corrected during the outage, the justification of the acceptability of the situation and the schedule forecasted for the correction.
- The conclusion of the outage concerning radioprotection, waste and effluent production.
- The list of the significant events concerning safety, radioprotection and environment that occurred during the outage or just after the outage (and due to the outage).

This document is used by ASN during the preparation of the next outage.

7. Are there any other important topics that you would like to be considered at the workshop?

GERMANY

1. Regulatory requirements

a. *What are the regulatory requirements governing the outage of NPPs?*

The regulatory requirements are fixed in the licenses (license conditions) of the NPPs. Therefore they differ slightly between the individual NPPs.

The main requirements are:

- submission of the outage programme (about 8 weeks before shutdown);
- submission of the planned follower core composition and proof that this follower core fulfils the reactor physics parameter (about 8 weeks before shutdown);
- submission of the inspection programme for the core components (fuel elements, control rods etc.) to be reloaded (about 8 weeks before shutdown);
- submission of the final follower core composition and the evaluation of the inspection results of the core components (before re-loading the reactor pressure vessel);
- confirmation that the operator's inspections, tests and maintenance work showed no deviations from the license and no safety-relevant insights which conflict the restart (before restart);
- confirmation that the right threshold values have been adjusted in the reactor protection system (before restart).

Before restart an approval (authorisation) by the RB is required.

The in-service inspections (periodic tests and preventive maintenance measures) required during an outage are fixed in the in-service inspection programme (periodic test programme and the maintenance programme). The programme includes a list of all in-service inspections of safety significant SSC to be performed for the NPP and which is approved by the RB with help of the authorized TSO. In the testing framework:

- the type of the in-service inspection;
- the test interval (with and without participation of a TSO that is authorized by the RB) and;
- the preconditions under which the in-service inspections take place (power, non-power etc.) are indicated.

The test procedures are also approved by the RB/TSO.

b. *What are the regulatory requirements relating to fire protection at NPPs during outages?*

There are no regulatory requirements for fire protection specific for outages. The requirements for fire protection and fire protection systems are fixed in the technical rules (KTA 2101). In these rules it is required that in the design of fire protection systems the additional fire loads usually present during the outage phase shall be taken into consideration.

Specifically, the KTA 2101.1 safety standard on "Fire Protection in Nuclear Power Plants, Part 1: Basic Requirements" requires in section 3.3 on "Reactor in Shutdown Condition":

- (1) The structure-related and operational fire protection measures shall be reviewed with regard to whether or not they shall be modified or supplemented in view of the modified operating conditions during this plant condition (shutdown reactor, possible additional combustible materials or a change of their location, possible ignition sources during repair work, additional personnel during inspection, servicing and repair work).
- (2) The additional fire loads usually present during non-power operation shall be taken into consideration in selecting the structure-related fire protection measures.

- (3) The fire protection concept shall reflect the changed conditions regarding fire protection, shall describe the basic measures and shall indicate that additional measures may become necessary and that these measures, then, shall be specified in each individual case.

Note: These measures include, in particular, operational fire protection measures such as fire guard, the availability of additional fire extinguishers and restrictions on bringing in additional fire loads.

When maintenance work or technical modification work is planned, fire protection issues have to be included in the work planning. Detailed requirements for the planning and conducting of the work are written in the maintenance regulation in the operating manual of the plant work. This maintenance regulation is part of the safety specifications and approved by the RB with help of the TSO. The requirements include hot work permits, clearings of the fire detection system or fire suppression systems, temporary closing of opened cable penetration seals, fire guards, etc. Thus, the fire protection measures are determined for each work dependent on the work to be performed and the operation phase (power operation or outage).

2. Outage scope and content

The following questions concern the review of outage scope and content by the RB with the licensee prior to the outage.

- a. *What types of pre-outage interactions (e.g. meetings, reports) are held between the RB and the licensee?*

The outage programme is submitted by the licensee. This outage programme is discussed in one or two meetings between licensee and RB (including TSO) and amended or modified before the outage starts.

The outage programme contains all the approved modification and back-fitting work which should be done during the outage. The applications and documents for the backfitting and modifications are reviewed and approved by the RB before the outage.

A framework time schedule is submitted and discussed.

The planned follower core composition and proof that this follower core fulfils the reactor physics parameter is submitted. The inspection programme for the core components (fuel elements, control rods, etc.) to be reloaded is submitted. If necessary, meetings are held to discuss occurring questions.

- b. *What documentation is supplied and what discussions are held in pre-outage interactions (e.g. test plan, modifications, regulatory commitments, in-service inspection, quality assurance, fire safety, etc.)?*

See answer to 2a.

- c. *What influence does the RB have on the scope, content and planning of NPP outages? Is there a formal approval required from the RB on the outage scope?*

The outage programme is approved by the RB. The RB checks with the assistance of the TSO that all the work packages resulting from license and licence conditions, from regular in-service inspections, supplemental tests or inspections (resulting e.g. from events in other NPPs), from approved modifications and from previous commitments are included in the outage programme.

d. Does the RB define preconditions for restart?

The restart after an outage requires a written approval by the RB. The preconditions are given in the license (license conditions) only in a general manner. Therefore, the RB often specifies in detail what documents, operator's analyses or verifications etc. are necessary for the RB's approval.

3. RB outage inspection scope

The following questions concern the scope and resourcing of inspections carried out by the RB during an NPP outage.

a. Does the RB explicitly define by internal procedure a list of topics that it will inspect during an outage and if so what are they?

A large amount of inspection is covered by accompanying and witnessing of the operator's in-service inspections. This is done by TSO staff on behalf of the RB. In the operator's in-service inspection programme it is indicated which in-service inspections are performed in the outage and which are accompanied by the TSO (see answer to 1a.)

For more general inspections, the RB has a list of topics which are inspected annually or in an interval of two or three years. It is not explicitly defined which topics are inspected during an outage. In general, inspections of outage activities (tests, maintenance activities, modifications, fuel handling etc.) and the precaution measures during these activities (radiation protection, fire protection, industrial safety, prohibition of intake of foreign material, house-keeping, contractors' oversight, security etc.) are inspected during outages. In the contrary, the inspection of processes (quality assurance, qualification of the personnel, radiological emission, contracting etc.) and the documentation/records of the process results are inspected in the non-outage times.

b. Which of the following topics are typically inspected by the RB?

- *safety culture*
to some extent, by collecting impressions
- *operating experience*
yes
- *qualification of licensee staff/contractors*
no
- *fire protection*
yes
- *radiological protection*
yes
- *control of foreign material (FME)*
yes
- *housekeeping*
yes
- *industrial safety (personal safety)*
not in the competence of the RB, but findings are communicated
- *working time*
no (not in the competence of the RB)
- *management of contractors*
no
- *security*
yes

- *environmental issues*
no (not in the competence of the RB)
- *modifications*
yes
- *quality assurance*
no
- *in-service inspections (periodic tests)*
yes
- *pressure boundaries*
yes
- *outage management*
yes
- *maintenance activities*
yes
- *handling of fuel elements*
yes
- *specific technical areas (e.g. structural integrity, electrical, etc)*
yes (technical SSC are inspected via accompanying operator's in-service inspections, buildings are inspected by the competent building inspection authority).

In addition to this list:

- nuclear waste management
- activities of the control room personnel.

- c. *What type and how much inspection resource is utilised (e.g. RB inspection staff, RB specialist, and technical support organisation manpower)?*

On-site-inspection effort for a typical outage (2-4 week duration):

- RB inspection staff: about 6-10 person days
- TSO staff: about 60-100 person days
- For fire protection inspections: TSO staff: about 80-150 person days per year, about 10 % were utilized during outage.

- d. *What inspections are undertaken by the RB to evaluate that the licensee has minimized nuclear safety risks during the outage?*

In the procedures for in-service inspections, conditions are fixed which have to be fulfilled before the test or the maintenance action can be performed. The procedures are inspected/assessed by the RB with help of the TSO. A lot of in-service inspections of the licensee are accompanied and witnessed by the TSO.

In the planning of the non-routine work (modifications, maintenance, etc.) the operator has to consider the nuclear risks and to undertake measures to reduce them (e.g. restriction of the work to one redundancy of the safety system, separation of the affected components, additional instructions for the control room staff). The planning of modifications is inspected/assessed by the RB with help of the TSO.

The outage work is inspected on a spot check basis. During on-site inspections the RB checks that general safety requirements are fulfilled (e.g. maintenance work only in one redundancy of the safety system, compliance with the work planning, radiation protection measures, fire safety, house-keeping).

4. Fire safety

The following questions concern fire safety maintenance programmes, the impact of outage activities on fire safety and arrangements for response to a fire.

- a. *What inspections are undertaken by the RB regarding oversight of the maintenance of fire protection systems during an outage?*

In the in-service inspection programme it is fixed which in-service inspections (of fire protection systems) have to be performed during the outage (e.g. tests of fire detection systems in rooms which are not accessible during power operation). It is also fixed which of these inspections are accompanied and witnessed by the TSO.

If maintenance work is necessary or special inspections (resulting e.g. from operation experience in other NPP) are required, it is decided by the RB to which extent the operator's activities are inspected by the TSO.

- b. *What inspections are undertaken by the RB of the licensee's ability to control fire risks arising during an outage (e.g. hot work, fire loading, etc.)?*

In the planning of the work (modifications, maintenance etc.) the operator has to consider the fire risks and to undertake measures (e.g. reduction of the fire loads, additional equipment, fire fighters in place) to reduce the fire risk. The planning of modifications is inspected/assessed by the RB with help of the TSO.

The normal outage work is inspected on a spot check basis. This includes hot work, fire loads, fire-protection doors, fire-protection walls, fire-retarding sealings etc.

Every some years a special fire protection inspection is performed. Usually these inspections are not in the outage. However, the fire protection measures for work in safety relevant areas and at safety relevant systems, respectively are the same. In these inspections the operation experience of fire protection systems, the number and the causes of fire alarms, the lessons-learned from fire brigade exercises etc. are inspected.

- c. *How does the RB evaluate that the licensee's arrangements for response to fire during an outage are adequate?*

See answer to 4b.

5. Outage findings

The following questions concern RB follow-up on outage findings¹ (e.g. test results, in-service inspection (ISI) results) and events (e.g. leaks, fire, workforce accidents, reportable and non-reportable events) and their resolution.

- a. *How is the RB informed of any findings and events arising during the outage?*

The RB is informed about all in-service inspections which showed any indication. The removal of small indications (e.g. readjustment) is noted in the inspection record.

The RB is informed about findings from ISI and other outage findings or events related to safety significant structures, systems or components (SSC) which may be reportable events or events below the level for reportable events. The information is given orally (by phone or to an inspector during an on-site inspection) or by email within a work day. Afterwards a report is submitted

¹ Identified either by the RB or the licensee

where the finding or event is described in detail. The report also deals with the corrective actions which have been taken or are intended.

Events which do not affect safety significant SSC are not reported. However, major fire occurrences and severe workforce accidents are communicated with the RB.

b. How does the RB respond to findings and events (e.g. specific resources, specific inspections)?

The licensee has to demonstrate that all non-conformities or weaknesses are removed before restart. Therefore the RB reviews the findings and events on basis of licensee's reports and expert opinions of the TSO.

Depending on the safety significance of the findings or events additionally

- an on-site inspection may be performed to get additional information and an visual impression, to check information etc.
- a meeting of the licensee, the RB and its TSO may be held to determine the causes and to discuss the remedy measures.

c. Is the RB routinely informed of all fire occurrences?

No. Only fire occurrences which affect safety significant SSC and major fires.

d. How does the RB assess that any findings are evaluated in a timely manner?

The licensee has to submit the outage report and his comments on the state of the outage activities shortly prior to restart. These documents should contain statements on all relevant activities, in particular on findings and events. Furthermore, the state of compliance and of fulfilment of the preconditions stipulated by the RB should be documented.

The RB review these documents prior its approval for restart.

6. Outage key stages, restart, and post outage actions

The following questions concern the monitoring of progress by the RB during an NPP outage, RB witness points, authorisation for restart, post outage review and relevant post outage testing

a. What arrangements does the RB have to monitor progress with the outage program (e.g. daily reports, routine meetings, database access)?

- routine outage meetings with the licensee (about 1 to 3, depending on the duration of the outage);
- updated time schedules (overall time schedule and time schedule with the activities of the following few days submitted every few days by email);
- information about unplanned occurrences (by phone or email).

b. Does the RB define any formal witness or hold points during the outage and if so what are they?

Yes.

- refuelling of the reactor pressure vessel,
- restart (i.e. start of de-borating of the cooling water in case of PWR).

c. Does the licensee require formal authorisation from the RB before restart, and if so what is the RB decision making process to allow the restart?

Yes.

The RB reviews the documents and reports of the licensee and the expert opinions of the TSO. On basis of this information the approval letter of the restart is prepared. The approval letter may impose requirements which have to be met within the next cycle or in the next outage. The letter is

prepared by the competent inspector who manages the outage from the RB's side in collaboration with the other staff in the section responsible for the NPP. The letter is signed by the section head.

Prior restart a plant walk-down is conducted by the TSO (completion of the work, leakages and house-keeping issues). The RB finally checks e.g. by an on-site inspection and final outage meeting with the plant manager that the requirements relevant for the restart have been met. Then the approval letter is handed over to the licensee.

- d. *What type activities (if any) are undertaken by the RB after restart (e.g. inspection of physics tests, review of licensee lessons learned, etc.)?*
- review of the licensee's report on the reactor physics measurements and the in-service inspections which have to be performed in the time between de-borating and full power operation and the corresponding expert opinion of the TSO;
 - if necessary, discussions with the licensee and the TSO about the experiences gained from the outage;
 - follow-up the fulfilment of the obligations of the approval letter.

7. Are there any other important topics that you would like to be considered at the workshop?

No.

HUNGARY

1. Regulatory requirements

a. What are the regulatory requirements governing the outage of NPPs?

Following refuelling, the nuclear reactor may only be made critical once in possession of the nuclear safety authority permit. The permit shall provide authorisation to bring the nuclear power plant unit to a minimal controlled capacity, and to later load it to the nominal capacity. Following the achievement of nominal capacity, the permit shall automatically become invalid and operation shall be performed according to the nuclear power plant unit operation licence. The permit request for restarting and the required documents shall be submitted at least two weeks before the scheduled outage of the nuclear power plant unit for refuelling.

b. What are the regulatory requirements relating to fire protection at NPPs during outages?

There is no difference comparing normal operation, however regarding fire protection, another authority has the competence.

2. Outage scope and content

The following questions concern the review of outage scope and content by the RB with the licensee prior to the outage.

a. What types of pre-outage interactions (e.g. meetings, reports) are held between the RB and the licensee?

Two days prior the outage there is a pre-outage meeting when details and conditions of the outage plan are checked by the regulatory body and a report is prepared about the meeting.

b. What documentation is supplied and what discussions are held in pre-outage interactions (e.g. test plan, modifications, regulatory commitments, in-service inspection, quality assurance, fire safety, etc.)?

The maintenance schedule, the plan and preliminary cartograms of refuelling, and the preliminary load plan and safety substantiation of the active core shall be attached to the permit request.

At least one week prior to the scheduled date for rendering the active core critical the following shall be submitted to the nuclear safety authority for its information, with the content in compliance with the condition of the second day prior to submission:

- 1) the load plan, physical features of the reactor, launch calculations and safety foundation of the as-built active core,
- 2) the cartograms of the arrangement of fuel assemblies,
- 3) list of alterations implemented during maintenance or under implementation,
- 4) the executed technical safety reviews, material testing, corrosion testing, and the results thereof, furthermore the list and schedule of any remaining inspections,
- 5) the executed unit start tests and the results thereof, furthermore the list and schedule of any remaining tests,
- 6) the summary of completed scheduled maintenance and repair works, the works over schedule and the necessity thereof and a brief justification of the cancelled works, and
- 7) summary of events concerning nuclear safety which occur during maintenance and the management thereof.

- c. *What influence does the RB have on the scope, content and planning of NPP outages? Is there a formal approval required from the RB on the outage scope?*

The outage plan is approved by the regulatory body and details and conditions are checked two days prior at the pre-outage meeting.

- d. *Does the RB define preconditions for restart?*

Preconditions are defined in the Technical Specifications in general, but if necessary the regulatory body can define different preconditions as well.

3. RB outage inspection scope

The following questions concern the scope and resourcing of inspections carried out by the RB during an NPP outage.

- a. *Does the RB explicitly define by internal procedure a list of topics that it will inspect during an outage and if so what are they?*

Yes, in the pre-outage meeting report the general and specific inspections are defined.

- b. *Which of the following topics are typically inspected by the RB?*

- *safety culture*
During the daily overhaul inspection by unit inspector.
- *operating experience*
During the daily overhaul inspection by unit inspector.
- *qualification of licensee staff/contractors*
During the inspection of the overhaul plan.
- *fire protection*
Monitor during the daily overhaul inspection by unit inspector, but another authority is competent.
- *radiological protection*
During the daily overhaul inspection by unit inspector.
- *control of foreign material (FME)*
During the core inspection.
- *housekeeping*
During the daily overhaul inspection by unit inspector.
- *industrial safety (personal safety)*
During the daily overhaul inspection by unit inspector.
- *working time*
No.
- *management of contractors*
During the daily overhaul inspection by unit inspector and QA.
- *security*
Yes, by physical-protection inspections and daily overhaul inspection by unit inspector.
- *environmental issues*
By the general notification requirement.
- *modifications*

During the daily overhaul inspection by unit inspector and by individual inspections.

- *quality assurance*
Yes, before the overhaul.
- *in-service inspections (periodic tests)*
During the daily overhaul inspection by unit inspector.
- *pressure boundaries*
During the daily overhaul inspection by unit inspector.
- *outage management*
Yes by the overhaul plan.
- *maintenance activities*
During the daily overhaul inspection by unit inspector.
- *handling of fuel elements*
By safeguards inspections and daily overhaul inspection by unit inspector.
- *specific technical areas (e.g. structural integrity, electrical, etc.)*
During the daily overhaul inspection by unit inspector.

- c. *What type and how much inspection resource is utilised (e.g. RB inspection staff, RB specialist, and technical support organisation manpower)?*

From the submittal of the application two inspectors are engaged in full time until the end of the overhaul.

- d. *What inspections are undertaken by the RB to evaluate that the licensee has minimized nuclear safety risks during the outage?*

The unit inspector performs daily on-site inspection regarding pressure retaining components and another inspector performs daily inspection regarding systems and components.

4. Fire safety

The following questions concern fire safety maintenance programmes, the impact of outage activities on fire safety and arrangements for response to a fire.

- a. *What inspections are undertaken by the RB regarding oversight of the maintenance of fire protection systems during an outage?*

Regarding fire protection another authority has the competence.

- b. *What inspections are undertaken by the RB of the licensee's ability to control fire risks arising during an outage (e.g. hot work, fire loading, etc.)?*

Regarding fire protection another authority has the competence.

- c. *How does the RB evaluate that the licensee's arrangements for response to fire during an outage are adequate?*

Regarding fire protection another authority has the competence.

5. Outage findings

The following questions concern RB follow-up on outage findings¹ (e.g. test results, in-service inspection (ISI) results) and events (e.g. leaks, fire, workforce accidents, reportable and non-reportable events) and their resolution.

- a. *How is the RB informed of any findings and events arising during the outage?*

In case of an event by the standard event notification system, in case of any finding or non-conformance individual inspection is performed as soon as possible. Also the regulatory body can reach all documentation on-line during the overhaul.

- b. *How does the RB respond to findings and events (e.g. specific resources, specific inspections)?*

In case of event with event investigation, in case of any finding or non-conformance individual inspection is performed.

- c. *Is the RB routinely informed of all fire occurrences?*

Yes, the regulatory body is informed, but regarding fire protection another authority has competence.

- d. *How does the RB assess that any findings are evaluated in a timely manner?*

- e. Unit inspector performs daily inspection, and also the regulatory body can reach all documentation on-line during the overhaul.

6. Outage key stages, restart, and post outage actions

The following questions concern the monitoring of progress by the RB during an NPP outage, RB witness points, authorisation for restart, post outage review and relevant post outage testing

- a. *What arrangements does the RB have to monitor progress with the outage program (e.g. daily reports, routine meetings, database access)?*

Monitoring the daily overhaul reports, monitoring the progression by the overhaul schedule, monitoring the online documentations.

- b. *Does the RB define any formal witness or hold points during the outage and if so what are they?*

Yes, these are integral leak test, 164 bar pressure test, steam generator safety valves test, preparation for Minimal Controlled Power state, in service inspections and on-site work inspections related to

- c. *Does the licensee require formal authorisation from the RB before restart, and if so what is the RB decision making process to allow the restart?*

Yes, the regulatory body issues a start license before the Minimal Controlled Power state.

- d. *What type activities (if any) are undertaken by the RB after restart (e.g. inspection of physics tests, review of licensee lessons learned, etc.)?*

Licensee is required to submit the overhaul evaluation report after 60 days the overhaul.

7. Are there any other important topics that you would like to be considered at the workshop?

¹ Identified either by the RB or the licensee

INDIA

1. Regulatory requirements

- a. *What are the regulatory requirements governing the outage of NPPs?*

Most of the NPPs in India are PHWRs that have on-line refuelling facility. The technical specifications and ISI manual of NPPs, which are approved by RB, specify requirements on In-Service Inspection (ISI) and surveillance. These requirements are one of governing criteria for outage of NPPs

- b. *What are the regulatory requirements relating to fire protection at NPPs during outages?*

The technical specification of NPPs specify the requirements on availability of fire protection systems, allowed outage time of fire pumps and surveillance requirements. The safety standard of RB on fire protection systems gives detailed requirements for fire prevention, detection and protection. All these requirements are applicable during outage of NPPs.

2. Outage scope and content

The following questions concern the review of outage scope and content by the RB with the licensee prior to the outage.

- a. *What types of pre-outage interactions (e.g. meetings, reports) are held between the RB and the licensee?*

The activities planned by the licensee during the outage are reviewed by safety committee of RB. The representatives from NPPs also participate in the meeting and present all aspects of the outage planning including collective radiation dose budget for the outage. It is ensured that licensee has planned to address all the regulatory requirements related to In-service inspections, surveillance and safety modifications during the outage.

- b. *What documentation is supplied and what discussions are held in pre-outage interactions (e.g. test plan, modifications, regulatory commitments, in-service inspection, quality assurance, fire safety, etc.)?*

The licensee submits an application giving detailed account of the activities planned during the outage. This includes In-service inspection, surveillance tests, safety modifications and preventive maintenance of systems and equipments. The application also gives the collective dose budget for the planned jobs. The licensee's outage plan is reviewed by RB against the regulatory requirements. Any special activities requiring review and prior permission of RB is discussed in advance.

- c. *What influence does the RB have on the scope, content and planning of NPP outages? Is there a formal approval required from the RB on the outage scope?*

RB ensures that the scope, content and planning of NPPs consider compliance with the regulatory requirements related to In-service inspections and surveillance given in technical specification and ISI manual of NPPs. In addition RB also ensures that the licensee also addresses the pending regulatory recommendations including safety modifications based on events or analysis, if any, during the outage.

d. Does the RB define preconditions for restart?

The licensee submit an application for restart of the reactor after completion of outage activities. This application includes results of In-service inspections, important surveillance tests and compliance to other regulatory requirements including collective radiation dose consumption and radiological status of the plant. This application is reviewed in RB before permitting restart of the NPP.

3. RB outage inspection scope

The following questions concern the scope and resourcing of inspections carried out by the RB during an NPP outage.

a. Does the RB explicitly define by internal procedure a list of topics that it will inspect during an outage and if so what are they?

The RB does not explicitly define by internal procedure a list of topics that it will inspect during an outage. However RB may decide to inspect some of the activities and tests during the outage. This decision is taken during review of the licensee's application in RB for taking outage.

b. Which of the following topics are typically inspected by the RB?

- *safety culture*
- *operating experience*
- *qualification of licensee staff/contractors*
- *fire protection*
- *radiological protection*
- *control of foreign material (FME)*
- *housekeeping*
- *industrial safety (personal safety)*
- *working time*
- *management of contractors*
- *security*
- *environmental issues*
- *modifications*
- *quality assurance*
- *in-service inspections (periodic tests)*
- *pressure boundaries*
- *outage management*
- *maintenance activities*
- *handling of fuel elements*
- *specific technical areas (e.g. structural integrity, electrical, etc.)*

Inspection of NPPs during outage is undertaken by RB to check compliance with the radiological work practices. In addition few surveillance tests or special activities of interest to RB may also inspected during an outage

c. What type and how much inspection resource is utilised (e.g. RB inspection staff, RB specialist, and technical support organisation manpower)?

One or two regulatory inspectors are deputed covering the area of radiological work practices during annual outage. If it is decided to inspect some surveillance tests/special activities, then additional inspectors are deputed.

- d. *What inspections are undertaken by the RB to evaluate that the licensee has minimized nuclear safety risks during the outage?*

Inspections are performed to check compliance to radiological work practices during the outage. Also special inspections on need basis are also carried out. Records of NPPs outage activities are checked for any deviation during routine inspection under taken twice in a year.

4. Fire safety

The following questions concern fire safety maintenance programmes, the impact of outage activities on fire safety and arrangements for response to a fire.

- a. *What inspections are undertaken by the RB regarding oversight of the maintenance of fire protection systems during an outage?*

Maintenance of fire protection system is to be carried out in accordance with the conditions stipulated in the technical specifications and fire standards. RB inspects fire and industrial safety aspects of NPPs during routine inspections, which includes scrutiny of the records of the maintenance undertaken on fire protection system. There are no specific requirements for inspecting maintenance of fire protection system during outage.

- b. *What inspections are undertaken by the RB of the licensee's ability to control fire risks arising during an outage (e.g. hot work, fire loading, etc.)?*

The jobs having significant industrial safety risk are required to undertaken after obtaining industrial work permit. The industrial work permit stipulates the conditions to be maintained during execution of the work. The licensee's compliance to these procedures is checked during routine regulatory inspections.

- c. *How does the RB evaluate that the licensee's arrangements for response to fire during an outage are adequate?*

The licensee is required to carry out periodic fire drills to check preparedness & adequacy of fire protection/fire fighting. The report of these drills is checked by RB during regulatory inspections.

5. Outage findings

The following questions concern RB follow-up on outage findings¹ (e.g. test results, in-service inspection (ISI) results) and events (e.g. leaks, fire, workforce accidents, reportable and non-reportable events) and their resolution.

- a. *How is the RB informed of any findings and events arising during the outage?*

The licensee is required to intimate events to RB as per the criteria given in technical specifications. The events related to fire and industrial safety is reported to RB through a quarterly report. However major fires involving major loss of property or compromising safety of NPP and industrial safety accidents of serious nature (involving fatality and loss of man-hour more than 48) hours are to be reported promptly.

- b. *How does the RB respond to findings and events (e.g. specific resources, specific inspections)?*

The surveillance tests results, In-service inspection test results are reviewed within RB and permission restart of the reactor is given only after satisfactory review of the results. In case of events of serious nature, reactive inspections are taken up.

¹ Identified either by the RB or the licensee

c. Is the RB routinely informed of all fire occurrences?

Yes. The licensee is required to submit a monthly report in which events of all types of fire are to be reported. In addition, prompt notification for significant fire event is submitted in accordance with fire classification criteria.

d. How does the RB assess that any findings are evaluated in a timely manner?

The events of fire and industrial safety are reviewed by a committee constituted by RB. The committee ensures that all events are reviewed and actions taken to prevent reoccurrence.

6. Outage key stages, restart, and post outage actions

The following questions concern the monitoring of progress by the RB during an NPP outage, RB witness points, authorisation for restart, post outage review and relevant post outage testing

a. What arrangements does the RB have to monitor progress with the outage program (e.g. daily reports, routine meetings, database access)?

Important activities involving review and prior permission are discussed by RB on receipt of application from the licensee. Events of safety significance during the outage are reported to RB by the licensee as per the reporting criteria.

b. Does the RB define any formal witness or hold points during the outage and if so what are they?

The licensee is required to complete the activities for meeting the regulatory requirements and also meet the conditions given in technical specifications and procedures. In some cases RB decides in advance to witness certain important surveillance tests/important activities and the licensee informs the RB accordingly before carrying out these activities.

c. Does the licensee require formal authorisation from the RB before restart, and if so what is the RB decision making process to allow the restart?

The licensee is required to submit an application for restart of the unit on completion of outage activities. This application contains the results of major In-Service inspections, compliance to surveillance requirements and safety modifications. This application is reviewed by RB before permitting restart of the unit.

d. What type activities (if any) are undertaken by the RB after restart (e.g. inspection of physics tests, review of licensee lessons learned, etc.)?

The detailed reviews are only taken up before restart of the unit. Any recommendation arising out the review of start up application of the licensee is followed up by RB for compliance. This may include certain stipulations of RB to be addressed by the licensee before, during or after start up of the unit.

7. Are there any other important topics that you would like to be considered at the workshop?

No.

JAPAN

1. Regulatory requirements

a. *What are the regulatory requirements governing the outage of NPPs?*

- The limitation on operation term [Timing of Facility Periodic Inspection: Article 43-3-15 of the Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors (hereinafter referred to as "Reactor Regulation Act")].

In the present circumstances, any licensee of reactor operation must suspend the reactor operation not later than 13 months of the operation and must undergo the inspection conducted by Nuclear Regulation Authority (hereinafter referred to as "NRA") concerning Specific Important Power Reactor Facilities such as nuclear reactor, reactor coolant system facility, etc.

- Inspections and Reviews during outage
 - Duty to undergo Facility Periodic Inspection (Article 43-3-15 of the Reactor Regulation Act)

Any licensee of reactor operation must undergo the inspection conducted by NRA concerning specific important power reactor facilities.
 - Duty to implement Periodic Licensee's Inspection and to keep the record [Article 43-3-16 (1) of the Reactor Regulation Act]

Any licensee of reactor operation must implement inspections (disengaging, disassembling, non destructive inspection, function and performance inspection, trial operation, etc.) and must record and keep the results.
 - Duty to undergo Periodic Safety Management Review [Article 43-3-16 (4) of the Reactor Regulation Act]

Any licensee of reactor operation must undergo the review concerning the system of the implementation of the Periodic Licensee's Inspection (organization, method, process control, management of cooperating companies, management of records, education and training).

b. *What are the regulatory requirements relating to fire protection at NPPs during outages?*

- Prevention of fire damage

Technical standards stipulate following matters:

 - Taking measures to prevent fire
 - Installation of fire sensors and fire extinguishing systems
- Development of systems for conducting activities to maintain the integrity of reactor facilities in the event of fire

NRA Ordinance Concerning the Installation, Operation of Commercial Power Reactors (hereinafter referred to as "NRA Ordinance on Commercial Reactors") stipulate taking measures concerning development of systems for conducting fire protection measures including activities to maintain the integrity of reactor facilities in the event of fire.
- Besides, Fire Service Act and Building Standards Act stipulate requirements for fire protection measures.

2. Outage scope and content

The following questions concern the review of outage scope and content by the RB with the licensee prior to the outage.

- a. *What types of pre-outage interactions (e.g. meetings, reports) are held between the RB and the licensee?*

[Article 46 of the NRA Ordinance on the installation and operation of commercial power reactors (hereinafter referred to as "NRA Ordinance on Commercial Reactors")]

Any licensee of reactor operation shall submit an application form of the Facility Periodic Inspection by one month before undergoing the inspection based on the law.

- b. *What documentation is supplied and what discussions are held in pre-outage interactions (e.g. test plan, modifications, regulatory commitments, in-service inspection, quality assurance, fire safety, etc.)?*

In addition to a name of applicant, target facility of the inspection and inspection date, following documents shall be attached to the above-mentioned application.

- Plan of the Periodic Licensee's Inspection, radiation control
 - Maintenance plan
 - Quantitative maintenance management goals,
 - Method, frequency and timing of the maintenance,
 - Inspection and repair,
 - Judgment method,
 - Measures for ensuring safety when conducting inspections,
 - Preceding maintenance management goals and evaluation of the inspections etc.
 - For the above-mentioned maintenance plan, confirmation of the plan by JNES (TSO) (and also question and answer session with the licensee as necessary) is held before the commencement of the inspections.
 - Concerning fire protection, effectiveness of fire protection measures of a licensee is confirmed by checking fire protection manuals, training record, etc. and witnessed inspections with unannounced visit. Inspection items of a fiscal year are selected based on past results and then inspections are planned and conducted.
- c. *What influence does the RB have on the scope, content and planning of NPP outages? Is there a formal approval required from the RB on the outage scope?*

It is possible that there are additional demands by RB on knowledge, etc. acquired from information of nonconformities, etc. of other NPPs.

- d. *Does the RB define preconditions for restart?*

Passing the Facility Periodic Inspection is the precondition for restart since the duty to undergo the inspection is stipulated in the article 43-3-15 of the Reactor Regulation Act.

Concerning fire protection, by the provision of the article 43-3-22 (1) of the Reactor Regulation Act, it is the precondition for restart to develop systems for conducting activities to maintain the integrity of reactor facilities (including reporting to fire fighters, fire extinguishing or prevention of spread of fire and other activities which are carried out until a fire brigade arrive at the scene of the

fire. the same shall apply hereinafter) in the event of fire at a factory or business establishment in which reactor facilities are located (hereinafter referred to as “in the event of fire”).

3. RB outage inspection scope

The following questions concern the scope and resourcing of inspections carried out by the RB during an NPP outage.

- a. *Does the RB explicitly define by internal procedure a list of topics that it will inspect during an outage and if so what are they?*

It is stipulated in statutes as follows:

- Facility Periodic Inspection (Article 47 of the NRA Ordinance on Commercial Reactors)
Implementation of following inspections are stipulated for each classification of facilities (nuclear reactor, reactor coolant system facility, nuclear fuel handling and storage facility, etc.):
 - Visual inspection,
 - Non destructive inspection,
 - Function and performance inspection, etc.
- Periodic Safety Management Review (Article 43-3-16 (4) of the NRA Ordinance on Commercial Reactors)

Following items are reviewed concerning system of the implementation of the Periodic Licensee’s Inspection are stipulated:

- Organisation,
- Method,
- Process control,
- Management of the cooperating companies,
- Management of records,
- Education and training.

- b. *Which of the following topics are typically inspected by the RB?*

- *safety culture*
- *operating experience*
- *qualification of licensee staff/contractors*
- *fire protection*
- *radiological protection*
- *control of foreign material (FME)*
- *housekeeping*
- *industrial safety (personal safety)*
- *working time*
- *management of contractors*
- *security*
- *environmental issues*
- *modifications*
- *quality assurance*
- *in-service inspections (periodic tests)*
- *pressure boundaries*
- *outage management*
- *maintenance activities*

- *handling of fuel elements*
- *specific technical areas (e.g. structural integrity, electrical, etc.)*
- Facility Periodic Inspection (Mainly on hardware)
 - in-service inspection (periodic tests),
 - pressure boundaries,
 - qualification of licensee staff / contractors.
- Periodic Safety Management Review (Matters relating to Periodic Licensee's Inspection (Mainly on software))
 - quality assurance,
 - management of contractors,
 - qualification of licensee staff / contractors,
 - operating experience,
 - housekeeping,
 - maintenance activities (assessment of the effectiveness of maintenance).
- c. *What type and how much inspection resource is utilised (e.g. RB inspection staff, RB specialist, and technical support organisation manpower)?*
 - For important inspections of Periodic Inspection, two Nuclear Facility Inspectors (approximately 2 weeks).
 - For the other inspections of Periodic Inspection, three to five inspectors of JNES (TSO) for Facility Inspection and Periodic Safety Management Review during Facility Periodic Inspection term.
- d. *What inspections are undertaken by the RB to evaluate that the licensee has minimized nuclear safety risks during the outage?*

In the confirmation of the maintenance plan, “measures for ensuring safety when conducting inspections” are confirmed.

4. Fire safety

The following questions concern fire safety maintenance programmes, the impact of outage activities on fire safety and arrangements for response to a fire.

- a. *What inspections are undertaken by the RB regarding oversight of the maintenance of fire protection systems during an outage?*
- b. *What inspections are undertaken by the RB of the licensee's ability to control fire risks arising during an outage (e.g. hot work, fire loading, etc.)?*
- c. *How does the RB evaluate that the licensee's arrangements for response to fire during an outage are adequate?*
 - Concerning fire protection, by the provision of the article 43-3-22 (1) of the Reactor Regulation Act, measures listed in each of the following items are required to be taken (RB checks the compliance during the Operational Safety Inspection):
 - 1) Making a plan for conducting activities to maintain the integrity of reactor facilities in the event of fire;
 - 2) Installing equipment necessary for reporting the occurrence of a fire to fire fighters without fail;

- 3) Deploying personnel necessary for conducting activities to maintain the integrity of reactor facilities in the event of fire;
 - 4) Taking measures concerning trainings of personnel who conduct activities to maintain the integrity of reactor facilities in the event of fire;
 - 5) Furnishing chemical fire engines, fire fighting foams, and other equipment necessary for conducting activities to maintain the integrity of reactor facilities in the event of fire;
 - 6) Managing combustibles appropriately at a factory or business establishment;
 - 7) In addition to what is listed in the preceding six items, developing systems for conducting activities to maintain the integrity of reactor facilities in the event of fire;
 - 8) Evaluating measures listed in the preceding seven items and taking necessary measures based on the result of the evaluation.
- Besides, periodic inspections and installation inspections on fire extinguishing systems and alarm systems are conducted based on the Fire Service Act.

5. Outage findings

The following questions concern RB follow-up on outage findings¹ (e.g. test results, in-service inspection (ISI) results) and events (e.g. leaks, fire, workforce accidents, reportable and non-reportable events) and their resolution.

a. *How is the RB informed of any findings and events arising during the outage?*

The progress is reported in the regular daily meeting held by RB and licensee at the site unless there is particular problem. Troubles are reported to Safety Inspectors permanently stationed at the site on each occasion.

b. *How does the RB respond to findings and events (e.g. specific resources, specific inspections)?*

Depending on the content of the trouble, check the scene, report to the headquarter and at the same time, ask experts for their opinion, and direct licensee as necessary. And also conduct follow-up activities for the results.

c. *Is the RB routinely informed of all fire occurrences?*

Licensees report on all matters which might be categorized into fire to local fire station and release information on their web sites. All the information is reported to the Safety Inspectors at the site.

d. *How does the RB assess that any findings are evaluated in a timely manner?*

The progress of the various inspections conducted during the outage are reported unless there is particular problem. Measures are taken in proportion to the “b” above when there are findings.

6. Outage key stages, restart, and post outage actions

The following questions concern the monitoring of progress by the RB during an NPP outage, RB witness points, authorisation for restart, post outage review and relevant post outage testing

a. *What arrangements does the RB have to monitor progress with the outage program (e.g. daily reports, routine meetings, database access)?*

The progress of maintenance and inspections, etc. during the outage are confirmed in the regular daily meeting.

¹ Identified either by the RB or the licensee

- b. *Does the RB define any formal witness or hold points during the outage and if so what are they?*

For the Facility Periodic Inspection and Periodic Safety Management Review conducted by RB, statutes stipulate the implementation of witnessed inspection or record check for the licensee's inspection. For especially important equipment, witnessed inspection is conducted. For other equipment, sampling and unannounced witnessed inspection is conducted.

- c. *Does the licensee require formal authorisation from the RB before restart, and if so what is the RB decision making process to allow the restart?*

- In case of restart

The completion of the inspections which must be finished before restart and progress of dealing with problems are confirmed (measures for nonconformity, for example).

- In case of commencement of commercial operation

By the law, the completion of the Facility Periodic Inspection is the condition on the restart of commercial operation.

After the restart of the nuclear reactor and trial operation with load, the Integrated Performance Test is conducted and evaluated as the final inspection item of the Facility Periodic Inspection, and the completion of all inspection items of Facility Periodic Inspection is confirmed.

RB evaluates the results of the Facility Periodic Inspection and issue the completion certificate of Facility Periodic Inspection to the licensee.

- d. *What type activities (if any) are undertaken by the RB after restart (e.g. inspection of physics tests, review of licensee lessons learned, etc.)?*

As part of the Periodic Safety Management Review, review on the quality management is conducted concerning the progress of the management of nonconformity by licensee and the assessment of the effectiveness of the maintenance (progress of achievement of the maintenance management goals, evaluation of the results of the inspections and its reflection to next time, etc.).

7. Are there any other important topics that you would like to be considered at the workshop?

Nothing in particular.

KOREA

1. Regulatory requirements

a. *What are the regulatory requirements governing the outage of NPPs?*

The licensee has to take regulatory inspection periodically in order to ensure the plant is operated meeting the criteria that was applied to its operating license. The licensee should take periodic inspection within 20 months after start of commercial operation or end of last inspection. The inspection is carried out during the outage period from reactor shutdown for refuel and to restart of full-power operation

b. *What are the regulatory requirements relating to fire protection at NPPs during outages?*

Three regulatory requirements relating to fire protection apply to periodic inspection for NPP during outages. Regulations on Technical Standards for Nuclear Reactor Facilities, Etc. Article 14 (Protection against Fire Protection, etc.) require that SSCs important to safety shall be designed and located in order to minimize the probability and the effects of fire and explosion. Based on above Article 14, fire protection systems including fire confinement features such as fire resistant penetration seal are maintained in state where nuclear facilities have been permitted to operate by pre-operational regulatory inspection. Notice of the NSSC (nuclear safety and security commission) 2012-21 (regulation on establishment and implementation of fire protection program) requires that the licensee shall provide implementation of fire protection plan including fire prevention activities, firefighting strategy, training program for fire brigades, etc. In accordance with Notice of the NSSC 2012-22 (Technical standards for fire hazard analysis), safe-shutdown capability for achieving and maintaining success pass necessary to reactor safe-shutdown is required.

2. Outage scope and content

The following questions concern the review of outage scope and content by the RB with the licensee prior to the outage.

a. *What types of pre-outage interactions (e.g. meetings, reports) are held between the RB and the licensee?*

The licensee has to supply the document of application for periodic inspection, and the RB and the licensee usually have meeting to discuss the major process such as test plan and modifications (if any).

b. *What documentation is supplied and what discussions are held in pre-outage interactions (e.g. test plan, modifications, regulatory commitments, in-service inspection, quality assurance, fire safety, etc.)?*

The licensee has to submit the following documentations;

- major maintenance work for each SSC to be inspected
- test plan according to technical specifications and FSAR
- reactor core physics test plan
- time schedule for major test and maintenance work

As mentioned in the answer to question a, major process such as test plan and modifications (if any) is discussed at the meeting.

- c. *What influence does the RB have on the scope, content and planning of NPP outages? Is there a formal approval required from the RB on the outage scope?*

Since the scope is specified in the government notice for periodic inspection, RB does not affect the scope of NPP outage. But, in some case such as follow-up of specific event, RB may request the licensee to add or change the scope and content of outage.

Formal approval on outage scope is not required.

- d. *Does the RB define preconditions for restart?*

The RB approves reactor criticality to proceed reactor power ascension test only if the inspection results show that the plant meets the criteria that was applied to its operating license.

3. RB outage inspection scope

The following questions concern the scope and resourcing of inspections carried out by the RB during an NPP outage.

- a. *Does the RB explicitly define by internal procedure a list of topics that it will inspect during an outage and if so what are they?*

RB prepared inspection guidelines as a kind of internal document, and list of inspection items are defined in those documents. When the licensee submits application for periodic inspection, the RB establishes inspection plan which includes test items other than those listed in the inspection guidelines.

- b. *Which of the following topics are typically inspected by the RB?*

- *safety culture*
- *operating experience*
- *qualification of licensee staff/contractors*
- *fire protection*
- *radiological protection*
- *control of foreign material (FME)*
- *housekeeping*
- *industrial safety (personal safety)*
- *working time*
- *management of contractors*
- *security*
- *environmental issues*
- *modifications*
- *quality assurance*
- *in-service inspections (periodic tests)*
- *pressure boundaries*
- *outage management*
- *maintenance activities*
- *handling of fuel elements*
- *specific technical areas (e.g. structural integrity, electrical, etc.)*

RB typically inspects the following topics:

Safety culture(under pilot application), operating experience, qualification of licensee staff/contractors, fire protection, radiological protection, modifications, quality assurance (not during outage), in-service inspections, pressure boundary, handling of fuel elements, and specific technical areas.

