NUCLEAR ENERGY AGENCY
COMMITTEE ON NUCLEAR REGULATORY ACTIVITIES

Proceedings of the 13th International Workshop on Inspection Practices

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Bruges, Belgium

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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 that 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

The main purpose of the workshop was to provide a forum for information exchange on the regulatory inspection activities. Participants had the opportunity to meet with their counterparts from other countries and organisations to discuss current and future issues on the selected topics. They developed conclusions regarding these issues and identified methods that may help to improve their own inspection programmes.

The CNRA believes that an essential factor in ensuring the safety of nuclear installations is the continuing exchange and analysis of technical information and data. To facilitate this exchange the Committee has established working groups and groups of experts in specialised topics. The Working Group on Inspection Practices (WGIP) was formed in 1990 with the mandate “[…] to concentrate on the conduct of inspections and how the effectiveness of inspections could be evaluated […]”. The WGIP facilitates the exchange of information and experience related to regulatory safety inspections between CNRA member countries.

These proceedings cover the 13th International Nuclear Regulatory Inspection Workshop held by WGIP on regulatory inspection activities. This workshop, which is the 13th in a series, along with many other activities performed by the working group, is directed towards this goal. The consensus from participants at previous workshops noted that the value of meeting with people from other inspection organisations was one of the most important achievements. The focus of this workshop was on experience gained from regulatory inspection activities in three areas:

- experience from the inspection activities during the transition from an operating reactor to a defueled status with a commitment to permanently cease power operations;
- inspection of modifications;
- the inspectors’ role in the enforcement process.

Members of the workshop organising committee wish to acknowledge the excellent planning and arrangements made by the staff of the host organisations, FANC and BeV, as well as the United States Nuclear Regulatory Commission (NRC). Special recognition is given to the Belgian CNRA members, Ms An Wertelaers, and Michel Van Haesendonck, for their leadership and support to the WGIP, and to the Belgian WGIP member, Mr Pierre Barras, for his essential co-ordination and efforts for the workshop.

Special acknowledgement is given to the WGIP members who facilitated the topic discussion groups, Mr Alexandre Leblanc, Mr Christopher Regan, Mr Paul Smith, Mr Pierre Barras, Mr Jukka Kupila, Dr Matthias Schneider and Mr Julio Crespo.
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1. EXECUTIVE SUMMARY

The main objectives of the WGIP workshops are to enable inspectors to meet with inspectors from other organisations, to exchange information regarding regulatory inspection practices, to discuss the selected topics, to discuss contemporary inspection issues, and to develop conclusions and commendable practices (CPs) on the selected topics.

Regarding the 13th workshop organised by the WGIP, the three following topics were selected to be discussed and to identify commendable practices:

- Inspection activities during the transition from an operating reactor to a defueled status with a commitment to permanently cease power operations;
- Inspection of modifications;
- The inspectors’ role in the enforcement process.

As part of the registration, participants were asked to respond to a questionnaire describing practices within their own countries on these topics. The complete compilation of questionnaire responses is contained in the appendix (NEA/CNRA/R(2016)2/ADD1) to this document.

Approximately 57 participants from 18 different countries and one participant from the IAEA took part in the workshop. Countries included: Belgium, Canada, the Czech Republic, Finland, France, Germany, Hungary, India, Japan, Korea, Poland, Russia, Slovenia, Spain, Sweden, Switzerland, the United Kingdom and the United States.

Six discussion groups were established for the breakout sessions. Each group consisted of inspectors from countries to ensure diversity of views for each of the topics. Discussion groups met for three separate sessions on one topic. The exchange between participants was open and active, and the groups formulated conclusions and identified CPs.

Evaluation of the workshop results were based on questionnaire responses received from the participants at the closing of the workshop. The evaluation showed that, as in the past workshops, the highest value perceived, was in meeting and exchanging information with inspectors from other organisations. Responses also showed that the format selected was highly favoured and that more workshops of this type are supported in the future.

The results of the evaluation also reflected that participants in exchanging information were provided a unique opportunity to “calibrate” their own inspection methods against those from other countries. While exchanging inspection practices and learning new ideas were part of the main objectives, this opportunity to recognise and understand commonalities and differences is equally important.

Overall discussions between the various participants both in discussion group sessions and throughout the workshop were extensive and meaningful. Ideas and practices regarding regulatory inspection activities were exchanged and it can be foreseen that these ideas will provide improved expertise when being applied in the future.
Various and complementary points of view were expressed. The workshop conclusions include observations and CPs for each of the three topics that were developed by the discussions groups. The essence of these exchanges and of the many commendable practices is mainly the following:

- In the field of inspection activities during the transition from an operating reactor to a defueled status with a commitment to permanently cease power operations, the workshop highlighted, in particular, the importance for the regulatory body to have the capacity to anticipate, prepare and implement in an adequate way its inspection programme. Due to the complexity and the duration of any transition phase, discussions also confirmed the need for the regulatory body to have sufficient resources to dedicate to its inspection programme. It was also underlined the importance for the regulatory body inspection programme to be comprehensive, optimised, highest significant safety issues related and adjustable. If the importance of technical issues of such operations were confirmed, aspects related to safety culture were highlighted as key issues to monitor too.

- In the field of modifications, the workshop highlighted, in particular, the need for the regulatory body to be able to evaluate, in an adequate and effective way, through various and complementary criteria, the graded approach implemented by the licensee to classify its modifications as permanent or temporary. Discussions highlighted the positive benefit for the regulatory body to implement an appropriate inspection process based both on documentation review and on-site controls. In particular, the on-site inspections should be conducted in such a way the regulatory body can collect sufficient and relevant insights and evidences on the process followed by the licensee to rank its modifications, in order to evaluate if the process is adequate for an optimal oversight of the temporary modifications and correctly applied.

- In the field of enforcement, based on the high-profile nature of enforcement actions, the workshop highlighted the need for the regulatory body to have a well-structured enforcement process with appropriate and understandable procedures. The need for the enforcement process to be as consistent, as clear and as transparent as possible was confirmed as being a key issue to give to the enforcement process and inspectors’ decisions credibility and legitimacy and make them acceptable by the licensee.
2. ORGANISATION AND OVERVIEW OF WORKSHOP

2.1 Planning

Preliminary planning for this workshop, the 13th in a series of International Workshops on Regulatory Inspection Activities began following the conclusion of the previous workshop in Chattanooga, Tennessee, United States, in April 2014. Formal planning started following approval by the CNRA at its annual meeting in December 2014.

Members of the WGIP reviewed comments and suggestions made at previous workshops and considered and discussed ways to improve the format of the workshop. The workshop was hosted by the Belgian Regulatory Body: FANC and Bel V in Bruges, Belgium, 17-21 April 2016.

In the evaluation at the previous workshop [references: NEA/CNRA/R(2014)8 and NEA/CNRA/R(2014)8/ADD1], participants suggested topics for discussion at a future workshop. The working group considered these topics and also reviewed various proposals on other contemporary topics that were of interest to the countries. Three potential topics were developed and proposed to the CNRA. The Committee approved the three topics for the workshop at the December 2014 CNRA meeting. Members of the workshop organising committee further defined the issues to be discussed under each of these topics.

The workshop followed the well-established format which was first utilised in 1992 in Chattanooga and has evolved over the continuing series of workshops. The WGIP workshops consist of three topics. The topic discussions occur in parallel. As such, as part of registration, each participant designates the one topic in which he/she will participate. Many countries elect to send three inspectors, one for each topic, so that the country can benefit from all three topics. In the plenary opening session to “set the scene”, the topic leads give the opening presentation based on their analyses of the questionnaire responses. Next, participants divide into small discussions groups to discuss the topic in detail. In general, there are two discussion groups of 6–10 participants for each topic. In the plenary closing session, the leads present the results of the discussions and CPs that have been derived, so that all of the workshop participants can benefit from the other topics.

2.2 Announcement and pre-workshop activities

The workshop announcement was transmitted in the fall of 2015. As part of the registration form, participants were asked to respond to a questionnaire describing practices within their own countries on the topics for inclusion as pre-workshop information. The responses were used to prepare the opening topic presentation and were used as background material for the group discussions. A compilation of the responses was produced as an appendix to these proceedings (NEA/CNRA/R(2016)2/ADD1).
2.3 Overview of workshop

Facilitator training

Prior to the start of the workshop, facilitators attended a training meeting. As the WGIP chair and vice-chair, Mr Olivier Veyret and Mr Julio Crespo led the training. Mr Veyret reviewed the general objectives of the workshop and outlined the various characteristics required of a good facilitator and recorder. He noted the importance of their role in guiding the group, opening discussion, continually monitoring that all of the group members participate in the discussion, and various methods to manage an effective discussion. Mr Veyret and Mr Crespo reviewed techniques to promote active participation. They also discussed various alternatives for the two discussion groups for each topic to interact during the workshop, such that each group has the opportunity to follow independent discussion paths but also benefit for some interaction with the other group. Next, the two facilitators for each topic met to review the various issues transmitted via the questionnaires and to outline major points to be covered in the discussion sessions.

Meet-and-greet session

The evening before the workshop, a reception was held to allow participants to meet each other in an informal setting. Mr Veyret welcomed the attendees, introduced the group’s leads and requested that participants join their group leads. This informal session allowed the workshop to begin in a more productive manner given that initial introductions have been completed.

Opening session

Mr Olivier Veyret, Chair of WGIP, welcomed the participants and noted the importance and relevance of this type of workshop and the excellent opportunity it presented to both inspectors from OECD member countries and non-member countries to meet and exchange information on important issues. He highlighted that the output of the workshop would be commendable inspection practices (CPs). He defined CPs as extracts from the topics, which will be discussed by the workshop participants and are thought to be reference for member countries. CPs are not international standards or guidelines.

Mr Jan Bens, Director-General of Federal Agency for Nuclear Control (FANC) and Mr Benoit De Boeck Director-General of Bel V, welcomed participants to the Belgium. Both DGs provided the audience with a background of their respective organisations that together represent the Belgian regulatory authority. They discussed the value the output from previous WGIP workshops, and they expect useful commendable inspection practices. Lastly, they encouraged the participants to actively participate.

Mr Ho Nieh, NEA Head of Nuclear Safety Division and WGIP technical secretariat, provided a welcome on behalf of the Nuclear Energy Agency CNRA. He provided the context of the senior regulators that serve on the CNRA and expressed their support and expectations for the workshop. Additionally, he noted that a major benefit for the countries was for the participants to apply the information to the inspection programme when they return to their regulatory organisation.

The leads reviewed the questionnaire responses and created opening presentations. The opening presentation summarised the responses and suggested additional questions for the discussion groups. The presentations are summarised in the topic chapters. The presenters and topics were as follows:

A. Mr Alexandre Leblanc, CNSC, Canada, on Experience from the Inspection Activities during the Transition from an Operating Reactor to a Defueled Status with a Commitment to Permanently Cease Power Operations.

B. Mr Paul Smith, ONR, United Kingdom, on Inspection of Modifications.

C. Mr Jukka Kupila, STUK, Finland, on The Inspectors’ Role in the Enforcement Process.
Group discussion sessions

Participants were divided into six discussion groups, based on their preference given at registration, to discuss topics. Three half-day sessions were held. A facilitator and recorder worked with each group to stimulate and encourage discussions. For each two topics, there were two discussion groups. The group leads co-ordinated time for the participants to interact as well as time to have sufficient time for good discussion.

Presentations by host country representatives

Mr Gaston Meskens made a presentation concerning, Ethical Aspects of Radiation Protection. The following is short abstract of the presentation:

Due to the specific character of the radiological risk, judgements on whether or not the use of nuclear technology would be justified in society have to take into account knowledge-related uncertainties and value pluralism. The justice of justification not only informs the right of the potentially affected to participate in decision making, but it also implies the responsibility of concerned actors to give account of the way they rationalise their own position, interests, hopes, hypotheses, believes and concerns in knowledge generation and decision making. The presentation characterises the evaluation of whether or not the use of nuclear technology would be justified in society as a ‘complex social problem’ and reflects on what it would imply to fairly deal with its complexity. Based on this assessment, the presentation proposes ‘reflexivity’ and ‘intellectual solidarity’ as ethical attitudes or virtues for all concerned actors, to be understood from a specific ‘ethics of care’ perspective ‘bound in complexity’. Consequently, it argues that there is a need for an ‘interactive’ understanding of ethics in order to give ethical attitudes or virtues a practical meaning in a socio-political context and draws conclusions for the case of radiological risk governance.”

Closing presentation of topics

A closing presentation on each of the workshop topics was made by the facilitators. Each presentation was followed by general questions and comments from the floor. Each of the groups developed a set of commendable inspection practices based on their discussions.

CPs are extracts from the topics, which were discussed by the workshop participants and were thought to be reference for member countries. These are neither international standards nor guidelines. Each country should determine inspection practices, considering its own historical, social and cultural backgrounds and the CPs can be useful reference when each country improves its inspection practices.

Closing remarks

Mr Veyret remarked on the success of the discussions. He noted, as typical for the inspection practices workshops, that there had been open and frank exchange during the group discussion sessions. He also noted that many of participants took advantage of the scheduled informal sessions to further bilateral exchange. Discussions on the workshop topics have shown that:

- These workshops for inspectors continue to provide a unique environment in which inspectors can exchange information on current issues to gain insights and to also validate their own processes.
- The topics were well developed and the participants were well prepared and made important contributions.
The development of both CPs and the development of new challenges to be faced were successful and participants and their national organisations would hopefully benefit from the insights gained.