- c. *What type and how much inspection resource is utilised (e.g. RB inspection staff, RB specialist, and technical support organisation manpower)?*

Technical support organisation resources are used, and 1.6 man-year in average was spent for periodic inspection last year.

- d. *What inspections are undertaken by the RB to evaluate that the licensee has minimized nuclear safety risks during the outage?*

There is no special inspection to evaluate that the licensee has minimized safety risks during the outage since the maintenance rule is not legislated. But, the licensee makes effort voluntarily to minimize risks by monitoring risk changes prior to test and maintenance work.

4. Fire safety

The following questions concern fire safety maintenance programmes, the impact of outage activities on fire safety and arrangements for response to a fire.

- a. *What inspections are undertaken by the RB regarding oversight of the maintenance of fire protection systems during an outage?*

Regulatory inspection during outage relating to fire protection is conducted to verify the followings: performance of fire suppression and fire detection system, operational status and condition of passive fire protection features, capability for achieving success pass necessary for post fire safe-shutdown, fire prevention activities such as control of combustibles and ignition sources, and firefighting capability of fire brigade including drill and education.

- b. *What inspections are undertaken by the RB of the licensee's ability to control fire risks arising during an outage (e.g. hot work, fire loading, etc.)?*

Activities of fire prevention including handling and storing combustibles, controlling ignition source, and hot work (welding, cutting, etc.) are verified by regulatory inspection during outage. In the process of regulatory inspection related to fire prevention, review of a list of record for licensee's procedures of combustibles storage and ignition sources and plant walk-down by inspectors are conducted.

- c. *How does the RB evaluate that the licensee's arrangements for response to fire during an outage are adequate?*

RB will evaluate the effectiveness of licensee's procedures and instructions for response to fire. To determining the effectiveness of licensee's arrangements, the followings are considered: the level of fire brigade drill for each postulated fire scenarios and initial/ corporation reporting system.

5. Outage findings

The following questions concern RB follow-up on outage findings¹ (e.g. test results, in-service inspection (ISI) results) and events (e.g. leaks, fire, workforce accidents, reportable and non-reportable events) and their resolution.

- a. *How is the RB informed of any findings and events arising during the outage?*

Inspection findings are usually identified by the inspectors during outage inspection. Events are typically notified by the licensee to the RB.

¹ Identified either by the RB or the licensee

- b. *How does the RB respond to findings and events (e.g. specific resources, specific inspections)?*

Inspection findings and events arising during the outage are handled by the inspection team which is organized for that specific periodic inspection.

- c. *Is the RB routinely informed of all fire occurrences?*

The licensee informs the RB of all fire occurrences.

- d. *How does the RB assess that any findings are evaluated in a timely manner?*

Inspection findings are evaluated in terms of safety significance as an internal process of the RB, and the findings critical to restart are required to be resolved before the approval of reactor criticality.

6. Outage key stages, restart, and post outage actions

The following questions concern the monitoring of progress by the RB during an NPP outage, RB witness points, authorisation for restart, post outage review and relevant post outage testing

- a. *What arrangements does the RB have to monitor progress with the outage program (e.g. daily reports, routine meetings, database access)?*

The licensee typically informs the RB of the progress of the outage by sending daily reports regarding major tests and maintenance works.

- b. *Does the RB define any formal witness or hold points during the outage and if so what are they?*

The RB doesn't define any formal witness or hold points during the outage.

- c. *Does the licensee require formal authorisation from the RB before restart, and if so what is the RB decision making process to allow the restart?*

As mentioned in the answer to question 2-d, the RB approves reactor criticality to proceed reactor power ascension test only if the inspection results show that the plant meets the criteria that was applied to its operating license. The inspection team reports the inspection results to the RB, and the RB decides whether it approves the reactor criticality or not.

- d. *What type activities (if any) are undertaken by the RB after restart (e.g. inspection of physics tests, review of licensee lessons learned, etc.)?*

Inspection findings are monitored to confirm the licensee's activity is adequate to resolve the safety issue raised by the RB. Baseline inspections are carried out by the resident inspectors.

7. Are there any other important topics that you would like to be considered at the workshop?

MEXICO

1. Regulatory requirements*a. What are the regulatory requirements governing the outage of NPPs?*

In accordance with the provisions of the Regulatory Law of Constitutional Article 27, Chapter IV Article 32 and Chapter VI Article 50 Fraction XII, the Regulatory Body has the authority to conduct audits, inspections, verifications and surveys to confirm compliance and adherence to the legal provisions regarding nuclear, radiation and physical safety, and safeguards; and to execute enforcement actions and decree administrative sanctions as foreseen by this Law and its regulations.

Specifically, the regulatory requirements governing outages is paragraph 50.59 of 10CFR of the NRC, "Change, tests, and experiments.

b. What are the regulatory requirements relating to fire protection at NPPs during outages?

There are not special requirements during outages, the regulatory requirements that the regulatory body follow during all the operational phases are:

- | | |
|------------------------------|--|
| 1. 10 CFR Part 50, § 50.48 | "Fire Protection". |
| 2. Appendix R del 10 CFR 50 | "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979". |
| 3. BTP APCS 9.5-1 Appendix A | "Guidelines for Fire Protection for Nuclear Plants Docketed Prior to July 1, 1976". |
| 4. BTP CMEB 9.5-1 | "Guidelines for Fire Protection for Nuclear Plants", rev. 2 - July 1, 1981. |
| 5. Regulatory Guide 1.189 | "Fire Protection for Nuclear Power Plants". |
| 6. NRC: IP71111.05 | "Fire Protection" March 6, 2003. |

2. Outage scope and content

The following questions concern the review of outage scope and content by the RB with the licensee prior to the outage.

a. What types of pre-outage interactions (e.g. meetings, reports) are held between the RB and the licensee?

Two months before the outage, the licensee informs during the pre-outage meeting or by the outage modification report to the resident inspector about the design modifications that will be implemented during the refueling.

One month before the refueling the licensee have a meeting in the regulatory body headquarters to inform about the modifications related with the safety systems, that will be implemented during the outage. In this meeting the licensee provides to the regulatory body with all the information related with these modifications.

In this meeting the licensee informs about the dose programmed and the radiological control process for each task during the outage, this information is also supplied to the regulatory body one month before the outage.

- b. *What documentation is supplied and what discussions are held in pre-outage interactions (e.g. test plan, modifications, regulatory commitments, in-service inspection, quality assurance, fire safety, etc.)?*

The documentation provided for the licensee includes: the outage programme, in which is described (1) tests; (2) modifications, (3) regulatory commitments, and (4) 10CFR 50.59 assessment for the safety systems that will be modified during the outage.

The discussions are related with the regulatory commitments that the licensee must implement during the outage and with the 10CFR50.59 assessment. Also, before the outage the regulatory body provided the list of modifications that will be following by the inspectors.

- c. *What influence does the RB have on the scope, content and planning of NPP outages? Is there a formal approval required from the RB on the outage scope?*

There would be influence of the regulatory body on the scope, content and planning of the NPP; if there are regulatory commitments (i.e. post Fukushima requirements).

No, there is not a formal approval required for outage scope.

There isn't any formal approval required from the RB on the outage scope.

- d. *Does the RB define preconditions for restart?*

No.

3. RB outage inspection scope

The following questions concern the scope and resourcing of inspections carried out by the RB during an NPP outage.

- a. *Does the RB explicitly define by internal procedure a list of topics that it will inspect during an outage and if so what are they?*

The regulatory body define by internal procedures a list of topics that it will inspect during the outage.

The list of topics is related with the follow cornerstones: (1) Initiating Events; (2) Mitigation Systems; (3) Barriers Integrity and (4) Occupational Radiation Safety

- b. *Which of the following topics are typically inspected by the RB?*

- safety culture	NO
- operating experience	YES
- qualification of licensee staff/contractors	YES
- fire protection	YES
- radiological protection	YES
- control of foreign material (FME)	YES
- housekeeping	YES
- industrial safety (personal safety)	YES
- working time	YES
- management of contractors	YES
- security	YES
- environmental issues	YES
- modifications	YES
- quality assurance	YES
- in-service inspections (periodic tests)	YES

- pressure boundaries YES
- outage management YES
- maintenance activities YES
- handling of fuel elements YES
- specific technical areas (e.g. structural integrity, electrical, etc.) YES

- c. *What type and how much inspection resource is utilised (e.g. RB inspection staff, RB specialist, and technical support organisation manpower)?*

The resident inspector prepares a program of inspections and audits based on the importance of the activities performed by the plant staff and contractors before to start the refuelling outage. A common practice has been to try to integrate a 24-hour permanent program of inspection covered by two shifts in which at least two inspectors participate per shift. These inspectors have the authority to impose stop work orders.

In this way during the shutdown or refuelling outage the resident inspectors receives support from the headquarters via experienced inspectors in the fields of plant operations, in-service inspections, ALARA principles, valve and containment leakage test, maintenance, plant modifications, reactor engineering, electric and I&C systems. Also, in order to provide a more efficient coverage for areas such as Limit Condition for Operations and Technical Specifications which are part of the normal duties during refuelling or shutdown, the resident inspector is supported with additional experienced and qualified inspectors.

- d. *What inspections are undertaken by the RB to evaluate that the licensee has minimized nuclear safety risks during the outage?*

During this stage the following is verified: as deterministic approach the compliance with the Technical Specifications and as probabilistic approach (qualitative) the color of risk associated with the configuration of the three electrical divisions.

4. Fire safety

The following questions concern fire safety maintenance programmes, the impact of outage activities on fire safety and arrangements for response to a fire.

- a. *What inspections are undertaken by the RB regarding oversight of the maintenance of fire protection systems during an outage?*

The resident Inspector checks the management of the compensatory measures proposed by the utility. He must pay particular attention to those works where there is an additional risk of fire (works with risk of fire) and to those works in which there is a degradation of the compensatory measures installed in the plant, as a result of the analysis of compliance with the 10CFR50 Appendix R.

- b. *What inspections are undertaken by the RB of the licensee's ability to control fire risks arising during an outage (e.g. hot work, fire loading, etc.)?*

During outages our inspectors are focused primarily on observing field activities of the following aspects related to fire protection:

- Control of materials and chemicals that enter into the process buildings: Control and restrictions on materials and substances that may be flammable and cause the spread of fire during a fire is verified.
- Control of Work Permits with Ignition Source: It is verified that the licensee has assessed and identified according to the characteristics of each work to be performed during the outage (by mechanical work, welding, etc.), potential ignition sources that could cause an outbreak of fire

and based on this analysis take precautionary measures to protect or prevent personnel, equipment and materials to be exposed to an ignition source.

- Housekeeping Control: Within this area, the inspectors verify the licensee control over the areas used as a repository or temporary storage of oils, clothing or other materials prior to be removed of the process buildings, verifying adoption compensatory measures to ensure that these areas comply with the controls established in the Fire Protection program according to the heat load.
- c. *How does the RB evaluate that the licensee's arrangements for response to fire during an outage are adequate?*
1. Verifies status and maintenance given to fire extinguishers, fire hydrants and hoses, fire-engine truck, clothes and attachments of the personnel of the brigades.
 2. Verifies that the training program considers theoretical and practical activities on the protection against fire in all modes of operation.
 3. Checks that fire drill program complies with the participation of all the groups in integrated brigades, as well as that the scenarios that are performed at different times, in all buildings of the NPP and considering the three types of fire.

5. Outage findings

The following questions concern RB follow-up on outage findings¹ (e.g. test results, in-service inspection (ISI) results) and events (e.g. leaks, fire, workforce accidents, reportable and non-reportable events) and their resolution.

- a. *How is the RB informed of any findings and events arising during the outage?*

The findings are documented by the inspectors, as a good practice these findings are immediately reported to the headquarters, adding at this report the safety significance categorization, in this way the supervisor decides to implement a reactive inspection.

The occurrence of all incidents covered by categories defined in 10CFR50.72, according to the regulatory framework, must report to the Commission using the format identified as "Notification of Reportable Event" (NRE). This format includes a summary of the event; immediate corrective actions; core emergency cooling system and engineering safeguards system conditions; as well as information on radiological conditions.

Also it is established that the event must be reported by a telephone call to the inspector on duty

- b. *How does the RB respond to findings and events (e.g. specific resources, specific inspections)?*

The inspectors follow the corrective actions of the findings.

As part of the outage inspection, the inspectors follow-up the events that occur in the facility, the causes and the corrective and preventive actions that are taken to prevent their recurrence.

Additionally, the findings documented during the inspection and the operational events are categorized according to their safety significance. If the findings or the events have high importance to the safety, part of the inspectors start a reactive inspection, if it is necessary experts or more inspectors from the headquarters must take part of this inspection.

- c. *Is the RB routinely informed of all fire occurrences?*

Yes, the resident inspector is routinely informed of all fire occurrences, because he must report these occurrences to the headquarters.

¹ Identified either by the RB or the licensee

- d. *How does the RB assess that any findings are evaluated in a timely manner?*

For the Corrective Action Plan (CAP), both the resident inspectors (monthly, semi-annually and annually) and the main office inspectors (every two years) verify: (1) the CAP effectiveness to identify and resolve problems according to their safety significance; (2) specific problems with generic implications, (3) the impact that the combination of otherwise riskless individual problems have on safety; and (4) if the Licensee is properly logging the information.

6. **Outage key stages, restart, and post outage actions**

The following questions concern the monitoring of progress by the RB during an NPP outage, RB witness points, authorisation for restart, post outage review and relevant post outage testing

- a. *What arrangements does the RB have to monitor progress with the outage program (e.g. daily reports, routine meetings, database access)?*

The progress of the outage programme is verified: (1) Attending the daily meeting in which the licensee inform about the advance in the outage programme and (2) look up in the licensee' intranet in the section related with outage programme.

- b. *Does the RB define any formal witness or hold points during the outage and if so what are they?*

The Regulatory Body only define formal witness or hold point during outage, when there are modifications that have been made as a result of a Regulatory body requirements or when the system has been involved in many events.

- c. *Does the licensee require formal authorisation from the RB before restart, and if so what is the RB decision making process to allow the restart?*

Yes, the licensee require formal authorisation from the RB before restart.

One week before the outage ends, in the headquarters the directors of assessment and inspection have a meeting in which they analyse if all the modifications required by the regulatory body have been completed and if there aren't other problems which affect the safety.

- d. *What type activities (if any) are undertaken by the RB after restart (e.g. inspection of physics tests, review of licensee lessons learned, etc.)?*

There is not any type of activities taken by the regulatory body after restart; only the resident inspector carries out routine inspections

7. **Are there any other important topics that you would like to be considered at the workshop?**

No.

SLOVAK REPUBLIC

1. Regulatory requirements

a. *What are the regulatory requirements governing the outage of NPPs?*

The Nuclear regulatory authority of the Slovak republic (hereinafter “ÚJD SR”) has no specific requirements regarding the outage scope. However it has requirements on the restart of NPP after the outage. These requirements are focused on presenting the functionality of all systems and components necessary for assuring of safe and reliable operation.

b. *What are the regulatory requirements relating to fire protection at NPPs during outages?*

ÚJD SR does not distinguish between fire protection requirements for operation and for outages. There is only one set of requirements specified in the regulatory decree no. 430/2011 Coll. These requirements are as follows:

- (1) For every nuclear facility, a fire-risk analysis or other fire-hazard assessment must be prepared, also including an assessment of the possible effect of fire on nuclear safety.
- (2) Based on an analysis pursuant to (1), measures must be taken that ensure an acceptable level of nuclear safety is preserved, even in case of fire in the nuclear facility.
- (3) Facilities important for nuclear safety of nuclear facilities must be designed to achieve the following goals:
 - a) fire prevention,
 - b) identification, signalling and extinguishing of fires,
 - c) isolation of fires that have not been extinguished.
- (4) The design must use non-flammable materials, materials that do not propagate fire, and fire-resistant structures.
- (5) A nuclear facility must offer fire-control equipment that must be designed and located in such a manner that their failure or incorrect functioning does not affect the functionality of facilities important for nuclear safety.
- (6) Fire-control and fire-prevention systems must be certified.
- (7) The project must include an analysis of the risk of explosion or fire to specify the required fire resistance of firewalls and doors.

2. Outage scope and content

The following questions concern the review of outage scope and content by the RB with the licensee prior to the outage.

a. *What types of pre-outage interactions (e.g. meetings, reports) are held between the RB and the licensee?*

There is a pre-outage meeting between the ÚJD SR and the licensee. At this meeting the outage scheduler and work that will be done during the outage are discussed.

b. *What documentation is supplied and what discussions are held in pre-outage interactions (e.g. test plan, modifications, regulatory commitments, in-service inspection, quality assurance, fire safety, etc.)?*

The licensee supplies the detailed schedule of the outage and restart, risk profile, control program of equipment during the outage and list of works that will be done on classified equipment during the outage. Also during the outage the licensee submits daily reports on the progress of the outage.

- c. *What influence does the RB have on the scope, content and planning of NPP outages? Is there a formal approval required from the RB on the outage scope?*

The RB does not authorize the outage scope. However it can impose task that need to be done in its decision (this is on case to case basis). Regulatory authorization is required for the cartogram of fuel loading, core characteristics and in case that there are modifications of NPP design the regulatory body needs to issue an authorization.

- d. *Does the RB define preconditions for restart?*

As it has been said earlier the requirements of UJD SR on restart are mainly focused on presenting the functionality of all systems and components necessary for assuring of safe and reliable operation. These requirements are as follows:

- (2.1) A permit holder may begin with restart and start up of nuclear facilities or parts thereof to operating parameters following their shutdown only when all facilities and systems needed to ensure reliable and safe operation have been tested and are functional, and if they are in accordance with the design, the preoperational safety report, the nuclear facility's limits and conditions, and with operating rules. After the check has been performed, the permit holder must produce a summary document on the results of areadiness check of the nuclear facility and the permit holder's employees for further operation.
- (2.2) A permit holder must perform restart and start up of nuclear facilities based on programmes.
- (2.3) The goal of restart and commissioning tests is to verify the functionality of the nuclear facility being started up during prescribed operating states listed in the pre-operational safety report.
- (2.4) A success criterion for restart or commissioning of a nuclear facility must be a match between measured values with values specified in programmes. However, these values must not exceed limits specified in the pre-operational safety report. Meeting test success criteria is a condition for the start of another restart test.
- (2.5) A nuclear facility is considered to have been restarted once commissioning success criteria specified in programmes have been met.

There are also requirements regarding start-up tests. These test need to be divided into two stages. First one is physical commissioning which includes test focused on the validation of core characteristics and the second one is power commissioning f which is to verify, at various power levels, the facility's design characteristics and design cooperation of all systems under stabilized operation and during transient processes

3. RB outage inspection scope

The following questions concern the scope and resourcing of inspections carried out by the RB during an NPP outage.

- a. *Does the RB explicitly define by internal procedure a list of topics that it will inspect during an outage and if so what are they?*
- b. *Which of the following topics are typically inspected by the RB?*
 - safety culture
 - operating experience

- qualification of licensee staff/contractors
- fire protection
- radiological protection
- control of foreign material (FME)
- housekeeping
- industrial safety (personal safety)
- working time
- management of contractors
- security
- environmental issues
- modifications
- quality assurance
- in-service inspections (periodic tests)
- pressure boundaries
- outage management
- maintenance activities
- handling of fuel elements
- specific technical areas (e.g. structural integrity, electrical, etc.).

UJD SR inspects almost all of the listed topics except for radiological protection, working time and management of contractors. Inspections of UJD SR are typically focused on one or more specific topics

- c. *What type and how much inspection resource is utilised (e.g. RB inspection staff, RB specialist, and technical support organisation manpower)?*

Outage/ post-outage inspections are usually team inspections performed by several inspectors from different departments. This may require up to 8 people and several hundred man-hours.

- d. *What inspections are undertaken by the RB to evaluate that the licensee has minimized nuclear safety risks during the outage?*

The licensee submits to the UJD SR the risk performance report prior to the outage. Also during the outage there is residential site inspector and UJD SR performs its inspections.

4. Fire safety

The following questions concern fire safety maintenance programmes, the impact of outage activities on fire safety and arrangements for response to a fire.

- a. *What inspections are undertaken by the RB regarding oversight of the maintenance of fire protection systems during an outage?*

The inspection of fire protection systems during outage is in the competence of the resident site inspector.

- b. *What inspections are undertaken by the RB of the licensee's ability to control fire risks arising during an outage (e.g. hot work, fire loading, etc.)?*

The licensee's ability to control fire risk during outage are as mentioned earlier in the competence of resident site inspector. He has a specific procedure for this task.

Also the licensee's ability to control fire risk is analyzed in his quality assurance system that requires the authorization of UJD SR.

- c. *How does the RB evaluate that the licensee's arrangements for response to fire during an outage are adequate?*

Licensee's arrangements for response to fire during outage are part of his quality assurance system. This requires the authorization of UJD SR. During the authorization process the licensee was obligated to submit an independent analysis of all his safety arrangements – this includes fire protection. Also the fire protection arrangements were compared with the standards valid at time of the authorization process.

5. Outage findings

The following questions concern RB follow-up on outage findings¹ (e.g. test results, in-service inspection (ISI) results) and events (e.g. leaks, fire, workforce accidents, reportable and non-reportable events) and their resolution.

- a. *How is the RB informed of any findings and events arising during the outage?*

Through the daily reports of the licensee on the progress of the outage, the reports of the residential site inspector and through regular channels.

- b. *How does the RB respond to findings and events (e.g. specific resources, specific inspections)?*

If a certain issue occurs the UJD SR usually responds with a specific inspection or this issue is addressed during post-outage inspection. However if an event occurs during the outage of a NPP the licensee is obligated to follow the same rules as if it occurred during regular operations (guidance for event response is provided in our legislation).

- c. *Is the RB routinely informed of all fire occurrences?*

The resident site inspector is informed of all fires on the site.

- d. *How does the RB assess that any findings are evaluated in a timely manner?*

This is done on a case to case basis and it strongly depends on the nature of the findings.

6. Outage key stages, restart, and post outage actions

The following questions concern the monitoring of progress by the RB during an NPP outage, RB witness points, authorisation for restart, post outage review and relevant post outage testing

- a. *What arrangements does the RB have to monitor progress with the outage program (e.g. daily reports, routine meetings, database access)?*

UJD SR receives daily reports on the progress of the outage and it has a resident site inspector on the site. There is also the possibility to conduct an inspection during the outage. This might be done outside regular working hours if the situation requires it.

- b. *Does the RB define any formal witness or hold points during the outage and if so what are they?*

I am not really sure if i understand the question correctly. The UJD SR requires that certain activities are recorded with protocol. Protocols are usually signed by several individuals from whom one may be an independent witness if the situation requires it. Otherwise there is a resident site inspector on the site and the UJD SR conducts inspections during the outage.

¹ Identified either by the RB or the licensee

- c. *Does the licensee require formal authorisation from the RB before restart, and if so what is the RB decision making process to allow the restart?*

Certain regulatory selected procedures that are regularly updated before the outage need to be approved before restart. This includes neutron-physical characteristics of the core and fuel load plan. Otherwise no formal authorization is required for restart after outage.

- d. *What type activities (if any) are undertaken by the RB after restart (e.g. inspection of physics tests, review of licensee lessons learned, etc.)?*

Usually after the restart of a NPP the UJD SR conducts an post-outage inspection. This inspection may start before the outage so the whole outage is inspected. After the outage the licensee submits to the regulatory body the results of physical and power tests, Evaluation of the program of operational check, and several other reports.

7. Are there any other important topics that you would like to be considered at the workshop?

No, there are not.

SLOVENIA

1. Regulatory requirements*a. What are the regulatory requirements governing the outage of NPPs?*

In the Slovenian rule "Rules on operational safety of radiation or nuclear facilities" (JV9) in article no. 29 it is stated:

- (1) The facility operator of a nuclear power plant or a research reactor shall, at the latest 30 days before the start of the planned outage, transmit to the Administration the following information:
 1. general outline of the overhaul activities and the plan of the shutdown;
 2. the plan of implementation of all the SSC inspections in the scope of the outage;
 3. the list of approved permanent and temporary modifications to be implemented in the scope of the outage;
 4. any activities already undertaken or planned in the scope of the outage on the proposals by authorised experts and listed in the expert assessments of the previous outages.
- (2) Within 45 days from the completion of the outage, the facility operator shall transmit to the Administration the following information:
 1. written summary expert assessment by the authorised experts on nuclear safety, which have monitored or executed the outage activities;
 2. report on the SSCs inspected during the outage;
 3. the plan of remedying deficiencies detected in the scope of the outage;
 4. the positions of the facility operator concerning the proposals and comments listed in the summary expert assessment referred to in subparagraph 1 of this paragraph;
 5. realisation of the envisaged plan of the outage, and
 6. the assessment of the collective dose sustained in the course of the outage and its comparison and analysis with respect to the plan.
- (3) The Administration shall forward the assessment of the collective dose and its comparison and analysis to the Radiation Protection Administration.

b. What are the regulatory requirements relating to fire protection at NPPs during outages?

There are no special requirements.

2. Outage scope and content

The following questions concern the review of outage scope and content by the RB with the licensee prior to the outage.

a. What types of pre-outage interactions (e.g. meetings, reports) are held between the RB and the licensee?

Meetings regarding the scope of the outage are carried out before the outage with NPP personnel and Technical Support Organizations (TSO). The scope of TSO activities is also defined on pre-outage meetings.

Shut – down safety is also one of the important issues and it is discussed during special inspection review before outage.

Regulatory body (RB) evaluates and approves the proposed modifications or other improvements important to nuclear safety. For comprehensive modifications regular meetings are held well in advance of the outage.

- b. *What documentation is supplied and what discussions are held in pre-outage interactions (e.g. test plan, modifications, regulatory commitments, in-service inspection, quality assurance, fire safety, etc.)?*

Look at Answer 1a.

- c. *What influence does the RB have on the scope, content and planning of NPP outages? Is there a formal approval required from the RB on the outage scope?*

RB approves important modifications and improvements important to safety and the scope of TSO activities – supervision of NPP outage activities.

- d. *Does the RB define preconditions for restart?*

Preconditions for the restart of the NPP are not defined in legislation. Following the good practice in the past NPP submits to the RB “Statement for re-criticality after the outage” prepared by TSO.

3. RB outage inspection scope

The following questions concern the scope and resourcing of inspections carried out by the RB during an NPP outage.

- a. *Does the RB explicitly define by internal procedure a list of topics that it will inspect during an outage and if so what are they?*

The inspection activities during the outage are defined in documents as follows:

- OP 3.1 Inspection Manual,
- ON 2.6 Supervision (inspection) of NPP fuel cycles and outages.

After the outage RB prepares independent document “Outage analysis” with “Action Plan” concerning findings, non-conformances, safety culture issues, etc.

- b. *Which of the following topics are typically inspected by the RB?*

- safety culture
- operating experience
- qualification of licensee staff/contractors
- ~~— fire protection~~
- radiological protection
- control of foreign material (FME)
- housekeeping
- ~~— industrial safety (personal safety)~~
- ~~— working time~~
- ~~— management of contractors~~
- ~~— security~~
- ~~— environmental issues~~
- modifications
- quality assurance
- in-service inspections (periodic tests)

- pressure boundaries
- outage management
- maintenance activities
- handling of fuel elements
- specific technical areas (e.g. structural integrity, electrical, etc.).

c. *What type and how much inspection resource is utilised (e.g. RB inspection staff, RB specialist, and technical support organisation manpower)?*

Site inspector is present all the time during the outage at the NPP, supported by RB experts and TSO staff. There are regular (weekly) meetings with TSO and NPP staff.

Site inspector attends at daily meetings of the NPP staff (morning and afternoon meetings).

d. *What inspections are undertaken by the RB to evaluate that the licensee has minimized nuclear safety risks during the outage?*

Shut – down safety is monitored on the daily bases. Special inspection regarding shut - down PSA and critical activities during outage is carried out before the outage.

4. Fire safety

The following questions concern fire safety maintenance programmes, the impact of outage activities on fire safety and arrangements for response to a fire.

a. *What inspections are undertaken by the RB regarding oversight of the maintenance of fire protection systems during an outage?*

Outage of all fire protection pumps and other important equipment is part of TSO supervision and partly also a part of inspection. Surveillance activities (Tech. Spec.) of fire protection equipment (pumps, sprinkler systems, deluge valves, smoke detectors, hydrant system and instrumentation) are inspected during the whole fuel cycle, not only during outages (6 – 8 inspections per year).

b. *What inspections are undertaken by the RB of the licensee's ability to control fire risks arising during an outage (e.g. hot work, fire loading, etc.)?*

Hot work, fire load, flammable materials etc. are regulated by NPP's internal procedures and inspected by Administration for Civil Protection and Disaster Relief (Fire safety inspection).

c. *How does the RB evaluate that the licensee's arrangements for response to fire during an outage are adequate?*

This evaluation is performed by Administration for Civil Protection and Disaster Relief (Fire safety inspection).

5. Outage findings

The following questions concern RB follow-up on outage findings¹ (e.g. test results, in-service inspection (ISI) results) and events (e.g. leaks, fire, workforce accidents, reportable and non-reportable events) and their resolution.

¹ Identified either by the RB or the licensee

a. *How is the RB informed of any findings and events arising during the outage?*

SNSA has following possibilities to receive information of findings:

- Information transmitted to the RB headquarters by the site inspector.
- Information is detected on regular meetings.
- Transmitting of information by TSO staff.
- Licensee Event Reports prepared by the NPP as defined in Rules JV9.

b. *How does the RB respond to findings and events (e.g. specific resources, specific inspections)?*

- Reactive inspections with RB experts and TSO staff.
- Requirements for Root Cause Analysis with Corrective Action Programme.
- In the worst case RB issues a Decree with specific requirements.

c. *Is the RB routinely informed of all fire occurrences?*

Yes. NPP daily written report is defined in Rules JV9. In case of important event the NPP staff makes a phone call to the RB.

d. *How does the RB assess that any findings are evaluated in a timely manner?*

In accordance to the Rules JV9, NPP has to report about the implemented corrective actions based on the findings. Besides this the SNSA developed its own Commitment Tracking System to follow the implementation of corrective actions. Follow-up inspections are performed when needed.

6. Outage key stages, restart, and post outage actions

The following questions concern the monitoring of progress by the RB during an NPP outage, RB witness points, authorisation for restart, post outage review and relevant post outage testing

a. *What arrangements does the RB have to monitor progress with the outage program (e.g. daily reports, routine meetings, database access)?*

- Daily outage report.
- Regular daily meetings with the NPP staff.
- Regular weekly meetings with the TSOs and NPP.
- Revised outage plan.
- Outage status.

b. *Does the RB define any formal witness or hold points during the outage and if so what are they?*

There are two hold points: “Statement for re-criticality after the outage” and “Statement for full power operation after the outage” prepared by TSO.

c. *Does the licensee require formal authorisation from the RB before restart, and if so what is the RB decision making process to allow the restart?*

No.

d. *What type activities (if any) are undertaken by the RB after restart (e.g. inspection of physics tests, review of licensee lessons learned, etc.)?*

Physics tests, RCS Integrity test and Rx Start-up are supervised by RB staff.

7. Are there any other important topics that you would like to be considered at the workshop?

./.

SPAIN

1. Regulatory requirements

- a. *What are the regulatory requirements governing the outage of NPPs?*

The main regulatory requirement is based on the Nuclear Safety Council Instruction IS-15 on the “requirements for monitoring the effectiveness of maintenance at NPPs” which is developed with Safety Guide 1.18 that adapts the “Maintenance Rule” established 10CFR50.65 that requires the establishment of a methodology to assess and manage the increase of risk resulting from the maintenance activities (including outages).

- b. *What are the regulatory requirements relating to fire protection at NPPs during outages?*

There are not specific requirements relating to fire protection during outages. The CSN has recently approved a new revision of its Nuclear Safety Council Instruction IS-30 on “requirements of the fire protection program in nuclear power plants”.

2. Outage scope and content

The following questions concern the review of outage scope and content by the RB with the licensee prior to the outage.

- a. *What types of pre-outage interactions (e.g. meetings, reports) are held between the RB and the licensee?*
- b. *What documentation is supplied and what discussions are held in pre-outage interactions (e.g. test plan, modifications, regulatory commitments, in-service inspection, quality assurance, fire safety, etc.)?*

As stated in Nuclear Safety Council Instruction IS-2 on “documentation relating to Refueling Activities at Light Water Nuclear Power Plants” up to 2 months in advance the licensee has to provide the CNS with the following documents:

- Refueling safety Report
- Refueling planning report
- General Schedule for the refueling activities.

The Resident Inspection in each NPP has to provide a “Pre-outage Report” in which, based on the previous documentation and specific meetings with the licensee, all the Nuclear Safety aspects are assessed.

- c. *What influence does the RB have on the scope, content and planning of NPP outages? Is there a formal approval required from the RB on the outage scope?*

There are not specific requirement or formal approval required on the outages scope and planning, but it is not uncommon to have other safety requirement (like plant modifications or specific tests) to be made in specific outages that, obviously, have influence on the content of the licensee’s planning of the outage.

- d. *Does the RB define preconditions for restart?*

Not specifically (see above).

3. RB outage inspection scope

The following questions concern the scope and resourcing of inspections carried out by the RB during an NPP outage.

- a. *Does the RB explicitly define by internal procedure a list of topics that it will inspect during an outage and if so what are they?*

The CSN has a specific Inspection Procedure for the Resident Inspection related to outages (PT.IV-217) in which the main topics of inspection are established. Other inspections held each outage by other CSN' inspectors concern radiological protection, in-service inspection and specific outage surveillance tests.

- b. *Which of the following topics are typically inspected by the RB?*

- safety culture
- operating experience
- qualification of licensee staff/contractors
- fire protection
- radiological protection
- control of foreign material (FME)
- housekeeping
- industrial safety (personal safety)
- working time
- management of contractors
- security
- environmental issues
- modifications
- quality assurance
- in-service inspections (periodic tests)
- pressure boundaries
- outage management
- maintenance activities
- handling of fuel elements
- specific technical areas (e.g. structural integrity, electrical, etc.).

Most of this topics are inspected by the CSN as part of its biannual Basic Inspection Program, but the majority of them are not specifically inspected for outages. The list can be clarified:

Topics specifically inspected for outages:

- radiological protection,
- in-service inspections,
- surveillance tests.

Topics inspected but not specifically for outages:

- safety culture,
- operating experience,
- qualification,
- fire protection.
- management of contractors,
- security,

- modifications,
- quality insurance.

Topics inspected by the Resident Inspection (mainly in outages):

- control of foreign material,
 - housekeeping,
 - maintenance activities,
 - handling of fuel elements.
- c. *What type and how much inspection resource is utilised (e.g. RB inspection staff, RB specialist, and technical support organisation manpower)?*

The Resident Inspection activities during outages are mostly focused on its specific inspections. The involvement of other inspection staff and specialists is linked to the specific outage inspections (see above). If possible, periodic basic inspections are avoided during outages.

The CSN does not employ any TSO.

- d. *What inspections are undertaken by the RB to evaluate that the licensee has minimized nuclear safety risks during the outage?*

Inspection Procedure PT.IV-217 for the Resident Inspections includes an inspection of the control by the licensee of the Nuclear Safety Functions, which are reported daily.

4. Fire safety

The following questions concern fire safety maintenance programmes, the impact of outage activities on fire safety and arrangements for response to a fire.

- a. *What inspections are undertaken by the RB regarding oversight of the maintenance of fire protection systems during an outage?*
- b. *What inspections are undertaken by the RB of the licensee's ability to control fire risks arising during an outage (e.g. hot work, fire loading, etc.)?*
- c. *How does the RB evaluate that the licensee's arrangements for response to fire during an outage are adequate?*

There are not specific fire protection system inspections held during outages. Inspection procedure PT.IV-205, defines some general inspection activities to be made by the Resident Inspection every year, and there is an effort to make some of this inspections in outages.

5. Outage findings

The following questions concern RB follow-up on outage findings¹ (e.g. test results, in-service inspection (ISI) results) and events (e.g. leaks, fire, workforce accidents, reportable and non-reportable events) and their resolution.

- a. *How is the RB informed of any findings and events arising during the outage?*

There is no change in the way the RB is informed by the licensee of any findings, events and its resolution during outages.

¹ Identified either by the RB or the licensee

The normal procedure is that every day, the Resident Inspection is informed and reports the RB with any significant event. Additionally Nuclear Safety Instruction IS-10 establishes criteria for the formal report of events to the CSN.

- b. *How does the RB respond to findings and events (e.g. specific resources, specific inspections)?*

There is no change in the way the RB responds to findings and events during outages. Procedure PA.II-05 establishes criteria to arrange “Reactive Inspections” in case the finding or event is significant enough and there is a need to collect additional information.

- c. *Is the RB routinely informed of all fire occurrences?*

Yes, to the Resident Inspection or by an Event Report when fire occurrence meets certain criteria.

- d. *How does the RB assess that any findings are evaluated in a timely manner?*

Outside of the daily interaction and communication between the licensee and the CSN (normally via the Resident Inspection), the licensees are required to maintain a “Corrective Action Programme” that is inspected regularly.

6. Outage key stages, restart, and post outage actions

The following questions concern the monitoring of progress by the RB during an NPP outage, RB witness points, authorisation for restart, post outage review and relevant post outage testing

- a. *What arrangements does the RB have to monitor progress with the outage program (e.g. daily reports, routine meetings, database access)?*

The daily interaction between the CSN and the licensee is held by the Resident Inspection, who have access to some of the licensee databases, receives daily reports and have routine meeting at least once a day. During outages, the progress with the outage program is the main topic of information.

- b. *Does the RB define any formal witness or hold points during the outage and if so what are they?*
Not specifically.

- c. *Does the licensee require formal authorisation from the RB before restart, and if so what is the RB decision making process to allow the restart?*

There is not a specific requirement for the restart of a plant, but it is not uncommon to have other safety requirements (like plant modifications, changes in the TS or specific tests) to be made in specific outages that have to be approved before the restart.

- d. *What type activities (if any) are undertaken by the RB after restart (e.g. inspection of physics tests, review of licensee lessons learned, etc.)?*

Safety Instruction IS-02 requires a “Final Report” on the outage to be sent by the licensee to the CSN up to 3 months after the completion of the shutdown.

7. Are there any other important topics that you would like to be considered at the workshop?

SWEDEN

1. Regulatory requirements

- a. *What are the regulatory requirements governing the outage of NPPs?*

There are no special requirements explicitly stated governing the outage of NPPs. The general requirements don't make difference between outage and other operating modes of the NPP. The RB's regulations require that licensee shall establish SAR and OLC and ensure they are up to date. Before the trial and routine operation the SAR and OLC shall be submitted to the RB. RB shall be notified of any modifications or temporary deviations from the OLC before they may be applied.

- b. *What are the regulatory requirements relating to fire protection at NPPs during outages?*

As earlier there are no special requirements related to the outages. In general the fire protection is not regulated by the RB other than what is stated in the design principles about the physical and functional separation.

2. Outage scope and content

The following questions concern the review of outage scope and content by the RB with the licensee prior to the outage.

- a. *What types of pre-outage interactions (e.g. meetings, reports) are held between the RB and the licensee?*

Prior to the outage a meeting between the RB and the licensee is held on the regular basis. The topics discussed are typically: planning and experience from previous outages, the most risk-significant works and how it has been prepared for these risks, larger preventive maintenance, tests planned in the primary system and reactor vessel, safety-increasing and other larger modifications, estimation of the expected radiation doses to the personnel.

- b. *What documentation is supplied and what discussions are held in pre-outage interactions (e.g. test plan, modifications, regulatory commitments, in-service inspection, quality assurance, fire safety, etc.)?*

According to the regulatory requirements all plant modifications shall be notified to the RB before implementation. An appointed working group at the RB handles all notifications and decides if further review is needed and in that case if the implementation of the modification may commence before review by the RB is completed. Work activities where the total collective dose is expected to exceed 100 mmanSv shall be notified in advance, in writing, to the RB.

- c. *What influence does the RB have on the scope, content and planning of NPP outages? Is there a formal approval required from the RB on the outage scope?*

In normal case RB is not involved in the planning of the scope and content of NPP outages and direct influence doesn't exist. Indirectly there is a general influence from the RB by the fact that RB has issued new regulations concerning the design and construction of the NPP implying the modernisation requirements. There is no formal approval however from the RB on the outage scope.

- d. *Does the RB define preconditions for restart?*

RB defines what is to be contained in the OLC in general preconditions for restart included. RB is not involved in defining preconditions from case to case.

3. RB outage inspection scope

The following questions concern the scope and resourcing of inspections carried out by the RB during an NPP outage.

- a. *Does the RB explicitly define by internal procedure a list of topics that it will inspect during an outage and if so what are they?*

There is no such list.

- b. *Which of the following topics are typically inspected by the RB?*

- **safety culture**
- **operating experience**
- **qualification of licensee staff/contractors**
- **fire protection**
- **radiological protection**
- **control of foreign material (FME)**
- **housekeeping**
- **industrial safety (personal safety)**
- *working time*
- *management of contractors*
- **security**
- **environmental issues**
- **modifications**
- *quality assurance*
- **in-service inspections (periodic tests)**
- *pressure boundaries*
- **outage management**
- **maintenance activities**
- *handling of fuel elements*
- *specific technical areas (e.g. structural integrity, electrical, etc.)*

- c. *What type and how much inspection resource is utilised (e.g. RB inspection staff, RB specialist, and technical support organisation manpower)?*

Those who are normally involved are inspectors (operations at NPP) and radiation protection analysts. An independent and impartial organ that in a third party position monitors, assesses and documents non-destructive testing.

- d. *What inspections are undertaken by the RB to evaluate that the licensee has minimized nuclear safety risks during the outage?*

There are no other than what has already been mentioned.

4. Fire safety

The following questions concern fire safety maintenance programmes, the impact of outage activities on fire safety and arrangements for response to a fire.

- a. *What inspections are undertaken by the RB regarding oversight of the maintenance of fire protection systems during an outage?*

Walk around, housekeeping.

- b. *What inspections are undertaken by the RB of the licensee's ability to control fire risks arising during an outage (e.g. hot work, fire loading, etc.)?*

Walk around, housekeeping.

- c. *How does the RB evaluate that the licensee's arrangements for response to fire during an outage are adequate?*

There is no such evaluation.

5. Outage findings

The following questions concern RB follow-up on outage findings¹ (e.g. test results, in-service inspection (ISI) results) and events (e.g. leaks, fire, workforce accidents, reportable and non-reportable events) and their resolution.

- a. *How is the RB informed of any findings and events arising during the outage?*

There is a general responsibility for the licensee to report events which have occurred and conditions which have been detected, to the RB no matter whether it is outage or other operational mode.

- b. *How does the RB respond to findings and events (e.g. specific resources, specific inspections)?*

RB considers on a case by case basis whether an event implies that we must take further action. If an event is quite serious, RB may launch a rapid investigation. This kind of investigation involves a team of around four persons visiting the facility to gain their own understanding of the situation. This investigation should be launched immediately once the event has taken place. As a rule, this means that the team leaves for the site latest the day after the event.

- c. *Is the RB routinely informed of all fire occurrences?*

We assume we are but there is no special forum for this in addition to the regular applicable to all events.

- d. *How does the RB assess that any findings are evaluated in a timely manner?*

There are no special routines during outages. There are however RB requirements for classification, evaluation and reporting of events.

6. Outage key stages, restart, and post outage actions

The following questions concern the monitoring of progress by the RB during an NPP outage, RB witness points, authorisation for restart, post outage review and relevant post outage testing

- a. *What arrangements does the RB have to monitor progress with the outage program (e.g. daily reports, routine meetings, database access)?*

No arrangements.

- b. *Does the RB define any formal witness or hold points during the outage and if so what are they?*

There are no such witness or hold points.

- c. *Does the licensee require formal authorisation from the RB before restart, and if so what is the RB decision making process to allow the restart?*

No.

¹ Identified either by the RB or the licensee

- d. What type activities (if any) are undertaken by the RB after restart (e.g. inspection of physics tests, review of licensee lessons learned, etc.)?*

A joint meeting is held after outage where all units at a particular site participate. The purpose of the activity is to obtain an overall picture of how licensee works and follows up lessons learned from outages with regard to planning, implementation and other experiences.

7. Are there any other important topics that you would like to be considered at the workshop?

This topic itself is interesting to us so we are fine.

SWITZERLAND

1. Regulatory requirements

a. *What are the regulatory requirements governing the outage of NPPs?*

The legislative and regulatory framework in Switzerland for the peaceful use of nuclear energy, the safety of nuclear installations and radiological protection is based on a four-level system:

- 1st level: Federal Constitution of the Swiss Confederation;
- 2nd level: Federal Acts;
- 3rd level: Ordinances (issued by the Federal Council or a federal department);
- 4th level: Regulatory guidelines.

b. *What are the regulatory requirements relating to fire protection at NPPs during outages?*

There are no special requirements for the outage period. The fire protection concept is valid for power production and outage period. All permanent and significant temporary modifications to existing fire protection infrastructure are subject of acceptance by the RB.

Legal basis is given by the Nuclear Energy Act (KEG) and the Ordinances (KEV) and suitable ENSI guidelines(ENSI B02, HSK R-030, HSK R035, R-050).

The law of the canton for every NPP-site has to be respected. The fire insurances of the cantons are joined in the VKF (Union of cantonal fire insurances). VKF sets basic principles for fire prevention in Switzerland (education, guidelines, certification of material). The canton conducts a risk evaluation and asks for provisions in preventive and defensive fire protection. ENSI completes the demands of the cantons in checking, if they comply with international instructions, ENSI guidelines and the guidelines of the licensee.

Guideline R50: “Requirements important to safety for fire protection in nuclear installations”.

The Guideline B11 requires plant emergency exercises to be carried out with an emphasis on the engagement of the plant fire brigade. Such exercises are to be organized on a regular basis and the participation of plant external fire brigades within such plant emergency exercises is now foreseen as well. Such exercises primarily serve the purpose of training and verification of the operational readiness of the plant fire brigade.

2. Outage scope and content

The following questions concern the review of outage scope and content by the RB with the licensee prior to the outage.

a. *What types of pre-outage interactions (e.g. meetings, reports) are held between the RB and the licensee?*

During each refuelling outage, the plant is subjected to a review, which covers many aspects.

b. *What documentation is supplied and what discussions are held in pre-outage interactions (e.g. test plan, modifications, regulatory commitments, in-service inspection, quality assurance, fire safety, etc.)?*

- Well before the outage the licensee is carrying e detailed programme of the different outage activities. The Inspectorate (RB) monitors in-service inspections, preventive maintenance and re-pairs/modifications to safety-related mechanical equipment undertaken by licensees to maintain or enhance plant safety. Well before the outage the licensee is carrying e detailed programme of the different outage activities.

- The licensee carries out a review of mandatory periodic functional testing of systems and components, including switchover tests for the electricity supply. These tests are performed in accordance with written procedures and all test results are documented.
 - Cycle-specific fuel and core-related issues are reviewed as part of the “Refuelling Licensing Submittal” submitted by the licensee at the beginning of the plant-refuelling outage.
- c. *What influence does the RB have on the scope, content and planning of NPP outages? Is there a formal approval required from the RB on the outage scope?*

No, there is no formal approval required from the RB on the outage scope. But the RB is informed about all activities of importance well before the outage. In several technical meetings the scope of the outage activities is discussed between the licensee and the RB. Most of the planned modifications in the plant have to be accepted by the RB.

- d. *Does the RB define preconditions for restart?*

Yes, there are several preconditions defined. Most important are: All requested tests have to be successfully done. All requested documents must be submitted to the RB. The result of the final walk down, conducted by the RB, must be positive. The licensee needs this final approval from the RB to increase the power over 5 % nominal power.

3. RB outage inspection scope

The following questions concern the scope and resourcing of inspections carried out by the RB during an NPP outage.

- a. *Does the RB explicitly define by internal procedure a list of topics that it will inspect during an outage and if so what are they?*

Yes, the RB is defining a list of topics:

- The Inspectorate (RB) monitors in-service inspections, preventive maintenance and repairs/modifications to safety-related mechanical equipment undertaken by licensees to maintain or enhance plant safety. Its mandated expert, the Swiss Association for Technical Inspections supervises and verifies these activities using a combination of selective supervisory and random checks. In contrast, the Inspectorate focuses on specific issues.
- The Inspectorate inspects selected tests and also reviews the results of the entire test programme.
- The Inspectorate must approve fuel and core loading before any cycle start-up. The Inspectorate also reviews fuel handling and inspection and attends selected fuel inspection campaigns.

- b. *Which of the following topics are typically inspected by the RB?*

- *safety culture*
- *operating experience*
- *qualification of licensee staff/contractors*
- *fire protection*
- *radiological protection*
- *control of foreign material (FME)*
- *housekeeping*
- *industrial safety (personal safety)*
- *working time*
- *management of contractors*

- *security*
- *environmental issues*
- *modifications*
- *quality assurance*
- *in-service inspections (periodic tests)*
- *pressure boundaries*
- *outage management*
- *maintenance activities*
- *handling of fuel elements*
- *specific technical areas (e.g. structural integrity, electrical, etc.).*

Most important are: Radiological protection, fire protection, management of contractors, modifications, in-service inspections (tests), outage management, maintenance activities, handling of fuel elements and specific technical areas. Safety Culture aspects are observed during any inspection.

- c. *What type and how much inspection resource is utilised (e.g. RB inspection staff, RB specialist, and technical support organisation manpower)?*

The RB is performing about 400 inspections per year (at 5 NPPs). Involved are about 120 inspectors. Most inspectors are specialists performing inspections within their area of expertise. Areas of expertise are mechanical, electrical and civil engineering, reactor physics, health physics, radiation protection and organisational aspects.

- d. *What inspections are undertaken by the RB to evaluate that the licensee has minimized nuclear safety risks during the outage?*

See above 3.a.

4. Fire safety

The following questions concern fire safety maintenance programmes, the impact of outage activities on fire safety and arrangements for response to a fire.

- a. *What inspections are undertaken by the RB regarding oversight of the maintenance of fire protection systems during an outage?*

During the daily walk-downs in the plant by the site inspector general aspects of fire protection, such as evacuation routes or fire protection doors, are subject of the inspection.

After the outage before moving toward power production a general inspection is undertaken. This covers also fire protection.

- b. *What inspections are undertaken by the RB of the licensee's ability to control fire risks arising during an outage (e.g. hot work, fire loading, etc.)?*

Well before the outage the licensee makes requests for each modification planned. Fire risks are part of the modification requests and also of the acceptance by the RB.

Modifications which had to be granted by the RB are often subject of an inspection during outage by the RB.

- c. *How does the RB evaluate that the licensee's arrangements for response to fire during an outage are adequate?*

The licensee arrangements (equipment, qualified manpower) for response to fire are defined by the canton. ENSI stipulated additional risks as flooding or earthquake where adequate response to fire has to be taken by the licensee.

5. Outage findings

The following questions concern RB follow-up on outage findings¹ (e.g. test results, in-service inspection (ISI) results) and events (e.g. leaks, fire, workforce accidents, reportable and non-reportable events) and their resolution.

- a. *How is the RB informed of any findings and events arising during the outage?*

According Art. 73 of the Nuclear Energy Act the supervisory authorities shall be provided with all information and documentation they may need in order to make comprehensive assessments or carry out effective controls. The licensee is informing the RB according the guideline ENSI-B03.

- b. *How does the RB respond to findings and events (e.g. specific resources, specific inspections)?*

- Assessment of the corrective action performed and proposed by the licensee.
- Assessment of the facts in accordance with the principles of the systematic safety assessment.

These assessments can contain inspections or expert discussions.

- c. *Is the RB routinely informed of all fire occurrences?*

Yes, See 5a.

- d. *How does the RB assess that any findings are evaluated in a timely manner?*

The licensee has to submit reports to the RB. These reports are covering the following topics:

- description of the finding or the event respectively,
- causes of the finding/event,
- safety significance,
- corrective action already carried out,
- corrective action planned.

6. Outage key stages, restart, and post outage actions

The following questions concern the monitoring of progress by the RB during an NPP outage, RB witness points, authorisation for restart, post outage review and relevant post outage testing

- a. *What arrangements does the RB have to monitor progress with the outage program (e.g. daily reports, routine meetings, database access)?*

There are full-time site inspectors for the nuclear power plants (one per plant). They are generalists, focused on normal operation and are performing approximately weekly inspections during power operation and approximately daily inspection during outages. The site inspectors are well informed about progress with the outage programme. Twice a week there is a meeting at the RB to coordinate activities and to inform the other inspectors.

- b. *Does the RB define any formal witness or hold points during the outage and if so what are they?*

No, the only hold point is before restarting the plant. See below, Chapter 6d.

- c. *Does the licensee require formal authorisation from the RB before restart, and if so what is the RB decision making process to allow the restart?*

The Inspectorate issues a letter granting permission to restart plant operation after the maintenance/refuelling outage. In this letter, the Inspectorate gives its assessment of the outage

¹ Identified either by the RB or the licensee

maintenance and refuelling activities, the radiological status of the plant and the cycle-specific safety analyses. The permit may also include conditions for plant operation or requirements and recommendations for maintaining and improving plant safety. The Inspectorate documents its own activities during the outage in a separate outage report.

There is a team inspection to verify, if the plant is ready for a new cycle. Team inspections are carried out by a multidisciplinary group of specialists and are an important tool of Integrated Oversight.

- d. *What type activities (if any) are undertaken by the RB after restart (e.g. inspection of physics tests, review of licensee lessons learned, etc.)?*

After restart of the plant the normal oversight process starts. See Chapter 5.a.

The experience feedback (lessons learned) takes place at different technical meetings of specialists during the year.

7. Are there any other important topics that you would like to be considered at the workshop?

No.

UNITED KINGDOM

1. Regulatory requirements

a. *What are the regulatory requirements governing the outage of NPPs?*

The over-arching UK legislation is currently the *Health & Safety at Work Act (1974) which identifies the Nuclear Installations Act (1965) as one of its 'statutory provisions'. The Nuclear Installations Act gives the Health and Safety Executive (HSE) powers to attach licence conditions to a nuclear site licence. The Office for Nuclear Regulation (ONR) is currently an agency of HSE.

[*From 1 April 2014, new legislation will come into effect, 'The Energy Act' will formally create the Office for Nuclear Regulation as a public corporation and the relevant sections of the Nuclear Installations Act will be captured within the new Act.]

There are 36 licence conditions attached to the standard nuclear site licence, Licence Condition (LC) 28 deals with examination, inspection, maintenance and testing.

LC28 requires that licensees make and implement adequate arrangements for regular and systematic examination, inspection, maintenance and testing of all plant that may affect safety. As part of their arrangements to address LC28, the licensee produces maintenance schedules, including a maintenance schedule preface that defines the maintenance periodicities, allowable extensions and tolerances for maintenance tasks.

The preface also defines the operating period between statutory outages, and hence defines the when reactors should be shut down for statutory outages (nominally every 18 months for PWR, 3 yearly for Advanced Gas Reactors (AGR)).

RB formally approves the preface by issuing a Licence Instrument (Approval). Approved arrangements can only be amended by a further formal Approval.

b. *What are the regulatory requirements relating to fire protection at NPPs during outages?*

The requirements of the legislation are exactly the same as that during normal operational periods i.e. the Responsible Person must take all reasonable steps to prevent the occurrence of a fire and ensure the safety of persons from fire should one occur. Key areas of focus are Means of Escape, Warning in the event of a Fire, Signage, Emergency Lighting and Training. Training and procedural awareness are specifically important when persons unfamiliar with their surroundings are involved. The Fire Risk Assessment (FRA) should identify all the risks and hazards and offer a commentary against all the significant findings. The legislation is goal based and thus is not prescriptive. This offers the Responsible Person the opportunity to apply differing ways of achieving the expected outcome.

2. Outage scope and content

The following questions concern the review of outage scope and content by the RB with the licensee prior to the outage.

a. *What types of pre-outage interactions (e.g. meetings, reports) are held between the RB and the licensee?*

Outage intent meeting is held 6 months before the outage. The RB is represented by the nominated site inspector and lead specialist inspectors (e.g. lead structural engineering inspector). A draft outage intent document will have been available to RB prior to this meeting.

b. *What documentation is supplied and what discussions are held in pre-outage interactions (e.g. test plan, modifications, regulatory commitments, in-service inspection, quality assurance, fire safety, etc.)?*

Outage intent document is reviewed, discussed and agreed (not a formal agreement) at the outage intent meeting. This document sets the scope of the essential maintenance work packages, ISI inspections, engineering modifications and appropriate safety justifications that will be produced for RB review/assessment.

- c. *What influence does the RB have on the scope, content and planning of NPP outages? Is there a formal approval required from the RB on the outage scope?*

Influence is through normal regulatory interactions, inspectors use regulatory leverage to include work packages in the scope, but these are not formal License Instruments. No formal approval is required or given for the outage scope.

- d. *Does the RB define preconditions for restart?*

No.

3. RB outage inspection scope

The following questions concern the scope and resourcing of inspections carried out by the RB during an NPP outage.

- a. *Does the RB explicitly define by internal procedure a list of topics that it will inspect during an outage and if so what are they?*

Yes. Dependant on reactor type (Advanced Gas Reactor or PWR), areas are typically civil engineering, structural engineering, in core inspections (graphite core for AGR), control & instrumentation, heavy electrics, radiological protection, fire protection.

- b. *Which of the following topics are typically inspected by the RB? See bold font.*

- safety culture
- operating experience
- **qualification of licensee staff/contractors**
- **fire protection**
- **radiological protection**
- **control of foreign material (FME)**
- **housekeeping**
- **industrial safety (personal safety)**
- working time
- **management of contractors**
- **security**
- environmental issues (**we have a separate environmental regulator**)
- **modifications**
- **quality assurance**
- **in-service inspections (periodic tests)**
- **pressure boundaries**
- **outage management**
- **maintenance activities**

- handling of fuel elements
 - **specific technical areas (e.g. structural integrity, electrical, etc)**
- c. *What type and how much inspection resource is utilised (e.g. RB inspection staff, RB specialist, and technical support organisation manpower)?*

Nominated site inspector attends site 3-4 weeks out of a 10 week outage. Specialist inspectors attending for 2-4 days each, as required to cover each of the above areas.

- d. *What inspections are undertaken by the RB to evaluate that the licensee has minimized nuclear safety risks during the outage?*

All outage operations are covered by a shut down safety case and Tech Specs. All RB inspections are nuclear safety focussed on outage operations, maintenance and modifications to ensure nuclear safety is maintained when the reactor returns to service (except fire inspections which are focussed on safety of persons).

4. Fire safety

The following questions concern fire safety maintenance programmes, the impact of outage activities on fire safety and arrangements for response to a fire.

- a. *What inspections are undertaken by the RB regarding oversight of the maintenance of fire protection systems during an outage?*

Specialist fire inspectors have tried where possible to align our inspections to outage periods where possible. This is not always possible.

- b. *What inspections are undertaken by the RB of the licensee's ability to control fire risks arising during an outage (e.g. hot work, fire loading, etc.)?*

Fire is recognised as being one of the most significant risks during an outage period. The specialist fire inspector reviews the FRA, confirming that arrangements are in place to manage hot work activities, management of combustibles, fire protection systems, emergency lighting, escape route travel distances, mustering etc.

- c. *How does the RB evaluate that the licensee's arrangements for response to fire during an outage are adequate?*

As part of the pre outage inspections, the licensee is asked to demonstrate site fire muster arrangements, including the mustering of a large number of additional contractors who are not normally on site during non-outage periods (circa 700 people on site for normal operations, up to 1,200 for outage period).

5. Outage findings

The following questions concern RB follow-up on outage findings¹ (e.g. test results, in-service inspection (ISI) results) and events (e.g. leaks, fire, workforce accidents, reportable and non-reportable events) and their resolution.

- a. *How is the RB informed of any findings and events arising during the outage?*

Formal event reporting arrangements are in place to report significant events/findings. For less significant events, informal working arrangements are in place between RB inspectors and licensee staff (based on professional/mutual respect and working relationships). Most communications are

¹ Identified either by the RB or the licensee

through the nominated site inspector, however specialist inspectors may deal directly with licensee counterparts as required.

- b. *How does the RB respond to findings and events (e.g. specific resources, specific inspections)?*

Generic issues will be dealt with by the nominated site inspector. Deep specialist issues, e.g. inspections of control and instrumentation modifications, will be undertaken by specialist inspectors. The nominated site inspector will maintain oversight of all inspections to enable him to maintain overall management of the regulation of the outage. Meetings will be arranged to discuss issues with licensee (face to face or video conference etc.) as required.

- c. *Is the RB routinely informed of all fire occurrences?*

Yes. Fires are reportable events and are split into separate sub categories e.g. smouldering fire, minor fire, significant/major fire etc. The licensees are particularly sensitive to all fire events.

- d. *How does the RB assess that any findings are evaluated in a timely manner?*

For generating civil reactors, formally reported events should be investigated by the licensee within 30 days and a follow up report sent to the RB within 60 days. The follow up report is assessed by the nominated site inspector and any follow up action is determined. For lower level events, the site inspector will interact with the licensee as normal business.

6. Outage key stages, restart, and post outage actions

The following questions concern the monitoring of progress by the RB during an NPP outage, RB witness points, authorisation for restart, post outage review and relevant post outage testing

- a. *What arrangements does the RB have to monitor progress with the outage program (e.g. daily reports, routine meetings, database access)?*

When at station, the nominated site inspector attends twice daily outage progress meetings at 08:00 hrs and 16:00 hrs. Planned licence compliance inspections and any required reactive inspections are undertaken by the nominated site inspector. Planned inspections are undertaken by specialist inspectors against the topics identified at 3b above. When not at station, RB inspectors keep up to speed with outage progress by telephone contact with licensee as required.

- b. *Does the RB define any formal witness or hold points during the outage and if so what are they?*

Not usually part of regulatory strategy for an outage, however formal permissioning (Agreement) of a safety case for a modification may mean that a hold point is in place.

- c. *Does the licensee require formal authorisation from the RB before restart, and if so what is the RB decision making process to allow the restart?*

Licensee and RB hold a formal 'Start Up Meeting' approximately one week prior to planned reactor start up. All outstanding work and actions are identified. The nominated site inspector manages and brings together all RB inspection and safety case assessor findings in a single outage Project Assessment Report (PAR). His line manager must then approve this report. The Deputy Chief Inspector (DCI) will only permission restart by signing a formal Licence Instrument (Consent) after he has reviewed the PAR and met with the nominated site inspector, who will explain how the licensee has demonstrated that all work packages are completed, any actions are closed out and that safety cases for significant engineering modifications are assessed and Agreed (formal agreement).

- d. What type activities (if any) are undertaken by the RB after restart (e.g. inspection of physics tests, review of licensee lessons learned, etc.)?*

Review of lessons learned, including discussion on effectiveness of interactions between licensee and RB. Licensee then produces a report within 28days (The 28 Day Report) that captures lessons learned, safety performance etc. for information/review by RB. Any outstanding issues are then picked up and managed as normal regulatory business.

- 7. Are there any other important topics that you would like to be considered at the workshop?**

USA

1. Regulatory requirements

- a. *What are the regulatory requirements governing the outage of NPPs?*

The design and operational regulatory requirements do not generally depend on operational modes. All licensed conditions, applicable portion of the plant Technical Specifications as well as applicable portions of Title 10 of Code of Federal Regulations, particularly, Part 50 Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants,” applies to U.S. commercial power plants during outage periods. U.S. Nuclear Regulatory Commission does not have a specific regulatory requirement governing the outages of nuclear power plants in the United States. Other requirements include operator training (10 CFR 50.55) and the licensee management of operator fatigue (10 CFR 26).

- b. *What are the regulatory requirements relating to fire protection at NPPs during outages?*

The regulatory requirements for fire protection do not generally depend on operational modes and continue to be governed 10 CFR 50.48, 10 CFR 50 Appendix R and the facility’s Technical Specification Licensee Conditions to implement a fire protection program consistent with those requirements. Those requirements are valid throughout a spectrum of operational modes, including outages.

2. Outage scope and content

The following questions concern the review of outage scope and content by the RB with the licensee prior to the outage.

- a. *What types of pre-outage interactions (e.g. meetings, reports) are held between the RB and the licensee?*

Prior to the outage inspectors are required by NRC inspection procedure IP 71111.20, “Refueling and Other Outage Activities,” to review the licensee’s outage risk control plan and verify that the licensee has appropriately considered risk, industry experience and previous site specific problems. Also, inspectors are required to confirm that the licensee has mitigation/response strategies for losses of key safety functions and confirm that the licensee has scheduled covered workers such that the minimum days off for individuals working on outage activities are in compliance with 10 CFR 26.205(d)(4) and (5).

NRC does not impose any mandatory outage meeting between the RB and the licensee or require that the licensee submit outage reports to the RB.

There are three main (operational, health physics, and in-service), sometimes four (licensee renewal), inspection scope reviews that are discussed with the licensee by the RB. The inspector conducts the operational review via a meeting with the facility outage manager (and other persons) and reviews their outage plan, usually within a month prior to the outage. The other scope reviews are covered via phone meetings with the responsible regional inspector team leaders who will be on-site during the outage for RB inspections.

- b. *What documentation is supplied and what discussions are held in pre-outage interactions (e.g. test plan, modifications, regulatory commitments, in-service inspection, quality assurance, fire safety, etc.)?*

Prior to the outage inspectors are required by NRC inspection procedure IP 71111.20, “Refueling and Other Outage Activities,” to review the licensee’s outage risk control plan and verify that the licensee has appropriately considered risk, industry experience and previous site specific

problems. Also, inspectors are required to confirm that the licensee has mitigation/response strategies for losses of key safety functions and confirm that the licensee has scheduled covered workers such that the minimum days off for individuals working on outage activities are in compliance with 10 CFR 26.205(d)(4) and (5).

NRC does not impose any mandatory outage meeting between the RB and the licensee or require that the licensee submit outage reports to the RB.

- c. *What influence does the RB have on the scope, content and planning of NPP outages? Is there a formal approval required from the RB on the outage scope?*

NRC does not influence the scope, content and planning of NPP outages. There is no regulatory requirement to have the outage scope approved by the RB, however, the plan is influenced by regulatory requirements and licensee commitments to the RB that will be reviewed by the inspectors by a sampling method

- d. *Does the RB define preconditions for restart?*

No.

3. RB outage inspection scope

The following questions concern the scope and resourcing of inspections carried out by the RB during an NPP outage.

- a. *Does the RB explicitly define by internal procedure a list of topics that it will inspect during an outage and if so what are they?*

Yes.

Areas we inspect during outages include:

- Review of Outage Plan
- Monitoring of Shutdown Activities
- Licensee Control of Outage Activities (for example, see below)
 - Clearance Activities
 - Reactor Coolant System Instrumentation
 - Electrical Power
 - Decay Heat Removal (DHR) System Monitoring
 - Spent Fuel Pool Cooling System Operation
 - RCS Inventory Control
 - Reactivity Control
 - Containment Closure
 - Fatigue Management

- Reduced Inventory and Mid-Loop Conditions
- Refueling Activities
- Monitoring of Heatup and Startup Activities
- Identification and Resolution of Problems
- Non-destructive Examination (NDE) Activities and Welding Activities
- PWR Vessel Upper Head Penetration (VUHP) Inspection Activities (when conducted)
- Boric Acid Corrosion Control (BACC) Inspection Activities (PWRs)
- Steam Generator (SG) Tube Inspection Activities

Inspection procedures used during the outage include:

- IP 71111.20, “Refueling and Other Outage Activities”
- IP 71111.08, “Inservice Inspection Activities”

Also, the following Health Physics inspections are normally conducted during or near the outage period:

- IP 71124.01, “Radiological Hazard Assessment and Exposure Controls”
- IP 71124.02, “Occupational ALARA Planning and Controls”
- IP 71124.03, “In-Plant Airborne Radioactivity Control and Mitigation”
- IP 71124.04, “Occupational Dose Assessment”

Additionally, the following inspections may also be conducted to review licensee’s work which maybe in progress during outages:

- IP 50001, “Steam Generator Replacement Inspection”
- IP 71007, “Reactor Vessel Head Replacement Inspection”
- IP 52003, “Digital Instrumentation And Control Modification Inspection”.

b. *Which of the following topics are typically inspected by the RB?*

- safety culture (yes, particularly during supplemental inspections; i.e. IP 95001, “Supplemental Inspection for One Or Two White Inputs in a Strategic Performance Area;” 95002, “Supplemental Inspection for One Degraded Cornerstone or Any Three White Inputs in a Strategic Performance Area;” and 95003, “Supplemental Inspection for Repetitive Degraded Cornerstones, Multiple Degraded Cornerstones, Multiple Yellow Inputs or One Red Input”);
- operating experience (yes...in many baseline inspections);
- qualification of licensee staff/contractors (no, not usually under the inspection program, however, inspectors may sample as needed..);
- fire protection (yes.. part of baseline inspection program);
- radiological protection (yes... part of baseline inspection program);
- control of foreign material (FME) (yes.. part of outage inspection which is a baseline inspection program);
- housekeeping (we monitor material conditions of systems important to safety which may include housekeeping type items);
- industrial safety (personal safety) – as necessary...Memorandum of Understanding between Occupational Safety and Health Administration;
- working time (yes.. we have a new fatigue rule in place..);
- management of contractors (no, not under baseline program, however, may be evaluated when issues arise during nuclear safety-activities);
- security (yes, part of baseline inspection program);
- environmental issues (only as it relates to radiological issues.. e.g., tritium found in groundwater outside the protected area or owner controlled areas);
- modifications (yes, part of the baseline inspection program);
- quality assurance (always);
- in-service inspections (periodic tests) (yes, part of the baseline inspection program);
- pressure boundaries (always; resident inspectors are expected to become aware of any reactor coolant pressure boundary leakage issues in a timely basis);
- outage management (yes, part of the baseline inspection program);

- maintenance activities (yes, part of the baseline inspection program);
 - handling of fuel elements (yes, part of the baseline inspection program);
 - specific technical areas (e.g. structural integrity, electrical, etc) (yes, part of the baseline inspection program or special inspection, as needed).
- c. *What type and how much inspection resource is utilised (e.g. RB inspection staff, RB specialist, and technical support organisation manpower)?*

See below...from last ROP SECY paper.. SECY 13-0037 (note: 6,612 hours expended per site translates into about 5.75 FTE using a conversion factor of 1125 available hours per FTE).

Table 1 Resources Expended¹
(Inspection-Related Staff Effort Expended at Operating Power Reactors)

	<u>CY 2010 hrs</u>	<u>CY 2011 hrs</u>	<u>CY 2012 hrs</u>
Baseline Inspections	314,947	316,297	311,376
<i>Direct Inspection Effort</i>	156,319	156,871	154,221
<i>Inspection Prep/Doc</i>	109,550	111,194	110,825
<i>Plant Status</i>	49,078	48,232	46,330
Plant-Specific Inspections	26,229	21,670	27,382
<i>Direct Inspection Effort</i>	16,552	11,700	13,974
<i>Inspection Prep/Doc</i>	9,677	9,970	13,408
Generic Safety Issue Inspections	6,506	11,868	9,665
<i>Direct Inspection Effort</i>	3,643	6,302	5,696
<i>Inspection Prep/Doc</i>	2,863	5,566	3,969
Performance Assessment (Regional Effort Only)	10,439	10,247	10,417
Other Activities²	75,902	78,918	77,465
Total Staff Effort	434,023	439,000	436,377
Total Staff Effort/Operating Site	6,576	6,652	6,612

¹ Resources expended include regional, Office of Nuclear Reactor Regulation, and Office of Nuclear Security and Incident Response hours.

² Other activities consist of inspection-related.

- d. *What inspections are undertaken by the RB to evaluate that the licensee has minimized nuclear safety risks during the outage?*

See response to question 3.a.

4. Fire safety

The following questions concern fire safety maintenance programmes, the impact of outage activities on fire safety and arrangements for response to a fire.

- a. *What inspections are undertaken by the RB regarding oversight of the maintenance of fire protection systems during an outage?*

The resident inspectors monitor the licensee's compensatory actions and allowed out of service time-clocks for service fire protection systems under maintenance (or testing) per the licensee's fire protection program (required by the licensee's technical specification license conditions). The following inspection procedures are typically utilized:

- IP 71111.05AQ Fire Protection Annual/Quarterly
- IP 71111.05T Fire Protection (Triennial) or
- IP 71111.05XT Fire Protection - NFPA 805 (Triennial).

- b. *What inspections are undertaken by the RB of the licensee's ability to control fire risks arising during an outage (e.g. hot work, fire loading, etc.)?*

The licensee's fire protection program governs the control of fire risks for all operational modes. The inspectors would monitor licensee management of those risks, in accordance with established licensee procedures and controls, during the outage. The procedures listed in (a.) above are used.

- c. *How does the RB evaluate that the licensee's arrangements for response to fire during an outage are adequate?*

The licensee's fire protection program governs the response to fires for all operational modes. The inspectors would monitor licensee training and drills pre-outage and review the response to any actual fires during the outage, in accordance with established licensee procedures and controls. The procedures listed in (a.) above are used.

5. Outage findings

The following questions concern RB follow-up on outage findings¹ (e.g. test results, in-service inspection (ISI) results) and events (e.g. leaks, fire, workforce accidents, reportable and non-reportable events) and their resolution.

- a. *How is the RB informed of any findings and events arising during the outage?*

Depending on the issue, the licensee may be required to report the finding / event to the RB via required reporting criteria prescribed in 10 CFR50.72 / 50.73. Other events or findings of significance, that may not be reportable, are communicated to the on-site resident inspector and discussed with the specialist inspectors and the Office of Nuclear Reactor Regulation as necessary. Issues or findings of a less degree may be documented in reports (ISI reports, dose reports) that will be reviewed, on a sample basis by the inspectors on site or in the regional office. Some licensee reports are submitted to headquarters staff for program review. All issues will be documented by the licensee in their corrective action program which is reviewed daily by the on-site inspectors.

¹ Identified either by the RB or the licensee

- b. *How does the RB respond to findings and events (e.g. specific resources, specific inspections)?*

RB response is predicated on the issue's impact and significance towards nuclear safety and other elements. All potentially risk significant events at the site are evaluated by the regional office using IP 71153, "Followup of Events and Notices of Enforcement Discretion" (one of the baseline inspection procedures), Manual Chapter 0309, "Reactive Inspection Decision Basis for Reactors," and enforcement criteria for report documentation. Depending on the risk significance of the event, the regional office will determine whether to follow-up the event using resident inspectors or using region-based inspectors who may be tasked with conducting special inspections or augmented inspections.

- c. *Is the RB routinely informed of all fire occurrences?*

If the fire did not lead to an emergency declaration and required reporting to the RB, the licensee will communicate the occurrence (no matter the significance) to the on-site inspector. Resident inspectors are tasked with informing the regional office of notable events, like a fire onsite.

- d. *How does the RB assess that any findings are evaluated in a timely manner?*

Any findings identified during the outage are evaluated against facility Technical Specifications and other regulatory requirements while in progress. The inspectors supporting the outage review each finding to assess the licensee's corrective actions and determine if there are any challenges to allow plant start-up independent to the licensee. If any challenges exist, the inspectors verify that the licensee corrects the finding or reconciles the issues in an appropriate manner. Any other findings are reviewed for further follow-up at an appropriate time based on its significance.

All potentially risk significant findings are required to be evaluated; its final significance determined 90 days after the exit date of the inspection report in which the inspection finding is documented. NRC keeps a metrics on this aspect of timely evaluation and resolution of issues which could be risk significant (i.e. potentially greater than green) and reports the result to senior NRC management and the Commission.

6. Outage key stages, restart, and post outage actions

The following questions concern the monitoring of progress by the RB during an NPP outage, RB witness points, authorisation for restart, post outage review and relevant post outage testing

- a. *What arrangements does the RB have to monitor progress with the outage program (e.g. daily reports, routine meetings, database access)?*

The arrangements with the licensee are discussed pre-outage with the on-site resident staff and communicated to other visiting inspector resources regarding access to daily meetings, reports, and outage staff resources (and their location during the outage). The inspectors normally monitor outage shift turnovers and receive licensee outage progress reports. The inspectors also have access to the corrective action database to identify and review and issues. The inspectors have unfettered access to all areas (which is the norm) but must meet licensee guidelines on safety training for certain areas (confined spaces, working aloft) and are provided that training on request. See IMC 2515 App D, "Plant Status," for more details.

- b. *Does the RB define any formal witness or hold points during the outage and if so what are they?*

No formal witness or hold points unless specified under a RB commitment (unique to that outage) or a finding that was communicated to have restart concerns/challenges by the RB. Inspector practice (based on inspection procedures 71111.20 & 71111.08) leads to informal witness points for the following high-risk evolutions, which may impart licensee hold points:

- Initial containment entry and final containment closeout

- Initiation of defueling / refuelling operations
- Drain-down of reactor coolant system to mid-loop conditions
- Repair / replacement of reactor coolant system boundary components
- Approach to criticality.

c. *Does the licensee require formal authorisation from the RB before restart, and if so what is the RB decision making process to allow the restart?*

No. NRC's regulatory approach is the expectation that licensees adhere to all regulations, therefore, the licensee are not required to obtain approval for restart of the NPP after an outage from the NRC. NRC ensures through baseline inspections, and the resident inspector staff that the Agency is aware of all regulatory significant issues which are identified during the outage so in the event that we need to intervene in the licensee's decisions, we can.

d. *What type activities (if any) are undertaken by the RB after restart (e.g. inspection of physics tests, review of licensee lessons learned, etc.)?*

After the reactor is critical, on-site resident inspectors will review post-physics test data and will continue to monitor, on a sample basis, aspects of the unit synchronization and power ascent to full power based on the maintenance accomplished during the outage and adherence to facility technical specifications. The resident inspectors will monitor demobilization activities and impact on any RG requirements. A review of the licensee's lessons learned meetings are attended by the inspectors and incorporated into the RG assessment of licensee performance.

7. Are there any other important topics that you would like to be considered at the workshop?

None identified at this time.

TOPIC B.
EVENT RESPONSE INSPECTIONS

Introduction

How regulatory bodies (RBs) respond to events is significant for a variety of reasons. These include: 1) understanding the current status of the reactor, safety barriers, and safety related equipment to mitigate the aftermath of the event; and 2) is the safety of the public and the environment adequately protected. In addition, how the RB follows-up on the root cause and corrective actions associated with the event is important to later inspection activities for that facility. Lastly, strong regulatory oversight and follow-up of an event helps build public confidence in the ability of the regulator.

For the purposes of this workshop an event is defined as an incident that has had significant impact on plant safety. Security and safeguard events, and off-site emergency response, have been excluded from this workshop to better focus on reactor safety issues. The workshop session will thus focus on singular events during normal operations and outages which involve an immediate notification of the RB.

Each workshop participant should be prepared to give a short (5 minute) description of how their regulatory body reacted to a significant event (focus on the event inspection aspects; please do not describe the event itself in detail). These presentations are a starting point for the workshop discussions.

Questionnaire

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

1. Event notification and reporting

1.1. Do you have regulations for immediate event notification of the regulator and subsequent reporting requirements?

- 1.1.1. If yes, please describe the criteria used for event notification and follow-up reports.
- 1.1.2. Are there regulations for event classification?

1.2. Does your RB provide any additional guidance to licensees on notification and reporting expectations (e.g., written documents)?

1.3. Does your RB have any additional agreements in place with licensees for notifications (e.g., licensee informal calls to the inspector on duty, the resident inspectors or RB's offices)?

2. Immediate Response

2.1. Does your RB require inspectors, either formally or informally, to immediately go to the nuclear power plant following an event?

- 2.1.1. If yes, does your RB have criteria for which events the inspector should go to the site for?
- 2.1.2. If no, describe your RB approach to event response including any expectations or requirements that they go within a specific timeframe (e.g., one day, one week)?

2.2. Are there specific activities that the inspector is expected to perform when on site (e.g., control room observations, plant walkdown inspections, interactions with plant management)?

- 2.2.1. If yes, are these activities described in a procedure?
- 2.2.2. If a safety concern is identified by the inspectors how do they interact with the licensee and their RB to raise the concern (describe normal practices)?

2.3. How does the RB keep the public and other stakeholders (i.e. government) informed of the event and plant conditions?

3. Follow-up Inspections

3.1. Does your RB have a process to perform follow-up inspections of the event once the event has concluded?

- 3.1.1. If yes, what is the purpose of the inspection?
- 3.1.2. Are there specific criteria to determine whether an inspection should be performed?
- 3.1.3. What information (e.g., root cause analysis, corrective actions, operating experience report, event report) does the RB require from the licensee:
 - 3.1.3.1. Prior to initiating an inspection?
 - 3.1.3.2. During the inspection?
- 3.1.4. Are there time limits for when the inspection should be initiated and completed?

BELGIUM

1. Event notification and reporting

1.1. *Do you have regulations for immediate event notification of the regulator and subsequent reporting requirements?*

1.1.1. *If yes, please describe the criteria used for event notification and follow-up reports.*

1.1.2. *Are there regulations for event classification?*

Yes, there are events that have to be notified immediately, other events have to be notified the first working day. Event reporting is less formally defined: an incident report is expected within a month for most events. At the end of 2014, clear rules for reporting of every considered event are foreseen.

There are 4 groups of criteria:

1. Criteria are linked to "Nuclear safety.
2. Criteria linked to "Radiation protection".
3. Environmental criteria.
4. Other.

For event classification: the INES-manual is used.

1.2. *Does your RB provide any additional guidance to licensees on notification and reporting expectations (e.g., written documents)?*

The notification procedure that is used by the licensee is discussed with him, clarifications are added in the procedure and the procedure is approved by RB.

1.3. *Does your RB have any additional agreements in place with licensees for notifications (e.g., licensee informal calls to the inspector on duty, the resident inspectors or RB's offices)?*

Yes: there is a priority system to call the SPOC unit, SPOC site and finally inspector on duty of the site.

2. Immediate response

2.1 *Does your RB require inspectors, either formally or informally, to immediately go to the nuclear power plant following an event?*

2.2.1 *If yes, does your RB have criteria for which events the inspector should go to the site for?*

2.2.2 *If no, describe your RB approach to event response including any expectations or requirements that they go within a specific timeframe (e.g., one day, one week)?*

The RB inspection procedure foresees that for every event the long term corrective actions (as described in the incident report of the licensee) are evaluated. The procedure indicates also that the immediate short term response to an event is based on expert judgment of the inspector and dependent to the complexity of the installations, the nature of the event and the real or potential nuclear risk or radiological risk.

Goal is to verify that the licensee takes all actions that are necessary to assure the safety of the installations and to control the situation and to verify that all necessary measures are taken before the return to normal exploitation.

2.2 *Are there specific activities that the inspector is expected to perform when on site (e.g., control room observations, plant walkdown inspections, interactions with plant management)?*

2.2.3 *If yes, are these activities described in a procedure?*

2.2.4 *If a safety concern is identified by the inspectors how do they interact with the licensee and their RB to raise the concern (describe normal practices)?*

A procedure is written with guidelines, in case an on site visit is performed:

- Contacts with the licensees representatives to obtain the first results of his research to understand the incident (chronology, anomalies, ...).
- Interviews with management of the licensee, responsible for operation, maintenance or radiation protection.
- Interviews with the people directly involved with the incident
- Analyses of information available: logbooks, registered parameters, instructions...
- ,

If a safety concern is identified by the inspectors, it is discussed directly between RB and the licensee.

2.3 *How does the RB keep the public and other stakeholders (i.e. government) informed of the event and plant conditions?*

The initial notification is done to RB; a first technical evaluation of the situation is made and the notification level is confirmed (see answer 1.1). RB informs the Government (via the crises cell of the government) and the public (press release).

3. Follow-up inspections

3.1 *Does your RB have a process to perform follow-up inspections of the event once the event has concluded?*

3.1.1 *If yes, what is the purpose of the inspection?*

3.1.2 *Are there specific criteria to determine whether an inspection should be performed?*

3.1.3 *What information (e.g., root cause analysis, corrective actions, operating experience report, event report) does the RB require from the licensee:*

3.1.3.1 *Prior to initiating an inspection?*

3.1.3.2 *During the inspection?*

3.1.4 *Are there time limits for when the inspection should be initiated and completed?*

Yes, based on the incident report, to assure that the licensee has:

- documented his analysis correctly and timely;
- identified the root cause and all anomalies that happened during the incident;
- has defined adequate corrective actions to prevent the reoccurrence of the incident and has performed them in a timely matter.

CANADA

1. Event notification and reporting

1.1 Do you have regulations for immediate event notification of the regulator and subsequent reporting requirements?

Yes

1.1.1 If yes, please describe the criteria used for event notification and follow-up reports.

Paragraph 27(b) of the Canadian *Nuclear Safety and Control Act* (NSCA) requires that every licensee and every prescribed person make the prescribed reports and file them in a prescribed manner. In accordance with section 2 of the NSCA, *prescribed* means prescribed by regulation of the Commission. Accordingly, this paragraph obliges licensees who operate a nuclear power plant (NPP) to file reports in accordance with any relevant requirements in the regulations of the Commission.

The Canadian *General Nuclear Safety and Control Regulations* (GNSCR) specify various reporting requirements and exceptions for every CNSC licensee, including an operator of a NPP. Accordingly, when a Regulatory Standard is made a condition of a nuclear power plant operating licence (PROL), then under provisions of subsections 29(3) of the GNSCR, the reporting requirements of the regulatory standard supersede those of subsections 29(1) and 29(2), which states that *Subsections 29(1) and 29(2) do not require a licence to report a situation referred to in paragraphs (1)(a) to (j) if the licence contains a term or condition requiring the licensee to report that situation, or any situation of that nature, to the Commission.*

The CNSC imposes a licence condition in each PROL requiring that *the licensee shall notify and report in accordance with CNSC regulatory document S-99 Reporting Requirements for Operating Nuclear Power Plants.*

Some situations or events must be reported immediately, others may be reported the next business day:

A. Some situations or events require that a preliminary report be made immediately, where immediately means immediately after the licensee becomes aware of the situation or event and initiates any required response actions. For Example [S-99, Section 6.3.3.1.2(a)]:

(35) A situation or event that requires the implementation of a contingency or emergency plan in accordance with the license.

(36) A declaration of an alert or emergency, within the nuclear power plant, where personnel or resources are mobilized by the licensee in response to an unexpected occurrence that creates a hazard to the safe operation of the nuclear power plant, to the environment or to the health and safety of persons.

B. Other situations or events require a preliminary report be made on or before the first business day after the day the licensee determines that it is reportable.

During normal business hours, the licensee makes preliminary reports to the CNSC Designated Contact Person (DCP) or his/her delegate. On off hours, preliminary reports are made to the CNSC Duty Officer. The CNSC DCP is typically the Director of the regulatory program, who usually delegates this responsibility to his/her Site Office Supervisor.

A preliminary report must be followed by a detailed report, which, depending on the nature of the situation or event, must be submitted within 21 or 45 calendar days after making the preliminary report (S-99, Section 6.3.3.2.1).

Additional information reports may also be required for events “where detailed, final, or validated information is not immediately available or attainable by the reporting deadline.”[S-99, Section 6.3.3.3].

1.1.2. *Are there regulations for event classification?*

Yes

Paragraph 6(k)(v) of the Canadian Class I Nuclear Facilities Regulations states that An application for a licence to operate a Class I nuclear facility shall contain the following information...(k) the proposed measures to prevent or mitigate the effects of accidental releases of nuclear substances and hazardous substances on the environment, the health and safety of persons and the maintenance of national security.

Based on this regulatory requirement, the CNSC also imposes a licence condition in most PROL stating the licensee shall implement and maintain an emergency preparedness program, and conduct exercises in accordance with CNSC regulatory document RD-353 Testing and Implementation of Emergency Measures.

It is the intension of the CNSC to add RD-353 in all PROLs as they come up for modification or renewal.