In closing the workshop, Mr Veyret thanked the FANC and Bel V staff in particular the efforts of a few individuals who made major contributions. Mr Pierre Barras who co-ordinated the organisation efforts, the programme and ensured the success by his diligence and attention to all the many details involved. He also thanked Ms Nancy Salgado (OECD/NEA Technical Secretariat) for her service to the WGIP, which included support from NEA, all organisational aspects for the groups programme of work and for the group meetings and workshops.

In concluding, Mr Veyret thanked all the workshop participants, facilitators and recorders remarking that without their contributions, hard work, dedication and commitment the workshop would not have been a success.

Technical excursion

As an additional offer to the participants, a technical excursion tours was made to the Central Organisation for Radioactive Waste (COVRA) in the Netherlands. Staff members of the facility organisation provided an introduction and guided tour of the facility.

Reception and dinner

A reception and dinner was held mid-way during the workshop. Participants were given the opportunity to socialise and exchange information in an informal setting. This dinner was an excellent means to meet other workshop participants that are outside of their discussion group and encouraged international bilateral exchanges.
3. TOPIC A: EXPERIENCE FROM THE INSPECTION ACTIVITIES DURING THE TRANSITION FROM AN OPERATING REACTOR TO A DEFUELED STATUS WITH A COMMITMENT TO PERMANENTLY CEASE POWER OPERATIONS

3.1. Topic introduction

When the decision to permanently cease power operations is made, new safety issues may arise. Regulatory bodies (RB) must be aware of these issues and be prepared to respond/address them through their inspection programmes. Areas such as organisation, human, technical and financial may require different inspection approaches.

The purpose of the task is to identify commendable practices and share information about methods, procedures and criteria used to inspect a licensee transitioning from an operating reactor to a defueled status, with a commitment to permanently cease power operations.

It should be recognised that the end point of this workshop topic was difficult to establish. However, for the purposes of the workshop topic, it was determined to limit the scope to the transition phase, which is defined as the time frame between the licensee’s commitment (announced or unannounced) to permanently cease power operations and final defueling of the reactor vessel. This workshop topic excludes physical security.

3.2. Discussion group members

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<tr>
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<tr>
<td>Alexandre Leblanc, Canada*</td>
<td>Christopher Regan, USA*</td>
</tr>
<tr>
<td>Dirk Asselberghs, Belgium</td>
<td>Chantal Mommaert, Belgium</td>
</tr>
<tr>
<td>Frederik Van Wonterghem, Belgium</td>
<td>Kristof Van Cutsem, Belgium</td>
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<td>Matthias Papa, Germany</td>
<td>Marcel Buchholz, Germany</td>
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<td>Helmut Scheib, Germany</td>
<td>Walter Glöckle, Germany*</td>
</tr>
<tr>
<td>Junichi Kimura, Japan</td>
<td>Chang Ju Lee, Korea*</td>
</tr>
<tr>
<td>Hans Rudolf Fierz, Switzerland*</td>
<td>Petr Rubtsov, Russia</td>
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<td>Takayoshi Nezuka, NEA</td>
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(*) WGIP members

3.3. Pre-workshop questionnaire

For preparation of the workshop, participants were invited to supply their national inspection approaches used according to the questionnaire contained in the appendix (NEA/CNRA/R(2016)2/ADD1).
3.4. Opening presentation

To provide workshop participants with a common basis for discussing Topic A, Mr Alexandre Leblanc delivered a presentation summarising the responses received from 14 countries to the pre-workshop questionnaire.

Experience has shown that premature and/or unexpected permanent shutdowns (i.e. before end of design life) of nuclear power plants have challenged RB in areas such as baseline and plant specific inspections, inspection practices, as well as dispositioning of unresolved safety concerns. Premature shutdowns may result in RB having minimal notification and could lead to insufficient time to adequately plan, prepare and conduct appropriate inspection activities. Even planned permanent shutdowns can necessitate adjustments to inspection programmes and activities prior to the shutdown while the facility is still operating.

The opening presentation set the stage for discussions on how RB can better prepare themselves for the transition phase and touched on four areas: regulatory framework, inspection programme, scope of inspections and regulatory body organisational management. Below is a brief summary of the presentation:

- In most countries, the same regulatory requirements apply to operating and transition phases.
- An operating reactor is no longer considered as such upon complete defueling of the core.
- Some countries have requirements explaining when and to whom licensees must provide notification of permanent shutdown. Others do not.
- In some countries, plant specific inspections are conducted to verify activities associated with the end of operation and preparations for shutdown and decommissioning. Changes to the inspection programme may include more inspections in areas such as problem identification and resolution (PI&R), staffing levels, qualification of staff, motivation, safety culture and organisational arrangements and structure, and fewer inspections in areas such as modifications and systems.
- In most countries, RB modify their inspection programme in the same manner whether they have significant or minimal advanced knowledge of the permanent shutdown
- There were two approaches to address unresolved safety concerns. The first approach is to follow a process and determine if corrective actions still needed to be implemented; if not, the corrective action is dropped. The second approach is to have the licensee continue implementing all corrective actions until shutdown.
- During the transition phase, some RB modify the scope and level of effort of inspections based on licensee activities, structures, systems and components (SSC) to remain in service, changes to licensee programmes and operating experience.
- Generally, in the wake of a licensee’s commitment to permanently cease power operations, RB keep the same organisational structure and number of inspectors.

3.5. Group discussion summary

Group discussions were carried out in two sub-groups and focused on:

- regulatory body preparations for the transition phase;
- what to inspect during the transition phase;
- how to address outstanding regulatory commitments;
what to do with non-compliances identified during the transition phase.

Throughout the discussions, the exchange of experience and practices among participants was very informative. The sub-groups met on a few occasions to discuss the results of each group. Generally, the sub-groups shared similar opinions and the participants agreed with the results of each group.

In addition to identifying numerous commendable inspection practices, ideas of how to implement them were also discussed and can be found in the closing presentation as well as the section below.

3.6. Conclusions and closing presentation

The following conclusions emerged from the discussions during the workshop. (Note – These conclusions and the accompanying commendable practices are based on workshop discussions and do not reflect a consensus NEA opinion. Nevertheless, they can be utilised as a general benchmark for basic comparisons of those issues with inspectors from participating countries share).

Although the discussions in the two discussion sub-groups were different (reflecting the individual experiences of the participants and showing different emphasis of aspects of the workshop topic within the groups), the two sub-groups agreed in following CP as a common result. The results were presented in the closing presentation by Mr Alex LeBlanc and discussed in the exit meeting.

CPs for gaining confidence that sufficient oversight of licensee activities will be maintained during the transition phase are listed below; some sub-bullets provide guidance on how to implement the proposed CP. The CPs are not necessarily specific to inspection practices but were deemed applicable to this workshop topic. Moreover, they may be applicable beyond the transition phase.

*When compared to the final presentation slides, some of the CPs and sub-bullets below contain minor edits for readability purposes.

**CP1:** The RB should be prepared in advance for a licensee in the transition phase

- Information needed from the licensee to establish an appropriate inspection programme should be defined (e.g. proposed changes to technical specifications, plant modifications and the licensee’s organisation etc.).
- A communication scheme with the licensee should be established to ensure appropriate awareness of future licensee actions (e.g. provide sufficient time for inspection planning).
- The RB should ensure that adequate licensee performance indicators are in place.
- An analysis should be conducted to determine necessary RB inspection programme changes.
- An analysis of necessary RB organisational changes (preferably prior to an announcement of a plant closure) should be conducted.

**CP2:** The RB’s inspection programme should be optimised to ensure appropriate oversight of licensee activities during the transition phase

- Available inspection resources should be focused in areas of most benefit.
- Inspection programme should have sufficient flexibility to allow moving inspection resources from areas of less importance to areas that increase in importance.
- Some inspections may not be necessary if the plant is only to be operated for a short period of time (e.g. certain design basis inspections).
The RB inspection effort should be proportional to the licensee’s activities (e.g. increase or decrease level of effort of inspections – major plant modifications).

Changes to the inspection programme should take into account inspection findings.

**CP3: Inspection resources should not be reduced until the transition phase is complete**

- The licensee is still responsible for the safe operation of a fully functional reactor.

**CP4: The RB should establish a programme to evaluate the licensee’s safety culture during the transition phase**

- RB inspectors should receive adequate safety culture training.
- The RB should ensure it has sufficient expertise to assess safety culture issues.
- RB programme should develop safety culture indicators (e.g. motivation, morale, staff workload, relationship between RB and licensee).
- RB programme should include a process to analyse and trend safety culture data.
- RB programme should recognise that at multi-unit sites/licensees where at least one unit remains operational, the consequences on safety culture (e.g. resulting from job losses) may not be so important or significant.

**CP5: The RB should increase oversight and inspection of the licensee’s safety culture during the transition phase**

- Baseline inspection data should be obtained (preferably prior to the announcement of intent to permanently cease operation).
- Immediate inspection upon announcement of NPP shutdown should occur.
- Safety culture inspections should be performed at sufficient intervals to obtain data for trending.
- Assessment scope should be sufficiently diverse to obtain an overall image of the licensee’s safety culture.

**CP6: The RB should inspect outstanding regulatory commitments that continue to remain applicable up to the end of the transition phase**

- Licensee should identify regulatory commitments that are no longer applicable, justify why and obtain RB approval for the course of action to close the commitment.

**CP7: The RB should assess and inspect the licensee’s evaluation of actions to be taken in response to identified non-compliances.** More specifically, the RB should provide special consideration in the following areas during the transition phase:

- What is the safety relevance or safety significance of the finding?
- How firm is the commitment to shut down the NPP?
- What are the alternative compensatory measures proposed by the licensee?
- How long does it take the licensee to make the change?
- How long will the licensee’s actions be in effect before end of life?
– Will the action or change be useful beyond the transition phase?
– What are the external pressures to implement changes (e.g. public)?

**CP8:** During the transition phase, the RB should conduct inspections to verify that the licensee has control and understands the current configuration of systems, structures and components (SSC)
– Systems that have a safety function, that are functional or that are abandoned are defined and labelled.
– System boundaries are clearly defined (e.g. when a system is modified and part of it is abandoned).

**CP9:** The RB should inspect for changes to the licensee’s maintenance programme to identify reductions in maintenance activities of safety related SSCs that could negatively impact the level of safety
– Which safety related SSCs are required pre shutdown and which are required post shutdown?

**CP10:** The RB should inspect licensee organisational changes for the transition phase
– Review the licensee’s analysis of organisational changes.
– Are the changes appropriate and effective?
– Are sufficient staffing levels maintained?

**CP11:** The RB should increase inspections of the licensee’s oversight of contractor performance during the transition phase
– High probability of less licensee staff and more contractors.
– Contractor staff is integrated into the licensee’s safety culture and is trained on human performance tools and safety culture expectations.

**CP12:** If the licensee increases fuel handling activities, the RB should increase inspections in that area
– Fuel handling in spent fuel pool.
– Dry cask loading activities.
– Heavy load lifting.
– Additional radiation protection inspections.

**CP13:** If the licensee increases its effort in waste management, the RB should increase inspections in that area
– May also need additional radiation protection inspections.

**CP14:** The RB should ensure that the licensee has implemented a process/programme for two-way communication between licensee management and their staff
– Communications should reaffirm safety expectations and future changes at the facility.
– Ensure effective communication through diverse methods which may include verbal, website, etc.
4. TOPIC B: INSPECTION OF MODIFICATIONS

4.1 Topic introduction

The purpose of the task was to identify commendable inspection practices regarding the licensees’ control of modifications, with particular attention to temporary modifications and changes to systems, structures and components (SSCs) related to obsolescence, or operational experience. The focus on temporary modifications takes account of earlier workshops already addressing permanent modifications and identifying associated commendable practices. (International WGIP-Workshop Helsinki, 23-25 May 1994, NEA/CNRA/R(94)4).

The task also considered the regulatory approach to the use of non-identical replacement parts. These types of changes are characterised by replacement of defective or obsolete equipment or components by items which appear identical in that they fit into the existing connections or components, they have the same shape, size, colour, etc., and they deliver the same role by functioning in a similar manner. However they are typically not a replacement part sourced from the Original Equipment Manufacturer (OEM), and some internal parts, material specifications, and other attributes could vary. The decision to regulate them as modifications, or replacements could impact on the degree of licensee and regulatory scrutiny.