Section 5.2.1 of RD-353, Detection and Classification of Emergency- On-Site, requires that the licensee be able to *detect and correctly classify an emergency in order to initiate the appropriate response actions.* Some response actions that demonstrate the licensee's ability to meet this objective include:

1. The operations centre is promptly informed of the emergency;
2. The emergency classification correctly reflects the on-site risk; and
3. The emergency classification is re-assessed if emergency parameters change.

1.2 *Does your RB provide any additional guidance to licensees on notification and reporting expectations (e.g., written documents)?*

Yes, the CNSC imposes a licence condition in each Nuclear Power Reactor Operating Licence requiring that *the licensee shall notify and report in accordance with CNSC regulatory document S-99 Reporting Requirements for Operating Nuclear Power Plants.* The legislative basis of this regulatory standard is referenced in question 1.1.

Subsection 6.3.1 of CNSC regulatory standard S-99 lists 43 situations and events that require the licensee to submit a preliminary and detailed report. The most relevant sections for the purpose of this workshop are (13) to (16), related to process failures; Paragraphs (17) to (21) related safety systems; Paragraphs (22) to (26), related to pressure boundaries; Paragraph (27) , related to reactor and turbine control; and Paragraphs (35) and (36) related to Emergency.

Section 6.3.3.1.3 outlines the requirements for the contents of preliminary reports.

Section 6.3.3.2.2 outlines the requirements for the contents of detailed reports.

Explanatory notes for S-99 are published in a separate document and provide guidance to CNSC and licensee staff on the extent of reporting, the expected level of detail, etc. which is reported to the CNSC.

1.3 *Does your RB have any additional agreements in place with licensees for notifications (e.g., licensee informal calls to the inspector on duty, the resident inspectors or RB's offices)?*

No formalized agreements are in place, and as such, practices from site office to site office may vary.

At some NPPs, the CNSC Site Office Supervisor is notified verbally by the licensee of any event that puts plant safety at risk, and is notified of and invited to all subsequent status update meetings and post-transient review meetings, to which a Site Inspector may attend. If the event is classified as an emergency requiring the activation of the licensee's Emergency Operations Centre (EOC), the licensee notifies the CNSC site office and the Site Office Supervisor or a Site Inspector attends. Each licensee has a dedicated seat for CNSC staff at their EOC.

The Site Office Supervisor may elect to follow up on the situation or event with a “focused inspection” or “reactive inspection” in the following business days.

In the event of an emergency “where there is a potential impact outside the plant protected area”, the licensee uses their own procedures to determine whether to activate their EOC or not.

2. Immediate response

2.1. Does your RB require inspectors, either formally or informally, to immediately go to the nuclear power plant following an event?

It depends on the severity of the situation or event. During normal office hours, the CNSC Site Office Supervisor or a Site Inspector will present themselves at the licensee’s EOC. During off hours, CNSC management at Head Quarters will make the decision.

2.1.1. If yes, does your RB have criteria for which events the inspector should go to the site for?

There are no set criteria to help determine if the CNSC needs to send a representative to the licensee’s EOC. That being said, the CNSC has a Nuclear Emergency Response Plan that requires CNSC site staff to gather required on-site information and send it to the On-Site Liaison Officer at the CNSC EOC. Hence, site staff’s objective at the licensee’s EOC is to provide a communications link with CNSC’s EOC and provide the On-site Liaison Officer the station status during an emergency event.

In the event of an emergency “where there is a potential impact outside the plant protected area” then the Station Emergency Operations Center is guided by their own procedures to activate the Emergency Management Center (EMC). The CNSC has a desk in the EMC and a Site Inspector would be sent to the EMC to monitor the event and emergency response and relay information to CNSC emergency operating centre. I believe the decision to send a Site Inspector to the EMC or Station EOC is largely at the discretion of the Site Supervisor (Designated Contact Person).

2.1.2. If no, describe your RB approach to event response including any expectations or requirements that they go within a specific timeframe (e.g., one day, one week)?

N/A

2.2. Are there specific activities that the inspector is expected to perform when on site (e.g., control room observations, plant walkdown inspections, interactions with plant management)?

Yes.

2.2.1. If yes, are these activities described in a procedure?

The CNSC’s emergency response manual (Subsection 1.1 of the Assessment and Regulatory Control procedure) specifies the type of information that the on-site CNSC inspectors are expected to gather and send it to the On-Site Liaison Officer. The method of gathering the information may include control room and plant walk-down observations, interaction with plant management and attendance of licensee meetings. The information required is the following:

- Emergency Orders
 - Emergency orders that the CNSC On-Site Representative considers necessary to protect the environment or the health and safety of persons or to maintain national security or compliance with international obligations to which Canada has agreed.
- Operational Information
 - On-site response level
 - Off-site notification level
 - Worker(s) injured by radiation
 - Worker(s) injured physically

- Security incidents
- On-site protective actions (proposed, taken)
- On-site mitigation measures (proposed, taken)
- Off-site protective action
- recommendations
- On-site security measures
- Emergency communication products
- Technical Information
 - Event description (location, date, time, type)
 - Facility status (for the entire facility)
 - Safety systems status
 - Radioactive release (type, start time, end time, estimated amount)
 - Chemical release (type, start time, end time, estimated amount)
 - Movement of release from the site (direction and speed)
 - Survey results (on-site and off-site)
 - Source term data
 - Dose projections (on-site and off-site)
 - Current on-site meteorological data
 - On-site meteorological forecast

2.2.2 *If a safety concern is identified by the inspectors how do they interact with the licensee and their RB to raise the concern (describe normal practices)?*

As per the CNSC Process Overview: Conducting an inspection document, if unsafe conditions are observed, which have the potential for immediate impact on the health, safety security and the environment, the inspector requests that the licensee take immediate steps to correct the situation, and if necessary take further enforcement actions. If the safety concern does not require immediate action, then the inspector reports it to the licensee as soon as practical. As part of the “no surprises” approach consistent with CNSC’s Inspection Fundamental Principle #1 (Inspections are consistent and transparent), the inspector regularly communicates with the licensee any concerns or significant issues identified, such that the licensees are given the opportunity to provide clarification or perform required actions.

In extreme cases, Site Inspectors may issue an order under the Canadian Nuclear Safety Control Act.

2.3 *How does the RB keep the public and other stakeholders (i.e. government) informed of the event and plant conditions?*

Websites and Facebook

Although not a regulatory requirement, licensee’s have a Public Information Program, which they must submit to the CNSC for license renewal. Through this program, licensee’s post certain information on situations and events on their website.

If an event occurred that had the potential for offsite releases, the licensee’s EOC is required to send specific information on a routine basis to various municipal, provincial and federal governmental bodies.

For example, Emergency Management Ontario organizes any provincial response (i.e. police and hospitals), and has the ultimate responsibility for sending instructions on public emergency response (i.e. sheltering, evacuation, and potassium-iodine distribution). Emergency Management Ontario would liaise heavily with the CNSC EOC and Health Canada on these decisions.

The CNSC OEC disseminates information to 1) Health Canada and 2) Government Canada. The CNSC also liaises with Health Canada to review plume modeling and radioactive release mitigating/contingency strategies.

Some of this is detailed in the CNSC's Nuclear Emergency Response Plan. However, this plan is currently undergoing some significant changes.

3. Follow-up inspections

3.1 Does your RB have a process to perform follow-up inspections of the event once the event has concluded?

Yes

3.1.1 If yes, what is the purpose of the inspection?

After an event occurs, a Focused Inspection may be conducted to provide prompt, technically sound information and advice to CNSC management, in response to an operationally or safety significant event, or emerging trend, according to CNSC's Conduct a Focused Inspection Procedure.

3.1.2 Are there specific criteria to determine whether an inspection should be performed?

No, this is largely up to the discretion of the Site Office Supervisor and his/her Director.

3.1.3 What information (e.g., root cause analysis, corrective actions, operating experience report, event report) does the RB require from the licensee:

3.1.3.1 Prior to initiating an inspection?

CNSC staff review event reports, and conduct informal interviews with station staff; although there is no clear written requirement for this. It is left largely up to the discretion of the Inspector, and his Supervisor, and Director.

3.1.3.2 During the inspection?

Speaking from experience in past inspections we have focused on two elements 1) constructing a timeline of the event from interviews and reviewing alarm logs and 2) reviewing the licensee investigations and corrective action plans.

3.1.4 Are there time limits for when the inspection should be initiated and completed?

The procedure does not specify time limits for when the inspection should be initiated or completed. From past experience inspections typical start the following work week.

CZECH REPUBLIC

1. Event notification and reporting

1.1 *Do you have regulations for immediate event notification of the regulator and subsequent reporting requirements?*

Yes, we have.

1.1.1 *If yes, please describe the criteria used for event notification and follow-up reports.*

Criteria for both event notification and follow-up reports are defined in the attachment to the SÚJB guide (BN-JB-1.1) on operating experience feedback system.

There is total of 31 various situations to be reported defined in this guide. Examples of such situations are: OLC violations, reactor trips, ESF actuations, Event preliminary classified as INES 1 and higher, loss of residual heat removal, exceeding radiation action levels defined in the monitoring program, fire in the controlled area, security incidents, uncontrolled leakages from NSSS, etc. ...

There is total of 30 various events types for which follow up report is to be provided to the SÚJB. Examples of such events are: RPS, ESF actuations, unplanned reductions of reactor power, malfunctions of limited SSCs, forced changes of OLCs operating modes, failed tests of limited CCSs, loss of reactor or SFP residual heat removal, deficiencies in the safety analyses, events related to eh radiation protection action levels or monitoring systems, events related to the nuclear materials, security incidents, etc. ...

1.1.2 *Are there regulations for event classification?*

Yes, requirements for events classification are given in regulations on nuclear installations operation and on emergency arrangements. SÚJB guide BN-JB-1.1 provides guidance on all safety relevant events (see above.).

1.2 *Does your RB provide any additional guidance to licensees on notification and reporting expectations (e.g., written documents)?*

Yes, additional guidance is provided in the SÚJB guide BN-JB-1.1 (see above).

1.3 *Does your RB have any additional agreements in place with licensees for notifications (e.g., licensee informal calls to the inspector on duty, the resident inspectors or RB's offices)?*

There is an informal agreement between licensee and SÚJB. Resident inspector on duty is informed about safety relevant events listed in the BN-JB-1.1 guide.

2. Immediate response

2.1 *Does your RB require inspectors, either formally or informally, to immediately go to the nuclear power plant following an event?*

There is no formal requirement in the SÚJB internal guidance.

2.1.1 *If yes, does your RB have criteria for which events the inspector should go to the site for?*

N/A.

2.1.2 *If no, describe your RB approach to event response including any expectations or requirements that they go within a specific timeframe (e.g., one day, one week)?*

Decision on inspectors' presence on site after events is made based on analysis of information on event reported to the SÚJB by licensee.

2.2 *Are there specific activities that the inspector is expected to perform when on site (e.g., control room observations, plant walkdown inspections, interactions with plant management)?*

Resident inspectors are expected to observe activities related to the event. Inspectors are trained to decide on which activities and place should be visited when following an event. Examples include: control rooms, SSCs (if accessible), emergency response centers, licensees meetings, etc. ...

2.2.1 *If yes, are these activities described in a procedure?*

No procedure describing these activities exists.

2.2.2 *If a safety concern is identified by the inspectors how do they interact with the licensee and their RB to raise the concern (describe normal practices)?*

Inspectors interact with SÚJB HQ staff (management). Their main role is to provide information on event course and licensees activities. They are collecting information, discuss situation with licensee. Dealing with safety concerns is coordinated between SÚJB HQ and resident inspectors. Advices, warnings, requests are given to licensee either by SÚJB management or by resident inspector, SÚJB strategy is always internally agreed.

2.3 *How does the RB keep the public and other stakeholders (i.e. government) informed of the event and plant conditions?*

SÚJB provides information on safety relevant events that are of public interest on website. SÚJB managers are asked to explain more serious events in public media radio, TV). SÚJB responds to all written questions raised by public. Government is informed on events in the annual report, additional information is provided on request. There was no need to provide additional information to government on domestic events within last 5 years.

3. Follow-up inspections

3.1 *Does your RB have a process to perform follow-up inspections of the event once the event has concluded?*

Yes, events follow-up inspection are performed by SÚJB.

3.1.1 *If yes, what is the purpose of the inspection?*

The main purpose of these inspections is to confirm if licensees OEF system provided adequate results, i.e. if causes of the event were defined correctly, if event analyses was thorough, if corrective actions are "SMART".

3.1.2 *Are there specific criteria to determine whether an inspection should be performed?*

Guidance on initiation of reactive inspections are defined in SÚJB internal directive on inspections. Unplanned reactive events follow-up inspections are initiated for events classified as INES 2 or higher, for events with unclear or non-acceptable results of licensee event analysis, and for events with obviously high risk significance.

3.1.3 *What information (e.g., root cause analysis, corrective actions, operating experience report, event report) does the RB require from the licensee:*

3.1.3.1 *Prior to initiating an inspection?*

The following information is provided to SÚJB:

- Event report – description of event course
- Minutes from licensee OEF board – results of event analysis, list of direct and root causes, list of corrective actions and status of their implementation, event classification, INES classification, ...

3.13..2 During the inspection?

Additional explanations on all event aspects that are not sufficiently clear from OEF records mentioned above. Records of interviews with relevant staff, event trees, additional information on corrective actions implementation is usually required to be provided during inspections.

3.1.4 *Are there time limits for when the inspection should be initiated and completed?*

There are no specific time limits prescribed in internal documents. Decision is made by SÚJB management based on the relevance of given event.

FINLAND

1. Event notification and reporting**1.1 Do you have regulations for immediate event notification of the regulator and subsequent reporting requirements?**

1.1.1 *If yes, please describe the criteria used for event notification and follow-up reports.*

A. Emergencies

a) An emergency standby, site emergency or general emergency has been declared at a nuclear facility (Guide YVL7.4).

B. Events related to radiation safety

b) Uncontrolled radioactive leakage inside the plant so that air or surface contamination or radiation dose rate in the premises in question has essentially risen.

c) Some individual's radiation dose may have exceeded the dose limit (Guide YVL 7.10).

d) Radioactive releases into the environment have exceeded the limit requiring corrective measures (Guide YVL 7.1).

C. Special situations related to the Technical Specifications

e) The plant has been operated in a way violating the Technical Specifications. For example the time for restriction of the use has been exceeded, a parameter has not been restored to the allowed level within a set time limit, or such a limit has been exceeded, the function of which is to ensure the integrity of the fuel cladding or a pressure retaining component of the primary circuit.

D. Events related to safety functions, and defects and damages of systems, structures and components.

f) An automatic function of a protection system has not been triggered although a parameter has exceeded the protection limit set in the Technical Specifications, or a protection function has not been completed as planned.

g) An increase in the radioactivity of the reactor coolant indicating a failure of several fuel rods or a significant damage of one fuel rod, an exceptional leakage or degradation of the primary circuit or a degradation of the containment so that it no longer fulfils requirements set for tightness or strength has been detected.

h) An erroneous or significant defective functioning of a safety valve or pressure relief valve of the primary or secondary circuit has been detected.

i) The emergency core cooling system or isolation of the containment has been actuated in a required situation. The isolation of some process systems occurring normally after a reactor scram is not considered as such isolation of the containment.

E. Incidents imminent to safety functions

j) A defect, operational error or deficiency, erroneous process, automation or electric connection, erroneous instruction or other reason which might prevent the fulfilment of a safety function has been detected.

k) A common cause failure, recurrent defects or malfunctions in an important component type, structure or function related to some safety function has been detected.

l) A liquid or gas leakage has occurred at the plant and the circumstances caused by this leakage are endangering or may endanger the fulfilment of a safety function.

F. Weaknesses in safety management or assessment

m) Such a problem or deficiency in management or organisation culture has been detected, which is significant and possibly affecting safety.

- n) An error in an accident analysis or in the analysis method or other erroneous ground for the Technical Specifications has been detected. In addition, there is a reason to suspect that the use of the plant in some situations is not as safe as previously assessed or presented in the design bases.
- o) A deviation of more than 1 percent from the estimated value of the reactor multiplication factor in a stationary state, or the possibility of an unplanned criticality inside or outside the reactor has been detected.

G. External incidents

- p) An exceptional natural phenomenon or some other external threat to the plant has caused a situation endangering safety.
- q) A fire, an explosion or a chemical damage has occurred at the plant site.
- r) Off-site power has been lost and as a result it has been necessary to supply the plant's AC power by on-site electrical power supply units.

H. Other incidents

- s) An automatic protection function related to safety of the plant has been erroneously triggered.
- t) A fuel bundle has or may have sustained damage during handling or may have been at risk as a result of another incident.
- u) A threat to the physical protection arrangements of the plant, or an attempt to cause intentional damage to the plant, or a significant defect in the physical protection arrangements has been detected. In such a case the regulations concerning secrecy stated in the legislation (Section 78 of the Nuclear Energy Act and Section 24 of the Act on the Openness of Government Activities) have to be taken into account.

1.1.2 *Are there regulations for event classification?*

Regulatory Guide requires NPP to report for approval (RB's decision is needed) as above. In addition events that are similar nature (but not directly mentioned in the list above) are reported for information. Also it OEF requirement states that NPP may have internal reporting system for low level events.

In addition there is a preliminary report which is used to inform RB about events, their safety significance and INES classification proposal.

1.2 *Does your RB provide any additional guidance to licensees on notification and reporting expectations (e.g., written documents)?*

No, NPP has their internal guidance but it is not provided by the RB.

1.3 *Does your RB have any additional agreements in place with licensees for notifications (e.g., licensee informal calls to the inspector on duty, the resident inspectors or RB's offices)?*

There is certain agreement that resident inspectors are to be informed during working hours for any special events.

2. Immediate response

2.1 *Does your RB require inspectors, either formally or informally, to immediately go to the nuclear power plant following an event?*

2.1.1 *If yes, does your RB have criteria for which events the inspector should go to the site for?*

During working hours the residents take any events as their first priority. Off hours on-duty person receives notification about the event, the case is handed over to the RB's responsible director who then decides if any immediate response is needed. There is no criteria for this, but it depends about the nature of the event. It has been a practice for residents to go to the plant if there is a more significant event or corrective actions needed.

2.1.2 *If no, describe your RB approach to event response including any expectations or requirements that they go within a specific timeframe (e.g., one day, one week)?*

2.2 *Are there specific activities that the inspector is expected to perform when on site (e.g., control room observations, plant walkdown inspections, interactions with plant management)?*

2.2.1 *If yes, are these activities described in a procedure?*

It is expected to identify the safe behavior of the plant and that any remedial actions are fulfilling RB's expectations. This can be done with negotiations with management and staff, also plant walkdowns are used. There is no official procedure for this.

2.2.2 *If a safety concern is identified by the inspectors how do they interact with the licensee and their RB to raise the concern (describe normal practices)?*

Usually they inform the NPP responsible staff about their finding and opinion. This may take place also after RB's staff have been consulted from the HQ. If there is strict requirements or enforcement needed then HQ will issue a decision. Residents may influence the NPP's actions by questioning their actions and requesting more detailed clarification about the safety issue orally or by the protocol.

2.3 *How does the RB keep the public and other stakeholders (i.e. government) informed of the event and plant conditions?*

Internet news brief is issued after an event. In most severe events (below emergencies) also press release can be issued. These are also sent for information to NPP and sometimes to Government Ministries if seen relevant.

3. Follow-up inspections

3.1 *Does your RB have a process to perform follow-up inspections of the event once the event has concluded?*

3.1.1 *If yes, what is the purpose of the inspection?*

Yes, there is a process for this, however it is not widely used. Purpose would be a fact finding mission and to inspect any corrective actions. However more often the residents do get enough information and can follow actions that are taking place so the inspection is not necessary.

3.1.2 *Are there specific criteria to determine whether an inspection should be performed?*

There is short guidance about this in procedure: "When there is need to get more thorough understanding about the event."

3.1.3 *What information (e.g., root cause analysis, corrective actions, operating experience report, event report) does the RB require from the licensee:*

3.1.3.1 *Prior to initiating an inspection?*

Nothing. If the inspection is taking place after some time, then there would be some event reporting available.

3.1.3.2 *During the inspection?*

Most important persons would be interviewed and any relevant memos or minutes and documents would be inspected.

3.1.4 *Are there time limits for when the inspection should be initiated and completed?*

Not for initiating. Either same week or after the event report has been issued. But these inspections are not used that much.

After an inspection target is to get an inspection protocol issued immediately or after one week if more detailed reporting is necessary.

FRANCE

1. Event notification and reporting

1.1 *Do you have regulations for immediate event notification of the regulator and subsequent reporting requirements?*

In case of a significant accident or incident, the Environment Code (binding) defines what are the obligations of the licensees in terms of notification of the regulator: “ In the event of an incident or accident, whether nuclear or not, that has or is likely to have significant consequences on the safety of the installation or of the transport or endanger, by significant exposure to ionising radiations, persons, goods or the environment, the licensee of a basic nuclear installation or the person responsible for the transport of radioactive substances is obliged to declare it **without delay** to the Nuclear Safety Authority and to the State representative in the département of the place of the incident or accident and, where applicable, to the State representative at sea.”

Additionally, ASN established a guide in 2005 to the declaration procedure and coding system for criteria concerning significant events related to safety, radiation protection or the environment, applicable to basic nuclear installations and the transport of radioactive materials. ASN’s guides are non binding: they are only recommendations. But they are traditionally taken into account by the licenses which base their organization on them.

This guide recommends that: “A delay of **2 working days** further to the detection of the event is tolerated, except in the case of a demonstrated emergency situation. For a generic anomaly declared by the central services, this delay is extended to one week as from the date on which the anomaly is characterised.

1.1.1 *If yes, please describe the criteria used for event notification and follow-up reports.*

ASN guide defines 10 criteria for safety events, 10 criteria for radiation protection events and 9 criteria for environmental events.

The follow-up reports have to be transmitted within 2 months further the declaration according the ASN guide.

1.1.2 *Are there regulations for event classification?*

Subsequent to a recommendation issued by the High Council for Nuclear Safety and Information, the International Nuclear Event Scale (INES) was adopted in France by the nuclear safety authority in April 1994 for all BNIs under its supervision. Its scope of application was extended to the transport of radioactive and fissile materials for civil use as of the 1st of October 1999, and to radiation protection (on an experimental basis) as of the 1st of January 2005.

The significant event declaration includes an INES classification proposal submitted to the approval of the nuclear safety authority, which is solely responsible for the final classification decision.

1.2 *Does your RB provide any additional guidance to licensees on notification and reporting expectations (e.g., written documents)?*

ASN guide on this topic clarifies the explanation in terms of information that the declaration must contain. It gives the methodological guidelines for completing the significant event report: context, chronology, analysis of causes, consequences, potential impact, corrective measures and experience feedback.

1.3 *Does your RB have any additional agreements in place with licensees for notifications (e.g., licensee informal calls to the inspector on duty, the resident inspectors or RB’s offices)?*

Traditionally, licensees’ representatives give the inspectors an informal phone call to inform them of the occurrence of an event and the future sending of its notification.

2. Immediate response

2.1 *Does your RB require inspectors, either formally or informally, to immediately go to the nuclear power plant following an event?*

No, it doesn't.

2.1.1 *If yes, does your RB have criteria for which events the inspector should go to the site for?*

2.1.2 *If no, describe your RB approach to event response including any expectations or requirements that they go within a specific timeframe (e.g., one day, one week)?*

It depends on the gravity of the event and the media coverage or the interest of environmental associations on the event. For example, an event that cause radioactive leakages or damages on material or person are systematically followed by an inspection. The approach is to carry out the inspection within 1 to 4 days after an event that justify it.

2.2 *Are there specific activities that the inspector is expected to perform when on site (e.g., control room observations, plant walkdown inspections, interactions with plant management)?*

Traditionally, a part of the inspection is dedicated to presentation of the event by the licensee followed by an investigation in terms of documentation, traceability, procedures respect. The other part is dedicated to an investigation on the location of the event.

2.2.1 *If yes, are these activities described in a procedure?*

Such a procedure does not exist.

2.2.2 *If a safety concern is identified by the inspectors how do they interact with the licensee and their RB to raise the concern (describe normal practices)?*

The inspectors interrogate the licensee representatives.

2.3 **How does the RB keep the public and other stakeholders (i.e. government) informed of the event and plant conditions?**

The ASN and the licensee keep the public automatically informed of the event when it is classified on the INES scale with a statement on their Internet site. The annual report of the ASN summarizes the main events of the year.

When the event justifies a more important communication different media can be used: journalist interview on radio, television or journals. The local information commissions (composed by citizens, elected representatives, associations) are instances dedicated to the public information too.

3. Follow-up inspections

3.1 *Does your RB have a process to perform follow-up inspections of the event once the event has concluded?*

Such process doesn't exist but follow-up inspections are carried out. It much depends on the context.

3.1.1 *If yes, what is the purpose of the inspection?*

Investigations on the application of the operating procedures, respect of the licensee organization, regulation, and the measures taken to mitigate the event, to prevent it for the future.

3.1.2 *Are there specific criteria to determine whether an inspection should be performed?*

Such criteria does not exist.

3.1.3 *What information (e.g., root cause analysis, corrective actions, operating experience report, event report) does the RB require from the licensee:*

3.1.3.1 *Prior to initiating an inspection?*

It depends on the context. Generally the inspectors collect most of the available information to establish an inspection frame.

3.1.3.2 *During the inspection?*

It depends on the context. Generally all these aspects are investigated.

3.1.4 *Are there time limits for when the inspection should be initiated and completed?*

No, there are not.

GERMANY

1. Event notification and reporting

1.1 *Do you have regulations for immediate event notification of the regulator and subsequent reporting requirements?*

Yes. According to the Nuclear Safety Officer and Reporting Ordinance (“AtSMV”), the licensee of a nuclear power plant have to report accidents, incidents or other events important to safety as so called “reportable events” to the RB1 in a fixed period of time.

1.1.1 *If yes, please describe the criteria used for event notification and follow-up reports.*

The criteria used for event notification are defined in the AtSMV. They are subdivided into radiological criteria common for all nuclear installations and individual technical criteria applicable differently to nuclear power plants, to installations of the nuclear fuel cycle, to research reactors, to installations that are being decommissioned and to the storage of spent fuel. The reportable events are assigned to one or several reporting criteria based on an initial engineering assessment of the cause of the event. This approach particularly takes into account that the RB has to be able to take precautionary measures even before an in-depth safety review of the event has been carried out. The reporting criteria also specify the time frame for event notification as follows:

Category S – immediate report

Immediately after detection: by telephone and in writing by means of telecommunication; not later than the fifth workday after detection: completion and, if necessary, correction of the report by means of the report form;

Category E – quick report

Not later than 24 hours after detection: by telephone and in writing by means of telecommunication; not later than the fifth workday after detection: completion and, if necessary, correction of the report by means of the report form;

Category N – normal report

Not later than the fifth workday after detection by means of the report form;

The mapping of reporting criteria to a category orients broadly on the safety relevance. In general reportable events of category N (typically INES 0) are events with low significance to safety. The objective of the workshop and this questionnaire comprises mainly reportable events of category E and S (typically > INES 0). These events are very rare in Germany (typically << 5 per year).

The criteria for follow-up reports are also defined in the AtSMV. For the written notification of the reportable event to the RB a standardised reporting form has to be used. This reporting form contains the relevant reporting criterion / criteria for the reportable event. In the case an event fits to more than one criterion all fitting criteria have to be stated by the licensee. Further it contains information about the status of the plant prior and after the event, causes and impacts, affected systems and components, the description of the elimination and handling of the consequences as well as provisions taken to prevent a repeat. In such cases, where the information required in the reporting form is not completely available within the reporting deadline, the report has to be marked as preliminary by the licensee. The final report has to be delivered subsequently as soon as possible, but not later than after two years.

¹ In the framework of this questionnaire, RB means the competent supervisory authority of the respective Land of the nuclear power plants, supported by a technical support organisation (TSO) and a subordinate authority.

1.1.2 *Are there regulations for event classification?*

Yes. As described above in answer to question 1.1.1, the reportable events are classified in categories by a temporal distinction, namely Category S (immediate report), Category E (quick report) and Category N (normal report). Reportable events are further classified by technical aspects (1. Radiology and radiation protection, 2. Technical systems and operation, 3. External impacts and internal events).

In addition to the regulations by the AtSMV, the licensees also classify reportable events according to the seven levels of the International Nuclear and Radiological Event Scale (INES) of the IAEA.

1.2 *Does your RB provide any additional guidance to licensees on notification and reporting expectations (e.g., written documents)?*

Yes. The regulations in the AtSMV concerning notification and reporting are very extensive and strict. In order to simplify its application, in an additional guidance further explanation about the reporting criteria is given, for example about the utilization of the categories (S, E and N) during plant outages.

It is laid down in the ordinance that the RB may issue more detailed instructions concerning the reports. So, normally the licensee is requested to provide additional information to complement the standardised reporting form (for example a more detailed report). Furthermore, there exist requirements and expectations of the behaviour of the licensee in special events, e.g. in the case of a forced reactor scram.

1.3 *Does your RB have any additional agreements in place with licensees for notifications (e.g., licensee informal calls to the inspector on duty, the resident inspectors or RB's offices)?*

Yes, but no formal requirements. The licensees are requested to report additionally to a technical support organisation (TSO) in the same time as to the RB. Furthermore, in case of specific events like a forced reactor scram there are additional demands for notifications, depending on their classification.

2. Immediate response

2.1 *Does your RB require inspectors, either formally or informally, to immediately go to the nuclear power plant following an event?*

Yes, supported by a TSO if necessary, but no formal requirement.

It has to be noted that there are no resident inspectors on-site in Germany. They are located in the headquarters of the RB in the capital of the respective Land. There is an on-call duty 24 hours a day for immediate response, and the inspectors are generally able to reach a plant in not more than a very few hours. It is important that the inspectors are able to come on-site for inspection to conduce to

- verify statements of the licensee,
- inspect the completeness of information given by the licensee,
- evaluate the handling of the licensee in the case of imperfect information about the plant status,
- advise of further actions for event handling,
- serve as source for inspectors to gain an impression of the on-field situation in the plant.

If an immediate investigation is needed, depending on the safety relevance of the event, the inspectors are required to react immediately and to go to the facility, possibly accompanied and supported by its TSO, also having an on-call duty 24 hours a day for immediate response. The specific time frame coming on-site depends on the safety significance of the event and the plant status, taking into consideration the overall circumstances.

A very helpful tool for supporting the RB in an adequate immediate response to an event is provided by an independent nuclear power plant remote monitoring system. This system was established mainly for continuous monitoring of measurement data regarding emission and immission behaviour of the plant by the RB from off-site. In addition to the radiological data, it also allows monitoring of meteorological data and of a broad set of plant parameters relevant for current plant status (e.g. temperature, neutron flux,

pressure and electrical gauges) and its safety systems (e.g. state of safety valves, etc.). Further an automated calling system exists. In the case of exceeding pre-defined pre-alert or alert thresholds (defined by radiological criteria as well as plant state parameters) the on-call duty inspector gets an information call from that system.

2.1.1 *If yes, does your RB have criteria for which events the inspector should go to the site for?*

Going to site depends on the safety significance of the event with a margin of discretion. There are some criteria but not in form of a complete list. As an example, in case of a forced reactor scram assigned to category E or S, the inspector always goes on-site. The specific timeframe depends on the individual case. Typically on-site inspections are performed in the case of

- overall complex circumstances or
- inexplicit circumstances or
- necessity of temporary regulations if the specified state cannot be restored after an event.

2.1.2 *If no, describe your RB approach to event response including any expectations or requirements that they go within a specific timeframe (e.g., one day, one week)?*

Not applicable, see answer to question 2.1.1.

2.2 *Are there specific activities that the inspector is expected to perform when on-site (e.g., control room observations, plant walkdown inspections, interactions with plant management)?*

Yes. The following primary tasks during on-site inspection have to be realized:

1. Verify that the plant is in a safe state (carry out an initial assessment of the event with regard to possible consequences and impacts on the environment and the safety of the installation) as specified in the technical specification, and if immediate actions have been taken by the licensee, to verify that they are adequate and sufficient.
2. Gather information about causes of the event and the course of action of the event. Therefore it is expected that the inspector coming on-site gets direct information from the licensee and is able to ensure that the RB gets an independent and full insight on the event and the plant conditions. The inspector also checks the automatic messages/reports of the safety system and the operation protocol (“Schichtbuch”).
3. In the case of an event making it necessary for the RB to convey its emergency organization an inspector is send on-site as a liaison officer. The primary task of the liaison officer is to support the continual flow of information about the plant state between the licensee and the RB.¹

To fulfill these tasks, the inspector does everything necessary depending on the overall circumstances, e.g. going to the control room, taking pictures, saving relevant record keeping, reviewing the measurements of the licensee, performing own measurements (e.g. dose rates, sampling for contamination, radiological environmental monitoring), doing a plant walk down, or interviewing responsible shift personnel as well as the plant management or other staff members / contractor staff relevant to the event occurred.

2.2.1 *If yes, are these activities described in a procedure?*

The RB has a general description of tasks, activities and expectations for on-site inspections, but not in form of a detailed procedure, process or checklist for event initiated inspections.

As described in the answer to question 2.2 in the case of an event making it necessary to convey the emergency organization of the RB an inspector goes on-site as a liaison officer. The liaison officer has for his work a specific working place description, containing detailed instructions for his tasks.²¹

^{1.} Please note: In principle, this subparagraph is out of scope of the workshop and questionnaire, but is presented here in order to provide complete information.

2.2.2 *If a safety concern is identified by the inspectors how do they interact with the licensee and their RB to raise the concern (describe normal practices)?*

The interaction of the inspectors with their RB is depending on the safety significance of the finding(s). The competent section head in charge or another section member has to be informed immediately in case of a safety relevant finding, e.g. if the compliance with the protection goals in case of demand are most probably not granted. This person will initially take over the co-ordination of the further performance of the task within the RB. This includes, among others depending on the overall circumstances, an initial assessment, forwarding of information to the head office, the public relations department as well as to the minister by phone or by a short memo. Furthermore, the work of a specialized cross-sectional working group has to be initiated. Such a cross-sectional working group is implemented especially for supporting the competent section for assessing reportable events, and consists of members with a broad technical knowledge and varied experience.

The interaction of the inspector with the licensee is also depending on the safety significance of the finding(s). In case of a safety relevant finding immediate interaction of the inspector with the licensee is required. Depending on the overall circumstances the inspector can either supervise the actions taken by the licensee or if necessary threaten with or give a directive based on his authorization by the atomic law to the licensee. At the end, the atomic law comprises, among others, that the RB may impose additional obligations subsequently, revoke licences and general approvals, or may order that certain protective measures have to be taken by the licensee, finally up to the shutdown of the plant as a precautionary measure. The actions taken by the RB are depending on the safety significance of the event and the overall circumstances and stand under the restriction of commensurability.

2.3 *How does the RB keep the public and other stakeholders (i.e. government) informed of the event and plant conditions?*

The public relations department of the RB has to be informed by phone or with a short note (see answer to question 2.2.2.), and a draft of a press release has to be prepared for publication on the Internet including a description of the event, actions taken by the licensee and an initial safety assessment of the event from the RB.

Other stakeholders also have to be informed. Beside the minister of the respective Land Ministry (see answer to question 2.2.2.), also the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) has to be informed. In addition, the official standardised reporting form has to be forwarded directly to the BMUB, as well as to the Federal Office for Radiation Protection (BfS) as a central registration agency for reportable events and the Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) as a TSO supporting the BMUB, all of them part of the National Operating Experience Feedback Programme in Germany. Furthermore depending of the event and its categorization, other stakeholders like the Ministry of Interior or members of the parliaments, e.g. the head of the environmental committee, have to be informed.

The time limit for the forwarding of information by the RB to the different stakeholders depends on the category of the event (see answer to question 1.1.1.). In case of a category S event information has to be forwarded immediately, in case of a category E event within 24 hours after being notified by the licensee.

3. Follow-up inspections

3.1 *Does your RB have a process to perform follow-up inspections of the event once the event has concluded?*

Yes. The process is generally established in practice, but it is not formalized and depends on the individual case.

3.1.1 *If yes, what is the purpose of the inspection?*

As described in answer to question 1.1.1, the primary approach of event notification and reporting in Germany is that the RB is able to take precautionary measures even before an in-depth safety review of the event has been possible to carry out. After receipt and evaluation of all information to conclude the event, the RB may establish, if necessary, further corrective measures and precautions against recurrence to be taken after thorough discussion with the licensee. To make sure that all these arrangements are implemented correctly by the licensee, this has to be supervised subsequently by follow-up inspections performed by the RB. These inspections are mainly done on basis of reports and documents of the licensee submitted to the RB. It is follow up for example that all additional tests and inspections are performed, that plant modifications are planned and installed, that processes, documents, periodic inspections and audit programmes are improved, etc. (technical modifications of the plant and its operation, processes, documents and the technical specification are underlying an updating proceeding approved by the RB, typically the licensee has to submit documents describing the planned modifications; depending on the range of the modification TSO statement(s), RB approval or a modification license all prior to the beginning of the modification are required).

3.1.2 *Are there specific criteria to determine whether an inspection should be performed?*

Yes, but the criteria are formulated more general than specific and there exist no complete list. As mentioned in answer 3.1, the overall process is established in practice. The licensee has to give evidence by documents that all improvement measures have been taken. These documents are reviewed by the RB with the support by a TSO. Depending on the safety significance of the event additional on-site inspections are also performed. This is normally done within the framework of routine inspection, or depending on the issues it is inspected in detail by specific team inspections. The RB may also define a comprehensive supervision priority for the subsequent inspection activities.

3.1.3 *What information (e.g., root cause analysis, corrective actions, operating experience report, event report) does the RB require from the licensee:*

The RB requires all information from the licensee needed for a final evaluation of the event. With respect to the safety significance of the event, this may comprise comprehensive event reports by the licensee, including an in-depth analysis of the event. Here, the following aspects, among other things, have to be taken into account in a comprehensive manner: root cause analysis, contribution from man, technology and organization, radiological impacts inside and outside of the installation, corrective measures and precautions against recurrence, adverse effects on the safety precautions.

There is no fixed time schedule this information is required prior or during an inspection, it rather depends on the individual case.

3.1.3.1 *Prior to initiating an inspection?*

Usually the information has to be given in advance as described in the answer to question 3.1.3.

3.1.3.2 *During the inspection?*

During on-site inspection the RB and its TSO verifies that the information given by the licensee is correct and comprehensive e.g. by checking records, interviewing personnel, etc..

3.1.4 *Are there time limits for when the inspection should be initiated and completed?*

No, there are no time limits. The timeframe for the follow-up inspections depends on the safety significance of the event and the overall circumstances. However, as already noted in answer to question 1.1.1, the AtSMV requires a final formal report by the licensee within 2 years. If this is not possible in certain circumstances, the timeframe may be extended in agreement with the RB.

HUNGARY

1. Event notification and reporting

1.1 *Do you have regulations for immediate event notification of the regulator and subsequent reporting requirements?*

Yes in 118/2011. Governmental decree.

1.1.1 *If yes, please describe the criteria used for event notification and follow-up reports.*

The licensee shall fulfil its event reporting obligation according to the following:

- a) a prompt reportable event shall be immediately reported by phone to the nuclear safety authority but not later than it occurred, or if the event was not detected at the time of occurrence within 2 hours from the detection,
- b) an event that is not a prompt reportable event shall be reported by phone to the nuclear safety authority not later than it occurred or if the event was not detected at the time of occurrence within 14 hours from the detection,
- c) INES categorisation is reported within 16 hours,
- d) the event is reported in writing to the nuclear safety authority within 16 hours from the occurrence of the event,
- e) the event investigation report shall be submitted to the nuclear safety authority within 45 days following the occurrence or detection of the event.

The written report shall include the short description of the event, the developed operational conditions, the executed and planned measures as well as their expected success and probable effects, and the preliminary safety evaluation of the event.

1.1.2 *Are there regulations for event classification?*

Yes, according to the Regulatory Guide 1.25 the event classification of the events is made according to the translated and revised version of "The International Nuclear Event Scale User's Manual" issued by the authority.

1.2 *Does your RB provide any additional guidance to licensees on notification and reporting expectations (e.g., written documents)?*

Yes in Regulatory Guide 1.25.

1.3 *Does your RB have any additional agreements in place with licensees for notifications (e.g., licensee informal calls to the inspector on duty, the resident inspectors or RB's offices)?*

No, it is covered by the notification requirements.

2. Immediate response

2.1 *Does your RB require inspectors, either formally or informally, to immediately go to the nuclear power plant following an event?*

Yes, in case of serious or significant event with impact on the site or with outside effect, the inspector on duty immediately goes to the site and in the same time the emergency response organization stands up. In other cases after the notification the manager decides about the performance of an immediate inspection, and after this decision the inspectors immediately go to the site.

2.2.1 *If yes, does your RB have criteria for which events the inspector should go to the site for?*

There are no criteria, it depends on the decision of the manager.

2.2.2 *If no, describe your RB approach to event response including any expectations or requirements that they go within a specific timeframe (e.g., one day, one week)?*

There is no specific timeframe, the inspection is performed as soon as possible after the decision about the inspection.

2.2 *Are there specific activities that the inspector is expected to perform when on site (e.g., control room observations, plant walkdown inspections, interactions with plant management)?*

No, the inspector is expected to gather information on systematic way to support the investigation (interviewing, observation, etc.).

2.2.1 *If yes, are these activities described in a procedure?*

No.

2.2.2 *If a safety concern is identified by the inspectors how do they interact with the licensee and their RB to raise the concern (describe normal practices)?*

All non-conformances and safety concern is recorded in the inspection report, and the final regulatory decision prescribe certain corrective actions to eliminate the non-conformances and safety concern.

2.3 *How does the RB keep the public and other stakeholders (i.e. government) informed of the event and plant conditions?*

In case of INES 1, or higher classified events, the regulatory body informs the public in a press release. Government is informed by fax by the regulatory body.

In case of non-safety related events which may generate public interest, the regulatory body informs the public and other authorities by its website. Trends and summary of events is published yearly in the Annual Safety Performance Evaluation report.

3. Follow-up inspections

3.1 *Does your RB have a process to perform follow-up inspections of the event once the event has concluded?*

Yes.

3.1.1 *If yes, what is the purpose of the inspection?*

Review the effectiveness of the corrective actions.

3.1.2 *Are there specific criteria to determine whether an inspection should be performed?*

There are no specific criteria, according to the safety impacts of the corrective actions if necessary, the inspector can suggest further inspection.

3.1.3 *What information (e.g., root cause analysis, corrective actions, operating experience report, event report) does the RB require from the licensee:*

3.1.3.1 *Prior to initiating an inspection?*

Root cause analysis, consequences of the event, analysis of the possible consequences of the event, safety evaluation of the event, measures had been taken during the event, evaluation of the activity of the personnel and the suitability of regulations, notes regarding the normal operation and emergency procedure documentations, further notes regarding the operation of systems and components shall be submitted to the authority.

3.1.3.2 *During the inspection?*

According to the safety significance the regulatory body may perform an inspection prior to the submission of the required information as well. In this case the required information can be submitted during or after the inspection.

3.1.4 *Are there time limits for when the inspection should be initiated and completed?*

No.

INDIA

1. Event notification and reporting**1.1 Do you have regulations for immediate event notification of the regulator and subsequent reporting requirements?**

Answer: Yes.

1.1.1 *If yes, please describe the criteria used for event notification and follow-up reports.*

Answer: Events of relatively lower safety significance (limited consequences from safety point of view) are reported as event report to RB in a prescribed format as part of the minutes of the Station Operation Review Committee (SORC). Events of relatively higher significance for safety are required to be reported as Significant Event Reports (SER) as per the reporting criteria specified in the Technical Specifications for operations. These events are reported to RB in following three stages.

- i. Prompt Notification in the prescribed format is sent within 24 hours of the occurrence of the event.
- ii. A detailed Significant Event Report (SER) in a prescribed format for SER is submitted within a period of 20 days from the date of the occurrence of the event.
- iii. Event closing notification report (ECNR) in a prescribed format is submitted for those significant events for which route cause could not be established within 20 days (reporting time for SER). ECNR indicates completion of all the investigations pertaining to the event.