4.2 Discussion group members

<table>
<thead>
<tr>
<th>Group 3</th>
<th>Group 4</th>
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<tr>
<td>Paul Smith, United Kingdom*</td>
<td>Pierre Barras, Belgium*</td>
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<tr>
<td>Didier Degueldre, Belgium</td>
<td>Gilles Hermans, Belgium</td>
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<td>Jara Depuydt, Belgium</td>
<td>Nicolas Noterman, Belgium</td>
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<td>Dean Hipson, Canada</td>
<td>Hana Renova, Czech Republic</td>
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<td>Martti Vilpas, Finland</td>
<td>Kim Wahlstrom, Finland</td>
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<td>Paul Berenguier, France</td>
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<td>Yusuke Kasagawa, Japan*</td>
<td>Simone Stratmann, Germany</td>
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<td>Marek Jaszczebski, Poland</td>
<td>A.P. (Arvind Paul) Garg, India*</td>
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<td>Petr Rubtsov, Russia</td>
<td>Francisco José Gallardo Macia, Spain</td>
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<td>Adnan Kozarcancin, Sweden*</td>
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(*) WGIP members

4.3 Pre-workshop questionnaire

For preparation of the workshop, participants were invited to supply their national inspection approaches used according to the following contained in the appendix (NEA/CNRA/R(2016)2/ADD1).
4.4 Opening presentation

To provide the two discussion groups with a common basis for discussing the topic, Mr Paul Smith (UK, ONR) made a presentation summarising the different responses that he had received to the pre-workshop questionnaire that had been sent to the participants prior to the workshop itself.

The conduct of inspections for plant modifications was addressed at a previous International WGIP-workshop in Helsinki on 23-25 May 1994 (NEA/CNRA/R(94)4). Delegates at the 2016 workshop were provided with a summary of the commendable inspection practices that had been derived from the 1994 workshop. An important finding from the review of responses to the pre-workshop questionnaire was that the majority of countries adopt the same regulatory approach for temporary and permanent modifications. Hence, review and validation of previous work in this area was a key starting point for the group discussions.

Twenty countries provided responses to the pre-workshop questionnaire and a review of the answers provided the following observations:

Temporary modifications

- A number of countries have a definition for temporary modifications (Belgium, Canada, Czech Republic, Germany (one RB) Hungary, Mexico, Slovenia and Spain).

- The definition of temporary modification is not consistent:
  - time limited, typically: few weeks (Germany), 3 months (Mexico) to 1 year;
  - required for unforeseen operational or safety needs (Spain, Mexico);
  - low safety significance (Germany, Slovenia).

- The majority of countries adopt the same regulatory approach for temporary and permanent modifications.

- Some countries have less stringent requirements for temporary modifications (Belgium, Hungary, Germany (one RB), Slovenia), generally because they are of lower safety significance.

- Some countries that reported a different regulatory approach for temporary modifications noted a need to monitor compliance with time limits (Canada, Mexico, Slovenia, Sweden).

- All countries inspect temporary modifications as part of their compliance programmes.

- The majority of countries use the same inspection approach for temporary and permanent modifications. This will include change control processes and sampling of specific modifications.

- Most countries select (temporary) modifications for inspection based on safety significance.

- Inspection of (temporary) modifications may also be based on:
  - previous experience (Slovak Republic);
  - location (housekeeping) (Sweden);
  - as they occur (USA).

- A number of countries reported that the aggregation and interrelation of temporary modifications should be considered by the licensee in the safety analysis.

- There are opportunities for the RB to consider the aggregation/interaction of temporary modifications at safety review of the modification, routine inspection and periodic review.
Quality management principles and the competence of the design organisation may be considered by the RB (Finland).

Checks are made by the RB that temporary modifications do not interact with other SSCs (Germany).

RB requires limits on the number and duration of temporary modifications (Sweden).

Some countries noted that the matter is not specifically addressed or that such a check may be difficult.

The majority of countries require RB permission for a temporary modification, depending on the safety significance, licensing basis or screening criteria.

Generally, no specific permissions were identified for starting, extending, removing or making permanent a temporary modification.

Temporary modifications – Examples of inspection scope:

- Sample based on risk informed insights
- Check modification is classified/graded correctly
- Check that a safety evaluation has been completed
- Check interactions assessed if several temporary modifications exist
- Check compensatory measures are in place and assumptions correct
- Check implementation is in accordance with safety case/technical standards/documentation
- Check compliance with legal requirements and licensee procedures
- Check adequacy of documentation
- Check commissioning, inspection and testing
- Visually inspect temporary modification on-site
- Check adequacy of operator aids (labels and tags)
- Check awareness of operators of temporary modifications
- Check if temporary modifications have caused problems or negative impact
- Check temporary modifications are still necessary
- Check licensee has a system for tracking, review and removal
- Check removal within the approved time period
- Check any extensions to time period are justified
- Check that number of temporary modifications is minimised.

Temporary modifications – Examples of difficulties:

- Process for approval not formalised
- Temporary modifications remain in place longer than intended
- Discrepancies in documentation or technical justification
- Temporary modifications not identified on plant
- Compensatory actions or controls not adhered to
- Technical standards do not meet nuclear safety requirements
- Implementation before safety evaluation completed
- Operators not aware of temporary modifications
- Temporary (weld) repairs difficult to assess for limited life
- Circumstances may be unique and therefore difficult to evaluate
- Same as for permanent modifications;

**Non-identical replacement parts**

- There was a wide variation in responses from countries regarding when plant changes may be treated as a replacement rather than a modification. The range of responses were as follows:
  - Safety function is unaffected
  - Original specification/design/performance requirements met
  - Same fit, form and function
  - Original specification met and manufacturer is the same
  - Original specification and qualification requirements met
  - Technical requirements met and supplier is approved
  - Component/part has been qualified
  - Component part is identical;

- Examples of RB oversight activities:
  - Inspection of engineering change/modification process
  - Inspection of maintenance
  - Inspection of quality assurance process and records
  - Inspection of compliance with qualification process
  - Inspection of safety management system.

### 4.5 Group discussion summary

The discussion groups identified a number of areas for in-depth discussion. As follows:

- Definition of temporary/permanent modification or temporary configuration
- Factors taken into account when considering a graded approach to temporary modifications
- The validity of commendable inspection practices for modifications from the 1994 workshop and their applicability to temporary modifications.
- Additional inspections for temporary modifications
- The appropriate balance between process based and performance based inspections by the RB (document/desktop review verses field verification)
- Ensuring that temporary changes in plant configuration are controlled and time limited to prevent them from remaining in the field for an extended period of time;
- The oversight process that the RB can use to check that non-identical replacement parts will not affect safety
- Specific considerations on temporary modifications of software-based equipment.

**Definition of temporary modification**

Based on the answers from the questionnaires, there is no consistent definition of a temporary modification (or configuration change). The discussion groups agreed that temporary modifications are characterised by the following features:

- Temporary modification is a change in plant configuration, SSC’s, procedures, organisation, practices,… for a limited period of time specified beforehand and justified.
- Temporary modifications shall not lead to violation of existing licence.
- It may be necessary to implement a temporary modification in response to operational requirements, as a short term solution until a permanent modification can be appropriately reviewed and implemented.
- They are preferably applicable to low safety significant changes (e.g. operational/economic requirements).
- Due to emergent issues, there may be a need for a temporary modification before a permanent repair can be implemented

**Graded approach to classifying modifications**

The graded approach used by licensees for classifying permanent and temporary modifications is a key factor in determining whether a submission is made by the licensee for review by the RB. The discussion groups developed a commendable practice to assist RBs with the evaluation of licensees’ graded approach to the classification of modifications.

**Review of the 1994 commendable inspection practices**

Review of the 1994 commendable inspection practices for modifications was undertaken by the discussion groups because the majority of countries use the same inspection approach for temporary and permanent modifications. It was noted that the 1994 commendable inspection practices have an emphasis on large and complex modifications which are planned well in advance and may be authorised in stages. Whereas temporary modifications are typically associated with emergent issues and are less complex. Also, issues such as plant status and operability are more important in the case of temporary modifications. Nonetheless, the 1994 commendable inspection practices were confirmed as being valid and applicable to temporary modifications.
1994 Commendable Inspection Practices - All Modifications - Changes

All modifications should be classified by the licensee according to safety significance. This may indicate to both the licensee and the regulatory body the degree of safety assessment that is needed.

Assessment by the regulatory body may comprise of:
- applicability of design standards, safety classifications and reasons for modification
- review of licensee's safety assessment, design calculations, documentation and arrangements for radiation protection, where appropriate
- risk assessment
- licensee consideration of OpEx
- quality assurance plans
- component qualifications and construction testing, e.g., weld examinations
- commissioning programmes and results
- limits and conditions both during commissioning and during subsequent normal operation
- maintenance and testing arrangements
- operability and plant status (particularly during commissioning)

The regulatory body authorises modifications of high safety significance before they are brought into full operation. Large and complex modifications are often authorised in stages, by separately authorising the manufacturing, construction, commissioning, and full operation phases.

The regulatory body should review the licensee's processes and procedures for controlling modifications and that it is applied correctly.

The regulatory body can sample planned modifications of lower safety significance and intervene where necessary.

The regulatory inspection authority monitors the plans and progress of all modifications of both major and minor safety significance, and intervenes as necessary. By this means, the regulatory body may require modifications of low safety significance to be assessed and authorised by the regulatory body before being implemented.

The regulatory body/authorised inspection authority checks:
- implementation of quality assurance programmes
- the fabrication, testing and commissioning activities including
- design, installation, assembly control and implementation
- installation procedures
- operator training activities
- changes to operating and emergency procedures
- as-built-documentation
- test and commissioning/decommissioning procedures
- test and commissioning results
- compliance with legal requirements and licensee procedures
- visual inspection of the modification on site, if possible

The regulatory body/authorised inspection authority witnesses checks at hold points specified by the regulatory body, such as hold points during manufacture, installation, and commissioning. This inspection approach may apply particularly during large and complex modifications.

Necessary changes to the existing (1994) commendable practices
**Inspection of temporary modifications**

The discussion groups made the following observations:

- There is a need for the RB to be more proactive when dealing with temporary modifications.
- Some inspection activities may be delegated by the RB to an inspection agency.
- The temporary modification process should not be used to by-pass the permanent modification process.
- It is important for the RB to have a balanced approach between the inspection of (document/desktop based) processes and performance (field) based inspection activities.

The discussion groups developed a number of commendable practices to assist RBs with the inspection of temporary modifications.

**Non-identical replacement parts**

The discussion groups noted that the variation of a non-identical replacement part, compared to the original that is permitted by RBs for a replacement to be exempt from the modifications process is not consistent. But all approaches require the safety function to be unaffected.

Issues that potentially require or result in licensees using non-identical replacement parts include:

- The loss of original equipment manufacturers/suppliers.
- The introduction of fraudulent components into the supply chain.
- The potential for manufacturers/suppliers to change the specification of equipment without alerting the licensee.

**Temporary software modifications**

The temporary modification of software was examined by the discussion groups. It was concluded that the temporary modification of software –based equipment should be limited to changes of user configurable parameters only.

### 4.6 Conclusions and closing presentation

The following commendable inspection practices were developed by the discussion groups during the workshop. The results were presented to the workshop participants by Mr Paul Smith (UK, ONR).

**Temporary modifications**

**CP1:** The inspector should review licensee documentation to ensure that there is a satisfactory definition of temporary modifications and ensure that the licensee has a process in place accordingly

**CP2:** The inspector should verify by sampling that the licensee is following their temporary modifications process and maintaining any necessary records

**CP3:** The inspector should review trends in the licensee’s performance in controlling temporary modifications (e.g. compliance with specified time limits)

**CP4:** The inspector should verify by sampling that the licensee has documented the justification before extending time limits for temporary modifications
CP5: The RB should evaluate the licensee’s graded approach to classifying modifications, taking the following factors into account:

- How the approach considers SSCs
- How the approach takes account of equipment category and classification
- How the approach takes account of plant systems credited in the technical specifications
- How the approach makes use of quantified risk assessment
- How the approach takes account of complexity and the use of proven methods
- How the approach takes into account the worst case consequences of implementing the modification.

CP6: The RB should develop inspection procedures related to temporary modification

CP7: The RB should use a graded approach when selecting a sample of temporary modifications for inspection

CP8: Check that the licensee has used an approved process for the implementation of temporary modifications

CP9: Check that temporary modifications are classified/graded correctly and that a safety evaluation has been completed and documented

CP10: Check that interactions have been assessed by the licensee if several modifications exist

CP11: Check that any required compensatory measures are in place and effective

CP12: Check that documentation affected by temporary modification is appropriately marked in master documentation and controlled copies

CP13: Check the adequacy of operator aids (labels/tags/instructions)

CP14: Check that operators are aware of any temporary modifications, as appropriate, especially:

- the impact on plant operation
- safety limits and conditions of the implemented temporary modification.

CP15: Check that licensee staff pays the same attention for temporary modification as for permanent modifications (safety culture issue…)

CP16: Check that adequate maintenance, inspection and testing of temporary modifications is in place and conducted appropriately

CP17: Licensee periodically reviews the state of temporary modification taking into account the safety limits and changes in operational states

CP18: Check that the licensee has a system for tracking, review and removal of temporary modifications (Database for global overview)

CP19: Consistency between field observation and information within database
CP20: Check that temporary modifications have been removed within the approved time period (hardware and documentation) and that removal is complete

CP21: Check that plans developed by the licensee (especially outage activities) gives adequate priority to removal of temporary modification as soon as possible

CP22: Check that the number of temporary modifications in place is minimised.

Non-identical replacement parts

CP23: In order to ensure that non-identical replacement parts do not affect safety through plant obsolescence, the RB should verify implementation of an ageing/asset management process by the licensee

CP24: The RB should verify the implementation of an appropriate quality control/management programme for suppliers/vendors

CP25: Inspectors should sample check that replacement parts meet the specified safety requirements. This may be done during inspection of maintenance, modifications, QA/QC or equipment qualification

Temporary software modifications

CP26: RB inspections should include the verification that:

- Temporary modification of software-based equipment is limited to changes of user configurable parameters only.

- Validation can be done by review of logbooks or system logs to ensure the correct implementation.
5. TOPIC C: THE INSPECTORS' ROLE IN THE ENFORCEMENT PROCESS

5.1 Opening presentation

To provide the two discussion sub-groups with a common starting point for discussions, Mr. Jukka Kupila made a presentation summarising the different responses he received to the pre-workshop questionnaire that has been sent to the participants prior to the workshop itself.

Recognising the fact, that enforcement is a key regulatory function and acknowledging the previous WGIP report called “Regulatory Inspection Practices to Bring About Compliance” [NEA/CNRA/R(2005)1]. This report already describes that RB have available a series of graded enforcement options from oral advice and cautions, written letters and requirements into license withdrawal and prosecution in courts.

Nineteen countries provided responses to the pre-workshop questionnaire. The review of these answers showed the following:

5.2 Questionnaire and evaluation of answers

Question 1.1
What is the starting point for the enforcement process in regulatory inspections conducted by the inspector (e.g. a finding, a non-compliance, a violation, a wilful violation, etc.)?

Not generally fixed, varies from country to country.

In most countries in principle any (significant) finding of a non-compliance, deviation or violation to procedures, licences, standards, regulations, requirements or acts etc. A higher level kind of offence like “wilful” is not necessary.

Question 1.2
What is the inspectors’ role in evaluating the safety significance of the finding, non-compliance or any violation mentioned above?

In most countries the inspector is responsible for some kind of an “initial safety evaluation”.

In most countries the inspectors’ initial safety evaluation serves as a basis to for enforcement process by the RB.

In some countries the inspector decides by himself to start the enforcement process.

Some countries noted explicitly that the inspector has to take protection measures in case of immediate danger.

Question 2.1
With respect to the graded enforcement options of the RB listed in foreword, what is the limit of the inspectors’ authority?

In some countries the inspectors’ authority is limited to identifying and assessing of findings.
In some countries the inspectors’ authority is limited to the lower level of enforcement options like giving advice, oral and written cautions, letters etc.

In some countries, at least in principle, there is no limit, especially in the case of imminent danger.

In most countries the enforcement process may be initiated by the inspector, but will be adopted and completed by the RB.

**Question 2.2**

*Does the inspector have discretion to choose enforcement options?*

In some countries the inspector has no discretion, mainly in those countries where the enforcement process is adopted by the RB. In some countries the inspector has discretion, mainly in those countries where the inspector’s authority includes enforcement options.

**Question 2.3**

*How is the enforcement power given to inspector? (i.e. directly by legislative power; indirectly by internal RB processes; etc.)*

In most countries power is given directly by legislative power. Some countries power is given indirectly by internal RB processes, whereas in couple of countries, there is no enforcement power given to inspectors.

**Question 2.4**

*How does the inspector participate in the enforcement process of the RB once it has started?*

In most countries the inspector participates in the enforcement process of the RB from beginning to the end.

In some countries the inspector role is limited to identifying and assessing of findings and reporting.

**Question 2.5**

*Is there any written guidance for the inspectors concerning the RBs enforcement processes? Please describe briefly what kind of guidance or technical tools are available to the inspectors.*

In most countries there is written guidance, internal guidance was in form of policies, procedures, manuals etc.

**Question 2.6**

*How does the RB ensure consistency in the inspectors’ behaviour in the enforcement processes?*

In most countries the enforcement process is discussed with or carried out by the RB’s management.

In some countries the enforcement process is detailed in the procedures or written enforcement policy or law.

**Question 2.7**

*Are the inspectors specifically trained in the topic of enforcement?*

According to national practice of enforcement.

In some countries there is a detailed enforcement process and there usually is topical training on enforcement.

If enforcement is done only by the RB’s management then there is usually a more general type of training.

In some countries inspectors do not have enforcement powers so there is no training.

**Question 3.1**

*Please describe briefly inspectors’ role.*

In most countries the inspector need to verify closure of the issues.

In some countries there is an inspection to verify closure of the issues.
Question 4
What issue would you like to discuss during the workshop?

Main themes were:

- Monetary penalties/fines
- Graded approach to enforcement
- Inspectors’ authority
- Enforcement process
- Inspector skills and training.

5.3 Discussion group members

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<thead>
<tr>
<th>Group 5</th>
<th>Group 6</th>
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<tbody>
<tr>
<td>Jukka Kupila, Finland*</td>
<td>Julio Crespo, Spain*</td>
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<tr>
<td>Yves Van den Berghe, Belgium</td>
<td>An Wertzelaers, Belgium</td>
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<td>Anupama Persaud, Canada</td>
<td>Miroslav Jakes, Czech Republic*</td>
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<td>Yves Guannel, France*</td>
<td>Sergey Khlabystov, Russia*</td>
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<td>Patric Scheib, Germany</td>
<td>Sebastian Savli, Slovenia*</td>
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<td>Koji Takiyoshi, Japan</td>
<td>Karoline Gotlén, Sweden</td>
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<td>Marcin Dabrowski, Poland*</td>
<td>Daniel Billeter, Switzerland</td>
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<tr>
<td>Ami Patel, USA</td>
<td>Stephen Saunders, United Kingdom</td>
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<td>Tim Kobetz, IAEA*</td>
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(*) WGIP members

5.4 Group discussion summary

Discussions were held in two subgroups, both having independent discussions with an opportunity to exchange opinions and results of their work during the workshop. Final conclusions were compiled by the two topic leads from WGIP to reflect the discussions and with an effort to harmonise conclusions. The groups identified

Commendable Practices (CP) and Observations, seen as general agreement or already established international safety standards for a RB. Discussions were open and informative with participants sharing their practices and experiences for the discussion groups.

5.5 Conclusions and closing presentation

The following conclusions emerged from the discussions during the workshop. (Note – These conclusions and the accompanying commendable practices are based on workshop discussions and do not reflect a consensus NEA opinion. Nevertheless, they can be utilised as a general benchmark for basic comparisons of those issues with inspectors from participating countries share).

Although the discussions in the two discussion sub-groups were different, the two sub-groups agreed in following CP as a common result. The results were agreed and modified by both subgroups in a joint group meeting before the closing presentation. Closing presentation was given by Mr Jukka Kupila and following commendable practices were identified.

CP1: RB need a transparent enforcement process that is consistently implemented, based on the needs of the regulatory framework, that builds trust with the licensee and other stakeholders.
**CP2:** Consistency in the implementation of enforcement actions should be supported by the following:
- Enforcement policy, procedures etc.
- Support by management / review panel / enforcement specialist
- Initial and continuous training on practical implementation of enforcement techniques
- Knowledge transfer among inspectors by regular meetings, seminars, workshops, electronic fora, cross-site-inspections.

**CP 3:** RB should have a process for addressing differing professional opinions during the enforcement process

**CP 4:** Inspectors should have the questioning attitude and human interaction skills to appropriately challenge licensees when imposing enforcement actions

**CP 5:** A memorandum of understanding with other RBs, such as occupational health and safety, should be in place where authority is outside the jurisdiction of nuclear regulatory body.

**CP 6:** RB should carry out a follow-up inspection on licensee’s response to enforcement action to ensure continued compliance

During the final evaluation of the work of the both subgroups, some of the identified commendable practices were considered to be already something that is existing practice or requirement for RB. These issues were identified as observations. However, many of these observations are important and beneficial of the participants and were considered important to be recorded in the proceedings if this workshop. Identified observations were as follows:

1. RB should have effective enforcement tools available to carry out enforcement actions.
2. RB should have a evaluation of effectiveness of RB’s enforcement actions (internal/external).
3. Although it is understood that safety is licensee’s prime responsibility, inspectors should have the authority to direct actions when confronted with conditions that pose imminent danger.
4. RB should have the authority to require licensee to address emerging safety issues with implementation within appropriate time frame.
5. RB’s enforcement policy should have the capability to administer monetary penalties and should be legally bounded and a well-defined formal process.
6. The impact of media attention to enforcement actions can be more significant to the licensee than the actual financial impact and it may result in increased public/stakeholder interest and/or high economic side effects.
7. RB should evaluate the timeliness of corrective actions proposed by the licensee.
8. RB should document observations and facts that lead to or have the potential to result in enforcement actions.
6. GENERAL WORKSHOP CONCLUSIONS

Overall discussions between the various participants both in discussion group sessions and throughout the workshop were extensive and meaningful. Ideas and practices regarding regulatory inspection activities were exchanged and it can be foreseen that these ideas will provide improved expertise when being applied in the future. WGIP members continue to agree that: “The workshops on regulatory inspection practices held by the CNRA Working Group on Inspection Practices, continue to provide a unique opportunity for inspectors and inspection managers of NPPs to meet and share and exchange information.”

The topic chapters include the conclusions and CPs that evolved from the various group discussions. CPs are extracts from the topics, which were discussed by the workshop participants and were thought to be reference for member countries. These are neither international standards nor guidelines. Each country should determine inspection practices, considering its own historical, social and cultural backgrounds and the CPs can be useful references when each country improves its inspection practices.
7. WORKSHOP EVALUATION

7.1 Evaluation form results

All participants at the workshop were requested to complete an evaluation form. The results of this questionnaire summarised below, are utilised by WGIP in setting up future workshops and to look at key issues for in the programme of work over the next few years. Of the 58 total participants 32 responses were received.

The evaluation form, which was similar to ones issued at previous workshops, asked questions in four areas: general - workshop objectives, workshop format, workshop topics and future workshops. Participants were asked to rate the various questions on a scale of one to five, with one being a low (poor) score and five being a high (excellent) score. Results are provided in the following charts (which also reflect scores from the previous workshops - for comparison purposes) along with a brief written summary.

General

7.2 Suggested future topics

Participants were asked to provide their input on potential future topics. While no specific analysis was applied to the results, WGIP and the CNRA will evaluate these and use them in proposing topics for future workshops. The topics mentioned were as follows:

- Non-identical component replacements (in more depth)
- Spare parts and non-identical replacements
- Inspection of Digital I&C installation/modifications
- Ageing management inspection
- Ageing issues and loss of supplies
- Inspection of components on new ageing mechanisms or effects of ageing
- Commercial grade dedication programmes
- Quality Assurance Programmes
- How to inspect NCSFI issues?
- Post Fukushima Daiichi Modification Inspections
- Inspection of Safety Culture
- Inspection of Human and Organisational factors
- How to inspect safety culture during transition from NPP operation to decommissioning
- Inspection for assessment of safety culture of an organisation
- How to inspect decreasing safety culture?
- Safety Culture inspections analysis and trending by the regulatory body
- Assessment/inspection of safety climate/culture
- Inspection Techniques
- Inspection Best Practices
• Knowledge transfer from experienced to new inspectors
• Inspection of Main Control Room Activities
• Inspection of new installations (during commissioning)
• Inspections limited to waste on-site
• Inspectors’ role during start-up after a long outage
• Inspection of non-routine activities
• Implementation risk-oriented approach to inspections
• Design Basis Inspections
• System Design Basis Inspections (with multi-disciplinary staff)
• Long term operation inspections
• Planning issues related to inspections of various different projects
• Coherency of Inspection findings among inspectors in the same organisation
• Event reporting criteria
• Leadership building/development
• Documentation and Communication of Inspection Results
• Inspection Programme Optimisation
• Continue with transition phase
• Graded Approach Standards
• Emergency Preparedness and Response Arrangements
• Maintenance Effectiveness of Power Plants
• Fuel Handling (especially for transition phase/decommissioning)
• Risk significance of Fire Protection at NPP
• Inspection of Fire Protection
• Effectiveness of Regulatory Enforcement
• Subcontractors
• How to deal with potential safety issues limited with justified continued operation

**Additional Comments Received:**

**General:**

CNRA should facilitate the use of results in their own countries. Sometimes it is too much for a single inspector to influence the RB.

Exchange of information was in a cordial atmosphere and the participants shared their experiences on the topic.

Availability of projector in WG rooms could be useful to support the work and facilitates the consolidation of outcomes.

In transition phase Japan, Germany, Belgium, Switzerland and Canada were involved in our group. Experience from Russia was missed.

Thank you Topic Leaders!

**Workshop Format:**

Changes in organisation; please give information earlier; last minute changes are not helpful

Screen and compute availability for recording results.
The format of the workshop provided opportunity to focus discussions on the topic to arrive at commendable practices.

More time for discussion would be helpful.

Discussion in the groups was very important—exchange of experience. It is a very good method to use flip charts to record and to use persons for recording.

**Workshop Topics**

Topics were relevant and discussions adequately addressed the topics.

The topics included in the second topic (temporary modifications and non-identical replacements) are not directly related. They should be treated separately (2 different groups), with people experienced in each specific topic (probably requires different backgrounds) and with time enough to deal in depth the topic on non-identical replacements.

**Other Comments:**

The room for common meetings was a bit inconvenient since the presentation slides could not been seen behind the audience.