1.1.2 *Are there regulations for event classification?*

Answer: Yes. The regulations for event classifications are given in safety guide on operational safety experience feedback on NPPs (AERB/SG/O-13).

1.2 Does your RB provide any additional guidance to licensees on notification and reporting expectations (e.g., written documents)?

Answer: Yes. The guidance on notification and reporting expectations are given in safety guide on operational safety experience feedback on NPPs (AERB/SG/O-13).

1.3 Does your RB have any additional agreements in place with licensees for notifications (e.g. licensee informal calls to the inspector on duty, the resident inspectors or RB's offices)?

Answer: The licensee's inform the RB promptly in case of significant events as a practice.

2. Immediate response**2.1 Does your RB require inspectors, either formally or informally, to immediately go to the nuclear power plant following an event?**

Answer: For some of the safety significant events, RB undertakes a prompt inspection of NPP for gathering first hand information and prompt review.

2.1.1 *If yes, does your RB have criteria for which events the inspector should go to the site for?*

Answer: The decision to undertake inspection is decided on case by case basis.

2.1.2 *If no, describe your RB approach to event response including any expectations or requirements that they go within a specific timeframe (e.g., one day, one week)?*

Answer: In case of events of serious nature, special regulator inspection is conducted at the earliest opportunity to assess and get first hand information of the event. In general such inspections are undertaken within two to three days of the event.

2.2 *Are there specific activities that the inspector is expected to perform when on site (e.g., control room observations, plant walkdown inspections, interactions with plant management)?*

Answer: Yes

2.2.1 *If yes, are these activities described in a procedure?*

Answer: No. The inspection is undertaken taking into consideration nature of the event and collecting all relevant information for understanding of the event and its safety implications.

2.2.2 *If a safety concern is identified by the inspectors how do they interact with the licensee and their RB to raise the concern (describe normal practices)?*

Answer: The report of the special inspection is reviewed within RB and by safety committees constituted by RB in the presence of licensee. The licensee is bound to respond to the safety concerns of the event as brought during the deliberation of the event in the safety committee. Minutes of the Safety Committee are sent to the licensee for response. The corrective actions identified during the review are followed by RB for compliance.

2.3 *How does the RB keep the public and other stakeholders (i.e. government) informed of the event and plant conditions?*

Answer: RB provides all the information to its stake holders through its periodic newsletters, annual reports, web-site, press releases/briefings and TV interviews. The RB annual reports contain information on safety status of nuclear facilities and findings of regulatory review. It also includes information on safety significant events reported by licensee and regulatory inspectors.

3. Follow-up inspections

3.1 *Does your RB have a process to perform follow-up inspections of the event once the event has concluded?*

Answer: Need based follow up inspections are carried out for certain events of safety significance.

3.1.1 *If yes, what is the purpose of the inspection?*

Answer: The purpose of these inspections is to ensure compliance with the corrective actions identified during review of the event in RB

3.1.2 *Are there specific criteria to determine whether an inspection should be performed?*

Answer: No

3.1.3 *What information (e.g., root cause analysis, corrective actions, operating experience report, event report) does the RB require from the licensee:*

3.1.3.1 *Prior to initiating an inspection?*

Answer: The licensee has to submit significant events in a particular format assigned by the RB. This contains information on detailed description of the event, internal reviews of the event, RCA, coding of the event, short term and long term action plan for prevention of the event. The licensee is also required to submit relevant alarm prints outs for carrying out reviews in RB.

3.1.3.2 *During the inspection?*

Answer: The RB checks compliance with the identified corrective actions.

3.1.4 *Are there time limits for when the inspection should be initiated and completed?*

Answer: No.

JAPAN

1. Event notification and reporting

1.1 *Do you have regulations for immediate event notification of the regulator and subsequent reporting requirements?*

“N Alert” (notification of situation by email) is sent to the public and news media about 30 minutes after an occurrence of “information collecting situation”.

Information relating to the situation is also notified on the web site of Nuclear Regulation Authority (hereinafter referred to as “NRA”) and other measures are taken as necessary.

1.1.1 *If yes, please describe the criteria used for event notification and follow-up reports.*

In the “explanation of the criteria for determining emergency category of Nuclear Emergency Response Guidelines” stipulates following matters.

Emergency is categorized in detail into three categories of “Alert”, “Site Area Emergency” (called “Article 10 event”), “General Emergency” (called “Article 15 event”).

Examples of categorized emergencies:

- For a leak of reactor coolant,
 - Alert: Case of leak of reactor coolant which exceeds specific limit and cannot be fixed in specific time limit
 - Site Area Emergency (Article 10 event): Case of leak of reactor coolant which needs the operation of ECCS
 - General Emergency (Article 15 event): Case of leak of reactor coolant which needs the operation of ECCS and water injection into the reactor is not possible
- For a power failure,
 - Alert: Case of an off-site power failure over 3 hours
 - Site Area Emergency (Article 10 event): Case of station black out over 30 minutes
 - General Emergency (Article 15 event): Case of station black out over 1 hour

17 events, including these 2 events above, are classified into the three emergency categories.

1.1.2 *Are there regulations for event classification?*

The “explanation of the criteria for determining emergency category of Nuclear Emergency Response Guidelines” stipulates 17 events such as “Malfunction of reactor shutdown function”, “Malfunction of reactor cooling function”, “Abnormal situation of spent fuel pool”, etc.

1.2 *Does your regulatory body provide any additional guidance to licensee on notification and reporting expectations (e.g., written documents)?*

Ordinance for Enforcement of the Act on Special Measures Concerning Nuclear Emergency Preparedness provides the reporting form.

Main entries are the location of the site, the place of the event, the time of the event, the outline of the event, other reference information, etc.

1.3 *Does your regulatory body have any additional agreements in place with licensees for notifications (e.g., licensee informal calls to the inspector on duty, the resident inspectors or regulatory body’s offices)?*

The “explanation of the criteria for determining emergency category of Nuclear Emergency Response Guidelines” stipulates report by licensee in case of abnormal situation of nuclear reactor.

2. Immediate response

2.1 *Does your regulatory body require inspectors, either formally or informally, to immediately go to the nuclear power plant following an event?*

When there is report from licensee on the occurrence of trouble, Safety Inspector immediately reports it to the Accident Countermeasures Office and asks for direction. As a general rule, based on the direction from the Accident Countermeasures Office, the Safety Inspector goes to the nuclear facility to grasp the situation and report it to the Accident Countermeasures Office.

2.1.1 *If yes, does your regulatory body have criteria for which events the inspector should go to the site for?*

In case of occurrence of trouble, Safety Inspector reports it to the Accident Countermeasures Office and goes to the site to grasp the situation.

2.1.2 *If no, describe your regulatory body's approach to event response including any expectations or requirements that they go within a specific timeframe (e.g., one day, one week)?*

See 2.1.1

2.2 *Are there specific activities that the inspector is expected to perform when on site (e.g., control room observations, plant walkdown inspections, interactions with plant management)?*

Investigation of the compliance with the Operational Safety Programs are conducted such as:

- (1) Hearing on the situation of operation management
- (2) Record check
- (3) Patrol of nuclear facility; etc.

2.2.1 *If yes, are these activities described in a procedure?*

It is stipulated in the Manual of Nuclear Regulation Office.

2.2.2 *If a safety concern is identified by the inspectors how do they interact with the licensee and their regulatory body to raise the concern (describe normal practices)?*

Administrative Safety Inspector, when a situation was found which is noteworthy but does not needs measures for operational safety, notice and direct the licensee using specific form.

2.3 *How does the regulatory body keep the public and other stakeholders (i.e. government) informed of the event and plant conditions?*

In case of occurrence of trouble, RB establishes "Nuclear Regulation Authority Nuclear Accident Watch and Counter measure Headquarter".

For the stakeholder (the national government), "Newsletter of Nuclear Regulation Authority Nuclear Accident Watch and Counter measure Headquarter" is made and sent every 30 minutes in principle until the state of the plant become stable.

For the public, information relating to the trouble is notified on the web site of NRA and other measures are taken as necessary.

3. Follow-up inspections

3.1 *Does your regulatory body have a process to perform follow-up inspections of the event once the event has concluded?*

3.1.1 *If yes, what is the purpose of the inspection?*

Safety Inspector confirms the necessity of, and the results of measures reported by licensee concerning the state of implementation of preventive measures for preventing recurrence of troubles which occurred at other sites based on the information provided by the director for nuclear regulation.

3.1.2 *Are there specific criteria to determine whether an inspection should be performed?*

Though there is not specific criteria, the secretariat of NRA (hereinafter referred to as "S/NRA") direct each licensee to take measures for important events as a lateral spread of information about events which has occurred at other facilities. The results of the measures are reported to the S/NRA or confirmed in Safety Inspection, etc.

3.1.3 *What information (e.g., root cause analysis, corrective actions, operating experience report, event report) does the regulatory body require from the licensee:*

RB demands licensee to report the content, cause, corrective measures, lateral spread of information and measures, etc. of the trouble. RB also demands additional detailed information as necessary depending on the trouble.

3.1.3.1 *Prior to initiating an inspection?*

3.1.3.2 *During the inspection?*

RB demands information of the content, cause, corrective measures, etc. of the trouble, but there is not specific rule.

3.1.4 *Are there time limits for when the inspection should be initiated and completed?*

Time limits are set on each occasion.

KOREA

1. Event notification and reporting

1.1 *Do you have regulations for immediate event notification of the regulator and subsequent reporting requirements?*

1.1.1 *If yes, please describe the criteria used for event notification and follow-up reports.*

NSSC (Nuclear Safety and Security Commission of Korea) Notice 2013-50, Regulation on Reporting and Public Announcement of Accidents and Incidents for Nuclear Power Utilization Facilities, stipulates the criteria for reportable events. In addition, the Notice describes the format & contents, timeline of initial reporting and subsequent reporting in more detail.

1.1.2 *Are there regulations for event classification?*

The NSSC Notice 2013-50 describes the classification of events for facility type, event characters including radioactive material release. Also, the notice describes the event classification which is equivalent to the INES of IAEA.

1.2 *Does your RB provide any additional guidance to licensees on notification and reporting expectations (e.g., written documents)?*

The licensees notify and report the event according to the format and contents described in NSSC Notice 2013-50.

1.3 *Does your RB have any additional agreements in place with licensees for notifications (e.g., licensee informal calls to the inspector on duty, the resident inspectors or RB's offices)?*

When an event occurs, licensees calls to RB, resident RB officer, KINS correspondent staff at any time as stipulated in NSSC Notice 2013-50.

2. Immediate response

2.1 *Does your RB require inspectors, either formally or informally, to immediately go to the nuclear power plant following an event?*

2.1.1 *If yes, does your RB have criteria for which events the inspector should go to the site for?*

When the reportable events listed in NSSC Notice 2013-50 occurs, the resident inspector, at the first stage, go to the NPP to understand the situation. As a follow-up action, the event investigation team is dispatched to the NPP as soon as possible (within 24 hours).

2.1.2 *If no, describe your RB approach to event response including any expectations or requirements that they go within a specific timeframe (e.g., one day, one week)?*

N/A

2.2 *Are there specific activities that the inspector is expected to perform when on site (e.g., control room observations, plant walkdown inspections, interactions with plant management)?*

2.2.1 *If yes, are these activities described in a procedure?*

According to the pre-established procedures, the event investigation team performs the evaluation on plant status regarding NPP transients including actuation of protection system, and conduct the adequacy assessment of the cause analysis activities done by licensees, the measures to prevent recurrence and plant safety assessment in terms of operating experience feedback. The team performs an independent evaluation, if necessary.

2.2.2 *If a safety concern is identified by the inspectors how do they interact with the licensee and their RB to raise the concern (describe normal practices)?*

During the event investigation, several technical meetings between RB and utility are held to discuss and handle the important issues including safety concern. And the results are reported to RB in written documents.

2.3 *How does the RB keep the public and other stakeholders (i.e. government) informed of the event and plant conditions?*

As the event investigation finishes, the event investigation report and the result of INES rating are opened through the web operated by the RB for the public. Also public can visit the RB and licensee' homepage at any time and understand the plant conditions.

3. Follow-up inspections

3.1 *Does your RB have a process to perform follow-up inspections of the event once the event has concluded?*

3.1.1 *If yes, what is the purpose of the inspection?*

The purpose of the inspection is to assess the adequacy of operating experience feedback (OEF) activities done by licensees during the periodic regulatory inspection.

3.1.2 *Are there specific criteria to determine whether an inspection should be performed?*

NSSC Notice 2013-12, Regulation on Items and Method of Periodic Inspection for Nuclear Reactor Facilities, stipulates the inspection objects and items including OEF.

3.1.3 *What information (e.g., root cause analysis, corrective actions, operating experience report, event report) does the RB require from the licensee:*

3.1.3.1 *Prior to initiating an inspection?*

3.1.3.2 *During the inspection?*

The detail report on event describing RCA including implementation status of corrective actions. Furthermore annual OE report describing event statistics and analysis results of trending is required.

3.1.4 *Are there time limits for when the inspection should be initiated and completed?*

The inspection is done during the periodic inspection span in accordance with NSSC Notice.

MEXICO

1. Event notification and reporting

1.1 *Do you have regulations for immediate event notification of the regulator and subsequent reporting requirements?*

Yes.

1.1.1 *If yes, please describe the criteria used for event notification and follow-up reports.*

According to the regulatory framework, LVNPS must report to the Commission the occurrence of all incidents covered by categories defined in 10CFR50.72 and 10CFR5073 using the format identified as "Notification of Reportable Event" (NRE). This format includes a summary of the event; immediate corrective actions; core emergency cooling system and engineering safeguards system conditions; as well as information on radiological conditions.

This notification is sent to the on-site Resident Inspector as well as to the Commission's headquarters. According to the incident significance, the notification shall be sent immediately, within one hour or within four hours.

In compliance with 10CFR50.73, LVNPS must send a "Licensee Event Report" (LER) within 30 days after the occurrence of the event to completely describe the event, the result of the root cause analysis and corrective and preventive actions proposed.

1.1.2 *Are there regulations for event classification?*

The regulations for event classifications are 10CFR50.72 and 10CFR5073

The notification and reporting of the LVNPS safety significant events are carried out according to the reporting and notification criteria set in Procedure PAS-07 "LVNPS Event Notification and Reporting to the Commission", which is based on 10CFR50.72, and 10CFR50.73 and NUREG-1022 "Event Reporting Guidelines: 10CFR50.72 and 50.73."

1.2 *Does your RB provide any additional guidance to licensees on notification and reporting expectations (e.g., written documents)?*

No.

1.3 *Does your RB have any additional agreements in place with licensees for notifications (e.g., licensee informal calls to the inspector on duty, the resident inspectors or RB's offices)?*

Yes, additionally to send the notification, the licensee must make a phone call to the inspector resident after the event.

2. Immediate response

2.1 *Does your RB require inspectors, either formally or informally, to immediately go to the nuclear power plant following an event?*

YES

2.1.1 *If yes, does your RB have criteria for which events the inspector should go to the site for?*

Immediately after the event the resident inspector must be in the installation to verify the activities that the installation followed after the event, and to investigate the performance of the shift crew. Additionally, if the events have high importance to the safety (red color), it is possible to start immediately a reactive inspection.

2.1.2 *If no, describe your RB approach to event response including any expectations or requirements that they go within a specific timeframe (e.g., one day, one week)?*

For the events classified with colors white or yellow more or less one week after the event there is a reactive inspection; the objective of this inspection is to ensure that the causes of the deficiency have been properly identified and that the necessary corrective actions have been conducted to prevent repetition

2.2 *Are there specific activities that the inspector is expected to perform when on site (e.g., control room observations, plant walkdown inspections, interactions with plant management)?*

Yes

2.2.1 *If yes, are these activities described in a procedure?*

Yes there are many procedures.

The specific activities that the inspectors perform on site are:

- control room observations,
- plant walk down inspections,
- operation log review,
- interview with the personnel involve with event,
- interactions with plant management

2.2.2 *If a safety concern is identified by the inspectors how do they interact with the licensee and their RB to raise the concern (describe normal practices)?*

If a safety concern is identified by the inspectors, they inform to the headquarters in order to determine if it is necessary a reactive inspection and the plant shut down; the relation with the licensee is to inform them about the concern and request for additional information.

2.3 *How does the RB keep the public and other stakeholders (i.e. government) informed of the event and plant conditions?*

After the event the regulatory body send an informative note to the minister of energy in which is reported the event and the plant conditions, the communications office of the minister has the function to keep the public informed.

3. Follow-up inspections

3.1 *Does your RB have a process to perform follow-up inspections of the event once the event has concluded?*

Yes.

3.1.1 *If yes, what is the purpose of the inspection?*

The objective of this inspection is to ensure that the causes of the deficiency have been properly identified and that the necessary corrective actions have been conducted to prevent repetition.

3.1.2 *Are there specific criteria to determine whether an inspection should be performed?*

According with the Action Matrix the reactive inspections would be performed if there is

1. 1 or 2 White inputs in different cornerstones and no more than 2 whites in one strategic area
2. 2 white inputs or 1 yellow or any 3 whites in a strategic area
3. Multiple yellow inputs or 1 red or a degraded cornerstone for 5 or more quarters.

3.1.3 *What information (e.g., root cause analysis, corrective actions, operating experience report, event report) does the RB require from the licensee:*

3.1.3.1 *Prior to initiating an inspection?*

The event report, the root cause analysis and corrective actions (if they are available)

3.1.3.2 *During the inspection?*

Operating experience report, main control room documents and registers, and corrective actions if were not available before the inspection.

3.1.4 *Are there time limits for when the inspection should be initiated and completed?*

No, time limits depend of the importance and complexity of the problems.

SLOVENIA

1. Event notification and reporting**1.1 Do you have regulations for immediate event notification of the regulator and subsequent reporting requirements?**

Yes.

1.1.1 If yes, please describe the criteria used for event notification and follow-up reports.

"Rules on operational safety of radiation or nuclear facilities" (JV9, article no.30:

- (1) The facility operator of a radiation or nuclear facility shall report to the Administration events in the facility in accordance with the national protection and rescue plan in case of nuclear accident.
- (2) In addition to the reporting laid down in the previous paragraph, the facility operator of a radiation or nuclear facility shall notify the Administration of any event listed in Annex 6, which is a constituent part of these Rules, within 24 hours from the occurrence or detection of the event. The report shall also be confirmed by phone to the inspector on duty in the Administration.
- (3) Within 60 days from an event referred to in the previous paragraph, the facility operator of a radiation or nuclear facility shall transmit to the Administration a report on the undertaken analysis of the event. Such a report shall include:
 1. a brief description of the event, including the state of the radiation or nuclear facility prior to the event and following it;
 2. elements of the analysis referred to in paragraph 4 of Article 9 of these Rules except for the interviews, which shall be transmitted only on a specific request by the Administration, observing the provisions of the personal data protection regulations;
 3. in the case of a nuclear power plant, findings of the probabilistic safety analysis of the event, if the analysis model supports such assessment;
 4. any measures already implemented and their assessment if available, and
 5. the classification of the event according to the international nuclear and radiation event scale.
- (4) The Administration may forward any information referred to in this article to the Radiation Protection Administration insofar such information is relevant for the protection of the public from harmful effects of ionizing radiation.

Annex 6***List of events requiring a special report by the facility operator of a nuclear power plant***

1. Any event that causes a reactor shutdown.
2. Any unexpected irregularity in the core reactivity, exceeding 1 % $\Delta K/K$, or any uncontrolled change of power exceeding 10 % of the rated thermal power.
3. Any event that causes a reduction of power in order to comply with operational limits and conditions, but does not require a submission of the report on the undertaken analysis of the event pursuant to paragraph 3 of Article 30 of these Rules.
4. Any operation of the facility beyond the operational limits and conditions.
5. Any event that actuates or should actuate:

- the reactor protection system;
 - components of the containment system, as follows:
 - containment spray system;
 - containment isolation or actuation of at least one isolation valve;
 - containment recirculation system.
 - emergency core cooling system;
 - residual heat removal system;
 - auxiliary feedwater system;
 - diesel generator system.
6. Any event which might prevent the fulfillment of a safety function:
- the reactor protection system;
 - components of the containment system, as follows:
 - containment spray system;
 - containment isolation or actuation of at least one isolation valve;
 - containment recirculation system;
 - containment depressurisation system;
 - containment integrity.
 - emergency core cooling system;
 - residual heat removal system;
 - auxiliary feedwater system;
 - diesel generator system;
 - essential service water system;
 - component cooling system;
 - chilled water system.
7. Any event that causes serious reduction of the radiation or nuclear safety of the plant, including the essential safety barriers.
8. Any natural threat or external event that might significantly affect the safety of the plant or significantly interfere with personnel tasks.
9. Any event that causes a release of radioactive substances into the plant controlled area or into the environment in excess of statutory limits for the plant personnel or general public.
10. Any newly discovered fact that affects the operation of the plant in a state less conservative than described in the safety analysis report.
11. Any event that causes any accident with casualties.

1.1.2 *Are there regulations for event classification?*

No.

1.2 *Does your RB provide any additional guidance to licensees on notification and reporting expectations (e.g., written documents)?*

Yes. Look at the answer 1.1.1.

1.3 *Does your RB have any additional agreements in place with licensees for notifications (e.g., licensee informal calls to the inspector on duty, the resident inspectors or RB's offices)?*

No.

2. Immediate response

2.1 *Does your RB require inspectors, either formally or informally, to immediately go to the nuclear power plant following an event?*

Yes. The requirement is defined in OP 3.1 Inspection Manual.

2.1.1 *If yes, does your RB have criteria for which events the inspector should go to the site for?*

Yes. For all events defined in Annex 6.

2.1.2 *If no, describe your RB approach to event response including any expectations or requirements that they go within a specific timeframe (e.g., one day, one week)?*

2.2 *Are there specific activities that the inspector is expected to perform when on site (e.g., control room observations, plant walkdown inspections, interactions with plant management)?*

Yes. All above mentioned activities are performed by the SNSA inspectors.

2.2.1 *If yes, are these activities described in a procedure?*

Yes. The requirement is defined in OP 3.1 Inspection Manual, Annex 3.

2.2.2 *If a safety concern is identified by the inspectors how do they interact with the licensee and their RB to raise the concern (describe normal practices)?*

When a safety concern is identified inspector recorded it in the Inspection report. Inspector immediately informs RB management. The information is later on evaluated on the RB and NPP management meeting.

2.3 *How does the RB keep the public and other stakeholders (i.e. government) informed of the event and plant conditions?*

- Press release
- Press conference
- Web page information.

3. Follow-up inspections

3.1 *Does your RB have a process to perform follow-up inspections of the event once the event has concluded?*

Yes.

3.1.1 *If yes, what is the purpose of the inspection?*

To verify the implementation of short and long term corrective actions on-site.

3.1.2 *Are there specific criteria to determine whether an inspection should be performed? No.*

3.1.3 *What information (e.g., root cause analysis, corrective actions, operating experience report, event report) does the RB require from the licensee?*

3.1.3.1 *Prior to initiating an inspection?*

- Root cause analysis,
- Short and long term corrective actions programme,
- LER.

3.1.3.2 During the inspection?

- Clarification of opened issues,
- Implementation status of short and long term corrective actions programme.

3.1.4 *Are there time limits for when the inspection should be initiated and completed?* No.
No.

SPAIN

1. Event notification and reporting**1.1 Do you have regulations for immediate event notification of the regulator and subsequent reporting requirements?**

1.1.1 *If yes, please describe the criteria used for event notification and follow-up reports.*

Reportable incidents are those specified in IS-10 (safety instruction on reporting events).

Some of the criteria herein included may be declared under any of the categories of the plant emergency procedures depending on the specific conditions in which they occur. Some of these criteria match the NUREG-1022 ones.

The events are reported in 1 hour or 24 hours depending of its importance. In all cases, a 30 days report is required with the Root Causes Analysis (RCA).

Reportable criteria are divided in the following categories:

- A. Records.
- B. Occupational Safety and Health.
- C. Releases of Radioactive Materials or Substances.
- D. Technical Specifications.
- E. Operation.
- F. Safety Systems.
- G. Other risk situations not included in the licensing documents.
- H. External Treat.

1.1.2 *Are there regulations for event classification?*

No, but the Spanish RB (CSN) has a technical procedure to classify the reportable events in four categories, Not Relevant, Interest, Generic and Significant. The classification is done by a group of experts in a monthly meeting, the Incident Review Panel. These meetings are regulated by the CSN technical procedure mentioned above.

1.2 Does your RB provide any additional guidance to licensees on notification and reporting expectations (e.g., written documents)?

Yes. It exist a guide GS-1.6, which is now under revision, to help the licensees on notification criteria.

1.3 Does your RB have any additional agreements in place with licensees for notifications (e.g., licensee informal calls to the inspector on duty, the resident inspectors or RB's offices)?

Yes. There is daily information from resident inspectors, provided previously for the licensee.

2. Immediate response**2.1 Does your RB require inspectors, either formally or informally, to immediately go to the nuclear power plant following an event?**

2.1.1 *If yes, does your RB have criteria for which events the inspector should go to the site for?*

Yes. It has a procedure with criteria to decide whether perform a reactive inspection.

2.1.2 *If no, describe your RB approach to event response including any expectations or requirements that they go within a specific timeframe (e.g., one day, one week)?*

2.2 *Are there specific activities that the inspector is expected to perform when on site (e.g., control room observations, plant walk down inspections, interactions with plant management)?*

2.2.1 *If yes, are these activities described in a procedure?*

Yes. Before the inspection, a meeting (reactive inspection evaluation team) takes place to determine the purpose of the inspection, and reactive inspection are described in a CSN technical procedure.

2.2.2 *If a safety concern is identified by the inspectors how do they interact with the licensee and their RB to raise the concern (describe normal practices)?*

After the inspection, it takes place a meeting of the inspectors with the licensee to comment the main inspection findings and conclusions. After the inspection, a findings report is drawn up. If it is found a non-compliance with regulations, a disciplinary proceeding is initiated.

2.3 *How does the RB keep the public and other stakeholders (i.e. government) informed of the event and plant conditions?*

Every event reported is published through the CSN web site. Reported events have a broad distribution list.

3. Follow-up inspections

3.1 *Does your RB have a process to perform follow-up inspections of the event once the event has concluded?*

The procedure foresees that a follow-up inspection could be proposed as result of the first inspection conclusions.

There are two-yearly OE inspections which review all the OE process, event reported included.

3.1.1 *If yes, what is the purpose of the inspection?*

Review de OE licensee process, including internal and external inputs.

3.1.2 *Are there specific criteria to determine whether an inspection should be performed?*

No. Reactive inspection covers a broad spectrum of the investigation

3.1.3 *What information (e.g., root cause analysis, corrective actions, operating experience report, event report) does the RB require from the licensee:*

3.1.3.1 *Prior to initiating an inspection?*

Licensees submit a yearly report with the OE analysis and conclusions, which is the main source of information for inspectors. Also information about Anomalous Conditions (degraded conditions and noncompliance conditions) could be asked.

3.1.3.2 *During the inspection?*

Inspectors check corrective actions, RCA conclusions and on-site changes, if necessary.

3.1.4 *Are there time limits for when the inspection should be initiated and completed?*

No, only recommendations.

SWEDEN

1. Event notification and reporting**1.1 Do you have regulations for immediate event notification of the regulator and subsequent reporting requirements?**

Yes.

1.1.1 If yes, please describe the criteria used for event notification and follow-up reports.

What follows is a quotation from the RB regulations.

The following shall be reported without delay:

- an event or condition which causes an alarm for increased preparedness or an accident fulfilling the alarm criteria established by the Swedish Radiation Safety Authority.
- an event or condition which belongs to Category 1 in accordance with Appendix 1.
- a scram in a reactor facility where expected consequential functions of importance for safety have failed.

The Swedish Radiation Safety Authority shall in these cases be informed within one hour after the event has occurred or the condition is detected.

The following information shall be reported to the Swedish Radiation Safety Authority when such an event or condition has occurred:

- what has occurred,
- when it occurred,
- which immediate consequences it has resulted in,
- which actions have been taken,
- which actions are planned, and
- an assessment of the progression of the situation.

Follow-up reports shall be submitted in the event of any essential change in the safety state or when a new assessment is made of the progression of the situation.

The following shall be reported within 16 hours:

- an event or condition which, in accordance with the applicable technical criteria, is classified as Level 2 or higher on the International Nuclear and Radiological Event Scale (INES).

The following shall be reported within 7 days:

- a comprehensive report on any event or condition which has resulted in an alarm in accordance with item 1 above or which has been assigned to Category 1 in accordance with Appendix 1.

Such report shall contain:

- a description of the event and event sequence
- a preliminary analysis of causes and consequences as well as an assessment of the significance of the event or condition in terms of safety

- measures that have been taken or are planned to restore the safety margins and to prevent a recurrence.

A record or corresponding statements of undertaken safety reviews shall be attached to the report.

Reporting in accordance with Chapter 7, Section 2

4. The following shall be reported within 30 days:

- a comprehensive report on any event or condition which has been assigned to Category 2 in accordance with Appendix 1
- an event or condition that is assigned to Level 1 on the International Nuclear and Radiological Event Scale (INES)
- a scram report for a reactor facility If there are particular grounds meaning that a final report in accordance with the first paragraph cannot be submitted within 30 days, a preliminary report shall be submitted to the Swedish Radiation Safety Authority. This report shall also contain a justification of the particular grounds and a fixed time schedule specifying when a final report can be ready. A safety review of such justification and time schedule shall be carried out in accordance with Chapter 4, Section 3.

In addition to the above-mentioned reporting of events and conditions, the Swedish Radiation Safety Authority's regulations (SSMFS 2008:13) concerning mechanical components contain requirements on special reporting of damage that has occurred.

Reporting in accordance with Chapter 7, Section 3

5. A nuclear power reactor shall submit the following report every day (daily report):

- operational state during the day,
- thermal power level in per cent,
- event or condition of Category 1, 2 or 3 that has occurred,
- abnormal operation, for example the activation of the reactor protection system, and
- other circumstances which may be of importance for safety.

6. Other facilities shall submit the following report every week (weekly report):

- abnormal operation,
- event or condition of Category 1, 2 or 3 that has occurred, and
- other circumstance which may be of importance for safety

7. The following report shall be submitted every year (annual report):

- an integrated report of activities at the facility during the calendar year with experience gained and conclusions reached with regard to safety. An account of events or conditions that have been assigned to Categories 1, 2 or 3 or that have resulted in a reactor scram shall also be included in the report. Conditions which have been assigned to Category 3 shall also be described with respect to the purpose of the measures and the time utilised to implement the measures (prevention time).
- The annual report shall be submitted to the Swedish Radiation Safety Authority no later than 1 March the following year.

1.1.2 *Are there regulations for event classification?*

Yes

1.2 Does your RB provide any additional guidance to licensees on notification and reporting expectations (e.g., written documents)?

No written documents but there are meetings on regular basis between the working group at the RB which handles the event reports and licensees.

1.3 Does your RB have any additional agreements in place with licensees for notifications (e.g., licensee informal calls to the inspector on duty, the resident inspectors or RB's offices)?

There is a quite close contact between the licensee and senior inspector. The contact between licensee and inspector on duty is more formal and established. There are no resident inspectors in Sweden.

2. Immediate response

2.1 Does your RB require inspectors, either formally or informally, to immediately go to the nuclear power plant following an event?

Yes.

2.1.1 If yes, does your RB have criteria for which events the inspector should go to the site for?

There are no such criteria.

2.1.2 If no, describe your RB approach to event response including any expectations or requirements that they go within a specific timeframe (e.g., one day, one week)?

After the RB decided to perform the investigation it should be launched immediately. As a rule, this means that the team leaves for the site latest the day after the event.

2.2 Are there specific activities that the inspector is expected to perform when on site (e.g., control room observations, plant walk down inspections, interactions with plant management)?

Yes, all mentioned above in addition to revision of the necessary documents etc.

2.2.1 If yes, are these activities described in a procedure?

There is a procedure on an overall level.

2.2.2 If a safety concern is identified by the inspectors how do they interact with the licensee and their RB to raise the concern (describe normal practices)?

Depending on the nature of what is observed the custom is to in the first hand take contact with the Quality and safety department at the NPP. If the licensee doesn't respond adequately the RB takes further measures.

2.3 How does the RB keep the public and other stakeholders (i.e. government) informed of the event and plant conditions?

The basic principle is that all RB documents are public. RB has a communication department that deals with public relations and all formal decisions are published at the RB website.

3. Follow-up inspections

3.1 Does your RB have a process to perform follow-up inspections of the event once the event has concluded?

Periodic inspections are performed where operation history and events follows up.

3.1.1 If yes, what is the purpose of the inspection?

To be ensured that the proper measures have been taken by the licensee after the event.

3.1.2 *Are there specific criteria to determine whether an inspection should be performed?*

There are no such criteria.

3.1.3 *What information (e.g., root cause analysis, corrective actions, operating experience report, event report) does the RB require from the licensee:*

3.1.3.1 *Prior to initiating an inspection?*

RB decides from case to case what documents are needed. It should be noted that the RB has full access to the licensee document system.

3.1.3.2 *During the inspection?*

RB has full access to the licensee document system when on site.

3.1.4 *Are there time limits for when the inspection should be initiated and completed?*

No.

UNITED KINGDOM

1. Event notification and reporting

1.1 *Do you have regulations for immediate event notification of the regulator and subsequent reporting requirements?*

The over-arching UK legislation is currently the *Health & Safety at Work Act (1974) which identifies the Nuclear Installations Act (1965) as one of its 'statutory provisions'. The Nuclear Installations Act gives the Health and Safety Executive (HSE) powers to attach licence conditions to a nuclear site licence.

[*From 1 April 2014, new legislation will come into effect 'The Energy Act' will formally create the Office for Nuclear Regulation and the relevant sections of the Nuclear Installations Act will be captured within the new Act.]

There are 36 licence conditions attached to the standard nuclear site licence, Licence Condition 7 deals with event notifications and reporting.

Licence condition 7: incidents on the site

- 7(1) The licensee shall make and implement adequate arrangements for the notification, recording, investigation and reporting of such incidents occurring on the site.
- 7(2) The licensee shall submit to the Executive for approval such part or parts of the aforesaid arrangements as the Executive may specify.
- 7(3) The licensee shall ensure that once approved no alteration or amendment is made to the approved arrangements unless the Executive has approved such alteration or amendment.

Purpose of licence condition 7

The purpose of this licence condition is to ensure that incidents on the site are notified, recorded, investigated and reported by the licensee. ONR anticipates that only incidents with the potential to have an adverse effect on safety are notified to ONR.

Licensees are required to make arrangements under the nuclear site licence and other statutory legislation, to notify ONR of various nuclear events.. Depending upon the nature of the nuclear event, there are three routes by which a telephone notification can be received by ONR and then to a Nominated Inspector. For events on nuclear sites, specifically where the approved emergency plan is invoked, the operator must notify ONR via the emergency telephone number. During office hours this will be answered (on the red cordless handset) by a member of the ONR Duty Business Support Team and out of office hours by the HSE Duty Officer system

1.1.1 *If yes, please describe the criteria used for event notification and follow-up reports.*

ONR has produced guidance for use by licensees on what, when and how to notify and report to ONR incidents or other events with the potential to affect nuclear safety, radiological safety security, safeguards and transport safety. ONR Guidance: Notifying and Reporting Incidents and Events to ONR (ONR-OPEX-GD-001 Revision 4)

ONR has a comprehensive list of notification and reporting criteria and describes the timing and information that ONR requires or requests in respect of incidents, and how, when and to whom the information is to be provided.

There are 17 nuclear safety criteria identified of which four require immediate notification, three require notification the same day and 10 require notification within one week.

For each criterion the origin of the requirement is identified, clarification of the requirements is provided and illustrative examples are included.

Full details of the criteria will be provided at the WGIP workshop.

1.1.2 *Are there regulations for event classification?*

There are a number of regulations covering event classification.

The principle regulations in relation to nuclear safety events are the Nuclear Installations (dangerous Occurrences) Regulations (DOR) 1965.

1.2 *Does your RB provide any additional guidance to licensees on notification and reporting expectations (e.g., written documents)?*

ONR Guidance: Notifying and Reporting Incidents and Events to ONR (ONR-OPEX-GD-001 Revision 4)

1.3 *Does your RB have any additional agreements in place with licensees for notifications (e.g., licensee informal calls to the inspector on duty, the resident inspectors or RB's offices)?*

For other events on nuclear sites, the operator may either directly notify the Superintending Inspector responsible for the site, or the site inspector, the Duty Business Support Team or the HSE Duty Officer.

2. Immediate response

2.1 *Does your RB require inspectors, either formally or informally, to immediately go to the nuclear power plant following an event?*

ONR's response is entirely dependent upon the nature and significance of the event. In addition to going to the site {if an inspector was not already there), ONR has purpose-built Command and Control facilities in its offices (Redgrave Court Incident Suite) which would be set up to provide authoritative advice to the Government Technical Advisor (GTA) and other Government Departments. The GTA is a formally appointed Senior Inspector of the Office for Nuclear Regulation.

In such circumstances an ONR Inspector would be immediately deployed to site, together with other ONR Inspectors being deployed to a number of off-site centres.

The expected timing of notifications is broadly proportionate to the significance of the incident or event being reported. Different terms are used in regulations and other reporting requirements in relation to the timing of notifications, with information to be provided to meet times specified such as: by the quickest means available, forthwith, without undue delay, as soon as practicable etc. To make this clearer and for consistency this document outlines initial notification timing categories, as follows:

- Immediate: As soon as practicable, but in any event within 8 hours.
- Day: By the end of the next working day.
- Week: Within 7 days.

2.1.1 *If yes, does your RB have criteria for which events the inspector should go to the site for?*

ONR's criteria for the notification and reporting of incidents is fully defined in the Appendix to document (ONR-OPEX-GD-001 Revision 4)

2.1.2 *If no, describe your RB approach to event response including any expectations or requirements that they go within a specific timeframe (e.g., one day, one week)?*

N/A

2.2 *Are there specific activities that the inspector is expected to perform when on site (e.g., control room observations, plant walkdown inspections, interactions with plant management)?*

Yes

2.2.1 *If yes, are these activities described in a procedure?*

For an off-site nuclear emergency at a UK civilian licensed site, ONR will: witness, monitor and record the operator's actions; take enforcement action if appropriate; and provide advice to other government departments and the Government Technical Adviser (GTA). ONR's response will be led and managed by the RCIS Director.

To meet these commitments, ONR will: ascertain the facts surrounding the emergency; assess the safety of the affected site, including the licensee's proposed actions; deploy staff as required; and formulate an appropriate strategy and response.

ONR will deploy staff to: the affected site; the Off-Site Facility (OSF) or Strategic Co-ordination Centre (SCC) or other technical support centre; and the National Emergency Briefing Room (NEBR) at the Department of Energy and Climate Change (DECC) in London, or the Scottish Government (SG) at the Scottish Government Resilience Room (SGoRR), in Edinburgh. ONR will provide advice to these teams during the event.

ONR will advise the DECC or SG on the appointment of a GTA. The GTA will normally be a Deputy Chief Inspector (DCI). ONR will also provide a team to support the GTA

2.2.2 *If a safety concern is identified by the inspectors how do they interact with the licensee and their RB to raise the concern (describe normal practices)?*

ONR can raise any concern that may be identified either directly, i.e. whilst on site, or indirectly via other communication routes with any individual within the licensee's organisation; however, this is likely to be a senior manager within the licensee, since the concern may require some action that needs to be put in place on an immediate basis.

2.3 *How does the RB keep the public and other stakeholders (i.e. government) informed of the event and plant conditions?*

The Radiation (Emergency Preparedness and Public Information) Regulations 2001 (REPPiR) Ref Appendix 7 provides the legal basis for the supply of information to the public in response to a nuclear emergency. These place a duty on the Operator to supply prior information to members of the public in an area which could be affected, and a duty on the local authority to supply information to the public in the event of an emergency. If this is pre-prepared information it must be kept under review to ensure it is up to date at any time.

The UK Government, through its Department of Energy Climate and Change has produced 'Nuclear Emergency Planning Liaison Group Consolidated Guidance'. Chapter 13 deals with Emergency Media Handling.

This document details the interactions and reporting responsibilities between the licensee, Regulatory Body and other Government departments and other stakeholders which include the media and public.

3. Follow-up inspections

3.1 *Does your RB have a process to perform follow-up inspections of the event once the event has concluded?*

Yes, depending upon the significance of the incident/event.

3.1.1 *If yes, what is the purpose of the inspection?*

ONR responds to incidents in accordance with principles established by HSE/ONR, where appropriate we may take enforcement action in compliance with the HSE Enforcement Policy Statement, evaluation processes and guidance. The guidance contains five basic principles and requires that enforcement is proportionate, targeted, consistent, transparent and accountable. There are a range of measures available to secure compliance with regulatory requirements, and to ensure an appropriate response to a shortfall in duty-holder performance. Fundamental is the principle that the regulatory response should be proportionate

to the risks to health and safety or security, the hazard presented, the seriousness of the transgression, and the history of compliance.

Duty-Holders' and Licensees' arrangements usually include event categorisation codes to indicate the activity involved and the safety significance of the event. Events notified to ONR may have several operator/licensee event codes included, to capture the range of activities contributing to the event; the codes are also used in licensees' reporting, screening, analysing and trending of events, as appropriate. ONR is aware of the use of event codes by operators/licensees, but does not allow them to influence regulatory assessment of events. ONR is primarily concerned with the circumstances surrounding the event, their significance for safety, licensee's corrective actions, and prevention of recurrent events.

ONR monitors the response of licensees and duty-holders to incidents and may be satisfied when they act in accordance with adequate arrangements made to address LC7 and other requirements, particularly where a thorough investigation has been undertaken by them and corrective actions identified to help prevent recurrence. Enforcement action involves a graded response, and may begin with discussions, providing advice or issuing verbal alerts on shortfalls to licensee's representatives during a site inspection or following an incident notification to ONR. For more significant incidents, or following an investigation by ONR, a letter containing regulatory requirements to correct an adverse condition may be sent to the licensee or duty-holder. These options are the enforcement measures most frequently employed by ONR inspectors to address non-compliances. However, if deemed appropriate prosecution could be considered in serious cases.

3.1.2 *Are there specific criteria to determine whether an inspection should be performed?*

All events rating INES1 on the nuclear event scale are investigated.

3.1.3 *What information (e.g., root cause analysis, corrective actions, operating experience report, event report) does the RB require from the licensee?*

ONR would expect the licensee to carry out a thorough investigation into every event, the scope and detail of the licensee's investigation would be commensurate with the significance of the event.

ONR's view is that reporting and investigation systems and processes alone cannot deliver learning; it is dependent on attitudes and behaviours (especially at senior level). Potentially, all events and near misses have organisational and cultural underlying causes. Licensees and regulators need to recognise this and ensure that investigation teams have the appropriate knowledge and expertise, regardless of any structured root cause analysis tools they use (the tool is only as good as the user). Too often the underlying organisational and cultural factors are not identified by investigations, even though recognised RCA tools are used. Where licensees have defined behavioural expectations, investigations should identify shortfalls in the expected behaviours, at all levels in the organisation if applicable.

3.1.3.1 *Prior to initiating an inspection?*

ONR expects licensees to undertake their own investigations of all incidents and events prior to, or in parallel to, ONR completing its own investigations.

3.1.3.2 *During the inspection?*

3.1.4 *Are there time limits for when the inspection should be initiated and completed?*

Subsequent to the incident it is expected that the licensee or operator will perform an investigation into the circumstances surrounding the incident. This process should permit a more complete report of the details related to the incident to be produced by the operator and sent to ONR within 60 days of the incident. For the purposes of this document, this is termed a "Follow-up Report". However, Follow-up Reports may still need to be made separately to other timescales to meet legal obligations; some will also require specific information as set out in relevant legislation.

UNITED STATES

1. Event notification and reporting

1.1 *Do you have regulations for immediate event notification of the regulator and subsequent reporting requirements?*

Yes. See Title 10 Code of Federal Regulations Part 50.72 “Immediate Notification Requirements for Operating Nuclear Power Reactors.”