Thank you very much for the organisation.
8. LIST OF PARTICIPANTS

**BELGIUM**

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSELBERGHS, Dirk</td>
<td>Bel V</td>
</tr>
<tr>
<td>BARRAS, Pierre</td>
<td>Bel V</td>
</tr>
<tr>
<td>BENS, Jan</td>
<td>Bel V</td>
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<tr>
<td>DE BOECK, Benoit</td>
<td>Bel V</td>
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<tr>
<td>DEGUELDRE, Didier</td>
<td>Bel V</td>
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<tr>
<td>DEPUYDT, Jara</td>
<td>Bel V</td>
</tr>
<tr>
<td>HERMANS, Gilles</td>
<td>Bel V</td>
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<tr>
<td>JUANOS CABANAS Cristina</td>
<td>Bel V</td>
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<tr>
<td>MOMMAERT, Chantal</td>
<td>Bel V</td>
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<tr>
<td>NOTERMAN, Nicolas</td>
<td>Bel V</td>
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<tr>
<td>VAN CUTSEM, Kristof</td>
<td>Bel V</td>
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<tr>
<td>VAN de BERGHE, Yves</td>
<td>Bel V</td>
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<tr>
<td>VAN HAESENDONCK Michel</td>
<td>Bel V</td>
</tr>
<tr>
<td>VAN WONTERGHEM, Frederik</td>
<td>FANC</td>
</tr>
<tr>
<td>WERTELAERS, An</td>
<td>Bel V</td>
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</tbody>
</table>

**CANADA**

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
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</thead>
<tbody>
<tr>
<td>HIPSOn Dean</td>
<td>Canadian Nuclear Safety Commission</td>
</tr>
<tr>
<td>LEBLANC, Alexandre</td>
<td>Canadian Nuclear Safety Commission</td>
</tr>
<tr>
<td>PERSAUD, Anupama</td>
<td>Canadian Nuclear Safety Commission</td>
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</tbody>
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**CZECH REPUBLIC**

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
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<tbody>
<tr>
<td>JAKES, Miroslav</td>
<td>State Office for Nuclear Safety</td>
</tr>
<tr>
<td>RENOVA, Hana</td>
<td>State Office for Nuclear Safety</td>
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</tbody>
</table>

**FINLAND**

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<tr>
<th>Name</th>
<th>Affiliation</th>
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<tbody>
<tr>
<td>KUPILA, Jukka</td>
<td>Radiation and Nuclear Safety Authority</td>
</tr>
<tr>
<td>VILPAS, Martti</td>
<td>Radiation and Nuclear Safety Authority</td>
</tr>
<tr>
<td>WAHLSTROM, Kim</td>
<td>Radiation and Nuclear Safety Authority</td>
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**FRANCE**

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
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<tbody>
<tr>
<td>BERENGUIER, Paul</td>
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</tr>
<tr>
<td>GUANNAEL, Yves</td>
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</tr>
<tr>
<td>VEYRET, Olivier</td>
<td>Autorité de Sûreté Nucléaire (ASN)</td>
</tr>
</tbody>
</table>
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SMITH, Paul
Office for Nuclear Regulation

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PATEL, Ami
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REGAN, Christopher
Nuclear Regulatory Commission

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KOBEZT, Timothy
IAEA

NIEH, Ho
NEA

NEZUKA, Takayoshi
NEA

SALGADO, Nancy
NEA
9. PREVIOUS WGIP REPORTS

CNRA reports available to download for free at: www.oecd-nea.org/nsd/docs/indexcnra.htmls

- Inspection of Emergency Arrangements [NEA/CNRA/R(2013)2]
- Inspection of Licensee – Maintenance Programme and Activities [NEA/CNRA/R(2013)1]
- Fire Inspection Programmes [NEA/CNRA/R(2009)1]


- The Effectiveness of Nuclear Regulatory Inspection [NEA/CNRA/R(2001)7]

- The Effectiveness of Licensees in Inspecting the Management of Safety [NEA/CNRA/R(2001)9]


- Proceedings of the Workshop on Regulatory Inspection Practices Related to Older Operating NPPs, Risk Evaluation and Licensee Resource Commitment, Prague, Czech Republic, 8-11 June 1998 [NEA/CNRA/R(99)2]

- Comparison of the Inspection Practices in Relation to the Control Room Operator and Shift Supervisor Licences [NEA/CNRA/R(98)1]

- Inspection of Licensee Activities in Emergency Planning [NEA/CNRA/R(98)2]

- Performance Indicators and Combining Assessments to Evaluate the Safety Performance of Licensees [NEA/CNRA/R(1998)3]

- Regulatory Inspection Practices on Fuel Elements and Core Lay-out at NPPs [NEA/CNRA/R(97)4]

- Proceedings of an International Workshop on Regulatory Inspection Activities related to Inspection Planning, Plant Maintenance and Assessment of Safety – Chester, United Kingdom, 19-23 May 1996 [NEA/CNRA/R(97)1; also OECD/GD(97)62]

- Inspector Qualification Guidelines [NEA/CNRA/R(94)1]


- Proceedings of the International Workshop on Conduct of Inspections and Inspector Qualification and Training – Chattanooga, Tennessee, 31 August-3 September 1992 [NUREG/CP-0128; also NEA/CNRA/R(92)3]

- Proceedings of the CSNI Specialist Meeting on Operating Experience Relating to On-site Electronic Power Sources – London, United Kingdom, 16-18 October 1985 [No. 115, February 1996]
10. WORKSHOP OPENING PRESENTATION

13th International Nuclear Regulatory Inspection Workshop

Jan Bens
Director-General
Federal Agency for Nuclear Control (FANC)
Welcome

- Welcome to Belgium
- Welcome to Bruges
- Welcome to the WGIP workshop

FANC & BelV

- FANC
  - Public service organisation
  - Independent, reports to Parliament through the Minister of Security and the Interior
  - Mission: “to ensure protection of workers, the population and the environment against the hazards of ionizing radiation”
- Areas of work
  - Information, regulation, authorization, inspection, enforcement, emergency situations
  - All users of ionizing radiation (from NPP to dentists)
  - Also covers security and safeguards
Enforcement

- In August 2015: first formal enforcement action against the licensee of an NPP
  - Safety culture deficiencies, resulting in formal violations of the licensing conditions
  - Public prosecutor
  - Action plan ongoing

This workshop

- A tool to improve
- Commendable practices
- High expectations from NEA - WGIP
Share experience

- Continuous improvement
  - Regulatory body
  - Licensee
- Detect, share and develop commendable practices
- Learn from each other
  - Crossed inspections

Our goals

- Improved safety
  - Operator = first line
  - Design safety (stress tests, PSR, Topical Peer Reviews, ...)
  - Operational safety \(\rightarrow\) inspections
- Our tools:
  - Verification of regulatory compliance
  - Promotion of continuous improvement
  - Enhanced effectiveness of inspections
Do not forget

• 3 pillars of safety:
  – Technical / design
  – Organizational / process & procedure
  – Human

Have a productive workshop!
11. WORKSHOP OPENING PRESENTATION 2

13th International Nuclear Regulatory Inspection Workshop

Welcome by
Benoît De Boeck
General Manager
Bel V

- Bel V can boast a nuclear expertise dating back to 1965
- Who were our predecessors?
  - CORAPRO, established in 1965, and
  - The SNV department of Vinçotte, established in 1969; later AVN
  - CORAPRO and AVN merged in 1996
- Bel V became operational in 2008

Bel V

- Bel V is a Foundation (thus non-profit)
- Subsidiary of the FANC (2/3 of the Board members common)
- Control of the Belgian nuclear installations in the frame of the Belgian laws and regulations
- Belgian nuclear Regulatory Body = duo FANC + Bel V
Bel V BASIC ROLE

- Technical Support of the Federal Agency for Nuclear Control
  - Nuclear Safety Assessments: Safety Evaluation Reports
  - Conformity checks of new plants or modifications: issuance of permits
  - Inspections: written reports

Structure of control in Belgium

FANC

Bel V

HPD

responsible for safety

Authority

Licensee
Bel V today

- 80 employees
  - 20 inspectors (generalists)
  - 45 specialists (experts in one of more disciplines)
  - 15 administrative employees
Inspection

- The majority of the regulatory inspections by the RB are performed by Bel V
- Integrated inspection strategy FANC-Bel V
- Yearly inspection programme established in close collaboration FANC-Bel V
- Communicated to each licensee
- Recent addition to the programme:
  - Collection and analysis of safety culture observations

WGIP

- Created by CNRA 25 years ago
- Very practical group
  - People performing the same job in the field
  - Meetings in different countries with technical visits
  - Organisation of workshops
  - Creates a very useful network
Workshops

- Promotes direct contacts between peers
- Compare practices and opinions
- Get to know who can help you in case of need, e.g.:
  - NPP restart after long shutdown
- Excellent driver for continuous improvement

This workshop

- Themes chosen are important and relevant today:
  - Transition phase from operation to permanent shutdown
  - Inspection of modifications (special focus on obsolescence and disappearance of suppliers)
  - Role of inspectors in the enforcement process
Location and setup for the workshop were chosen to foster effective and efficient work.

I wish you a productive meeting.
12. HOST COUNTRY PRESENTATION
### Ethical Aspects of Radiation Protection

**Intro**
- The energy facts: controversy, power politics and distrust

1. The idea of fair energy governance
2. Dealing with risk: between knowledge and fairness
3. Fair and effective risk assessment: three reflections
4. Sealing societal trust: the challenge for science
5. The real problem (a critical theory of modernity)
6. An ethics of care for our modern coexistence
7. An ethics of care for radiological protection

---

### The energy facts: controversy, power politics and distrust

**Intro**
- The quest for climate justice

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### Intro
The energy facts: controversy, power politics and distrust
Old technologies, new risks

Earthquakes from gas field complicate Europe’s energy future

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<table>
<thead>
<tr>
<th>Country</th>
<th>Location</th>
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<tbody>
<tr>
<td>Poland</td>
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<tr>
<td>Belarus</td>
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<tr>
<td>Russia</td>
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<tr>
<td>Ukraine</td>
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<tr>
<td>MOLDAVA</td>
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</table>

Map of major routes of gas pipelines through Ukraine

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*Sources: East European Gas Analysis, The National Gas Union of Ukraine.*
The energy facts: controversy, power politics and distrust
The subsidies issue (fossil fuels)

European Investment Bank criticised for 'hypocrisy' of fossil fuel lending
The European Union has made loans to fossil fuel projects through its financial arm despite sanctions on Iran, which targets its members.

By Owen carrym, the Guardian | 04 Dec 2011 | 5 Comments

Wind taken out of nuclear power's sails
It is one thing for a green pressure group to claim nuclear power is too expensive, but quite another when the change comes from the head of an atomic industry pioneer such as General Electric.

Earlier claims that new reactors could be built without state subsidies now look wide of the mark.
The energy facts: controversy, power politics and distrust
Fossil fuel use stretching the exploration of fragile territories

The Telegraph
24 May 2012
Arctic drilling is inevitable: if we don’t find oil in the ice, then Russia will

Progress and Controversy Arrive With New Rules for Fracking on Public Lands
By Abhijit Guhathakurta
"Don’t Frack Us!

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<table>
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<tr>
<th>Intro</th>
<th>The energy facts: controversy, power politics and distrust</th>
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<tbody>
<tr>
<td></td>
<td>Uranium mining pollution and power politics</td>
</tr>
</tbody>
</table>

**The Guardian**

*Extracting a disaster*

The effects of uranium mining are dangerous. To maintain the supply chain, new independent auditing and increased oversight of the uranium industry is necessary to ensure that nuclear facilities are built in an efficient and environmentally sustainable manner. The World Nuclear Association (WNA), the trade body for companies that make up parts of the industry, aims to "mining uranium-producing countries" to have a safe and effective nuclear industry. The International Atomic Energy Agency's (IAEA) effort to help the Management of Radioactive Waste from the Mining and Milling of Uranium (IAEA) is not fully distinct from uranium.

**RT News**

*‘TEPCO covered up the truth about Fukushima disaster’*

Published Time: October 28, 2011 15:12

*AP Photos / Rod / Emmanuell Reyes*
Intro: The energy facts: controversy, power politics and distrust
Post-accident power politics and public distrust

https://nuclearhistory.wordpress.com/2012/page/26/

Intro: The energy facts: controversy, power politics and distrust
Controversies over nuclear energy and nuclear weapons remain intermixed
The energy facts: controversy, power politics and distrust

Today's society has settled in a comfort of polarisation over the nuclear issue.

- Reasoning on the acceptability of nuclear is 'complex', but since the beginning opinion makers have been divided into two camps.
- Opinion makers have been using the same arguments pro and con contra.
- Today, the debate is no longer a 'radiated' camp debate, but a polarised debate.

Science & Value

Based arguments

- These camps are now turned into non-overlapping comfort zones, maintained by strategic and often populist simplifications of arguments pro/contra.
- As in a joint conspiracy, both make no effort to convince each other, but focus on the general public.
- The pro-camp tries to convince it of the contra camp claims to represent it.

The result is a polarisation, not (only) in the public debate, but one that is deeply rooted in the structures of politics, science and civil society.
The idea of fair energy governance

What we can agree on: setting policy priorities right to minimize adverse impact on health and the environment now and in the future

Minimise energy consumption (or thus maximise energy savings) through

1 Maxmise renewables through democratic deliberation on how and where

2 Organise a fair debate on how to produce what cannot be done with 1 and 2

3 Minimise risk-inherent energy technologies with each other

Democracy in this sense involves that a society would need to be able to decide on how to produce the rest of its needed energy for the time to come with nuclear or fossil fuels or with a combination of both.