1.1.1 *If yes, please describe the criteria used for event notification and follow-up reports.*

- (i) The declaration of any of the Emergency Classes specified in the licensee's approved Emergency Plan² ; or
- (ii) Those non-emergency events specified in paragraph (b) of this section that occurred within three years of the date of discovery.

(b) **Non-emergency events--(1) One-hour reports.** If not reported as a declaration of an Emergency Class under paragraph (a) of this section, the licensee shall **notify the NRC** as soon as practical and **in all cases within one hour of the occurrence of any deviation from the plant's Technical Specifications** authorized pursuant to Sec. 50.54(x) of this part.

(2) **Four-hour reports.** If not reported under paragraphs (a) or (b)(1) of this section, the licensee shall notify the NRC as soon as practical and in all cases, within four hours of the occurrence of any of the following:

(i) The initiation of any nuclear plant shutdown required by the plant's Technical Specifications.

(iv)(A) Any event that results or should have resulted in emergency core cooling system (ECCS) discharge into the reactor coolant system as a result of a valid signal except when the actuation results from and is part of a pre-planned sequence during testing or reactor operation.

(B) Any event or condition that results in actuation of the reactor protection system (RPS) when the reactor is critical except when the actuation results from and is part of a pre-planned sequence during testing or reactor operation.

(xi) Any event or situation, related to the health and safety of the public or onsite personnel, or protection of the environment, for which a news release is planned or notification to other government agencies has been or will be made. Such an event may include an onsite fatality or inadvertent release of radioactively contaminated materials.

(3) **Eight-hour reports.** If not reported under paragraphs (a), (b)(1) or (b)(2) of this section, the licensee shall notify the NRC as soon as practical and in all cases within eight hours of the occurrence of any of the following:

(ii) Any event or condition that results in:

(A) The condition of the nuclear power plant, including its principal safety barriers, being seriously degraded; or

(B) The nuclear power plant being in an unanalyzed condition that significantly degrades plant safety.

(iv)(A) Any event or condition that results in valid actuation of any of the systems listed in paragraph (b)(3)(iv)(B) of this section, except when the actuation results from and is part of a pre-planned sequence during testing or reactor operation.

(B) The systems to which the requirements of paragraph (b)(3)(iv)(A) of this section apply are:

- (1) Reactor protection system (RPS) including: Reactor scram and reactor trip.
 - (2) General containment isolation signals affecting containment isolation valves in more than one system or multiple main steam isolation valves (MSIVs).
 - (3) Emergency core cooling systems (ECCS) for pressurized water reactors (PWRs) including: High-head, intermediate-head, and low-head injection systems and the low pressure injection function of residual (decay) heat removal systems.
 - (4) ECCS for boiling water reactors (BWRs) including: High-pressure and low-pressure core spray systems; high-pressure coolant injection system; low pressure injection function of the residual heat removal system.
 - (5) BWR reactor core isolation cooling system; isolation condenser system; and feedwater coolant injection system.
 - (6) PWR auxiliary or emergency feedwater system.
 - (7) Containment heat removal and depressurization systems, including containment spray and fan cooler systems.
 - (8) Emergency ac electrical power systems, including: Emergency diesel generators (EDGs); hydroelectric facilities used in lieu of EDGs at the Oconee Station; and BWR dedicated Division 3 EDGs.
- (v) Any event or condition that at the time of discovery could have prevented the fulfillment of the safety function of structures or systems that are needed to:
- (A) Shut down the reactor and maintain it in a safe shutdown condition;
 - (B) Remove residual heat;
 - (C) Control the release of radioactive material; or
 - (D) Mitigate the consequences of an accident.
- (vi) Events covered in paragraph (b)(3)(v) of this section may include one or more procedural errors, equipment failures, and/or discovery of design, analysis, fabrication, construction, and/or procedural inadequacies. However, individual component failures need not be reported pursuant to paragraph (b)(3)(v) of this section if redundant equipment in the same system was operable and available to perform the required safety function.
- (xii) Any event requiring the transport of a radioactively contaminated person to an offsite medical facility for treatment.
- (xiii) Any event that results in a major loss of emergency assessment capability, offsite response capability, or offsite communications capability (e.g., significant portion of control room indication, Emergency Notification System, or offsite notification system).
- (c) **Followup notification.** With respect to the telephone notifications made under paragraphs (a) and (b) of this section, in addition to making the required initial notification, each licensee, shall during the course of the event:
- (1) *Immediately report* (i) any further degradation in the level of safety of the plant or other worsening plant conditions, including those that require the declaration of any of the Emergency Classes, if such a declaration has not been previously made, or (ii) any change from one Emergency Class to another, or (iii) a termination of the Emergency Class.

(2) *Immediately report* (i) the results of ensuing evaluations or assessments of plant conditions, (ii) the effectiveness of response or protective measures taken, and (iii) information related to plant behavior that is not understood.

(3) Maintain an open, continuous communication channel with the NRC Operations Center upon request by the NRC.

1.1.2 *Are there regulations for event classification?*

Yes. Go to Appendix E to Part 50—Emergency Planning and Preparedness for Production and Utilization Facilities

The emergency classes defined shall include: (1) **Notification of unusual events**, (2) **alert**, (3) **site area emergency**, and (4) **general emergency**. These classes are further discussed in NUREG-0654/FEMA-REP-1.

1.2 *Does your RB provide any additional guidance to licensees on notification and reporting expectations (e.g., written documents)?*

Yes. Go to 50.73 “License Event Report System.”

1.3 *Does your RB have any additional agreements in place with licensees for notifications (e.g., licensee informal calls to the inspector on duty, the resident inspectors or RB’s offices)?*

Yes. Normally, each licensee usually has an agreement to call the resident inspector for notifications made in order to comply with Part 50.72 and 50.73 requirements.

2. **Immediate response**

2.1 *Does your RB require inspectors, either formally or informally, to immediately go to the nuclear power plant following an event?*

Yes. Our Agency expectation is that resident inspectors should respond to events at a power plant in a timely manner. Although what is meant by timely is not defined, resident inspectors, after notification, normally respond to events within hours of the event, and in many cases within one hour.

2.1.1 *If yes, does your RB have criteria for which events the inspector should go to the site for?*

Resident inspectors normally respond to all events reported under Part 50.72 and to all reactor trips.

2.1.2 *If no, describe your RB approach to event response including any expectations or requirements that they go within a specific timeframe (e.g., one day, one week)?*

N/A

2.2 *Are there specific activities that the inspector is expected to perform when on site (e.g., control room observations, plant walkdown inspections, interactions with plant management)?*

Yes. Resident inspectors’ knowledge of plant activities and status is important in the risk-informed inspection process for determining how to select and implement the appropriate baseline inspection procedures. Plant status activities will focus on being aware of emergent plant issues, potential adverse trends, current equipment problems, and ongoing activities, including their impact on plant risk. Based on the knowledge gained through the plant status review, the inspectors are expected to make adjustments to their inspections so that they can inspect activities which are of higher risk-significance. Included in these activities is the awareness of how licensees are managing fatigue due to the impact this can have on the protection of public health and safety and common defense and security. Additionally, resident inspectors should periodically (once a quarter) conduct tours of security related areas in order to identify any security-related issues which may warrant follow-up by region-based security inspectors.

Resident inspectors are expected to tour the control room daily. The purpose of the control room walkdown is to help enable the inspector to stay current of plant status as well as to identify unexpected plant conditions that warrant additional inspection under the baseline inspection program.

Additionally, resident inspectors are expected to attend licensee meetings, on a routine basis, that provide an overall status of the plant and pertinent ongoing activities. These meetings could include the licensee's plan of the day meeting, shift turnover meeting, emergent work meeting, equipment prioritization meeting, and corrective action document review meeting.

Also, resident inspectors are expected on a weekly basis, tour accessible areas of the plant containing safety significant structures, systems, and components (SSCs) within the scope of the maintenance rule, areas that contain significant radiological hazards, and areas with important physical security equipment. Focus on areas of the plant that inspectors have not entered while performing other inspections on a weekly basis.

See IMC 2515 App D, "Plant Status" policy document for additional details.

2.2.1 *If yes, are these activities described in a procedure?*

See IMC 2515 App D, "Plant Status" policy document for additional details.

2.2.2 *If a safety concern is identified by the inspectors how do they interact with the licensee and their RB to raise the concern (describe normal practices)?*

If the safety concern involves operability of plant safety equipment, the resident inspector informs the on shift senior licensed reactor operator. Inspection findings identified by the RB are communicated to the licensee through the appropriate licensee representative.

2.3 *How does the RB keep the public and other stakeholders (i.e. government) informed of the event and plant conditions?*

All NRC inspection findings are made available to the public through our NRC webpage. NRC conducts public meetings once a year near the licensee site to discuss past inspection findings and findings with all external stakeholders.

NRC's congressional affairs group supports questions from our nationally elected officials on inquiries associated with issues identified at the NPP. Locally elected public officials usually contact the resident inspectors to address their questions on issues at the NPP.

3. Follow-up inspections

3.1. Does your RB have a process to perform follow-up inspections of the event once the event has concluded?

Yes. NRC's guidance on how to perform follow-up inspections is contained in the following documents:

- IP 71153, "Follow-up of Events and Notices of Enforcement Discretion"
- IMC 0309, "Reactive Inspection Decision Basis for Reactors"

3.1.1 *If yes, what is the purpose of the inspection?*

The purpose of IP 71153 is to evaluate licensee events and degraded conditions for plant status and mitigating actions in order to provide input in determining the need for an Incident Investigation Team (IIT), Augmented Inspection Team (AIT), or Special Inspection (SI).

3.1.2 *Are there specific criteria to determine whether an inspection should be performed?*

Yes, specific criteria are risk-informed and are contained in IMC 0309. The decision to conduct a certain type of inspection is based on the risk associated with the event and information contained in Table 1 from IMC 0309.

Table 1: Event Response as a Function of CCDP

Estimated CCDP				
CCDP < 1E-6	1E-6 → 1E-5	1E-5 → 1E-4	1E-4 → 1E-3	CCDP > 1E-3
No Additional Inspection				
	SI			
		AIT		
			ITT	

3.1.3 *What information (e.g., root cause analysis, corrective actions, operating experience report, event report) does the RB require from the licensee:*

Only facts associated with the events are required to be provided to the RB during the event response inspection. RB may request additional information, such as root cause analysis, corrective actions, at a later date depending on the safety significance of the event.

3.1.3.1 *Prior to initiating an inspection?*

Only information provided verbally is needed prior to the event inspection.

3.1.3.2 *During the inspection?*

Only facts associated with the events are required to be provided to the RB during the event response inspection. RB may request additional information, such as root cause analysis, corrective actions, at a later date depending on the safety significance of the event.

3.1.4 *Are there time limits for when the inspection should be initiated and completed?*

Special and Augmented inspections are normally conducted within weeks of the event.

Inspections are normally completed in one to two weeks. Inspection reports are issued within 45 calendar days for a special inspection. Augmented inspection reports are required to be issued within 30 calendar days.

**TOPIC C.
THE IMPACT ON INSPECTION PROGRAMMES OF THE FUKUSHIMA DAIICHI NPP
ACCIDENT**

Introduction

The Fukushima accident had a significant impact on regulatory bodies (RB). Many RB reacted to the accident by reviewing their regulatory framework, licensing requirement, and inspection programmes. The purpose of this workshop topic is to explore how the reviews led to changes in inspection programmes. The focus of this workshop topic is to identify commendable inspection practices by the RB for gaining confidence that safety will be maintained in case of severe accidents. Note that the questions are for actions and changes imposed on the licensee, and not for changes made to how the RB manages an accident.

Questionnaire:

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

1. National response

- 1.1 What changes in regulations or national standards have been made or are planned that affects your inspection programme?
- 1.2 What are the changes at the national level for managing nuclear emergencies? How will they affect your inspection programme?
- 1.3 Have any changes in RB organisation been made (or planned) post Fukushima? How will these changes affect your inspection programme?

2. Licensee emergency programmes

- 2.1 Are there any changes in the licensee's emergency preparedness programmes? What impact will they have on your inspection programme?
- 2.2 Have any changes in licensee organisations been made post Fukushima?
- 2.3 Are there any changes in NPPs minimum complement of staff in view of the Fukushima accident?

3. Technical or engineering changes to plants

- 3.1 What are the changes with respect to SAMG assessments (flood, seismic levels - active and passive faults); and supporting facilities post Fukushima? Will any changes in the inspection programme be required?
- 3.2 Are there changes in RB inspection practices due to changes imposed by Fukushima on technical specifications, surveillance and testing of equipment & systems and maintenance programme?
- 3.3 What are the implications of multiunit sites on your inspection programme (such as common services)?
- 3.4 What are the required major modifications planned/carried out by the licensee in response to the Fukushima accident? Therefore, will any changes in the assessment and inspection by the RB be made?
- 3.5 What are the plans of RB to Inspect/assess plant design condition with respect to external events such as flood, cyclone, earthquake etc.?

- 3.6 What are the changes in emergency operating procedures such as extended station blackout etc?
How will this affect the inspection programme?

4. Post Fukushima inspection programme changes

- 4.1 Were focused inspections conducted immediately after the event? Did they result in long term changes to your inspection programme?
- 4.2 Are there any changes in frequency, scope, method of inspections conducted by RB post Fukushima?

5. Training and qualification

- 5.1 Does RB have plans to change the training of inspectors to ensure their understanding of the design changes including equipment and associated procedures?
- 5.2 What are the expected changes in training of operators and RBs oversight for the training programme post Fukushima? Any impact on simulator based training and the inspection programme.
- 5.3 How does RB assess the competence of operators to work under stressed conditions imposed by events beyond design basis accidents?

BELGIUM

1. National response**1.1 *What changes in regulations or national standards have been made or are planned that affects your inspection programme?***

Revision of regulations – Ex.: All the reference levels of the WENRA reactor harmonization group (RHWG) have been incorporated in the Belgian regulations. Relevant sections of this regulation concern in particular the design extension of existing reactors, as well as emergency operating procedures and severe accident management guidelines.

Issuance of safety guidances – Ex.: assessment of the seismic hazard.

1.2 *What are the changes at the national level for managing nuclear emergencies? How will they affect your inspection programme?*

- Reinforcement of the regulatory body's preparedness
 - Establishment of individual profiles for critical functions within the Belgian Regulatory Body in an emergency situation.
 - Training and refresher training programs for the involved staff of the regulatory body.
 - Introduction of procedures for recording and monitoring of the training and the participation to emergency drills, in order to maintain knowledge and skills of the RB staff.
 - Optimization of the collaboration between RB and other organisations involved in the management of emergency situations.
- Enhancement of the national crisis organization and structure

Several actions involving the national coordination and crisis centre (CGCCR) were decided to further improve the emergency preparedness with respect to Fukushima-like accidents:

 - review and update (where needed) of procedures,
 - installation of a videoconferencing system at the RB internal crisis centre that will be compatible with those installed in the CGCCR and on nuclear sites,
 - introduction of arrangements and mechanisms to provide officials and local authorities with advice and expertise in radiation protection,
 - introduction of an information brochure for the intervention staff explaining the concepts and provisions related to radiological emergency, radiation exposure and dose levels.

1.3 *Have any changes in RB organisation been made (or planned) post Fukushima? How will these changes affect your inspection programme?*

No change in the RB organisation has been made (or planned) after the accident of Fukushima.

2. Licensee emergency programmes**2.1 *Are there any changes in the licensee's emergency preparedness programmes? What impact will they have on your inspection programme?***

The main improvements are related to:

- multi-units events: up to now, an accident was supposed to affect only one of the units on a NPP;
- communication means: to add more redundancy and diversity both on site and for communication with Corporate level of the utility and with authorities.
- Additional (mobile) means that are stored at a Corporate level: diesel generators, communication means, pumps,...

2.2 *Have any changes in licensee organisations been made post Fukushima?*

The organisation of the licensee has been slightly changed to take into account the “multi-units” events: increase of the “on-call” staffing.

2.3 *Are there any changes in NPPs minimum complement of staff in view of the Fukushima accident?*

No.

3. Technical or engineering changes to plants

3.1 *What are the changes with respect to SAMG assessments (flood, seismic levels - active and passive faults); and supporting facilities post Fukushima? Will any changes in the inspection programme be required?*

Assessments take into account the Fukushima event, to (better) consider scenarios that were not supposed or underestimated before. There is up-to-now no changes in the inspection programme.

3.2 *Are there changes in RB inspection practices due to changes imposed by Fukushima on technical specifications, surveillance and testing of equipment & systems and maintenance programme?*

Improvement of the interface between the plant inspections and the technical-assessment project of licensee’s actions resulting from Fukushima.

3.3 *What are the implications of multiunit sites on your inspection programme (such as common services)?*

There is no change, since the RB inspections were already taking into account the inspection of common licensee’s services (especially the one in charge of emergency planning and preparedness).

3.4 *What are the required major modifications planned/carried out by the licensee in response to the Fukushima accident? Therefore, will any changes in the assessment and inspection by the RB be made?*

Modifications were planned by or required from the licensee in response to the Fukushima accident for the following major topics:

- enhanced protection against external hazards (earthquake, flooding, extreme weather conditions),
- enhanced power and water supplies,
- enhanced operation management (procedures),
- enhanced emergency management (on-site),
- non-conventional means (the so-called Additional Ultimate Means),
- enhanced design (ex.: installation of filtered containment vents) and organization (ex.: improvement of SAMG) for severe-accident mitigation.

Regarding RB changes: see Q 3.2

3.5 *What are the plans of RB to inspect/assess plant design condition with respect to external events such as flood, cyclone, earthquake etc.?*

Assessments and inspections of those topics were already performed in the frame of Periodic Safety Reviews before the Fukushima accident; they were adapted to the licensee’s actions resulting from Fukushima, and they will continue in the frame of the Periodic Safety Reviews.

3.6 *What are the changes in emergency operating procedures such as extended station blackout etc? How will this affect the inspection programme?*

Changes in operating procedures aim at:

- improving the prevention of degraded situations (ex.: reducing risk of power-supply loss by regular checks of fuel and oil availability and quality);
- better management of degraded situations (ex.: programmes for reducing the consumption of fuel and oil for the diesel generators, of the batteries, ...)
- better managing the degraded situations.

This does not lead to qualitative changes in the way inspections are performed.

4. Post Fukushima inspection programme changes

4.1 *Were focused inspections conducted immediately after the event? Did they result in long term changes to your inspection programme?*

No. Inspections were performed at a later stage, and were focussed on first improvements by the licensee (the so-called “quick wins”).

4.2 *Are there any changes in frequency, scope, method of inspections conducted by RB post Fukushima?*

No significant changes were made to the inspections conducted. A lot of modifications (hardware, procedures,...) are performed by licensee, implying specific RB conformity checks.

5. Training and qualification

5.1 *Does RB have plans to change the training of inspectors to ensure their understanding of the design changes including equipment and associated procedures?*

Specific training related to the new licensee’s emergency preparedness programmes is planned. The resident inspectors are involved in the examination and approval of the modifications performed. They are thus aware of the changes made.

5.2 *What are the expected changes in training of operators and RBs oversight for the training programme post Fukushima? Any impact on simulator based training and the inspection programme.*

No specific change is foreseen: the training has to take into account the modifications implemented on site (hardware, procedures,...). Exercises are made to verify the effectiveness of the organisation.

5.3 *How does RB assess the competence of operators to work under stressed conditions imposed by events beyond design basis accidents?*

We have no clear idea or tool to assess this area.

CANADA

1. National response**1.1 *What changes in regulations or national standards have been made or are planned that affects your inspection programme?***

With respect to emergency preparedness, before Fukushima, the CNSC had a regulatory guide that informed licensees of CNSC expectations with vis-à-vis EP programs. A separate Regulatory Document existed to govern the Drill and Exercise program requirements. The first was a guide, the second was a requirement. Now, these have been combined into a new Regulatory Document with more prescriptive requirements on the licensees, and clearer expectations for CNSC inspectors. In addition to making the document regime simpler and more prescriptive, the Fukushima lessons learned were incorporated into this new document.

1.2 *What are the changes at the national level for managing nuclear emergencies? How will they affect your inspection programme?*

No changes at the national level. At this level it was always assumed that the emergency was grave and national resources would be brought to the table as required. Notwithstanding this however, the impetus of the Fukushima accident has reignited interest in emergency response at the Federal level and as a result there is a new national level exercise in the planning stages that is designed to test the “unified response” of all federal agencies and their integration with Provincial, municipal and licensee emergency response organizations.

1.3 *Have any changes in RB organisation been made (or planned) post Fukushima? How will these changes affect your inspection programme?*

No specific structural changes have been made at this time; however incremental programmatic elements have been updated as required, e.g. updating the emergency preparedness programs to incorporate the periodic testing of standby emergency Mitigation Equipment into the exercise cycle, and ensuring that routine maintenance procedures are in place for this equipment.

2. Licensee emergency programmes**2.1 *Are there any changes in the licensee’s emergency preparedness programmes? What impact will they have on your inspection programme?***

The licensees are building standby facilities to house generic equipment (Emergency Mitigating Equipment) for each NPP site and some regional centres are in the planning stages to accommodate shared services and equipment. Once in place these will have to be incorporated into the site specific EP programs. These elements will be added to the CNSC inspection Program as required, but will be handled as per routine program changes, and do not necessitate any major rework of the inspection program.

2.2 *Have any changes in licensee organisations been made post Fukushima?*

The CANDU Industry Implementation Team (CIIT) was created to collaborate and coordinate the response of all licensees in Canada. For the implementation phase of the Fukushima Action Items, dedicated staff was assigned to lead these specific projects. Where appropriate, joint financial and material resources were used. A specific example of this is the creation of the Emergency Resource Centre that is jointly funded and managed through the industry group rather than a specific licensee (this is still in the planning stages). This temporary group will be active until all actions are complete.

2.3 *Are there any changes in NPPs minimum complement of staff in view of the Fukushima accident?*

No changes to minimum compliment.

3. Technical or engineering changes to plants

3.1 *What are the changes with respect to SAMG assessments (flood, seismic levels - active and passive faults); and supporting facilities post Fukushima? Will any changes in the inspection programme be required?*

Many minor changes were made to accommodate flooding and seismic requirements. E.g. an emergency fuel pump to the standby generator was found to be vulnerable to flooding due to its location in a sump. A barrier was built around the sump. Updates to filtered air discharge systems were made to improve capacity, passive hydrogen recombination units are being added to all facilities containment systems where needed. Physical connection points were added to facilitate raw water additions to boilers, heat transport systems, moderator systems, and spent fuel bays. Similar connections were made to specific electrical busses to power up critical electrical loads.

3.2 *Are there changes in RB inspection practices due to changes imposed by Fukushima on technical specifications, surveillance and testing of equipment & systems and maintenance programme?*

The CNSC is still determining the need for and scope of any possible changes to the normal inspection practices. However it is becoming evident that most if not all changes made in the plant SCC's or standby equipment will be integrated into those systems where the equipment is installed and managed within the appropriate licensee programs. Hence CNSC inspections that are related to those will be incrementally modified to accommodate these changes, but these will not require a new suite of inspection documents or practices.

3.3 *What are the implications of multiunit sites on your inspection programme (such as common services)?*

The implications on multi-unit sites are not much different than what existed before. Common services are still common. Some upgrades will be made to inter unit capabilities, and these will be isolatable for individual unit use as required. This is much the same approach as is used in CANDU units already. A good example of this is inter-unit boiler feed water tie. In the multi-unit stations, it is possible to provide chemically dosed water from any unit to any other unit, subject to operational and safety requirements of the donor unit. This capability will be augmented as it is an engineered purpose built system. However, additional boiler feed capability will be made through fire water connections to supply raw water to individual boiler feed systems on each unit. This approach will also be used for electrical systems.

3.4 *What are the required major modifications planned/carried out by the licensee in response to the Fukushima accident? Therefore, will any changes in the assessment and inspection by the RB be made?*

There are no major modifications being made. There are many incremental changes being made to SCC's. The most major impact of post Fukushima activities has been the procurement of standby equipment that is not connected to the facility but has been designed to function and be connected quickly to a facility. An example is new fire trucks to pump raw water into any affected facility; multiple different portable generators are now available on site as well as at remote locations to provide separation from common cause events. These remote pieces of equipment and equipment their storage facilities are the only major change to the CNSC's inspection program. We will need to add an inspection to these facilities to verify the condition of the equipment, and we will need to verify that the equipment is tested periodically to maintain effectiveness of both the equipment and the operating crews.

3.5 *What are the plans of RB to Inspect/assess plant design condition with respect to external events such as flood, cyclone, earthquake etc.?*

The CNSC created a technical working group to study postulated SAMG events or plant vulnerabilities. This resulted in a series of 33 "Fukushima Action Items". Some of these actions at the highest level were

for licensees to examine their individual vulnerabilities to certain conditions, and determine if any further actions were required to accommodate them (i.e. flooding potential, tornados, extreme wind etc.). From these evaluations the licensee may have determined that current systems were not vulnerable to the specific condition and hence no further action required. In other cases vulnerabilities were identified. The licensee proposed modifications to address each of these, and these in turn were reviewed and where necessary modified by the CNSC. Once done, the licensees started the design and implementation of the modifications. This process is well underway and the results of these are now being verified in the field by the CNSC site inspectors.

3.6 *What are the changes in emergency operating procedures such as extended station blackout etc? How will this affect the inspection programme?*

The major change to a station blackout is the review of battery life and load shedding requirements to extend battery life. This however should no pose any additional inspection challenges since testing of these types of safety features is done programmatically by the licenses during outages, and would not require any more detailed inspection than any of the hundreds of other test that are conducted during outages. The most significant changes are those related to the deployment of EME as described in section 2.2 of this text.

4. Post Fukushima inspection programme changes

4.1 *Were focused inspections conducted immediately after the event? Did they result in long term changes to your inspection programme?*

No focused inspections were conducted by the CNSC at individual plants. The CNSC did however create a task group to conduct an elaborate and thorough review of the lessons learned at Fukushima for their applicability at Canadian CANDU plants. The output of this was a report entitled CNSC Fukushima Action Plan. A related document entitled Fukushima Action Items Closure Criteria and Expectations was used to guide the licensees on how to approach their assessments and modifications. This document also served as a guide for inspectors and specialist reviewers to know when the changes made by licensees could be considered “in service” and hence part of routine compliance verification activities.

This has resulted in numerous inspections and verification activities during the implementation phase. For example, all components installed in the field, all plant modifications, and all standby equipment is in the process of being verified by site inspectors in the field. The inspectors verify that the equipment is in fact there, it exists, that it appears to have been properly commissioned and that it is indeed available for service. The technical specifications of these modifications are presumed to be correct due to adherence to each facilities quality assurance program specific to engineering change control. The ECC programs were each in turn confirmed to be current and without significant weakness by CNSC inspectors.

4.2 *Are there any changes in frequency, scope, method of inspections conducted by RB post Fukushima?*

Following implementation, it is not expected that there should be any major changes to the inspection program; however the scope may be somewhat larger with respect to credible accident scenarios during Drills and Exercises (SAMG).

5. Training and qualification

5.1 *Does RB have plans to change the training of inspectors to ensure their understanding of the design changes including equipment and associated procedures?*

It is not expected that a significant amount of training will be required for site inspectors since most components will be a relatively small addition to current inspection guides.

5.2 *What are the expected changes in training of operators and RBs oversight for the training programme post Fukushima? Any impact on simulator based training and the inspection programme.*

With respect to the operators, the CNSC expects that all new equipment and procedures will be evaluated by the licensees and a SAT based training needs analysis conducted to determine the scope of training required for successful deployment and/or implementation of any of these new systems. This training requirement is expected to be identified as a need through the engineering change control process, and then appropriate training prepared and delivered through the training units. The CNSC will validate the training programs on the usual cycle but with emphasis on Fukushima at the next audit.

5.3 *How does RB assess the competence of operators to work under stressed conditions imposed by events beyond design basis accidents?*

We have not done any new work on this subject at this time as it relates specifically to Fukushima upgrades. However, the CNSC has a Human and Organizational Factors section that assesses this subject area at all licensees on a programmed basis.

FINLAND

1. National response

1.1 *What changes in regulations or national standards have been made or are planned that affects your inspection programme?*

Not much. Eventually, some new systems are backfitted into the NPPs and these systems are just incorporated into the normal inspections.

1.2 *What are the changes at the national level for managing nuclear emergencies? How will they affect your inspection programme?*

Major change has been complete update of ALL regulatory guides to include updated requirements for safety. One input has been the lessons from Fukushima, but also other major safety updates has been made.

This will eventually lead in changes in the content of inspections but this is more broader issue than just Fukushima.

1.3 *Have any changes in RB organisation been made (or planned) post Fukushima? How will these changes affect your inspection programme?*

Media contact support has been added into emergency staffing and altogether more staffi are included into the emergency staffing lists in order to be able to sustain 24/7 operations.

2. Licensee emergency programmes

2.1 *Are there any changes in the licensee's emergency preparedness programmes? What impact will they have on your inspection programme?*

New Fukushima improvements need to be added into EP strategy and into EOP's. Staffing questions are also reviewed.

2.2 *Have any changes in licensee organisations been made post Fukushima?*

Not really.

2.3 *Are there any changes in NPPs minimum complement of staff in view of the Fukushima accident?*

Not in the operations staff. Perhaps more detailed staffing lists for emergency organization are needed for the NPP's too.

3. Technical or engineering changes to plants

3.1 *What are the changes with respect to SAMG assessments (flood, seismic levels - active and passive faults); and supporting facilities post Fukushima? Will any changes in the inspection programme be required?*

National actions, EU stress tests and related ENSREG activities have been quite thorough. Many abovementioned analysis has been revisited. There has not been any new SAM strategy because existing one has been quite comprehensive. Some more effort is in the area of spent fuel pools, longer autonomy requirements, multi-unit accidents, long duration accident scenarios (staffing), new olant feature to cover situations some new DEC scenarios to prevent severe acciedent.

Existing inspections may take this new things as a subject so there is really no changes in the inspection system. (Review and assessment + plant modifications; there is quite a lot effort).

3.2 *Are there changes in RB inspection practices due to changes imposed by Fukushima on technical specifications, surveillance and testing of equipment & systems and maintenance programme?*

New plant systems will be included in all of these due to the fact that they are part of licensing basis. (Although they have different criteria compared to DBA situations)

3.3 *What are the implications of multiunit sites on your inspection programme (such as common services)?*

EP inspection will include questions about this. Also next emergency exercise will be multiunit situation.

3.4 *What are the required major modifications planned/carried out by the licensee in response to the Fukushima accident? Therefore, will any changes in the assessment and inspection by the RB be made?*

New safety injection systems and/or cooling system. Electrical & I&C batteries and their availability is more stringent.

3.5 *What are the plans of RB to inspect/assess plant design condition with respect to external events such as flood, cyclone, earthquake etc.?*

External events have already been revisited.

3.6 *What are the changes in emergency operating procedures such as extended station blackout etc? How will this affect the inspection programme?*

EOP's are improved in the area of severe accident during shutdown, otherwise they are quite good.

4. Post Fukushima inspection programme changes

4.1 *Were focused inspections conducted immediately after the event? Did they result in long term changes to your inspection programme?*

Not really. No changes.

4.2 *Are there any changes in frequency, scope, method of inspections conducted by RB post Fukushima?*

Inspections have been stable (review and assessment activities have been quite extensive)

5. Training and qualification

5.1 *Does RB have plans to change the training of inspectors to ensure their understanding of the design changes including equipment and associated procedures?*

At the moment all regulatory guides have been updated (also due to the Fuku). This means that there is a lot of training at the moment and these will include a lot of effort to understand all the new requirements.

5.2 *What are the expected changes in training of operators and RBs oversight for the training programme post Fukushima? Any impact on simulator based training and the inspection programme.*

New plant modifications will of course be included in training programs. However the training is not affected that much. Some detailed scenarios may have been selected, but that is quite normal.

5.3 *How does RB assess the competence of operators to work under stressed conditions imposed by events beyond design basis accidents?*

Operators are re-licenced with oral test every 2 to 4 years so their capabilities to understand what need to be done in accidents is measured. How well would they perform under severe stress is not possible to

evaluate. Only thing that is used is psychological evaluation when operators are recruited, they are evaluated by the professionals but how reliable this is, I am not sure.

Of course, this provides some screening of those individual that are clearly not capable to work under stress.

FRANCE

1. National response**1.1** *What changes in regulations or national standards have been made or are planned that affects your inspection programme?*

No change

1.2 *What are the changes at the national level for managing nuclear emergencies? How will they affect your inspection programme?*

No change

1.3 *Have any changes in RB organisation been made (or planned) post Fukushima? How will these changes affect your inspection programme?*

No change

2. Licensee emergency programmes**2.1** *Are there any changes in the licensee's emergency preparedness programmes? What impact will they have on your inspection programme?*

See the answer to question 2.3.

2.2 *Have any changes in licensee organisations been made post Fukushima?*

See the answer to question 2.3.

2.3 *Are there any changes in NPPs minimum complement of staff in view of the Fukushima accident?*

Answer to questions 2.1, 2.2 & 2.3:

Since 21st January, EDF (French NPPs only licensee) is required to comply with the following prescriptions:

- the “Nuclear rapid intervention force (FARN)”, which ASN confirmed was able to intervene by late 2012 and which will be fully operational no later than the end of 2014. This force can provide assistance to a damaged site by providing specialised teams to back up those of the plant concerned and mobile equipment to supply additional water and electricity. A number of modifications were therefore made to the reactors to make it easier to connect this equipment brought on-site by the FARN;
- additional training to its staff for intervention in the event of an earthquake and a severe accident.

Those new aspects of the licensee organisation will be the subject of inspections in 2014.

3. Technical or engineering changes to plants**3.1** *What are the changes with respect to SAMG assessments (flood, seismic levels - active and passive faults); and supporting facilities post Fukushima? Will any changes in the inspection programme be required?*

See the answer to question 3.4.

3.2 *Are there changes in RB inspection practices due to changes imposed by Fukushima on technical specifications, surveillance and testing of equipment & systems and maintenance programme?*

There are no change in terms of inspection practises.

3.3 What are the implications of multiunit sites on your inspection programme (such as common services)?

In France, there is only one NPP licensee: Electricité de France (EDF) which own 58 reactors/unit divided into 19 NPP. Each inspection carried out on a NPP concerns all its reactors/units except for the inspection dedicated to the operations during reactors' outages.

3.4 What are the required major modifications planned/carried out by the licensee in response to the Fukushima accident? Therefore, will any changes in the assessment and inspection by the RB be made?

Yes, there are and will be major modifications carried out by the licensee. They are responses to ASN binding demands. Here is the chronology of what was decided...

Following the nuclear accident in Fukushima, ASN considered that stress tests on the French civil nuclear facilities with respect to the type of events which led to the Fukushima accident, should be initiated. These stress tests were in response to the requests made by the Prime Minister on 23 March 2011 and the European Council on 24 and 25 March 2011. The licensees presented the extreme situations stress tests of their facilities to ASN in September 2011. They were reviewed by the Advisory Committees for nuclear reactors (GPR) and for laboratories and plants (GPU) in November 2011. ASN published its conclusions on 3 January 2012 and on 26 June 2012 it issued **19 resolutions** instructing EDF to take additional measures to reinforce the safety of its facilities. Those measures are:

- The creation of a “hardened safety core” of material and organisational measures able to manage basic safety functions in extreme situations, for all the facilities concerned by the stress tests report. Before 30th June 2012, the licensees submitted to ASN the content and the specifications of the “hardened safety core” for each specific facility;
- Reinforced measures to reduce the risk of “uncovering” of the fuel in the fuel pools in the various facilities;
- Performance of feasibility studies for additional measures to protect underground and surface waters in the event of a severe accident.

For example before 30th June 2013, the licensee had to present ASN with the intended modifications for installing technical backup devices for long-term removal of residual power from the reactor and the spent fuel pool in the event of loss of the heat sink. Concretely it will lead to groundwater pumping solutions.

An other example: before 31st December 2018, EDF will have, on each reactor, to install an additional electrical power supply capable, if the other off-site and on-site electrical power supplies are lost, of supplying the systems and components belonging to the hardened safety core.

At the request of ASN, EDF's proposal for the creation of a “hardened safety core” was analysed by IRSN (ASN's technical expert). The results of this analysis were presented on 13th December 2012 to the GPR, which submitted its opinion to ASN.

On 21 January 2014, the ASN Commission adopted **19 resolutions** setting out additional requirements for implementation of the post-Fukushima “hardened safety core” in EDF's NPPs. These resolutions specify the objectives and the contents of this “hardened safety core”, which shall comprise measures to:

- Prevent a severe accident affecting the core of the reactor or the spent fuel pool;
- Limit the consequences of an accident which could not be avoided, with the aim of preserving the integrity of the containment without opening the venting system. This aim of mitigating the consequences of an accident applies to all the phases of an accident;
- Enable the licensee to perform its emergency management duties.

This “hardened safety core” must be as independent as possible from the existing systems, more specifically with regard to I&C and electrical power supplies. The ASN resolutions specify the design rules to be adopted for the “hardened safety core” equipment. These rules must comply with the most demanding nuclear industry standards, used for the design and construction of installations requiring a high level of safety. Finally, they will lead EDF to determine the maximum hazards to be considered for the “hardened safety core” equipment, in particular for earthquake, flooding.

3.5 *What are the plans of RB to Inspect/assess plant design condition with respect to external events such as flood, cyclone, earthquake etc.?*

ASN resolutions are binding law texts. In the resolutions taken on 26th June 2012 and 21st January 2014, some ASN demands were formulated on the topic of flood and earthquake. To summarize, the licensee must justify or carried out some modifications to assure that its main safety equipments, particularly “hardened safety core” equipments can resist to some level of earthquakes and flooding.

Those levels are defined in the ASN guide (the ASN guide on flooding was released in 2012) or fundamental safety rules (the “ancestors” of ASN guides).

Traditionally, inspections on those topics are carried out every two years on each site in addition of all the carried out inspections.

3.6 *What are the changes in emergency operating procedures such as extended station blackout etc.? How will this affect the inspection programme?*

The creation of the notion of “hardened safety core” is followed by the creation of new operating procedures mainly because new equipment are added but also because the organisation is changing (for example the creation of the “Nuclear rapid intervention force (FARN)”). Those new procedures can be inspected during inspections specially dedicated on these topics but also on emergency exercises.

4. *Post Fukushima inspection programme changes*

4.1 *Were focused inspections conducted immediately after the event? Did they result in long term changes to your inspection programme?*

Yes, focused inspections were conducted, in several steps:

- In addition to the normal inspection programme, the topics addressed by the stress tests were also covered by 1 targeted inspections on each NPPs in 2011.
- In 2012, ASN carried out follow-up inspections to check the corrective measures requested following the inspections performed in 2011 on all the NPPs. The general impression further to these follow-up inspections is a positive one. ASN considers that the organisation defined and implemented by EDF to address the corrective action requests following the targeted inspections carried out in 2011 is on the whole satisfactory, even if there are still a number of points to be dealt with or which will require particular vigilance on the part of ASN.
- In 2013, ASN carried out, on each NPP inspections to control the respect of the resolutions taken on 26th June 2012.

4.2 *Are there any changes in frequency, scope, method of inspections conducted by RB post Fukushima?*

For several years, inspections on the respect of the resolutions taken after Fukushima (26th June 2012 and 21st January 2014) will be carried out in addition of the traditional inspections. There are not fundamental changes in the method of inspection.

5. Training and qualification

5.1 *Does RB have plans to change the training of inspectors to ensure their understanding of the design changes including equipment and associated procedures?*

No it doesn't.

5.2 *What are the expected changes in training of operators and RBs oversight for the training programme post Fukushima? Any impact on simulator based training and the inspection programme.*

The training of operator progressively change to integrate the modifications and the new materials set up on the NNP. The new employees course now includes a specific presentation of the Fukushima accident.

5.3 *How does RB assess the competence of operators to work under stressed conditions imposed by events beyond design basis accidents?*

The training course to be an operator lasts 2 years. It is mainly made up of sessions on simulator. The competence of operator to work under stress is mainly tested on simulator during the 2-year training course but also all long the career (each operator must have 20 days every 2 years of training on simulator).

The operator behaviour/competence under stress is also tested on real situation by the hierarchy.

All this organization on operators' competence is investigated or verified during inspections on this specific topic (approximately 1 per 2 years on each site).

GERMANY

1. National response**1.1 *What changes in regulations or national standards have been made or are planned that affects your inspection programme?***

Directly after the Fukushima accident the German federal government decided to have the safety of all German NPPs reviewed by the RSK (reactor safety commission). Furthermore, 8, mostly the oldest, NPPs were provisionally shut down as a precautionary measure, respectively the authorisation to restart one of these NPPs was suspended. These 8 NPPs remained permanently shut down by an amendment of the Atomic Energy Act in August 2011, and the further 9 NPPs still operating will be shut down step by step till the end of year 2022 at latest.

In the aftermath of the Fukushima accident, the RSK continued its work in evaluating the robustness of the NPPs and giving recommendations on how to improve robustness. Furthermore, the Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) evaluated the lessons learned from Fukushima on behalf of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) and made recommendations in an Information Notice¹. Also a stress test for all NPPs within the European Union was initialised by ENSREG. The results of the safety evaluations mentioned above led to the national action plan (backfitting and analyses regarding severe accident management). On November 20th, 2012 the BMU and the nuclear supervisory authorities of the Länder adopted the new “Safety Requirements for Nuclear Power Plants” which update and replace older guidelines. The development of the safety requirement had been a long process and also insights gained from the Fukushima accident were included. The safety requirements are based on the defence-in-depth concept and now also comprise requirements for accident management in the event of beyond-design-basis plant states.

Also the criteria when the operator needs to inform the competent authorities for disaster control have been updated by RSK and SSK (Commission on Radiological Protection) in 2012. E.g. two criteria for setting off pre-alarm have been added: “SBO for more than 10 minutes” and “high temperature in the spent fuel pool” (before there was only the criterion “low water level in spent fuel pool”).

1.2 *What are the changes at the national level for managing nuclear emergencies? How will they affect your inspection programme?*

Regulations concerning on-site measures see Answer 1.1. Regarding off-site measures, BMU requested the SSK in June 2011 to carry out a review of the national technical regulations regarding off-site nuclear emergency preparedness. Experiences from the Fukushima accident call for a review of the entire body of regulations regarding emergency preparedness. The Länder contribute to the SSK working groups. The aim is to further develop technical and organisational co-operation for coping with radiological events. This includes national exercises under participation of several Länder, the integration of external observers and the performance of international exercises in areas near to the border. The experiences gained from these exercises are to be incorporated into the further development of off-site emergency planning. Moreover, an improved and more extensive information exchange in the radiological emergency management will offer the possibility to increase interaction of the emergency systems at the national (between the Federation and Länder) and international level. Besides the SSK also the “Fukushima” working group of the Conference of Ministers of the Interior is working on improvements for disaster control.

¹. Information notices are prepared by GRS as a technical support organisation (TSO) working for BMU for all those events in German and foreign NPPs where the in-depth analyses show a current or potential significance and applicability to the safety of other plants. These information notices play a key role in the German National Operating Experience Feedback Programm and are submitted to the supervisory authorities and expert organisations, the licensees, the manufacturers and other institutions.

The results of the mentioned working groups do not directly affect the inspection programme since the RB1 is not directly responsible for disaster control at the NPPs. Of course, suggestions about measures like evacuation are given by the RB. Thus, the RB monitors the progress of the above mentioned working groups and also participates in emergency drills. Emergency drills performed by the operator of a NPP are part of the inspection programme (see answer 5.3). It is also inspected that the licensee is prepared to fulfil the requirements in the area of off-site emergency response/disaster control (e.g. notification, liaison persons, radiological measurements on-site and off-site).

1.3 *Have any changes in RB organisation been made (or planned) post Fukushima? How will these changes affect your inspection programme?*

No changes in RB organisation have been made.

2. Licensee emergency programmes

2.1 *Are there any changes in the licensee's emergency preparedness programmes? What impact will they have on your inspection programme?*

In every German NPP exists a specific accident management system with a lot of concrete accident measures. As part of the national action plan (see answer 1.1) the licensees introduced additional accident management measures. In a further part of the accident management system SAMGs have been introduced or are in development and will be implemented (see also answer 3.1 and 3.4).

New procedures and systems are part of the inspection programme. Before being implemented, they are subject to approval by the RB. After implementation they become part of the regular inspection programme (e.g. hardware systems are subject to periodic testing, existence of equipment is inspected by on-site inspections, procedures are inspected by emergency exercises).

2.2 *Have any changes in licensee organisations been made post Fukushima?*

As a result of the Fukushima accident, Germany changed its energy policy leading to an immediate shutdown of 8 NPPs and a quickened phase out (see answer 1.1). Licensees made organisational changes in order to adapt to this situation, e.g. creating new departments for the decommissioning of the shut-down plants. The organizational changes are subject to approval by the RB.

2.3 *Are there any changes in NPPs minimum complement of staff in view of the Fukushima accident?*

No significant changes in the staff number due to lessons learned from Fukushima accident. In some plants a few new positions were established e.g. for emergency preparedness tasks.

3. Technical or engineering changes to plants

3.1 *What are the changes with respect to SAMG assessments (flood, seismic levels - active and passive faults); and supporting facilities post Fukushima? Will any changes in the inspection programme be required?*

New SAMGs for full power operation as well as for low power and shut down states have been introduced or are in development. These take lessons learned from the Fukushima accident as well as results from the European Stress test and the robustness analyses by the RSK into account. For example, as result of the Fukushima accident the robustness against external hazards for accident management measures has been evaluated.

About effects on the inspection programme see answer 2.1.

¹ In the framework of this questionnaire, RB means the competent supervisory authority of the respective Land of the nuclear power plants, supported by a technical support organisation (TSO) and a subordinate authority.

3.2 *Are there changes in RB inspection practices due to changes imposed by Fukushima on technical specifications, surveillance and testing of equipment & systems and maintenance programme?*

There are no fundamental changes. New systems, equipment and procedures are included in the inspection programme (see answer 2.1).

3.3 *What are the implications of multiunit sites on your inspection programme (such as common services)?*

In Germany there is only one operating multi-unit site (Gundremmingen) left. Effects of accidents in one unit on the neighbouring unit is being analysed as part of the national action plan. This applies for sites that have at most one operating unit with the second unit permanently shut down but not yet decommissioned as well. Focus is on accessibility of the buildings (especially the control room) in case of an accident.

3.4 *What are the required major modifications planned/carried out by the licensee in response to the Fukushima accident? Therefore, will any changes in the assessment and inspection by the RB be made?*

Major updates include:

- hardware modifications/backfitting for accident management:
 - in addition to the existing emergency diesel generators, installation of mobile station-black-out diesel generators including two connecting points to serve electrical power from outside
 - DC-power supply for at least 10 hours
 - additional possibilities for water injection into the spent fuel pool without entering potential high dose rate areas
- further implementation of SAMGs for full power operation as well as low power and shut down situations

About inspections see answer 2.1. In connection with the installation of hardware modifications function tests were performed by the licensee and inspected by the RB and its TSO.

3.5 *What are the plans of RB to inspect/assess plant design condition with respect to external events such as flood, cyclone, earthquake etc.?*

The design condition with respect to external events was part of the safety assessment by the RSK and further work of RSK working groups. Open issues are included in the plant specific Fukushima action plans. They are followed-up by the RB.

Examples would be (partly finished):

- the feasibility of filtered venting after an earthquake
- regaining access to building after external hazards

3.6 *What are the changes in emergency operating procedures such as extended station blackout etc.? How will this affect the inspection programme?*

The new/additional accident management measures mentioned in answer 3.4 have been/are being included in the EOPs (in Germany part of the Accident Management Manual). Also the feasibility of accident management-measures in case of external hazards is being analysed (e.g. access to buildings and to the site, availability of equipment).

4. Post Fukushima inspection programme changes

4.1 *Were focused inspections conducted immediately after the event? Did they result in long term changes to your inspection programme?*

Yes. Immediately after the Fukushima accident the RB conducted on-site inspections in the NPP focussing on external events. Generic robustness assessment of all German NPPs concerning beyond design basis events was carried by the RSK immediately after Fukushima. First results were reported by May 2011.

About long term effects on the inspection programme see answer 2.1.

4.2 *Are there any changes in frequency, scope, method of inspections conducted by RB post Fukushima?*

No major changes.

5. Training and qualification

5.1 *Does RB have plans to change the training of inspectors to ensure their understanding of the design changes including equipment and associated procedures?*

No. Design changes are closely monitored by the inspectors and conducted after being approved by the RB. Thus, the understanding of design changes happens during this process.

Further training of inspectors is an ongoing process. Besides this, the RB takes part in emergency drills conducted by the operators or by neighbouring countries (e.g. by Switzerland in November 2013).

5.2 *What are the expected changes in training of operators and RBs oversight for the training programme post Fukushima? Any impact on simulator based training and the inspection programme.*

There are only minor changes. The “Guideline for the Maintenance of Technical Qualification of Responsible Nuclear Power Plant Personnel” was updated in 2013. For members of the operator’s emergency organization there was an increase in the minimum required training for unforeseen events. There are no major changes regarding the oversight for the training programme and the inspection programme (see answer 5.3).

5.3 *How does RB assess the competence of operators to work under stressed conditions imposed by events beyond design basis accidents?*

Responsible NPP personnel is required to perform training according to requirements listed in the “Guideline for the Maintenance of Technical Qualification of Responsible Nuclear Power Plant Personnel”. This includes training for unforeseen events. The simulator training of control room personnel covers also, as far as possible, reacting to and managing unexpected beyond design basis accidents.

The operator training is always scheduled in a 3-year program. At the end of each year the type, scope and success of measures to maintain technical qualification and the participation of responsible shift personnel in such measures shall be furnished to the RB.

Emergency drills dealing with beyond design basis accidents are performed once per year and unit. The RB supervises these drills and/or participates.

INDIA

1. National response**1.1 *What changes in regulations or national standards have been made or are planned that affects your inspection programme?***

Answer: Subsequent to the Fukushima accident, RB of India (AERB) made a re-assessment of the requirements prescribed in AERB codes and guides for emergency preparedness. Based on these requirements the AERB guide “Preparation of off-site Emergency Preparedness Plan” revision of which was in progress to incorporate National Disaster Management Authority Guidelines, was extended to address the following:

- i. Implementation of Decision Support System
- ii. Establishment of On-site Emergency Support Centre at NPPs
- iii. Establishment of Nuclear and Radiological Emergency Monitoring Cell in AERB

1.2 *What are the changes at the national level for managing nuclear emergencies? How will they affect your inspection programme?*

Answer: The national agencies such as National Disaster Management Authority (NDMA), NEC (National Executive Committee) and NCMC (National Crisis Management Committee) have a role in management of all types of disasters including radiological/nuclear emergency. Following accidents at Fukushima NPPs, NDMA appointed a high level committee to review the existing plans of the off-site emergencies at the NPPs and prepare modified guidelines for the off-site nuclear emergency plan. These guidelines will form the basis for modification in off-site emergency plans that are inspected by AERB.

1.3 *Have any changes in RB organisation been made (or planned) post Fukushima? How will these changes affect your inspection programme?*

Answer: Preliminary reviews does not warrant any change in the RB organisation.

2. Licensee Emergency Programmes**2.1 *Are there any changes in the licensee’s emergency preparedness programmes? What impact will they have on your inspection programme?***

Answer: Subsequent to the Fukushima accident, RB of India (AERB) made a re-assessment of the requirements prescribed in AERB codes and guides for emergency preparedness. The safety guide “Intervention levels and derived intervention levels for off-site radiation emergency levels has been revised in line with IAEA safety standards and is currently under review. It is planned to review other AERB safety guides also. Following the revision of these guides, licensees are required to make suitable modifications in the emergency preparedness programmes.

2.2 *Have any changes in licensee organisations been made post Fukushima?*

Answer: The reviews carried out post Fukushima did not warrant any change in the licensee organisation.

2.3 *Are there any changes in NPPs minimum complement of staff in view of the Fukushima accident?*

Answer: No

3. Technical or engineering changes to plants**3.1 *What are the changes with respect to SAMG assessments (flood, seismic levels - active and passive faults); and supporting facilities post Fukushima? Will any changes in the inspection programme be required?***

Answer: Design levels of flood and earthquake are assessed conservatively during siting stage of NPPs. These are reviewed again when additional facilities are constructed at the same site. Detail review of external events for each NPP was undertaken by the RB and licensees independently post Fukushima accidents. Re-assessment of elevations of important equipment and systems was carried out to assess their operability and to identify the cliff edge effect if any, above Design Basis Flood Level (DBFL). The recent estimates at one of the coastal sites suggest that the postulated flood level may undergo upward revision. Considering this, diesel generators, fire water pumps, diesel driven feed pumps and external water injection points have been located above the re-evaluated flood level. All other stations have sufficient margins above Design Basis Flood Level (DBFL) and external water injection schemes are located well above the DBFL.

For coastal sites located in the west coast, Tsunami analysis shows that magnitude of tsunami height is well below the present DBFL after considering the extreme earthquake. For coastal sites located on the east coast, at one site, estimated levels are higher than the present DBFL and corrective actions have been taken.

As part of the Periodic Safety Review, seismic re-evaluation was carried out for older NPPs (i.e. TAPS-1&2, RAPS-1&2 and MAPS-1&2). Analysis shows that margins are available over and above the design basis. All important SSCs related to shutdown, decay heat removal and containment functions were included in the re-evaluations. For newer NPPs (i.e. NAPS onwards) preliminary assessment carried out indicate that SSCs required for accomplishing safety functions are capable of withstanding earthquake with margins of the order of two to three times above SSE (return period of 10,000 years)

3.2 *Are there changes in RB inspection practices due to changes imposed by Fukushima on technical specifications, surveillance and testing of equipment & systems and maintenance programme?*

Answer: The additional features provided for handling prolonged Station Blackout conditions andbdba conditions is checked during inspection of NPPs

3.3 *What are the implications of multiunit sites on your inspection programme (such as common services)?*

Answer: Multiunit sites share some of the common facilities such as fire station, waste management and services such as transport and communication etc. These common facilities have been reassessed after the Fukushima NPPs accident. The augmentation required in the common systems and its readiness to cater the requirements of all NPPs at multi-unit sites is checked during inspections.

It is proposed to house equipment required for handling beyond design basis situations in the on-site emergency control centre along with required plant and environmental radiation information with necessary documents. For all NPP sites access is available from two different routes and this aspect is being included in emergency plans.

3.4 *What are the required major modifications planned/carried out by the licensee in response to the Fukushima accident? Therefore, will any changes in the assessment and inspection by the RB be made?*

Answer: The major modifications being carried out are as follows:

- i. Improving availability of on-site power supply by:
 - a) Providing back up emergency diesel generator at higher location, where normal emergency diesel generator location is assessed to be vulnerable from point of view of external natural events
 - b) Providing smaller/mobile diesel generator. This can be utilised to power essential loads and charge station batteries for obtaining plant information and emergency lighting.
- ii. Improving steam generator heat sink:

- c) In selected units additional diesel engine operated pumps are being installed at location secured from external flood to transfer deaerator storage tank inventory to steam generators
 - d) In some units provision exists to transfer deaerator storage tank inventory to steam generators by gravity.
 - e) Provisions are being made to provide hook-up connections outside reactor buildings, through which water can be supplied to steam generators
- iii. Improving on-site water storage
- f) Based on station specific review, onsite water inventory is being augmented wherever considered necessary
 - g) Water sources at or near stations are identified, from where water can be transported with fire tenders
- iv. Hook-up to Primary Heat Transport (PHT) System, Emergency Core Cooling System (ECCS), Calandria, Calandria Vault, End Shield and spent fuel bay in PHWR reactors and emergency condenser, reactor pressure vessel & spent fuel bay in BWRs.
- A provision to inject water to safety systems is being made. This water supply arrangement is from outside reactor building without utilizing station power supply i.e. by diesel engine operated pumps and fire engines.
- v. Containment Integrity and Safety: The following improvements are under discussion and are being finalised:
- h) Provision of hydrogen management by passive autocatalytic recombiners.
 - i) Provision of filtered venting of containment.
 - j) Inerting of Primary containment of TAPS-1&2 (BWR reactors)

The implementation of these modifications, its surveillance tests and availability will be checked during routine regulatory inspections.

3.5 *What are the plans of RB to Inspect/assess plant design condition with respect to external events such as flood, cyclone, earthquake etc.?*

Answer: RB constituted a committee for review of safety of Indian NPPs against extreme external events following the accidents at Fukushima. In parallel the licensee also constituted a task force for assessment of safety of NPPs. Plant design conditions with respect to external events were assessed during these reviews. Based on the review report of the committee/task force safety modifications are being carried out at all the NPPs. These modifications are checked during routine inspections carried out every six months.

3.6 *What are the changes in emergency operating procedures such as extended station blackout etc? How will this affect the inspection programme?*

Answer: Severe Accident Management Guidelines have been prepared by the licensee. Based on these guidelines and the modifications carried out to strengthen safety of NPPs against external events, emergency operating procedures were revised. The implementation of these modifications, changes in the emergency procedures and training of operators on the severe accident management guidelines will be checked during inspection of NPPs.

4. Post Fukushima inspection programme changes

4.1 *Were focused inspections conducted immediately after the event? Did they result in long term changes to your inspection programme?*

Answer: Focussed inspections of NPPs were conducted immediately after the accident at Fukushima NPPs. However there is no long term change in inspection programme due to these focussed inspections.

4.2 *Are there any changes in frequency, scope, method of inspections conducted by RB post Fukushima?*

Answer: No. However, post Fukushima, more attention is paid to safety of NPPs against external events during routine regulatory inspections.

5. Training and qualification

5.1 *Does RB have plans to change the training of inspectors to ensure their understanding of the design changes including equipment and associated procedures?*

Answer: The inspectors are being made aware of the changes in the NPPs for strengthening safety against external events through colloquium, discussion meets and participation in the safety reviews of proposals submitted by the NPPs.

5.2 *What are the expected changes in training of operators and RBs oversight for the training programme post Fukushima? Any impact on simulator based training and the inspection programme.*

Answer: Training for handling beyond design basis situations is included in the Severe Accident Management Guidelines (SAMG). The training module includes beyond design basis scenario, positive and negative impact of suggested mitigating actions and appropriate considerations of human factors under accident conditions.

SAMG document includes analysis for severe accident scenario and will be used as a training material. The mode of training envisaged for severe accidents is classroom training, field walk down and table top exercises.

5.3 *How does RB assess the competence of operators to work under stressed conditions imposed by events beyond design basis accidents?*

Answer: Specific assessments are not made to assess the competence of operators to work under stressed conditions. However the decision making process of the operator for anticipated, design and severe events is assessed during licensing interview of the operator (RB is a member of the licensing committee), which is conducted every three years.

JAPAN

1. National response

1.1 *What changes in regulations or national standards have been made or are planned that affects your inspection programme?*

The Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors (hereinafter referred to as "Reactor Regulation Act") was revised in response to lessons of the Fukushima Daiichi accident. In this revision, in addition to the safety of the population, the protection of the environment is added to the purpose. And also following matters were stipulated:

- Addition of severe accidents to the scope of regulation
- Retroactive application of new regulation to existing facilities etc.

1.2 *What are the changes at the national level for managing nuclear emergencies? How will they affect your inspection programme?*

In response to lessons of the Fukushima Daiichi accident, The Act on Special Measures Concerning Nuclear Emergency Preparedness (hereinafter referred to as "Nuclear Emergency Act") was revised. For example, following provisions are stipulated:

- The responsibility of the national government to take measures in which the occurrence of a nuclear emergency caused by large scale natural disasters and terrorism, etc. are taken into consideration.
- The national government establishes Nuclear Emergency Response Guidelines.
- The national government orders necessary measures with regard to reports of nuclear emergency response drills of licensees as necessary.
- The national government continues Joint Council for Nuclear Emergency Response even after declaration of the cancellation of a nuclear emergency situation and cooperate mutually on nuclear emergency response.

1.3 *Have any changes in RB organisation been made (or planned) post Fukushima? How will these changes affect your inspection programme?*

Nuclear regulation system was reviewed and then Nuclear Regulation Authority (which govern the formulation and enforcement of necessary policies for ensuring safety in the use of nuclear energy. Hereinafter referred to as "NRA") and the Secretariat of the authority (hereinafter referred to as "S/NRA") were established on September 19, 2012

2. Licensee Emergency Programmes

2.1 *Are there any changes in the licensee's emergency preparedness programmes? What impact will they have on your inspection programme?*

Emergencies are classified into three categories (Alert, Site Area Emergency, and General Emergency). As a criteria for licensee to classify emergencies, Emergency Action Level (EAL) is set by licensee based on following matters:

- The state of equipment of each level of the defense-in-depth in the nuclear facility
- The state of confinement function of radioactive substance
- The occurrence of external events etc.

It was decided that licensee sets the EAL in proportion to a characteristic of each power reactor and a local situation based on the framework of the EAL proposed by NRA.

In case of occurrence of emergency at nuclear site, licensee notifies the national government, public communities, local governments, etc. immediately based on the Nuclear Emergency Act and concentrate

on the preventing expansion of the disaster. Licensee shall also report to the competent minister on a specified event in the previous stage of emergency.

It was decided that NRA checks and evaluates nuclear emergency response drills conducted by licensees.

2.2 *Have any changes in licensee organisations been made post Fukushima?*

As an example, there exists a licensee who separated the emergency preparedness work and operational safety management work into different sections which were formerly in the same section.

Licensees have been increasing the number of emergency preparedness personnel in proportion to the addition of emergency response equipment.

Licensees have been increasing the number of operators for the operation after tsunami.

Licensees are continuously reviewing and revising its organization system in emergency to design unified command system in proportion to the scale of emergency response (the number of plants, the number of emergency response personnel).

2.3 *Are there any changes in NPPs minimum complement of staff in view of the Fukushima accident?*

Licensees have been taking measures such as:

- Increasing the number of emergency preparedness personnel in proportion to addition of equipment for emergency response
- Increasing the number of the operators for the operation after Tsunami

3. Technical or Engineering Changes to Plants

3.1 *What are the changes with respect to SAMG assessments (flood, seismic levels - active and passive faults); and supporting facilities post Fukushima? Will any changes in the inspection programme be required?*

In the new regulatory requirements, in which “Defense-in-depth” is regarded as base idea, assumption of natural phenomena was considerably broadened. In addition to natural phenomena, measures for events which may cause simultaneous loss of safety functions because of common cause were strengthened. By these improvements, following matters are promoted:

- Rigorous evaluation of earthquake and tsunami
- Introduction of flood protection measures
- Rigorous evaluation of volcanos, tornados and forest fires
- Strengthening and thorough ensuring of fire protection measures
- Introduction of measures for internal flooding
- Strengthening of measures for power failure

An inspection program was established in which RB conducts reviews and inspections in order to confirm a licensee’s conformity to the new regulatory requirements.

3.2 *Are there changes in RB inspection practices due to changes imposed by Fukushima on technical specifications, surveillance and testing of equipment & systems and maintenance programme?*

In the new regulatory requirements, following matters are promoted:

- Rigorous evaluation of earthquake and tsunami
- Introduction of flood protection measures
- Rigorous evaluation of volcanos, tornados and forest fires
- Strengthening and thorough ensuring of fire protection measures

- Introduction of measures for internal flooding
- Strengthening of measures for power failure

RB will conduct reviews and inspections to confirm measures taken by licensees for the new regulatory requirements.

3.3 *What are the implications of multiunit sites on your inspection programme (such as common services)?*

Maintenance plans of licensees are made for each reactor unit and RB conducts inspections for each reactor unit.

3.4 *What are the required major modifications planned/carried out by the licensee in response to the Fukushima accident? Therefore, will any changes in the assessment and inspection by the RB be made?*

As of the timing when new regulatory requirements are enforced in July, 2013, licensees are required to establish necessary functions for all the new regulatory requirements. Yet, backup facilities for the improvement of reliability (for example, response facility for specific severe accident, permanent DC power source (the third power supply)) are required to be established within five years from the enforcement of the new regulatory requirements, not immediately after the enforcement.

3.5 *What are the plans of RB to Inspect/ assess plant design condition with respect to external events such as flood, cyclone, earthquake etc?*

NRA, receiving applications from licensees, reviews the conformity of those applications to the new regulatory requirements. Parallel review of three applications (Reactor Construction Permit, approval of Construction Plan and approval of Operational Safety Programs) is being carried out in order to review integrally both sides of hardware and software (for example, the design of equipment and operation management organization).

3.6 *What are the changes in emergency operating procedures such as extended station blackout etc? How will this affect the inspection programme?*

As changes in emergency operating procedure, diverse reviews and changes are conducted such as:

- Organization in case of loss of power source
- Addition of equipment (vehicle-mounted generators, fire trucks, etc.)
- Clarification of addressee of reports
- Deploying emergency preparedness personnel
- Addition of items for emergency response
- Response for a discharge of radioactive materials
- Response procedure at alternate command post
- Addition of means of reactor cooling

It is planned to conduct the confirmation of functions of emergency response equipment (during emergency drills) by RB.

For the inspection program (the confirmation of emergency drills), RB is conducting confirmation of emergency drills at each site from 2013. It is planned to conduct evaluation of drills in addition to confirmation.

4. Post Fukushima Inspection Programme Changes

4.1 *Were focused inspections conducted immediately after the event? Did they result in long term changes to your inspection programme?*

Inspections on equipment newly added for emergency response (fire trucks, vehicle-mounted generators, etc.) were conducted. Including such equipment, reviews and inspections are conducted in order to confirm the conformity to the new regulatory requirements on the occasion of the restart of nuclear power plants.

4.2 *Are there any changes in frequency, scope, method of inspections conducted by RB post Fukushima?*

Reviews and inspections are conducted in order to confirm the conformity to the new regulatory requirements on the occasion of the restart of nuclear power plants.

5. Training and Qualification

5.1 *Does RB have plans to change the training of inspectors to ensure their understanding of the design changes including equipment and associated procedures?*

New training programs are planned to be added to the training for Safety Inspector. The programs are concerning equipment for emergency response requirements (fire trucks, vehicle-mounted generators, filter vent, etc.). The addition of the new training programs would be after the reflection of the equipment to Operational Safety Programs of licensees.

It is under consideration to introduce operation simulator and to conduct training on operation and response in case of emergency (loss of power source, loss of cooling system, etc.).

5.2 *What are the expected changes in training of operators and RBs oversight for the training programme post Fukushima? Any impact on simulator based training and the inspection programme.*

For operators and emergency preparedness personnel, newly added trainings are being conducted such as:

- Operation in case of station black out
- Operation in case of loss of cooling system
- Procedure of connecting power supply from vehicle-mounted generators to the plant

Review of supervision training of RB is not planned specifically. It is under consideration to strengthen supervision training by training of Safety Inspector and of operation simulator.

5.3 *How does RB assess the competence of operators to work under stressed conditions imposed by events beyond design basis accidents?*

RB confirms and evaluates the capability of emergency response of licensees by their nuclear emergency response drills.

RB directs and advises licensees to prompt improvements of their capability of emergency response.

KOREA

1. National response

1.1 *What changes in regulations or national standards have been made or are planned that affects your inspection programme?*

The adequacy of Fukushima follow-up implementation has been added to the inspection items for periodic inspection.

1.2 *What are the changes at the national level for managing nuclear emergencies? How will they affect your inspection programme?*

Emergency planning zone is under consideration of revision to reflect the concept of PAZ and UPZ presented by IAEA.

Domestically, the cooperation has been enhanced with Ministry of National Defence and National Emergency Management Agency to effectively cope with the emergency situation.

Internationally, it is necessary to enhance the cooperation with the neighbour countries so that TRM (Top Regulator's Meeting) of Korea-China-Japan has recently agreed to exchange information instantly in case of emergency. Korea invited the neighbour countries to observe the national emergency drills. In 2012, Experts from China, Japan, and UAE visited for observation.

1.3 *Have any changes in RB organisation been made (or planned) post Fukushima? How will these changes affect your inspection programme?*

After Fukushima accident, NSSC (Nuclear Safety and Security Commission) established as the independent regulatory organization from the governmental body responsible to utilization of nuclear energy.

There is no major change in the inspection program. However, NSSC established the regional office near Kori site to strengthen the communication with local public. Three more regional offices are going to be opened in near future and the number of staff in the region office is going to be opened in near future and the number of staff in the regional office will be increased. Expanding the regional offices, NSSC considers to change the inspection program.

2. Licensee emergency programmes

2.1 *Are there any changes in the licensee's emergency preparedness programmes? What impact will they have on your inspection programme?*

The criteria for issuance of emergency drill program and emergency response organizations/personnel have been modified and emergency response facility has been improved to enhance the emergency response capability.

For example, emergency drill on unknown scenario and schedule is sometimes practiced.

2.2 *Have any changes in licensee organisations been made post Fukushima?*

Operation process of emergency response organization was modified to cope with concurrent accident at multiple units.

2.3 *Are there any changes in NPPs minimum complement of staff in view of the Fukushima accident?*

There is modification on how emergency response team is organized and operated to manage multi-unit accidents.

3. Technical or engineering changes to plants

3.1 *What are the changes with respect to SAMG assessments (flood, seismic levels - active and passive faults); and supporting facilities post Fukushima? Will any changes in the inspection programme be required?*

At this moment, inspection program for SAMG is not changed.

As part of the augmented stress test, the assessment of SAMG considering the effects of extreme natural event including earthquake and tsunami is undergoing. And SAMG for low power and shutdown condition is under development.

3.2 *Are there changes in RB inspection practices due to changes imposed by Fukushima on technical specifications, surveillance and testing of equipment & systems and maintenance programme?*

Since there are no changes in technical specifications, surveillance and testing of equipment & systems and maintenance programme, there are no changes in the inspection program yet.

3.3 *What are the implications of multiunit sites on your inspection programme (such as common services)?*

There is no change in the inspection program for the common equipment. However, the program for the mobile equipment to be added will be developed.

3.4 *What are the required major modifications planned/carried out by the licensee in response to the Fukushima accident? Therefore, will any changes in the assessment and inspection by the RB be made?*

The special inspection for the commercial NPP and research reactor right after the Fukushima accident resulted in the 50 implementation items. The items included external cooling water injection for primary side, secondary side, and spent fuel pool, installation of containment filtered vent system, installation of automatic SSE trip system, and mobile power generators.

3.5 *What are the plans of RB to inspect/assess plant design condition with respect to external events such as flood, cyclone, earthquake etc.?*

Assessment for external events was included in the augmented stress test.

In addition, assessment of external events will be included in periodic safety review, following the recent IAEA safety guides.

3.6 *What are the changes in emergency operating procedures such as extended station blackout etc? How will this affect the inspection programme?*

There is no change in EOP for long-term SBO.

However, in the augmented stress test, the strategy for the long-term SBO will be discussed and reflected in the EOP.

4. Post Fukushima inspection programme changes

4.1 *Were focused inspections conducted immediately after the event? Did they result in long term changes to your inspection programme?*

The special inspection for the commercial NPP and research reactor right after the Fukushima accident resulted in 50 implementation items.

There is no change in the inspection program, because the items are for the improvement of operator's response capability. However, the inspection program for the equipment to be added will be developed.

4.2 *Are there any changes in frequency, scope, method of inspections conducted by RB post Fukushima?*

The inspection program for the equipment to be added will be developed.

5. Training and qualification

5.1 *Does RB have plans to change the training of inspectors to ensure their understanding of the design changes including equipment and associated procedures?*

Configuration control program for the NPPs is being developed. This program includes the history management of the design changes, procedure changes, procurement and installation of components and parts.

5.2 *What are the expected changes in training of operators and RBs oversight for the training programme post Fukushima? Any impact on simulator based training and the inspection programme.*

The training program will be modified to include the variety of the severe accident scenario, and to utilize the devices simulating the severe accidents. Requirement for training hours has been changed from 8 hours every 2 years to 10 hours a year.

5.3 *How does RB assess the competence of operators to work under stressed conditions imposed by events beyond design basis accidents?*

Augmented stress tests for the old NPPs, operating beyond its design lifetime, are undergoing in Korea. The test program includes assessment for the capability degradation of operating personal and team, assuming limited available equipment, severe working environment, and the highly stressed condition.

MEXICO

1. National response**1.1 What changes in regulations or national standards have been made or are planned that affects your inspection programme?**

The changes that have been made after the accident, related with the implementation of: 10CFR50.54 (hh), SOER 2011-2 “Fukushima Daiichi Nuclear Station Fuel Damage caused by Earthquake and Tsunami”, IER -11-2 “Fukushima Daiichi Nuclear Station Spent Fuel Pool Loss of Cooling and makeup”, EA-12-049 “Mitigating strategies beyond design basis events”, EA-12-050 “Hardened vents for Mark I and II containments” and EA-12-051 “Spent fuel pool instrumentation”, they don’t affect our inspection programme.

1.2 What are the changes at the national level for managing nuclear emergencies? How will they affect your inspection programme?

The changes at the national level for managing nuclear emergencies are:

1. Tsunami

Actions:

- It was established a maintenance program for the inspection and verification of the seals of the watertight doors of reactor building (elevation – 0.65 meters) of the Units 1 and 2 (under implementation)

2. Reliability of Power Supply

Actions:

- Increase the diversity of power supplies, using external diesel generators (there are 2 (two) in building located in the restricted area) (under consideration).
- Instructions were made for field operators to verify that the equipment, materials and tools required for the implementation of the abnormal operation for “Station Blackout” remains available for use.
- Increase the battery long-term capacity.
- Interconnection among the EDGs units 1 and 2 (under consideration). Training was implemented for field operators to practice local operation of Emergency Diesel Generators Divisions I, II and III (start, stop, take-charge). A local panel for EDG Division III was constructed and connected to the Laguna Verde full-scope simulator

3. Reliability of Cooling Systems

Actions:

- Increase the number of internal (under implementation) and external systems which supply water to the spent fuel pool.
- Using a mobile diesel pump, for pumping water from “Laguna Verde” to the fire protection pump house.
- Installation of pipe line to supply emergency cooling water from fire protection pump house to spent fuel pool

4. Response to Severe Accidents

Actions:

- Installation of venting/depressurization devices to cope with pressure in primary containment. During the 15th refuelling of Unit 1 and 12th of Unit 2, a penetration of 20 inch diameter in the outer wall of each reactor building was opened, south and tubing spool was installed with caps at both ends, as a prerequisite for installing rigid emergency venting of primary containment in both units (under implementation).
- Prepare severe accident management guidelines (under consideration)

5. Emergency preparedness

Actions:

- Laguna Verde NPP acquired satellite phones for emergency management.
- Training was provided to notification personnel for improve the communications during emergencies

6. Fire Protection

Actions:

- Training was provided to field operators in driving the fire-engine truck, in case of emergency, to supply water to the reactor building.
- Use of a mobile diesel pump, for pumping water from the nearby lake to the fire protection pump house for increased the capacity of the safety system earthquake fire protection.

The regulatory body don't change his inspection programme because these aspects will be followed during the programme inspections or resident inspections.

1.3 *Have any changes in RB organisation been made (or planned) post Fukushima? How will these changes affect your inspection programme?*

No, there aren't any changes in regulatory body organization

2. Licensee emergency programmes

2.1 *Are there any changes in the licensee's emergency preparedness programmes? What impact will they have on your inspection programme?*

No, there aren't any changes in the licensee's emergency preparedness programmes.

2.2 *Have any changes in licensee organisations been made post Fukushima?*

No, there aren't any changes in the licensee's organisations.

2.3 *Are there any changes in NPPs minimum complement of staff in view of the Fukushima accident?*

No, there aren't any changes in NPPs minimum complement of staff in view of the Fukushima accident; the licensee have more personal than other nuclear installation but as a results Fukushima accident, the licensee improve the training of such personnel.

3. Technical or engineering changes to plants

3.1 *What are the changes with respect to SAMG assessments (flood, seismic levels - active and passive faults); and supporting facilities post Fukushima? Will any changes in the inspection programme be required?*

As described in 1.2.

3.2 *Are there changes in RB inspection practices due to changes imposed by Fukushima on technical specifications, surveillance and testing of equipment & systems and maintenance programme?*

The regulatory body will verify the changes imposed by Fukushima on technical specifications, surveillance and testing of equipment & systems and maintenance programme will be following with the modification of the check list.

3.3 *What are the implications of multiunit sites on your inspection programme (such as common services)?*

In Mexico there is only one site, with two units.

3.4 *What are the required major modifications planned/carried out by the licensee in response to the Fukushima accident? Therefore, will any changes in the assessment and inspection by the RB be made?*

As described in 1.2.

3.5 *What are the plans of RB to Inspect/assess plant design condition with respect to external events such as flood, cyclone, earthquake etc.?*

All these aspects were analysed in the stress test report, the main changes were described in 1.2.

3.6 *What are the changes in emergency operating procedures such as extended station blackout etc? How will this affect the inspection programme?*

This is addressed in section 1.2.2, and also in the stress test report.

During the reactive inspections that the regulatory body make after the accident, the modifications of the procedures and systems have been followed during the programme inspections.

4. Post Fukushima inspection programme changes

4.1 *Were focused inspections conducted immediately after the event? Did they result in long term changes to your inspection programme?*

Yes, the regulatory body performed three inspections after the event:

1. Using Temporary Instruction NRC 2515/183, "Follow-up to the Fukushima Daiichi Nuclear Station Fuel Damage Event"
2. Status of Station blackout (SBO)
3. Status of Fire Protection Systems

4.2 *Are there any changes in frequency, scope, method of inspections conducted by RB post Fukushima?*

No, there aren't any changes in frequency and method of inspections conducted by RB post Fukushima.

The scope of the inspections was changed to include the following of the modifications and corrective actions related with Fukushima.

5. Training and qualification

5.1 *Does RB have plans to change the training of inspectors to ensure their understanding of the design changes including equipment and associated procedures?*

Yes, the regulatory body will have plans to change the inspector training to ensure their understanding of the design changes including equipment and associated procedures; for the moment the inspectors related with operation, emergency plans, maintenance and training have been attending the same training as the licensed operators.

5.2 *What are the expected changes in training of operators and RBs oversight for the training programme post Fukushima? Any impact on simulator based training and the inspection programme.*

The training of the licenced operators have changed to include the design changes, external operation experience and associated procedures; at the present the licensee has define the training for SAMG; which will be provided after the validation of such guides.

Regarding with the simulator no impact has been identified.

5.3 *How does RB assess the competence of operators to work under stressed conditions imposed by events beyond design basis accidents?*

The stressed conditions imposed by event beyond design basis accident are not part of the evaluation criteria, but the regulatory body prepare the renewal and new licensee by using risk-based scenarios, in these scenarios it is possible evaluate the operator's performance under stress conditions.

RUSSIAN FEDERATION

1. National response

1.1 *What changes in regulations or national standards have been made or are planned that affects your inspection programme?*

Requirements to inspection programme are set in the "Provisions for the federal state supervision in the field of atomic energy use" (approved by the Decree of RF Government No.1044 of October 15, 2012) and "Administrative regulation of nuclear supervision" (Act of Rostehnadzor № 248 07.06.2013). In according with this regulations one of the important inspection programme issues is compliance of regulatory documents in the field of atomic energy.

The Fukushima-Daiichi NPP lessons are being considered in the process of current (scheduled) revision of the following regulatory documents:

- General Provisions of Nuclear Power Plant Safety Assurance (OPB-88/97);
- Accounting of External Natural and Man-Induced Impacts on Nuclear Facilities (NP-064-05);
- Provision on the Procedure of Announcement of Emergency Situation, Prompt Information Transmission and Arrangements for Emergency Assistance to NPPs in case of Radiation-hazardous Situations (NP-005-98);
- Safety Rules For Storage and Transportation of Nuclear Fuel at Nuclear Facilities (NP-061-05).

1.2 *What are the changes at the national level for managing nuclear emergencies? How will they affect your inspection programme?*

Requirements to managing nuclear emergencies are set in Federal Laws and national regulatory documents. No changes.

1.3 *Have any changes in RB organisation been made (or planned) post Fukushima? How will these changes affect your inspection programme?*

Following the results of self-assessment (analysis made by order of Rostehnadzor by FBE SEC NRS on the efficiency of Rostehnadzor's functioning as a safety regulatory body in the conditions of an accident at nuclear facilities, as well as analysis of the status and completeness of the Russian regulatory and legal framework in the field of atomic energy use in the light of the lessons learned from the accident at the Fukushima-Daiichi NPP), modernization (upgrading) of the Rostehnadzor's Information and Analytical Center completed, as well as the proposals on improvement of the regulatory and legal framework have been developed.

The "Provisions for the Federal Environmental, Industrial and Nuclear Supervision Service" has been updated, the following documents have been issued: a Rostehnadzor order on enhancement of the Rostehnadzor's functioning efficiency as a safety regulatory body in atomic energy use in the conditions of an accident at nuclear facilities in the light of the lessons learned from the accident at the Fukushima-Daiichi NPP, "The Provisions for the quality management system of the Federal Environmental, Industrial and Nuclear Supervision Service in the field of the governmental safety regulation in atomic energy use", 2012.

2. Licensee emergency programmes

2.1 *Are there any changes in the licensee's emergency preparedness programmes? What impact will they have on your inspection programme?*

The JSC Concern Rosenergoatom (operating organization – licensee) plans to revise emergency documentation, especially for providing such scenarios when abnormal operation (accident) impacts several units of a multiunit NPP simultaneously.

Rostehnadzor includes check of this issue to inspection programme.

2.2 *Have any changes in licensee organisations been made post Fukushima?*

Based on the results of the additional analysis of the protection of Russian NPPs from extreme external events impacts, a complex of measures on assuring the operability of communication means in accident circumstances coupled with a natural disaster was planned in the Russian Federation, namely:

- - incorporation of a unified radio communication system at NPPs;
- - creation of mobile redundant ground satellite stations;
- - modernization (creation) of mobile control centers for the emergency operations manager and the OPAS group leader.

2.3 *Are there any changes in NPPs minimum complement of staff in view of the Fukushima accident?*

No changes.

3. Technical or engineering changes to plants

3.1 *What are the changes with respect to SAMG assessments (flood, seismic levels - active and passive faults); and supporting facilities post Fukushima? Will any changes in the inspection programme be required?*

Following the analysis of Russian NPPs protection against extreme external effects it was planned to introduce at all NPP power units additional technical means to control the accidents with a long-term blackout of NPP and/or long failure to operate the systems of heat removal from reactor plants and spent nuclear fuel stores to the ultimate heat sink. Among short-term measures we should note equipment of all NPPs with additional mobile motor-mounted pumps, standpipes, motor tank trucks, additionally arranged points for cooling water intake from water reservoirs and tank systems, which can be arranged in an emergency water supply scheme for cooling the core (steam generators), spent fuel ponds, spent fuel storage facilities (medium-term measures are the upgrading of the fire ring main, arrangement of connection points for fire trucks and tanks - for all NPPs).

The requirements that a NPP shall have technical means for management of accidents with a NPP blackout and loss of heat removal to the ultimate heat sink are being introduced in the regulatory documents (in the currently reviewed General Provisions on Nuclear Power Plant Safety Assurance). The entirety of requirements for the systems of heat removal to the ultimate heat sink that already exist and new requirements that are being introduced can be considered sufficient, since they ensure defense-in depth fulfillment of the safety function of heat removal to the ultimate sink.

Fullfilment of measures is controlled and inspected by RB (Rostehnadzor).

3.2 *Are there changes in RB inspection practices due to changes imposed by Fukushima on technical specifications, surveillance and testing of equipment & systems and maintenance programme?*

RB includes to the inspection programme check of fullfilment by NPP measures following the analysis of Russian NPPs protection against extreme external effects.

3.3 *What are the implications of multiunit sites on your inspection programme (such as common services)?*

Every NPP in Russia is multiunit.

3.4 *What are the required major modifications planned/carried out by the licensee in response to the Fukushima accident? Therefore, will any changes in the assessment and inspection by the RB be made?*

Look answer p. 3.1.

3.5 *What are the plans of RB to Inspect/assess plant design condition with respect to external events such as flood, cyclone, earthquake etc.?*

In general, the methods and approaches established in regulatory documents (NP-031-01, NP-032-01, NP-064-05, OPB-88/97), also related to protection against external effects (including earthquakes, tsunami, etc.) can be considered sufficiently robust in the light of the Fukushima accident. At the present time there are plans to make a scheduled revision of the said regulatory documents, and this issue will be revisited.

3.6 *What are the changes in emergency operating procedures such as extended station blackout etc? How will this affect the inspection programme?*

Following Fukushima Daiichi NPP accident, these emergency operating procedures include training actions to be taken in response to simultaneous development of an accident at several power units of a multiunit NPP, loss of external power supply sources accompanied by the loss of the ultimate heat sink, etc. Following Fukushima Daiichi NPP accident, Rostekhnadzor decided to modify a series of regulations in order to introduce additional requirements considering the possibility of extreme external impacts and their combinations at NFs.

4. Post Fukushima inspection programme changes

4.1 *Were focused inspections conducted immediately after the event? Did they result in long term changes to your inspection programme?*

No requirements to conduct RB inspection immediately after the event. We conduct constant (resident) supervision.

4.2 *Are there any changes in frequency, scope, method of inspections conducted by RB post Fukushima?*

Frequency, scope, method of inspections conducted by RB are set by "Provisions for the federal state supervision in the field of atomic energy use" (approved by the Decree of RF Government No.1044 of October 15, 2012), "Provisions for the resident state supervision on nuclear facilities" (approved by the Decree of RF Government No.373 of April 23, 2012) and "Administrative regulation of nuclear supervision" (Act of Rostekhnadzor № 248 07.06.2013).

5. Training and qualification

5.1 *Does RB have plans to change the training of inspectors to ensure their understanding of the design changes including equipment and associated procedures?*

RB plans to strengthen training of inspectors.

5.2 *What are the expected changes in training of operators and RBs oversight for the training programme post Fukushima? Any impact on simulator based training and the inspection programme.*

It is expected, that in training programme of operators is accounted Fukushima lessons.

5.3 *How does RB assess the competence of operators to work under stressed conditions imposed by events beyond design basis accidents?*

Competence of operators is enough.

SLOVENIA

1. National response**1.1 *What changes in regulations or national standards have been made or are planned that affects your inspection programme?***

According to the Slovenian National Action Plan:

SNSA shall amend its legislation to include:

- requirements regarding the use of advanced deteriorating weather warning systems
- requirements regarding the use of seismic monitoring systems
- PSA Level 3 requirements (at least for new NPPs)
- requirements for Beyond Design Basis Accidents I&C for Spent Fuel Pool
- emergency planning requirements for prolonged SBO in the areas of communications capability (onsite, e.g., radios for response teams and between facilities, and offsite, e.g., cellular telephones, satellite telephones), ERDS capability, training and exercises, and equipment and facilities

The SNSA shall consider amending its regulation for the design basis by more stringent safety objectives for:

- Prevention and mitigation of core-melt accident in reactor and in spent fuel storage to avoid off-site long term contamination
- Large or early release to be practically eliminated (for new NPPs)
- Increase robustness of NPPs to be able to face natural hazards more severe than the ones considered in the design basis (DEC); this should also include requirements for test and maintenance of equipment, training,...

This will be done mainly by following WENRA/ENSREG new initiatives, updated RL...

The SNSA shall also examine whether more detailed requirements are needed regarding LOOP, SBO and loss of UHS.

SNSA shall assign dedicated inspections to:

- verify the external hazard protection equipment;
- systematically review and inspect SAME equipment, SAMGs, test and maintenance procedures, as well as full scale training events at the Krško NPP with the emphasis on how the limited number of staff are able to cope with equipment deployment and transfer of additional fuel to the users, what are the available and needed times, are there enough resources (human and equipment) available,...
- check what are plant's capabilities to power communications equipment needed to communicate onsite (e.g., radios for response teams and between facilities) and offsite (e.g., cellular telephones, satellite telephones) during a prolonged SBO;

1.2 *What are the changes at the national level for managing nuclear emergencies? How will they affect your inspection programme?*

No changes have been made yet.

1.3 *Have any changes in RB organisation been made (or planned) post Fukushima? How will these changes affect your inspection programme?*

No changes have been made yet.