The idea of fair energy governance

Fairness articulated as the ethical principles of energy governance

1 - minimise energy consumption (avoiding)

2 - prioritise capacities (available technologies)

3 - to the gas fossil fuels

- General principles: governance, protection, participation, accountability
- Specific principles: global agreements, transparency

There is no rational link between the ethical principles of energy governance and the criteria for available energy technologies to meet or respect these principles.

Therefore: fairness also relates to technology assessment as such to the way we make sense of the processes of capacities and the acceptability of risks of energy technologies.
2. Dealing with risk between knowledge and fairness
What is an acceptable risk?

- Risk governance: What is an acceptable level of nuclear risk for the public at large?
  - My answer: There exists no objective (scientific, economic, social, political or philosophical) rationale for the determination of the acceptable level of nuclear risk for the public at large. An acceptable nuclear risk is simply a risk that an informed democratic society justifies as acceptable.

- Nuclear fission for Low-Carbon

- Risk justification:
  - Calculation & control
  - Technocracy

- Technocracy is still among us
  - It may have good intentions.
  - It doesn’t work as such.
  - But it functions at the service of politics.

- Face the fact: Accepting nuclear energy = accepting the possibility of a nuclear accident.
2. Dealing with risk between knowledge and fairness
What is an 'acceptable risk?'

do we need to be able
to imagine a risk?

---

2. Dealing with risk between knowledge and fairness
What is an 'acceptable risk?'
do we need calculation
to support informed consent?
do we need informed consent
to support calculation?
2. Dealing with risk between knowledge and fairness

What is an acceptable risk?

- do we need calculation to support informed consent?
- do we need informed consent to support calculation?

Elements of a rational approach to risk justification:

- knowledge on outcome
  - knowledge on likelihood
    - moderate
    - risk
    - ambiguity
    - ignorance
  - poor
  - uncertainty

- alternatives
- fairness
  - possibility of a fair distribution of benefits and burdens
  - informed consent / possibility to avoid the risk
2. Dealing with risk between knowledge and fairness

Elements of a rational approach to risk justification

A short review of two cases of dealing with risk

with the aim to develop a meaningful rationale on the relation between

knowledge and fairness.

Case 1: the San Francisco Earthquake

1906
Dealing with risk between knowledge and fairness
Case 1: the San Francisco Earthquake

HUNDREDS DEAD!

Fire Follows Earthquake, Laying Downtown Section in Ruins — City Seems Doomed For Lack of Water

Map of San Francisco showing affected areas.
### Dealing with risk between knowledge and fairness

**Case 1: the San Francisco Earthquake**

#### 2006

- **Research report**: When the big one strikes again
  - "SF 1906 earthquake was biggest natural disaster in the US before Katrina"
  - "Geological study claims that a new earthquake in the area is unavoidable"
  - "Damage would be bigger and # deaths would be higher compared to 1906 due to higher population density"
  - The 2006 study did not trigger a 'great escape', neither protests of concerned citizens. Life went on and still goes on.

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<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Control</th>
<th>Fairness</th>
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</thead>
<tbody>
<tr>
<td><strong>(knowledge)</strong></td>
<td><strong>(control)</strong></td>
<td><strong>(fairness)</strong></td>
</tr>
<tr>
<td>there is a <em>transparent</em> cause-effect relation</td>
<td>there is no <em>technical</em> possibility to reduce the risk</td>
<td>there is a simple and fair distribution of benefits and burdens</td>
</tr>
<tr>
<td>the outcome of the cause-effect relation is clear and unambiguous</td>
<td>there exist technical possibilities for prevention</td>
<td>every citizen has the same benefits (living in SF) and the same risk (the earthquake)</td>
</tr>
<tr>
<td>the likelihood is seen only as a probabilistic uncertainty</td>
<td>and is free to leave the city</td>
<td></td>
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</table>
### 2. Dealing with risk between knowledge and fairness

#### Case 2: smoking

<table>
<thead>
<tr>
<th>World Health Organization Tobacco Fact sheet</th>
</tr>
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<tbody>
<tr>
<td><strong>Key facts</strong></td>
</tr>
<tr>
<td>- Tobacco kills up to half of its users.</td>
</tr>
<tr>
<td>- Tobacco kills nearly 6 million people each year.</td>
</tr>
<tr>
<td>More than five million of those deaths are the result of direct tobacco use while more than 600,000 are the result of non-smokers being exposed to second-hand smoke.</td>
</tr>
<tr>
<td>- Nearly 80% of the world’s one billion smokers live in low- and middle-income countries.</td>
</tr>
</tbody>
</table>

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#### Smokers engage in a real risk, however they accept the risk because

- **(knowledge)** there is a transparent cause-effect relation
  - the outcome is clear and unambiguous
  - the likelihood is seen only as a probabilistic uncertainty
- **(control)** the addictive character is known
  - there exist technical possibilities to reduce the risk
  - there is no technical possibility for prevention
- **(fairness)** there is a simple and fair distribution of benefits and burdens
  - measures to protect non-smokers are gradually adopted
  - every smoker has the same benefit (enjoy smoking) and the same risk (cancer)
  - and is free to quit at any time
2. Dealing with the risk between knowledge and fairness

Simple problems – simple fairness

- Apparently, people can accept a risk they cannot completely know and that they cannot completely control simply based on a sense that it is marked by fairness.

- SF fairness despite of (or because of) force majeur
  - complete freedom because of
    - complete lack of control of the phenomenon as such and
    - freedom to move away
  - distributive justice: informed consent (the right to know)
  - sharing of benefits and burdens

- smoking: fairness because of mastery of one’s own fate
  - complete freedom because of
    - the freedom to hurt yourself and
    - the freedom to quit at any time
  - distributive justice: informed consent (the right to know)
  - individual carrying of benefits and burdens

2. Dealing with the risk between knowledge and fairness

Complex problems – complex fairness

- In many other risky practices, the reasoning is not that simple and this because of a typical
  - inherent uncertainty with regard to the ‘cause – effect’ relation
    - stochastic character
    - complexity of the natural and/or technical system
    - time and space dimension
  - leading to complexity in acquiring knowledge

- complexity of ‘distributing the benefits and the burdens’
  - people are affected by the practice in diverse ways (diverse positive or negative, positive versus negative, variable in time, delayed, …)
  - the practice can influence or be influenced by other problematic practices
    - different visions on solutions, based on different ‘value frameworks’
  - leading to complexity in ensuring fairness
2 | Dealing with risk between knowledge and fairness

Key concepts of fairness for risk justification — the idea of intellectual solidarity

Value-based opinion

- dissent
  - moral pluralism
- consent
  - shared values

Incomplete/speculative knowledge

- The science of hypotheses, probabilities and foresight
  - moral pluralism

Even if we would all agree on the scientific knowledge base for the assessment of the risk, opinions could still differ on its acceptability.

Science may thus inform us about the technical and societal aspects of options, it cannot instruct or clarify the choice to make.
2. Dealing with risk between knowledge and fairness

Key concepts of fairness for risk justification – the idea of intellectual solidarity

Value-based opinion:
- dissent
- moral pluralism
- consent
- shared values

Knowledge-based opinion:
- uncertainty
- incomplete speculative knowledge
- consent
- evidence
- negotiation
- simple regulation

Fairness:
- key concepts
- decision fair play
2 | Dealing with risk between knowledge and fairness
Key concepts of fairness for risk justification – the idea of intellectual solidarity

value-based opinion

- dissent
- moral pluralism
- consent
- shared values

knowledge-based opinion

- uncertainty
- incomplete/skeptical knowledge
- consent
- evidence
- simple regulation

fairness:
- key concepts
- prevention
- fair play

intellectual solidarity
in dealing with incomplete & speculative knowledge

key concepts:
- precaution, informed consent, freedom of choice
2. Dealing with risk between knowledge and fairness

Key concepts of fairness for risk justification – the idea of intellectual solidarity

Value-based opinion

- dissent
- moral pluralism
- consent
- shared values

Knowledge-based opinion

- uncertainty
- incomplete/spectulative knowledge
- consent
- evidence

Intellectual solidarity

- in dealing with incomplete/spectative knowledge
- key concepts:
  - precaution
  - informed/consent
  - freedom of choice

Intellectual solidarity

- calibration
- in dealing with incomplete/spectative knowledge and moral pluralism
- key concepts:
  - precaution
  - informed/consent
  - confrontation of interests
  - accountability to next generations
2. Dealing with risk between knowledge and fairness
   Key concepts of fairness for risk justification – the idea of intellectual solidarity

   - Value-based opinion
     - Dissent
     - Shared values
     - Consent
     - Moral pluralism
     - Legal
     - Knowledge-based opinion
       - Uncertainty
       - Speculative knowledge

   Intellectual solidarity in dealing with incomplete and uncertain knowledge
   and moral pluralism
   Key concepts:
   - Precaution
   - Informed consent
   - Contestation of rationales
   - Accountability to next generations

3. Fair and effective risk assessment: three reflections
   The assessment of what is an acceptable risk for society is not a matter of science; it is a matter of justice
   - A risk is not a mathematical formula. It is a potential harm that
   - you cannot completely know and
   - you cannot fully control
   - Acceptable risk?
     People will accept a risk if they cannot completely know and that they cannot fully control simply when they trust that its justification is market by fairness.

   Fairness: the possibility of self-determination ensured by the right to be responsible
   Risk for society: the right to co-decide from a joint decision follows
   Risk for individual: the right to be responsible, the right to be protected, the freedom to hurt yourself
   - For any health risk that comes with technological, industrial or medical practices and that has a wider impact on society, the right to be responsible equates the right to co-decide. Giving this right is a principle of justice
3 Fair and effective risk assessment: three reflections

Societal trust in the assessment of what is an acceptable risk for society should be generated by method instead of proof:

- No scientific or political authority can determine alone what would be an acceptable risk for society.
- Good science and engineering, open and transparent communication and the promise of a responsible safety and security culture are necessary conditions, but can never generate societal trust in themselves.
- The reason is that there will always be essential factors beyond full control: natural, time, human error, unmitigated technology, which imply that one always has to deal with incomplete and speculative knowledge and value pluralism (also in post-accident conditions).
- Confronted with the need to deal with incomplete and speculative knowledge and value pluralism, the challenge of science in risk governance is not the production of credible proofs, it is the construction of credibility hypotheses.

Fair risk governance is risk governance of which the method of knowledge generation and decision making is trusted as fair by society. When the method is trusted as fair, that risk governance has also the potential to be effective, as the decision making will be trusted as fair also with those who would have preferred another outcome (the democracy principle).

Today, the governance methods we use to make sense of the complexity of risk assessment and justification are driven by the doctrine of scientific truth and the strategies of political positionism and economic profit.

- For the assessment of what is an acceptable health risk for society, one would wonder whether these methods:
  - really enable the right to co-decide (as a principle of justice);
  - are really able to generate societal trust by way of their very method.

One could wonder how, in the broader societal context, virtues relevant for safety culture and radiological protection (beneficence, non-maleficence, prudence, justice, dignity, honesty, truthfulness, empathy...) can over-work in a world still ruled by the doctrine of scientific truth and the strategies of political ‘positionism’ and economic profit.

It seems as if these virtues always need to resist the methods driven by these doctrines and work against them.
The challenge for science is to go beyond its traditional quality criteria.

- **Objective**
  - Ask a Question
  - Do Background Research
  - Construct a Hypothesis
  - Face the Impossibility to Test Your Hypothesis by Doing an Experiment
  - Analyze Your Data?
  - And Draw a Conclusion?
  - Communicate Your Results?

- **Scientific Method**

- **Peer Review**
4 Seeking societal trust: the challenge for science
The Nuclear Expert in parliament

The Nuclear Expert, claiming that nuclear energy technology is an acceptable energy technology, and this by arguing that

- recent estimates of commercially available natural resources
- and the potential role of breeders to produce more
- are based on the uranium resources are sufficient
- and on our estimates with regard to waste disposal and NPP dismantling
- and on our estimates with regard to waste disposal and NPP dismantling
- and on the assumption of the nuclear fuel cycle's low risk estimates for waste disposal and dismantling and the availability of
- and on the assumption of the nuclear fuel cycle's low risk estimates for waste disposal and dismantling and the availability of
- the price of nuclear electricity is base load competitive
- our probabilistic safety assessment, this use of the LHT hypothesis
- our probabilistic safety assessment, this use of the LHT hypothesis
- the safety norms of less responsible regimes
- our safety culture regimes and the openness of new technology
- our safety culture regimes and the openness of new technology
- the promise of responsible regimes and the great possibility of
- the promise of responsible regimes and the great possibility of
- our simulations of future conditions of radioactive waste disposal sites
- and on the promise of future waste treatment technologies
- our simulations of future conditions of radioactive waste disposal sites
- and on the promise of future waste treatment technologies
- we believe that
- we believe that
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- we believe that
Seeking societal trust: the challenge for science
What can we know? What can we do? Thinking beyond pro-contra

1, 2 and 3

- can be overcome by way of an open and transparent dialogue

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<th>Limited resources</th>
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<td>CO2 emissions</td>
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- significantly underestimated CO2 emissions
- insufficient not enough prior evidence, forecasts & demands

- statistical uncertainty
- being open and transparent in dealing with incomplete & speculative knowledge
- in principle, it is sufficient to try to acquire knowledge, apply causal reasoning and make fair estimates about the situation (which means that it is an easy task)
- Evidence can be found in the method, in the sense that we could compare different views and try to find out why they differ.