2. Licensee emergency programmes

2.1 *Are there any changes in the licensee's emergency preparedness programmes? What impact will they have on your inspection programme?*

Safety Terms of Reference have been determined. Mobile equipment has been purchased. Training program for NPP staff was modified. NPP developed Safety Upgrade Programme. The implementation of the programme already started (Passive Autocatalytic Recombiners and Passive Containment Filtered Venting System already installed) and will be completed in 2018. SAMG procedures were revised. Some additional inspections regarding post Fukushima activities have been introduced in the Inspection Plan prepared on the yearly bases.

2.2 *Have any changes in licensee organisations been made post Fukushima?*

No.

2.3 *Are there any changes in NPPs minimum complement of staff in view of the Fukushima accident?*

No.

3. Technical or engineering changes to plants

3.1 *What are the changes with respect to SAMG assessments (flood, seismic levels - active and passive faults); and supporting facilities post Fukushima? Will any changes in the inspection programme be required?*

Scope of the Safety Upgrade Programme to be implemented by the end of 2018 is defined in the Slovenian National Action Plan (Annex 1). SAMGs will be revised to reflect new installed equipment.

3.2 *Are there changes in RB inspection practices due to changes imposed by Fukushima on technical specifications, surveillance and testing of equipment & systems and maintenance programme?*

Yes.

New inspections of surveillance testing and maintenance of new equipment were introduced in Inspection Plan.

3.3 *What are the implications of multiunit sites on your inspection programme (such as common services)?*

N/A

3.4 *What are the required major modifications planned/carried out by the licensee in response to the Fukushima accident? Therefore, will any changes in the assessment and inspection by the RB be made?*

Modifications (upgrades) are defined in the Slovenian National Action Plan (Annex 1).

3.5 *What are the plans of RB to Inspect/assess plant design condition with respect to external events such as flood, cyclone, earthquake etc.?*

The existing dikes for flood protection of the NPP were reconstructed (higher) and some additional dikes were constructed. Seismic qualification for new equipment is 0,6 g (design 0,3 g) in accordance to the RB requirements.

3.6 *What are the changes in emergency operating procedures such as extended station blackout etc? How will this affect the inspection programme?*

Additional emergency diesel generator (100 %) was installed in outage 2012 (not a post Fukushima requirement). EOPs were revised.

4. Post Fukushima inspection programme changes

4.1 *Were focused inspections conducted immediately after the event? Did they result in long term changes to your inspection programme?*

No.

4.2 *Are there any changes in frequency, scope, method of inspections conducted by RB post Fukushima?*

Yes. Inspection of training and surveillance and maintenance of new equipment has been introduced.

5. Training and qualification

5.1 *Does RB have plans to change the training of inspectors to ensure their understanding of the design changes including equipment and associated procedures?*

Yes. Inspectors participated at the training of plant staff on the simulator and for use of new equipment.

5.2 *What are the expected changes in training of operators and RBs oversight for the training programme post Fukushima? Any impact on simulator based training and the inspection programme.*

As already discussed EOPs were revised. SAMG procedures will be revised. Simulator training reflects the above mentioned changes. All these changes are involved in Inspection Plan. Special training for use new implemented post Fukushima accident equipment was introduced.

5.3 *How does RB assess the competence of operators to work under stressed conditions imposed by events beyond design basis accidents?*

RB does not assess the competence of operators to work under stressed conditions imposed by events beyond design basis accidents.

Annex 1
The Slovenian post Fukushima National Action Plan; December 2013

No.	Future action / activity	Area	Status	Finalisation	Level
1	SUP SUP comprises of a set of modifications/ improvements (see numbers 1.1 to 1.10) that will be implemented in steps until the end of 2016. Some of the discussed recommendations (see related recommendations) are to be verified within the licensing and implementation of the SUP. (for SUP details see chapter 2 in Part IV)	SUP	in progress	2018	site
1.1	Safety upgrade of AC power supply	SUP	in progress	2015	site
1.2	New pump for supplying SGs; in a bunkered building, with a dedicated water supply	SUP	in progress	2018	site
1.3	Installation of alternative ultimate heat sink	SUP	in progress	2018	site
1.4	Additional pumps (low and high pressure, as well as a special pump for seal injection) in a bunkered building, with a dedicated water supply	SUP	in progress	2018	site
1.5	Containment integrity safety upgrades including containment filtered vent systems and PARs	SUP	implemented	2013	site
1.6	Establishment of emergency control room	SUP	in progress	2018	site
1.7	Installation of fixed spray system around the SFP with provisions for quick connection from different sources of water.	SUP	in progress	2015	site
1.8	Mobile heat exchanger with provisions to quick connect to SFP, containment sump or reactor coolant system	SUP	in progress	2018	site
1.9	Flood protection upgrade (additional protection of nuclear island and bunkered buildings)	SUP	in progress	2015	site
1.10	Establishment of new technical support center and upgrade of existing operational support center (emergency operating facilities)	SUP	in progress	2018	site
2.1	SNSA shall amend its legislation to include: <ul style="list-style-type: none"> • requirements regarding the use of advanced deteriorating weather warning systems • requirements regarding the use of seismic monitoring systems • PSA Level 3 requirements (at least for new NPPs) • requirements for Beyond Design Basis Accidents I&C for Spent Fuel Pool • emergency planning requirements for prolonged SBO in the areas of communications capability (onsite, e.g., radios for response teams and between facilities, and offsite, e.g., cellular telephones, satellite telephones), ERDS capability, training and exercises, and equipment and facilities 	legislation	planned	2014	national

No.	Future action / activity	Area	Status	Finalisation	Level
2.2	<p>The SNSA shall consider amending its regulation for the design basis by more stringent safety objectives for:</p> <ul style="list-style-type: none"> • Prevention and mitigation of core-melt accident in reactor and in spent fuel storage to avoid off-site long term contamination • Large or early release to be practically eliminated (for new NPPs) • Increase robustness of NPPs to be able to face natural hazards more severe than the ones considered in the design basis (DEC); this should also include requirements for test and maintenance of equipment, training,... <p>This will be done mainly by following WENRA/ENSREG new initiatives, updated RL...</p> <p>The SNSA shall also examine whether more detailed requirements are needed regarding LOOP, SBO and loss of UHS</p>	legislation	planned	2014	national
3	<p>In January 2012 SNSA issued the third decision regarding the Fukushima event requiring from the Krško NPP to review the basis and assumptions for the Radiological Emergency Response Plan. This is to be finished by March 2013. The results of the review, possible proposals for improvements of the Radiological Emergency Response Plan, shall be implemented as appropriate. In addition the SNSA (together with other appropriate stakeholders) shall give further consideration to:</p> <ul style="list-style-type: none"> • supplementing the national radiological emergency response plan with provisions for off-site support regarding to the long-term fuel supply and also some additional pieces of mobile equipment in case of widespread disruption of plant's infrastructure • within the supplementing of national radiological emergency response plan further consideration shall be given to: <ul style="list-style-type: none"> – Reference levels for importing food, – Trans-boundary processing of goods and services such as container transport – Approach / philosophy and associated limits and criterion to govern the 'remediation' phase of the event – Return to evacuated area criteria and criteria for return to normal from the emergency state – Establishing contamination monitoring protocols and locations during the recovery phase – preparing national strategy (also amending legislation if needed) regarding solutions for post-accident contamination and the treatment of potentially large volumes of contaminated water – enhancement of intervention personnel training, trans-boundary arrangements and education of the public and media – enhancing cooperation with neighboring countries (especially Croatia), including mutual exercises – enhancing exercises by including all interface points (National, Regional, Municipal...), performing longer term exercises for better reflection of the extreme events challenges, and incorporating failure of communication systems and radiation data availability into drill programs – enhancement of national radiological monitoring system 	emergency response	in progress (this action is divided into 8 activities, of which 3 have been implemented in 2013)	2016	national

No.	Future action / activity	Area	Status	Finalisation	Level
4	SNSA shall assign dedicated inspections to: <ul style="list-style-type: none"> • verify the external hazard protection equipment; • systematically review and inspect SAME equipment, SAMGs, test and maintenance procedures, as well as full scale training events at the Krško NPP with the emphasis on how the limited number of staff are able to cope with equipment deployment and transfer of additional fuel to the users, what are the available and needed times, are there enough resources (human and equipment) available,... • check what are plant's capabilities to power communications equipment needed to communicate onsite (e.g., radios for response teams and between facilities) and offsite (e.g., cellular telephones, satellite telephones) during a prolonged SBO; 	inspection	in progress partly implemented; three inspections that cover these issues were performed in 2013	2014	site
5	The SNSA shall consider requiring the plant to perform additional studies regarding: <ul style="list-style-type: none"> • accident timing, including core melt, reactor pressure vessel (RPV) failure, basemat melt-through, SFP fuel uncover, etc., using different computer codes • radiological protection equipment for SA response • analysis and identification of situations that would prevent performance of work for radiological reasons; • the question of stress on staff behavior including emotional, psychological and cultural aspects associated with emergency response and associated training and support 	additional studies	to consider parts of this action are already being implemented (e.g. additional analysis regarding accident timing...)	2017	site
6	Nuclear safety infrastructure in Slovenia needs more political support. Only in such environment the human resource capacity and competence across all organizations in the field of nuclear safety can be further developed. SNSA shall organize a meeting, where this topic shall be brainstormed by all involved parties (the utility, the regulatory body, TSOs...). Special action plan shall be prepared and executed to enhance political support to nuclear safety infrastructure.	nuclear safety infrastructure	planned	2014	national
7	To enhance its processes SNSA shall: <ul style="list-style-type: none"> • reconsider, which of the international meetings/groups are of utmost importance, since the decreasing number of staff and increasing number of international activities the quality of regular work may start to suffer • review its capability for evaluating defense-in-depth to see whether and how it could be further enhanced • enhance its staff training on severe accidents and SAMGs 	SNSA processes	in progress	2015	national
8	The SNSA shall consider inviting the following peer review missions <ul style="list-style-type: none"> • additional RAMP mission (best after completion of SUP) to again properly and independently validate the SAMGs. Likewise consideration shall be given to inviting peer review missions to reassess the external hazards • a follow-up IRRS mission in 2014, and next IRRS mission in the next 5-6 years • OSART mission to review plant design safety features and related modifications (in next 3 years) • EPREV (Emergency Preparedness Review) mission 	peer reviews	in progress IRRS follow-up and EPREV missions have already been invited in 2013 (2014 and 2016 respectively)	2017	site
9	SA plant parameters are being transferred to regulator premises. Still, this system needs a revision to include all needed SA parameters, increase reliability of the system...	ERDS	in progress	2014	site

No.	Future action / activity	Area	Status	Finalisation	Level
10	A full scope PSA (including Level 2) for low power and shutdown modes shall be implemented for the Krško NPP by the end of 2015. SNSA shall consider requiring a PSA for the Krško's Spent Fuel Pool.	PSA	in progress	2015	site
11	SNSA shall (together with the operator) analyze how the following topics are taken into account, maintained and improved: <ul style="list-style-type: none"> • Transparency; public discussion of safety issues • An open and trustful relationship between regulators, operators and the public with keeping in mind their respective roles and functions • Define appropriate actions to ensure that the desired safety culture characteristics are achieved in the regulatory and operational organizations • Methods to evaluate and detect degraded safety culture 	safety culture	to consider	2014	national
12	Within the reassessment of its severe accident management strategy, existing design measures and procedures, the operator has also reassessed its possibilities for alternative spent fuel strategy [16]. The results showed that best strategy would be storing the spent fuel in dry cask storage with a possibility to combine it with later reprocessing. In accordance with the latest study further actions shall be implemented on the national level to change the national strategy and to enable licensing of the modification.	reviews and NPP improvements	planned	2018	national

SPAIN

1. National response**1.1 *What changes in regulations or national standards have been made or are planned that affects your inspection programme?***

After Fukushima and the Stress Tests process, the CSN has carried out many specific inspections in order to verify the implementation of the improvements required in the orders (ITC) issued, however the “Basic Inspection Plan” (PBI) has not been modified.

1.2 *What are the changes at the national level for managing nuclear emergencies? How will they affect your inspection programme?*

Nuclear emergencies at national Level are not under the responsibility of the CSN, who only plays an advisory (even important) function to the local and national governmental organizations. Consequently, the CSN has not provisions to modify its PBI which includes verifications related to the On-site Emergency Plan.

1.3 *Have any changes in RB organisation been made (or planned) post Fukushima? How will these changes affect your inspection programme?*

Major changes have been deemed necessary to afford the Post-Fukushima issues.

2. Licensee emergency programmes**2.1 *Are there any changes in the licensee’s emergency preparedness programmes? What impact will they have on your inspection programme?***

CSN has requested the licensees to review different aspects of their Emergency Preparedness Plans. As commented before, specific inspections are being carried out to verify the whole process.

2.2 *Have any changes in licensee organisations been made post Fukushima?*

CSN requested the licensees to review and improve their emergency response organizations. At this moment CSN is evaluating the plants’ answers.

2.3 *Are there any changes in NPPs minimum complement of staff in view of the Fukushima accident?*

As commented in 2.2, CSN is currently reviewing this issue. Only one plant response has been already fully assessed; in this case the licensee has proposed to incorporate 6 new people in the Shift of the emergency response organization.

3. Technical or engineering changes to plants**3.1 *What are the changes with respect to SAMG assessments (flood, seismic levels - active and passive faults); and supporting facilities post Fukushima? Will any changes in the inspection programme be required?***

The expected plant actions related to extreme external hazards are not directly included in the SAMGs, but in certain design improvements. For example a new Alternative Accident Management Centre (CAGE) is being constructed at each site with capacity to withstand major natural and man-made phenomena.

3.2 *Are there changes in RB inspection practices due to changes imposed by Fukushima on technical specifications, surveillance and testing of equipment & systems and maintenance programme?*

See answer to question 1.1

3.3 *What are the implications of multiunit sites on your inspection programme (such as common services)?*

The inspections that are being carried out in the 2 existing dual plants, take care of the consistency of licensees' actions for this particular problem.

3.4 *What are the required major modifications planned/carried out by the licensee in response to the Fukushima accident? Therefore, will any changes in the assessment and inspection by the RB be made?*

The specific inspections that are being carried out by the CSN to oversee the implementation process of the improvements related to Fukushima, will cover practically all the aspects that are included in the post-Fukushima National Action Plan.

3.5 *What are the plans of RB to Inspect/assess plant design condition with respect to external events such as flood, cyclone, earthquake etc.?*

The CSN's PBI includes a biennial inspection in each plant to review the plant status against these hazards.

3.6 *What are the changes in emergency operating procedures such as extended station blackout etc? How will this affect the inspection programme?*

In Spain the post-Fukushima actions include different procedures & guidelines modifications that will be verified by the CSN inspectors as they are being implemented in the real plants.

4. Post Fukushima inspection programme changes

4.1 *Were focused inspections conducted immediately after the event? Did they result in long term changes to your inspection programme?*

The initial response included specific letters to each plant, that were promptly answered by the licensee and validated by the CSN.

4.2 *Are there any changes in frequency, scope, method of inspections conducted by RB post Fukushima?*

Not by the moment.

5. Training and qualification

5.1 *Does RB have plans to change the training of inspectors to ensure their understanding of the design changes including equipment and associated procedures?*

Not by the moment.

5.2 *What are the expected changes in training of operators and RBs oversight for the training programme post Fukushima? Any impact on simulator based training and the inspection programme.*

Before the Fukushima accident, CSN had requested the licensees to implement specific yearly training programs for Severe Accident situations. Now training program will be revised to incorporate Fukushima lessons learnt.

5.3 *How does RB assess the competence of operators to work under stressed conditions imposed by events beyond design basis accidents?*

This issue is not explicitly covered by the CSN oversight over licensees training programs. Nevertheless, the licensees have some specific training sessions to cope with the issue.

SWEDEN

1. National response

1.1 *What changes in regulations or national standards have been made or are planned that affects your inspection programme?*

No

1.2 *What are the changes at the national level for managing nuclear emergencies? How will they affect your inspection programme?*

No

1.3 *Have any changes in RB organisation been made (or planned) post Fukushima? How will these changes affect your inspection programme?*

No

2. Licensee emergency programmes

2.1 *Are there any changes in the licensee's emergency preparedness programmes? What impact will they have on your inspection programme?*

Measures to take care of Multiunit events, instructions,

2.2 *Have any changes in licensee organisations been made post Fukushima?*

No

2.3 *Are there any changes in NPPs minimum complement of staff in view of the Fukushima accident?*

No

3. Technical or engineering changes to plants

3.1 *What are the changes with respect to SAMG assessments (flood, seismic levels - active and passive faults); and supporting facilities post Fukushima? Will any changes in the inspection programme be required?*

3.2 *Are there changes in RB inspection practices due to changes imposed by Fukushima on technical specifications, surveillance and testing of equipment & systems and maintenance programme?*

No

3.3 *What are the implications of multiunit sites on your inspection programme (such as common services)?*

No

3.4 *What are the required major modifications planned/carried out by the licensee in response to the Fukushima accident? Therefore, will any changes in the assessment and inspection by the RB be made?*

Independent core Cooling (and residual heat removing) systems , Diversified power supply systems, requirements on containment venting filters for more than 24 hours (72 hours), possibility to take care of Multiunits events.

3.5 *What are the plans of RB to Inspect/assess plant design condition with respect to external events such as flood, cyclone, earthquake etc.?*

Review the safety analyses respect to 10-5 levels, especially sea water levels.

3.6 *What are the changes in emergency operating procedures such as extended station blackout etc? How will this affect the inspection programme?*

In the regulations that came into force in 2005 we have requirements on diversified safety systems and power supply. After the Fukushima event we will increase requirements on the diversified power supply systems, diesel generators and gas turbines for example.

New criteria for shut down because of high/low temperatures, snow etc.

4. Post Fukushima inspection programme changes

4.1 *Were focused inspections conducted immediately after the event? Did they result in long term changes to your inspection programme?*

No

4.2 *Are there any changes in frequency, scope, method of inspections conducted by RB post Fukushima?*

No

5. Training and qualification

5.1 *Does RB have plans to change the training of inspectors to ensure their understanding of the design changes including equipment and associated procedures?*

No

5.2 *What are the expected changes in training of operators and RBs oversight for the training programme post Fukushima? Any impact on simulator based training and the inspection programme.*

Training in Multi Unit events situations has started

5.3 *How does RB assess the competence of operators to work under stressed conditions imposed by events beyond design basis accidents?*

SWITZERLAND

1. National response

1.1 *What changes in regulations or national standards have been made or are planned that affects your inspection programme?*

After Fukushima the Swiss RB (ENSI) established an action plan based on lessons learnt from the accident. The action plan defines the key points of focus for ENSI's after-Fukushima activities and is regularly updated every year. As concerns inspections directly, a series of so-called topical inspections (multidisciplinary inspections on a specific topic) have been conducted on the NPPs on topics like filtered containment venting systems, flood protection and SBO coping strategies.

1.2 *What are the changes at the national level for managing nuclear emergencies? How will they affect your inspection programme?*

On 4 May 2011, the Swiss Government decided to appoint an official working group to review emergency protection measures in case of extreme events in Switzerland (IDA NOMEX). The remit of this working group, in which ENSI was also represented, was to examine in the light of the Fukushima accident whether further action is required regarding emergency protection in case of extreme events in Switzerland, and whether any new statutory and organisational emergency protection measures need to be taken. On 4 July 2012, the Federal Council acknowledged the report of the IDA NOMEX working group and issued tasks for the elaboration of organisational measures in the field of personnel and material for emergency management, improvement of the coordination and cooperation at national level and the clarification of responsibilities. The work on these tasks, for four of which ENSI has the lead, is still on-going and is expected to be terminated by 2016.

In relation to the inspection programme the creation of the Reitnau external storage for accident management equipment should be highlighted. All Swiss NPPs have, at the request of the RB, organized a common external storage with equipment (hardware and procedures) that in case of nuclear accident can be transferred on site either per helicopter or road. The Reitnau facility has hence been included in the inspection plan of the RB and it is also regularly tested during emergency drills.

1.3 *Have any changes in RB organisation been made (or planned) post Fukushima? How will these changes affect your inspection programme?*

The changes in the RB organisation (most notably the creation of a decommissioning section as a response to a governmental nuclear phase-out decision) have had no impact on the inspection activities. The basic inspection programme (i.e. the programme covering the topics and frequency intervals of inspections) has been reviewed and updated (also to adapt it to a new software tool), but not substantially changed.

2. Licensee emergency programmes

2.1 *Are there any changes in the licensee's emergency preparedness programmes? What impact will they have on your inspection programme?*

The licensee's emergency preparedness programmes have been extended. Thus SAM guidelines were upgraded and additional SAMG equipment has been acquired by licensees. The implementations of such measures are subject to focused inspections.

2.2 *Have any changes in licensee organisations been made post Fukushima?*

The licensee organisations have not changed but additional specialists were appointed to cope with the lessons learnt from Fukushima accident.

2.3 *Are there any changes in NPPs minimum complement of staff in view of the Fukushima accident?*

There were no changes in minimum complement of staff.

3. Technical or engineering changes to plants

3.1 *What are the changes with respect to SAMG assessments (flood, seismic levels - active and passive faults); and supporting facilities post Fukushima? Will any changes in the inspection programme be required?*

As stipulated under 2.1, the licensee's emergency preparedness programmes have been extended considering SBO, flooding and seismic events. All changes in emergency preparedness are subject to focused inspections.

3.2 *Are there changes in RB inspection practices due to changes imposed by Fukushima on technical specifications, surveillance and testing of equipment & systems and maintenance programme?*

Special SAMG equipment such as SAMG generators is implemented in the periodic testing plans by the licensees and became therefore part of the RB's basic inspection programme.

3.3 *What are the implications of multiunit sites on your inspection programme (such as common services)?*

Regarding the only multiunit site in Switzerland, emergency power generation has been changed for reason of separation between the units.

3.4 *What are the required major modifications planned/carried out by the licensee in response to the Fukushima accident? Therefore, will any changes in the assessment and inspection by the RB be made?*

See the response under 2.1.

3.5 *What are the plans of RB to inspect/assess plant design condition with respect to external events such as flood, cyclone, earthquake etc.?*

See the response under 3.1.

3.6 *What are the changes in emergency operating procedures such as extended station blackout etc? How will this affect the inspection programme?*

See the responses under 2.1, 3.1 and 3.2. The Swiss NPPs are prepared to cope with SBO conditions during at least 72 hours. Additionally, as a result of Fukushima accident, the NPPs established a commonly used external storage of SAMG equipment.

4. Post Fukushima inspection programme changes

4.1 *Were focused inspections conducted immediately after the event? Did they result in long term changes to your inspection programme?*

See the response under 1.3. Focused inspections were conducted immediately after the Fukushima accident regarding emergency preparedness.

4.2 *Are there any changes in frequency, scope, method of inspections conducted by RB post Fukushima?*

See the response under 4.1.

5. Training and qualification

5.1 *Does RB have plans to change the training of inspectors to ensure their understanding of the design changes including equipment and associated procedures?*

Most inspectors are specialists. There is customized additional training if required by the tasks assigned to the inspector. They act as assessors too. That's why there is a good understanding of the design changes including equipment and associated procedures. Generic retraining takes place when basic elements change e.g. legal basis, new guidelines. In case of a new position or new tasks there is customized retraining.

5.2 *What are the expected changes in training of operators and RBs oversight for the training programme post Fukushima? Any impact on simulator based training and the inspection programme.*

Fukushima has led the Swiss NPPs to an increased emphasis on the training of accident management measures. As most of this training is done with real equipment it has no impact on the simulator training. Until now Fukushima has had no impact on the inspection programme of ENSI regarding the training of operators?

5.3 *How does RB assess the competence of operators to work under stressed conditions imposed by events beyond design basis accidents?*

ENSI is involved in an international process of generating new knowledge about the influence of stress on operator's performance. New insights in this field are expected to lead to new regulatory requirements and will thus make their way into future inspection programmes of ENSI.

UNITED KINGDOM

1. National response

1.1 *What changes in regulations or national standards have been made or are planned that affects your inspection programme?*

The Chief Inspector of Nuclear Installations undertook a thorough review of the implications for UK nuclear industry following the Fukushima accident. This report made a number of recommendations aimed mostly aimed at making further improvements to the effectiveness of the response rather than changing legislation or guidance. The greater understanding that flows from this programme of work may be used to inform the changes to national standards, and the subsequent inspection response, that will need to be made as a result of the adoption of revised European Basic Safety Standards.

1.2 *What are the changes at the national level for managing nuclear emergencies? How will they affect your inspection programme?*

See answer to 1.1. The responses to the Chief Inspector's report may inform future changes to legislation and national arrangements for responding to nuclear emergencies. The inspection programme reflects national legislation and standards, and will be adapted as and when relevant changes occur.

Some specific activities, for example the production of site capability maps and greater clarity regarding accountabilities and responsibilities during a nuclear emergency have been developed from this work.

1.3 *Have any changes in RB organisation been made (or planned) post Fukushima? How will these changes affect your inspection programme?*

Changes have been made to the RB emergency response arrangements and readiness by improving available manning levels, out of hours call down lists and resources etc.

2. Licensee emergency programmes

2.1 *Are there any changes in the licensee's emergency preparedness programmes? What impact will they have on your inspection programme?*

The licensee has enhanced its existing severe accident response capability through a dual approach. For the PWR site, this consists of construction of a hardened emergency facility, and for the AGR sites, where the response timescales to restore critical safety function are longer, and the application of a strategy to deploy back-up equipment from strategic stores. The RB has initiated a targeted intervention programme to ensure the enhanced emergency programmes are appropriate and will be implemented adequately.

2.2 *Have any changes in licensee organisations been made post Fukushima?*

Implementation of the back up equipment deployment strategy for AGR sites has necessitated the creation of a number of new response roles and functions. These are discharged through the licensee's existing emergency preparedness organisation as well as working in partnership with a number of contract service providers.

2.3 *Are there any changes in NPPs minimum complement of staff in view of the Fukushima accident?*

The deployment of equipment from the hardened emergency facility has required a revision of the minimum compliment of staff for the PWR site. The back-up equipment deployment strategy for the AGR sites has created a number of new roles for which a minimum staff compliment is required to ensure delivery of the associated response functions.

3. Technical or engineering changes to plants

3.1 *What are the changes with respect to SAMG assessments (flood, seismic levels - active and passive faults); and supporting facilities post Fukushima? Will any changes in the inspection programme be required?*

There have been a large number of resilience enhancements following Fukushima and a number of design basis modifications. Inspections related to these changes that are undertaken by the Licensees themselves will be defined as part of justifying the effectiveness of each modification. Regulatory inspection programmes are set each year based on regulatory needs. A number of one-off inspections at selected sites were undertaken post Fukushima on flooding. Some further inspections are likely to confirm post Fukushima design basis and resilience enhancement modifications have been adequately implemented.

3.2 *Are there changes in RB inspection practices due to changes imposed by Fukushima on technical specifications, surveillance and testing of equipment & systems and maintenance programme?*

ONR has introduced safety case informed safety system inspections in addition to the licence condition compliance inspections. Whilst the safety system based inspections were not introduced as a direct result of events at Fukushima, they will form a useful tool in inspecting the modifications undertaken and the associated procedures, testing, maintenance and training provisions that are in place.

3.3 *What are the implications of multiunit sites on your inspection programme (such as common services)?*

Modifications undertaken by the licensee have taken account of multi unit sites as has the approach to emergency response. The exercise program at the one multi unit site will specifically test the resilience of the multi unit response and the first such exercise will take place in mid 2014.

3.4 *What are the required major modifications planned/carried out by the licensee in response to the Fukushima accident? Therefore, will any changes in the assessment and inspection by the RB be made?*

Licensees have embarked and are nearing completion of a wide range of modifications to both plant and procedures in response to events at Fukushima. The modifications will be inspected via system based inspections or by emergency exercises designed around Fukushima type scenarios. These inspections will form part of the existing work plan for each site.

3.5 *What are the plans of RB to Inspect/assess plant design condition with respect to external events such as flood, cyclone, earthquake etc.?*

Specific external hazard site inspections following the Fukushima accident have already been carried out at selected sites. Plans for external hazard specific inspections are currently being drawn up for 2014/5 and these will be supplemented by a programme of system based inspections.

3.6 *What are the changes in emergency operating procedures such as extended station blackout etc? How will this affect the inspection programme?*

Licensees have reviewed and revised their suites of accident management guidelines to account for both Fukushima type scenarios and to accommodate the addition back up equipment that has been procured in response to the event in Japan. These procedures will form an important part of the exercise programme going forward as part of normal business.

4. Post Fukushima inspection programme changes

4.1 *Were focused inspections conducted immediately after the event? Did they result in long term changes to your inspection programme?*

Licensee conducted own inspections as required by WANO and fed back to ONR The Stress Tests, Chief Inspector's report on the events at Fukushima and subsequent recommendations also provided feedback and have formed the basis of the licensee's response and modifications.

4.2 *Are there any changes in frequency, scope, method of inspections conducted by RB post Fukushima?*

Whilst the number of inspections has increased to look at Fukushima specific modifications there will be no increase in inspection frequency after the work is closed out. The scope of inspections will take account of the modifications and the exercise programme will test aspects of the Fukushima response and associated back up equipment

5. Training and qualification

5.1 *Does RB have plans to change the training of inspectors to ensure their understanding of the design changes including equipment and associated procedures?*

Inspectors will not be formally trained on design changes and revised procedures. However, a number of inspectors have spent significant periods of time working on the Fukushima work stream and this has involved extensive interaction and input throughout the modification process. Inspectors will also be formally assessing the claims stated in the licensee close out reports.

5.2 *What are the expected changes in training of operators and RBs oversight for the training programme post Fukushima? Any impact on simulator based training and the inspection programme.*

The strategy of restoring critical safety function through deployment and operation of back up equipment is supported by a comprehensive and ongoing training programme. The RB has developed a targeted intervention programme to confirm operators will receive the appropriate level of instruction and training. A revision of existing severe accident management guidance will be implemented through an appropriate training programme that may involve changes to simulator based training. This will be overseen by an appropriate RB inspection programme.

5.3 *How does RB assess the competence of operators to work under stressed conditions imposed by events beyond design basis accidents?*

Operator competence with respect to beyond design basis accidents will be assessed through review of operator training, and consideration of manning arrangements for beyond design basis events. Observations of exercises undertaken by the licensee to demonstrate adequacy of emergency arrangements in response to such accidents will also be used to judge operator competence.

UNITED STATES

1. National response

1.1 *What changes in regulations or national standards have been made or are planned that affects your inspection programme?*

The Commission directed the establishment of the Near-Term Task Force (NTTF) to conduct a systematic and methodical review of NRC processes and regulations to determine whether the agency should make additional improvements to its regulatory system. The NTTF made several recommendations that included clarifying the regulatory framework (Recommendations 1 thru 1.4), ensuring protection from external events (Recommendations 2 thru 2.3), mitigation (Recommendations 4 thru 8.4), Emergency Preparedness (EP) (Recommendations 9 thru 11.4) and NRC Programs (Recommendations 12 thru 12.4).

Three tiers of prioritization are being used for implementing the NTTF recommendations. The first tier consists of those that should be started without unnecessary delay and for which sufficient resource flexibility, including availability of critical skill sets, exists. The second tier consists of those NTTF recommendations which could not be initiated in the near term due to factors that include the need for further technical assessment and alignment, dependence on Tier 1 issues, or availability of critical skill sets. These actions do not require long-term study and can be initiated when sufficient technical information and, as applicable, resources become available. The third tier consists of those NTTF recommendations that require further staff study to support a regulatory action, have an associated shorter-term action that needs to be completed to inform the longer-term action, are dependent on the availability of critical skill sets, or are dependent on the resolution of NTTF Recommendation 1.

The Commission ordered licensees to (1) develop strategies to mitigate beyond design basis external events without limitation to natural phenomena which addresses both multiunit events and reasonable protection of equipment identified under such strategies; (2) install enhanced SFP instrumentation and (3) install a reliable, hardened vent that can remove heat and pressure before potential damage to a reactor core occurs and capable of being operated under severe accident conditions. The Commission also requested information from licensees with respect to NTTF Recommendations 2.1 (seismic and flooding reevaluations), 2.3 (seismic and flooding hazard walkdowns) and 9.3 (study staff qualifications and communications capabilities in responding to a multi-unit event).

Recommendation 4 - to strengthen station blackout mitigation capability at all operating and new reactors for design-basis and beyond-design-basis external events - and NTTF Recommendation 7 - to enhance SFP makeup capability and instrumentation for the SFP- were consolidated into one rulemaking, the "Station Blackout Mitigation Strategies Rulemaking." Additionally, Onsite Emergency Response Capabilities, Filtration and Confinement Strategies, and Periodic Confirmation of External Hazards will be addressed by rulemaking. The remaining actions require long-term evaluation.

1.2 *What are the changes at the national level for managing nuclear emergencies? How will they affect your inspection programme?*

The Nuclear Energy Institute (NEI) developed and the NRC endorsed NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," which outlines an approach for adding diverse and flexible mitigation strategies—or FLEX—that will increase defense-in-depth for beyond-design-basis scenarios to address the extended losses of AC power and loss of ultimate heat sink simultaneously at all units on a site. For the FLEX strategy, facilities initially will rely on installed systems, which will be supplemented as soon as possible by onsite but not permanently installed resources. This could be augmented by offsite resources available from regional response centers. Licensees are modifying their current plant design and the NRC is inspecting these modifications using the current Reactor Oversight Process Inspection Procedures. The NRC is writing Temporary Instructions to inspect NTTF

recommendations implemented by the licensee. Information gathered during implementation of the TIs will help inform improvements in the Reactor Oversight Process programs and procedures.

1.3 *Have any changes in RB organisation been made (or planned) post Fukushima? How will these changes affect your inspection programme?*

The NRC established the Japan Lessons Learned Project Directorate (JLD) under the Office of Nuclear Reactor Regulation to manage the NRC's actions related to the lessons learned from the Japanese nuclear accident at Fukushima Dai-ichi. The JLD plans, develops, and implements the actions found necessary to enhance the safety of the US reactor fleet. It also writes Commission papers, holds public meetings, provides presentations, and follows international events related to the Fukushima Dai-ichi accident.

On August 12, 2013, NRR implemented an interim organizational change by initiating the Mitigating Strategies Directorate (MSD). The MSD is tasked with evaluating industry plans submitted in response to Mitigating Strategies Order and issuing a formal staff assessment of these plans. The agency's efficient and effective review of industry's plans (NEI 12-06) to develop and implement these strategies will contribute to safety both by validating the licensees' plans to provide the requisite safety improvements and by avoiding unnecessary distractions from NRC's oversight of and licensees' execution of the day-to-day safe operation of the plants.

The outcomes and lessons-learned from Rulemaking and inspection-related activities (audits, TIs, etc.) developed by the JLD and MSD will be evaluated for incorporation into the Reactor Oversight Process.

2. Licensee emergency programmes

2.1 *Are there any changes in the licensee's emergency preparedness programmes? What impact will they have on your inspection programme?*

This is pending and site specific based on responses to the Commission information request for Emergency Preparedness – Staffing and Communications (Recommendation 9.3) to assess staffing needs and communication capabilities to effectively respond to an event affecting multiple reactors at a site. This capability will be inspected by the NRC under a TI and information collected during that TI implementation will be used to improve existing Emergency Preparedness programs, processes and procedures as necessary.

2.2 *Have any changes in licensee organisations been made post Fukushima?*

Licensees have established organizations and some have implemented compensatory actions for Commission-issued Orders and for organizational focus of Fukushima-related regulatory, hardware, program and process issues necessary for maintaining public health and safety

2.3 *Are there any changes in NPPs minimum complement of staff in view of the Fukushima accident?*

See response to Question 2.1 above.

Technical or engineering changes to plants

3.1 *What are the changes with respect to SAMG assessments (flood, seismic levels - active and passive faults); and supporting facilities post Fukushima? Will any changes in the inspection programme be required?*

A thorough review and reasonable simulation of licensee external flooding response was undertaken. In addition, sites identified as vulnerable to flooding are performing an updated analysis of the Probable Maximum Flood for their site. TIs 2515/183, "Followup to the Fukushima Daiichi Nuclear Station Fuel Damage Event," and 2515/184, "Availability and Readiness Inspection of Severe Accident Management Guidelines (SAMGs)," have been completed to independently assess the adequacy of actions taken by licensees in response to the Fukushima Daiichi nuclear station fuel damage event and to verify the

availability of and training to the licensee's SAMGs, respectively. Licensees have completed and are conducting flooding and seismic hazard reevaluations of their respective sites using present day information to determine if safety upgrades are needed (Recommendation 2.1). Temporary Instruction 2515/190, "Inspection of the Licensee's Proposed Interim Actions as a Result of the Near-Term Task Force Recommendation 2.1 Flooding Reevaluation," is being performed to assess licensees' proposed interim actions for beyond design basis flood mitigation. The NRC is currently drafting a Temporary Instruction to inspect those upgrades as necessary. Lessons learned from that TI will be evaluated for incorporation into the Reactor Oversight Process.

3.2 *Are there changes in RB inspection practices due to changes imposed by Fukushima on technical specifications, surveillance and testing of equipment & systems and maintenance programme?*

This is under development by multiple NRC organizations and Fukushima implications will be incorporated into the inspection program utilizing Commission guidance and after gaining alignment from internal and external stakeholders. Operating Procedures are controlled under 10 CFR 50.65, Maintenance Rule. In addition site's vulnerable to external flooding acknowledged as such in their UFSAR and as a result must be able to describe their response strategy as a part of their licensing basis.

3.3 *What are the implications of multiunit sites on your inspection programme (such as common services)?*

Following the September 11, 2001, terrorist attacks, the licensees have reevaluated mitigating strategies for beyond design basis events that included the consideration of impacts to common services at multi-unit facilities and have assessed the need for offsite support under such conditions. Mitigating strategies covered under NRC Order EA-02-026 issued in response to the terror events, are intended to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities under such circumstances. The licensee has implemented these strategies and these strategies are considered acceptable for beyond design basis events similar to those experienced at Fukushima. Inspection of this requirement is conducted under IP 71111.05T, "Fire Protection (Triennial)." The NRC staff is currently assessing improvements to this inspectable area commensurate with Commission guidance for addressing Fukushima-related issues.

3.4 *What are the required major modifications planned/carried out by the licensee in response to the Fukushima accident? Therefore, will any changes in the assessment and inspection by the RB be made?*

As mentioned above, the approach is to use currently-installed plant equipment supplemented by FLEX equipment to enhance the capability to maintain plant safety during prolonged loss of electrical power as described in NEI 12-06. Additionally, increased reliability of hardened vents, reliable wide-range indication of and makeup capability for the spent fuel pool, and safety upgrades from the seismic and flooding reevaluations are being considered as modifications. Longer-term modifications that are being considered include hydrogen control, implementing venting systems for containment designs other than Mark I and II, enhancements of reactor and containment instruments to withstand severe accident conditions and enhancements to the Emergency Response Data System capabilities. The NRC is evaluating the need for additional oversight of these modifications as necessary.

3.5 *What are the plans of RB to Inspect/assess plant design condition with respect to external events such as flood, cyclone, earthquake etc.?*

TI-2515/187, "Inspection of Near-Term Task Force Recommendation 2.3 Flooding Walkdowns," and TI-2515/188, "Inspection of Near-Term Task Force Recommendation 2.3 Seismic Walkdowns," have been completed to verify adequate implementation of the industry guidance for flooding and seismic, respectively. Licensees have entered deficiencies into their corrective action program related to flood mitigation strategies identified during the flood and seismic protection walkdowns (Recommendation 2.3).

Additionally, NRC inspectors perform routine baseline external flooding inspection samples, as well as imminent severe weather samples.

3.6 *What are the changes in emergency operating procedures such as extended station blackout etc? How will this affect the inspection programme?*

The Commission issued requirements through rulemaking to enhance the capability to maintain plant safety during a prolonged loss of electrical power (Station Blackout Mitigating Strategies) and to strengthen and integrate different types of emergency procedures and capabilities at plants (Onsite Emergency Response Capabilities). These Tier 2 items will be inspected using TIs and the lesson-learned gained from implementing the TIs will be evaluated for ROP inspection procedure development and/or changes to existing inspection procedures.

4. Post Fukushima inspection programme changes

4.1 *Were focused inspections conducted immediately after the event? Did they result in long term changes to your inspection programme?*

Immediately following the event, the NRC independently assessed the adequacy of actions taken by licensees in response to the Fukushima Daiichi nuclear station fuel damage event under Temporary Instruction (TI) 2515/183. The TI, which was issued on March 23, 2011, assessed the licensee's (1) capability to mitigate fires in large areas of the plant in accordance with 10 CFR 50.54(hh)(2), (2) capability to mitigate station blackout conditions, (3) capability to mitigate design basis internal and external events, and (4) the capability to respond to beyond design basis events involving fires, floods, and seismic events.

On April 29, 2011, the NRC issued TI 2515/184, "Availability and Readiness Inspection of Severe Accident Management Guidelines (SAMGs)," in order to support NRC activities related to the Fukushima Daiichi event. The objectives of TI 2515/184 were (1) to determine if the SAMGs were available and how they were being maintained, and (2) to determine the nature and extent of licensee implementation of SAMG training and exercises.

The NRC is evaluating using its programs and processes commensurate with Commission guidance and using stakeholder feedback whether long-term changes to inspection programs are needed.

4.2 *Are there any changes in frequency, scope, method of inspections conducted by RB post Fukushima?*

Preliminary approach is to improve existing Reactor Oversight Process programs and procedures using lessons-learned from TI inspections to provide more focused inspection samples without a corresponding substantial increase in resources and procedures. Rulemaking that creates new requirements may require the development of new procedures and adjustments in resources.

5. Training and qualification

5.1 *Does RB have plans to change the training of inspectors to ensure their understanding of the design changes including equipment and associated procedures?*

Inspectors currently are qualified under Appendix B of NRC Inspection Manual Chapter 1245, "Qualification Program for Operating Reactor Programs." This training includes classroom and simulator training for a particular reactor vendor (Westinghouse, Combustion Engineering, Babcock and Wilcox, and General Electric). As part of the qualification program, inspectors assigned to a site receive on the job training by conducting plant tours, reviewing plant procedures, training manuals and Design Basis Information (Final Safety Analysis Report) and observing plant evolutions to gain knowledge on site-specific plant and equipment responses. Understanding of the design changes and the associated procedures will be gained through on the job training.

5.2 *What are the expected changes in training of operators and RBs oversight for the training programme post Fukushima? Any impact on simulator based training and the inspection programme.*

This is to be determined, however, depending on the outcome of rulemaking, it is anticipated that licensees will include beyond-design basis scenarios in simulator training of operators on procedures that cover such events. The NRC typically conducts operator qualification and requalification inspection at licensed facilities. Licensees are required to submit scenarios for NRC review before the NRC evaluates operator competency of the event on the simulator.

As mentioned above, operations inspector qualification program requires technology courses be taken for a particular reactor vendor. This includes training in plant responses to varying design-basis scenarios. Based on the outcome of rulemaking with respect to beyond design basis events, the NRC will take measures to change current curricula to include beyond design basis scenarios.

5.3 *How does RB assess the competence of operators to work under stressed conditions imposed by events beyond design basis accidents?*

Currently, the NRC assesses the capabilities of the nuclear power plant operator to protect the public by requiring the performance of a full-scale exercise at least once every two years that includes the participation of government agencies. These exercises are performed in order to maintain the skills of the emergency responders and to identify and correct weaknesses. They are evaluated by NRC inspectors and Federal Emergency Management Agency evaluators. Between these two-year exercises, additional drills are conducted by the nuclear power plant operators that are evaluated by NRC inspectors.

Through the mitigating strategies order, the NRC will conduct rulemaking to enhance the integration of onsite emergency response procedures (EOP, EDMG, and SAMG), and emergency preparedness and will require that licensees effectively demonstrate the capability to respond to a multiunit event that results in an extended loss of alternating power. This will include the ability to staff the facility, implement the mitigating strategies, and effectively demonstrate the progression through the onsite emergency response procedures. A TI will be issued and implemented to evaluate the licensees' capability to conduct drills over a periodic basis that the staff will evaluate.