We could draw conclusions from those comparative assessments, reach a consensus on the knowledge base and inform policy about these

- The result would be an estimate that is supported by societal trust because of the deliberate and inclusive research method and not because of a predicted scientific proof

- In addition, also comparison of nuclear with alternatives is possible
- The consequences the knowledge can be adopted continuously
- It would not be too bad if we would turn out to be wrong
4. Seeking societal trust: the challenge for science
What can we know? What can we do? Thinking beyond pro & contra

- Need for an open and transparent dialogue is needed, but it can never generate societal trust itself.
- Limited resources
- Significantly underestimated CO₂ emissions
- Subsidies, not enough provisions for waste & dismantling
- TVC, Chernobyl, Fukushima, and lack of human error: force majeure
- Misuse, irresponsible regimes, proliferation, tensor
- Unproven technical solutions, questionable social solutions
4. Seeking societal trust: the challenge for science
What can we know? What can we do? Thinking beyond pro-con arguments

<table>
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<th>Evidence can only be found in the method</th>
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<td>the stability and reliability of the fuel market</td>
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<td>significantly underestimated CO2 emissions</td>
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<td>the competitive price of nuclear electricity in base load applications, not enough research for waste management</td>
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- Unproven technical solutions, questionable social solutions
- Available solutions for radioactive waste disposal
- Unproven technical solutions, questionable social solutions
- Good NPP safety records of modern and safer future plants
- Th233, MOX, PWR/k generating plants, human error focus makes some
- The stability and reliability of the fuel market
- Significantly underestimated CO2 emissions
- The competitive price of nuclear electricity in base load applications, not enough research for waste management

4. Seeking societal trust: the challenge for science - Post-nuclear accident situations instead of intellectual solidarity - Fukushima

The issue of the so-called 100 mSv threshold is an issue in urgent need of formal public intellectual confrontation between all responsible and concerned parties.

- There is major support for the view that no such threshold exists and that one needs to maintain the linear relation between radiation dose and risk (IOM) based on the precautionary principle.
- Who shall take the initiative to launch and organise this confrontation?

[Image of Fukushima nuclear power plant with additional text: "Modelling the Health Risks from Exposure to Low Levels of Ionising Radiation"]

4 Seeking societal trust: the challenge for science

Our current knowledge on low radiation dose effects

1. We have evidence of adverse health effects below 100 mSv, which means that we can say for sure that the 100 mSv threshold hypothesis is false;

2. Accumulating evidence tends to favour a proportionate relationship at low doses between radiation dose and cancer risk, but there is no definitive conclusion.
   This insight supports the idea that the Linear Non-Threshold hypothesis that was first introduced based on the precautionary principle is the right hypothesis to maintain;

3. We have scientific discussions going on with regard to possible concrete health effects of low doses in concrete situations such as the scientific discussion on the INWORKS study and the scientific discussion on possible thyroid cancer with children in Fukushima.
   As long as serious scientific discussions are taking place, we have to acknowledge that there is no definite scientific conclusion on the actual manifestation and predictability of these concrete health effects in these concrete situations.

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4 Seeking societal trust: the challenge for science

Post-nuclear accident situations in need of Intellectual solidarity – Chernoby!

[World Press photo 2006]

http://www.greenpeace.org/international/releases/greenpeace-viet-world-press-af/
4 Seeking societal trust: the challenge for science
The challenge for science is the construction of credible hypotheses

- Confronted with the need to deal with incomplete and speculative knowledge and value pluralism, the challenge of science in risk governance is not the production of credible proofs; it is the construction of credible hypotheses.
- The challenge is there as well with respect to the issue of justification of risk-inherent energy technologies in energy governance.
- With respect to issues of protection, restoration and compensation in crisis situations.
- In the general interest of rendering hypotheses with credibility and following the principle of trust by method instead of proof in risk governance.

Science has no choice but to involve society in general and the (potentially) affected in particular in producing its hypotheses.

5 The real problem (a critical theory of modernity)

References

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The real problem (a critical theory of modernity)

The social problems we face today are ultimately complex.

Characteristics of a complex social problem:

1. Diversified impact
   - Individuals and/or groups are affected by the problem in diverse ways (direct, positive or negative, variable over time, delayed, etc.).

2. Interdependence
   - The problem is caused and/or influenced by multiple factors (social, economic, technical, natural) and affects itself to other problems. Interdependence can change in time. (The concept of cascading impacts)

3. Organisational complexity
   - Due to the character of diversified impact and interdependence, problems need to be tackled together in a coherent and holistic approach.

4. Relative responsibilities
   - Due to the character of diversified impact and interdependence and the organisational complexity, responsibility cannot be assigned to one specific area. Responsibilities are relative in two ways:
     - Breakdown of responsibility: one can escape responsibility or dependence on the responsibility of another actor.
     - Breakdown of organisational responsibility: one needs to have a responsible actor in the case that we need to handle consequences of a crisis or decision by a new government, the next generations.)
5. The real problem (a critical theory of modernity)
Characteristics of a complex social problem

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<td>diversified impact</td>
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<td>organisational complexity</td>
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<td>relative responsibilities</td>
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<td>knowledge problem</td>
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<td>evaluation problem</td>
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<td>authority problem</td>
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- diversified impact
- interdependence
- organisational complexity
- relative responsibilities
- knowledge problem
- evaluation problem
- authority problem

The authority of actors who evaluate and judge the problem and rationalise their interests and responsibilities is relative, which gives other actors the opportunity to question the validity of the judgements and the legitimacy of the authority.
5. The real problem (a critical theory of modernity)
The real problem: obsolete but strategically maintained governing methods that hinder the possibility of intellectual solidarity.

Today, we have four so-called 'governing methods' concerned with the organization of our society: representative democracy, the liberal market, science and education.

Representative democracy, the liberal market and science are 'modern' because they can be seen as results of modernity as an emancipation process.

Typically modernity is the fact that these governing methods do not question the legitimacy of their authority, as what they do is tested by some form of 'internal control' (their 'internal logic').

- **Representative democracy**
  - as the search for compromise through organized conflict of opinion between parties, representing specific ideologies, and maintained within the nation state.

- **The free and competitive market**
  - as the self-configuring system of competition that automatically annihilates unsuccessful commercial projects and that serves as the motor for innovation.

- **Objective science**
  - in its reliance upon the scientific method and self-control through peer review.

5. The real problem (a critical theory of modernity)
The real problem: obsolete but strategically maintained governing methods that hinder the possibility of intellectual solidarity.

The idea is that the traditional representative democracy has the capacity of...
6 | An ethic of care for our modern coexistence

Ethics: Judging in absence of evidence

Ethics: As moral agents

- being concerned with questions and concepts of ‘what ought to be’
- rights and responsibilities

In absence of ‘evidence’ that would facilitate

straightforward judgement, consensus and

consequent action.

→ ‘what ought to be’
- a good society, a fair society
- to act responsibly
- being good, leading a good life

→ missing evidence
- a convincing scientific proof
- a democratically constituted law
- a universal principle to guide moral evaluation or action

Non-avtive ethical theories

- seeking reference in ‘universally applicable principles’
- (Cantian) deontology, consequentialism (utilitarianism)

- danger
- risk of overlooking the particulars of specific situations

- seeking reference in evaluating particular situations
- particularism

- danger
- risk of self-protective relativism (cultural, social, political)

- seeking reference in virtues (being good)
- virtue ethics (Aristotelian)

- problem
- virtues do not (always) unambiguously translate into concrete action

- seeking reference in the care for human relationships
- ethics of care

- problem
- works for close relations with known people; unclear how it could work for distant relations with strangers
6 An ethics of care for our modern coexistence

The trouble with complex social problems is not their complexity but the formal methods we use to make sense of them (in politics, science, the market and education).

The idea of complexity enables an ethics of care that could work for our distant relationships with strangers.

6 An ethics of care for our modern coexistence

The “fact of complexity” brings along three new characteristics of modern coexistence

- **Connectedness**: We are connected with each other in complexity. We cannot any longer escape or avoid it. Fair dealing with each other implies a fair dealing with the complexity that binds us.

- **Vulnerability**: In complexity, we become intellectually dependent on each other while we face our own and each other’s authority problem. We should care for the vulnerability of the ignorant and the confused, but also for mandated power.

- **(Need for) Commitment**: Our experiences now extend from the local to the global. As intelligent reflective beings, to become involved in deliberating issues of general societal concern becomes a new source of meaning and moral motivation.
An ethics of care for our modern coexistence. The new characteristics of coexistence imply the need to be intellectually solidarity in the way we make sense of complexity for social organisation.

**Connectedness**
- Intellectual solidarity as an ethical commitment
- The joint preparedness to enable and participate in intellectual confrontation with respect to the roles we use to define our interests, hopes, hypotheses, beliefs and concerns to relativise our uncertainties and doubts

**Vulnerability**
- The joint preparedness to acknowledge each other’s authority problem & the vulnerability of the next generations

**Sense of Commitment**
- The joint preparedness to enable and support intellectual emancipation of others with a view to providing every human being with the possibility to develop a self-critical sense and to be a self-critical actor in society.

Today, we don’t live in a world inspired by intellectual solidarity, but we have the capacity to foster it and to put it in practice.
6. An ethics of care for our modern coexistence: A sense for intellectual solidarity implies one common virtue for everyone concerned.

- reflexivity as an ethical attitude (an ethical 'experience')
  
  the own position interests, hopes, hypotheses, believes and concerns, and this in any formal role or social position as scientist, engineer, politician, manager, citizen, civil society representative, activist,...)

- adopting this attitude requires reflexivity as an intellectual skill

- seeing the bigger picture and yourself in it

- with your interests, hopes, hypotheses, believes and concerns

George Santayana: "Aristotle, plato... the dull of ages"
An ethics of care for our modern coexistence

A sense for intellectual solidarity implies one common virtue for everyone concerned

reflexivity as an ethical attitude (an ethical “experience”)

with respect to

the own position, interests, hopes, hypotheses, beliefs and concerns, and this in any formal role or social position as scientist, engineer, politician, manager, citizen, civil society representative, activist, …

seeing

the bigger picture

and yourself in it

An ethics of care for our modern coexistence

Trust by method as overall quality criterion

An “ethics of care” to deal with the complexity of social organisation has societal trust as its overall quality criterion.

Not the trust that the outcome of deliberation will be the “correct one”, but that this method is the best we can use given the complexity of the problem.

The democracy principle:

being able to accept an unpreferred outcome of decision making based on the knowledge that the method of decision making was fair.

What method of decision making has the potential to be judged as fair by everyone in consensus?

traditional criteria: transparency, openness, inclusiveness

In order for the method to be able to generate trust with its intended character of fairness, it should be transparent in itself.

In practice, this means that every decision-making process should be accompanied by a deliberation on the form of that process itself.
6. An ethics of care for our modern coexistence
   Intellectual solidarity requires new practical forms of democracy, research and education

   - Intellectual solidarity as a joint ethical commitment and reflexivity as an ethical attitude, motivated and given meaning to new practical forms of democracy, research and education.

   - Inclusive democratic deliberation as a collective learning process, bottom-up, connecting the local and the global.

   - Transdisciplinary and inclusive research, seeking synergy between expert knowledge and local indigenous knowledge.

   - Education inspired by plurality and with a focus on developing an ethical sense and the capability of critical contextual thinking.

   We don't need to wait for a utopian reform of society. These new forms of democracy, research and education are possible today.

7. An ethics of care for radiological protection
   An ethics of care for our modern coexistence supports the value of the principles of fairness in risk governance

   connectedness

   - An ethics of care perspective on our modern coexistence bound in complexity provides a powerful reference to defend the principles of precaution.

   - Informed consent.

   - Inclusion of the potentially affected.

   - Accountability towards next generations.

   - Against the doctrine of scientific truth and the strategies of political (positionism) and economic profit.
7 An ethics of care for radiological protection
An ethics of care for our modern coexistence gives new meanings to the ethical values (virtues) underpinning the system of radiological protection

connectedness

vulnerability

(sent for) commitment

For every professional (scientist, engineer, medical doctor, manager, or policy advisor) concerned with radiological protection, the virtues of beneficence, non-maleficence, prudence, justice, dignity, honesty, truthfulness, empathy...

receive an enriched ethical meaning when understood as grounded in a care for human relationships ‘bound in complexity’

The justice of justification, ensured by the possibility of self-determination of the potentially affected (enabling their right to be responsible) should be the central concern of risk governance and related systems of protection.

The system of radiological protection cannot and should not be stretched to provide the full rationale for societal justification.

In its recommendations, the ICRP could include critical considerations on why and how politics and science should foster the possibility of self-determination and involvement of the potentially affected as a way to ensure fairness in justifying radiation risk taking into account the different application contexts.

Given the central role of science in radiological protection, the ICRP should actively promote a ‘rich’ conception of science, being transdisciplinary and inclusive science.

That science would in principle be able to inform policy in a more reflective and thus deliberative way while it would at the same time be more resilient to strategic interpretations of its produced knowledge and hypotheses from out of politics, civil society and the market.
13. TOPIC A: OPENING PRESENTATION

Inspection Activities during the Transition from an Operating Reactor to a Defueled Status with a Commitment to Permanently Cease Power Operations

Committee on Nuclear Regulatory Activities (CNRA) Working Group on Inspection Practices (WGIP)

13th International Nuclear Regulatory Inspection Workshop (INRIW)

Leader: Alexandre Leblanc, Canada
Co-Leader: Christopher Regan, USA

Hosted by FANC and Bel V
Bruges, Brussels: April 17-21, 2016
Introduction

- WGIP exists to facilitate the exchange of information and experience related to regulatory safety inspections between member countries.
- The next few days will allow each of us to share what our respective regulatory bodies (RB) are doing or will do when an NPP is permanently shutdown.
- Other groups will be discussing
  - Inspection of Modifications
  - The Inspector’s Role in the Enforcement Process

Why was this topic selected?

Timely
- Several recent premature permanent shutdowns
- Known permanent shutdowns will soon follow

Discuss potential challenges faced by RBs
- Rethink baseline and plant specific inspection programmes
- Adapt inspection practices
- Address unresolved safety concerns
Important Reminder

- **Transition phase** is defined as the time frame between the licensee’s commitment (announced or unannounced) to permanently cease power operations and final defueling of the reactor vessel.
  - the RB may be given minimal advanced notification
  - the RB may be given significant advanced notification

Canada: Gentilly-2 NPP

**RB given minimal advanced formal notification**
- Single unit, CANDU 600
- Gross electrical output of 675 MWe
- Owned and operated by a provincial public utility
- Commercial operation began 1983
- 800 employees
Canada: Gentilly-2 NPP (cont’d)

Timeline

- From 2000 to 2012, licensee spent $1 billion CAD on engineering and procurement
- 04 September 2012, new provincial government elected
- 20 September 2012, closure of Gentilly-2 announced
- 29 December 2012, NPP shuts down
- 03 September 2013, reactor core defueled

Canada: Gentilly-2 NPP (cont’d)

- Licensee had to develop an End of Operation Plan
  - had not planned nor prepared for permanent shutdown
  - decommissioning strategy and preliminary decommissioning plan out-of-date
- RB had to rapidly revise its baseline and plant specific inspection programmes (i.e. work plan)
  - what do you inspect – what don’t you inspect – during the 11 month transition phase?
  - do you change the scope and level of effort of certain inspections?
  - are potential corrective actions useful in the long term?
USA: Vermont Yankee NPP

RB early awareness, but no formal notification

- Single unit, GE BWR-4, MK-I
- Gross electrical output of 620 MWe
- Owned and operated by Entergy
- Commercial operation began 30 November 1972
- 600 employees

USA: Vermont Yankee NPP (cont’d)

Timeline

- Since 2010 state legislature had voted to block the Public Services Board (determines electricity rate base) from allowing continued plant operation *BUT*...
- 21 March 2011, NRC issued a license to continue plant operations to 21 March 2032
- In 2013 licensee sues the State of Vermont for right to stay open and wins (national law overrides state law)
- *...plant continues to operate...for a while*
USA: Vermont Yankee NPP (cont’d)

Timeline (cont’d)
• 18 August 2013, licensee publically announces its intent to shutdown on 31 December 2014
  – but does not notify RB
• 23 September 2014, licensee formally notifies RB
• 29 December 2014, NPP shuts down
• 12 January 2015, reactor core defueled
  – defines termination of license to operate - licensee CANNOT restart the reactor

USA: Vermont Yankee NPP (cont’d)

Early indications (informal)
• Awareness that the licensee had not purchased fuel for the next operating cycle (~18 months)
• Ongoing legal issues with the State of Vermont and local community
• 18 August 2013, licensee publically announces its intent to shutdown on 31 December 2014
USA: Vermont Yankee NPP (cont’d)

• RB continued inspection programme unabated for an operating power reactor
  - risk factors do not change regardless of the licensee *intent* to decommission

  HOWEVER...

• Some areas of inspection “refocused”
  - Component Design Basis Inspections (CDBI) looked at components and systems likely to be used during the decommissioning phase
  - additional Problem Identification and Resolution (PI&R) samples were performed
  - increased resident inspector control room observations

Question 1, Framework
1.1 What are your RB’s regulatory requirements governing the transition from an operating reactor to a decommissioning reactor?

• Generally, same regulatory requirements apply to operating and transition phases
Question 1. Framework
1.2 When is it no longer considered an operating reactor? Describe the factors and criteria used in this consideration.

No longer operating reactor
• When reactor core is completely defueled
• Measures implemented to ensure permanent fuel removal

No longer operating plant
• New license for decommissioning and dismantling (Canada, Germany, Mexico)
• Approval of decommissioning plan by RB (India, Japan)
• After completion of preparatory work, which may include modifications and installation of new systems (Switzerland–Mühleberg)

Question 2. Inspection Programme
2.1 Describe how and when your RB expects to be informed by the licensee that they commit to permanently cease power operations (e.g. informally vs. formally, timeframe).

• Some countries have requirements explaining when and to whom licensees must provide notification of permanent shutdown
  - Royal Decree describes process for notifying RB (Belgium)
  - Act says Minister and RB must be notified at least 2 years before shutdown or ASAP if shutdown to occur sooner (France)
  - Grid authority and RB must be notified 6 months before shutdown (Germany)
  - RB notified one year before shutdown (Mexico)
  - Act/regulation says Ministry must be notified at least 1 year before shutdown (Spain)
  - Requirement says once decision made to shutdown, licensee must notify RB within 30 days (USA)
• No requirements (Canada, India, Sweden, Switzerland, UK)
• Infer (Korea, Spain)
Question 2. Inspection Programme

2.2 When the licensee has committed to permanently cease power operations, does your RB’s inspection programme change?

- No change (Japan, Russia, Switzerland, USA)
- No change to baseline inspection programme (Germany, Sweden)
- Plant specific inspections are conducted to verify activities associated with the end of operation and preparations for shutdown and decommissioning (Belgium, Canada, France, Germany, India, Korea, Mexico, Spain, Sweden, UK)
- More frequent focused/reactive/special inspections

Question 2. Inspection Programme

2.2(a) Describe changes to the inspection programme (e.g. scope, frequency, etc.).

- More inspections (or increased scrutiny) in areas such as
  - PBR (Canada, US)
  - Human factors as well as modifications/backfitting originating from PSR and post-Fukushima (France - Fessenheim)
  - Staffing levels, qualification of staff, motivation, safety culture and organisational arrangements & structure (Belgium, Germany, Sweden, Switzerland, UK)
  - Relationship between RB and licensee, work climate (France - Fessenheim)

- Less inspections in areas such as
  - Modifications/backfitting (Germany)
  - Systems (Canada – Gentilly-2)

- Increase focus on systems used for defueling (UK)
Question 2, Inspection Programme

2.2(b) Describe how risk is considered when changing the inspection programme?

- Identify safety relevance of structures, systems and components (SSC)
  - what’s required once the reactor is in a guaranteed shutdown state?
- Identify licensee activities
  - activities that occur only once in the life of an NPP may carry more risk
- Verify that safe operation of the NPP is maintained
  - human and organisational factors may carry more risk
  - criticality risk is reduced

Question 2, Inspection Programme

2.4 Describe how your RB modifies its inspection programme in the following instances:
(a) with significant advanced formal notification or informal awareness (years); and
(b) with minimal advanced formal notification or informal awareness (months)

- Generally, RBs do not distinguish between these scenarios
  - modify their inspection programme in the same manner whether they have significant or minimal advanced knowledge of shutdown (see question 2.2(a))
Question 2. Inspection Programme
2.5 When are the changes to your RB’s inspection programme implemented in relation to the date the licensee intends to permanently cease power operations?

- Generally, no regulatory requirements wrt timeframe
- Some time before shutdown (Belgium, Canada, France, Germany, India, Mexico, Spain, Sweden, UK)
- As soon as RB is notified of intention to shutdown (Sweden, Switzerland)
- After defueling (Japan, Russia, USA)

Question 2. Inspection Programme
2.6 Describe how your RB addresses unresolved safety concerns (e.g. those found in Periodic Safety Review, non-compliances, modifications, etc.) and inspection findings upon becoming aware that the licensee is committed to permanently cease power operations.

Two approaches

1. Perform analysis of unresolved issues
   - Who? RB or licensee?
   - Determine relevance of issue
   - Establish if time at risk is acceptable or not
   - Agreement reached between RB and licensee
   - Licensee implements corrective actions to mitigate ‘unacceptable’ risks

2. Licensees expected to continue implementing corrective actions up until shutdown
Question 3. Scope of Inspections

3.1 Does your RB identify and define, by internal procedure/process or otherwise, differences in the scope and level of effort of inspections conducted during the transition phase (compared to the same inspections conducted prior to the transition phase)? If so, describe how the identified inspections are modified.

- About half do and half do not
- Scope and level of effort are modified based on
  - licensee activities
  - SSCs to remain in-service/to be taken out of service
  - changes to licensee programmes
  - operating experience
  - professional judgement
  - RB resources

3.2 With respect to the scope and level of effort of inspections, which areas increase in importance, which areas decrease in importance and which areas maintain their importance? Give a brief comment explaining why.

- Control of foreign material
- Corrective action program
- Design basis inspections (e.g. systems, structures, components)
- Emergency preparedness (e.g. programme, exercises, availability of emergency response facilities)
- Environmental issues
- Equipment qualification (e.g. maintaining level of requirements)
- Financial resources (e.g. cost reduction plans, staffing, materials, etc.)
- Fire protection
- Housekeeping
- In-service inspections (periodic tests)
- Industrial safety (personal safety)
- Licensee interaction with external stakeholders
- Maintenance activities
- Management of contractors
- Modifications (permanent and temporary)
- Organization and general management
- Qualification of licensee staff or contractors (e.g. new staff, language challenges, preservation of knowhow)
- Quality assurance
- Radiological protection
- Safety culture (e.g. motivation of staff, staff turnover)
- Staffing levels (e.g. minimum shift complement, Emergency Response Team, etc.)
- Subcriticality and fuel safety
- Training programmes
- Waste management
Question 4. RB Organisational Management

4.1 Describe how your RB manages internal changes to face new challenges resulting from a licensee’s commitment to permanently cease power operations and to verify the continued effectiveness of its inspection capabilities. Include in your response a discussion of the following areas:

(a) organizational structure of the RB

• Generally, no significant changes during transition phase

(b) changes to the number of inspectors

• Generally, no change in number of inspectors
• Reduction in number of inspectors (Canada)
Question 4, RB Organisational Management
4.1 Describe how your RB manages internal changes to face new challenges resulting from a licensee’s commitment to permanently cease power operations and to verify the continued effectiveness of its inspection capabilities. Include in your response a discussion of the following areas:

(c) training of inspectors
- Generally, no changes
- Raise awareness of impact on human & organisational factors and safety culture

(d) safety culture (e.g. motivation of inspectors)
- Ensure employment in other areas of the RB
- Same inspectors responsible for decommissioning

- Cross-inspections with other RBs (Belgium, France, Switzerland)
- Visit of plants under decommissioning
- Participation in international forums (e.g. conferences, technical meetings, working groups, workshops and training courses)
- RB OPEX clearinghouse reviews events (e.g. those in the International Reporting System for Operating Experience)
- Information exchange between RBs (Germany, Switzerland)
Other topics that you would like to discuss

- How do you inspect staffing levels, morale, motivation and organisational changes?
- How do you adapt inspection practices to suit quickly changing conditions?
- When should you modify your inspection programme?

Workshop Goal

- Identify commendable inspection practices by RBs for gaining confidence that safety will be maintained during the transition phase.
Ground Rules

• Stay on topic
• Share experiences and ideas
• Equal opportunity to talk
• Listen to others
14. TOPIC A: CLOSING PRESENTATION

Commendable Practices from Groups 1 & 2

Inspection Activities During the Transition from an Operating Reactor to a Defueled Status with a Commitment to Permanently Cease Power Operations

Committee on Nuclear Regulatory Activities (CNRA)
Working Group on Inspection Practices (WGIP)
13th International Nuclear Regulatory Inspection Workshop

Leader: Alexandre Leblanc, Canada
Co-Leader: Christopher Regan, USA
Hosted by PHC and IEL V
Bruges, Belgium: April 18 to 20, 2016
Workshop Discussion Group

**Group 1**
- Alexandre Leblanc, Canada
- Dirk Asselberghs, Belgium
- Frederik Van Wonterghem, Belgium
- Matthias Papra, Germany
- Helmut Scheib, Germany
- Junichi Kimura, Japan
- Hans Rudolf Fierz, Switzerland
- Takayoshi Nezuka, NEA

**Group 2**
- Christopher Regan, USA
- Chantal Mommaert, Belgium
- Kristof Van Cutsem, Belgium
- Marcel Buchholz, Germany
- Walter Glöckle, Germany
- Chang Ju Lee, Korea

Workshop Objectives

- Share and exchange information between workshop participants on the impact of the transition phase on RB inspections practices and inspection programs
- Identify commendable inspection practices by RBs for gaining confidence that sufficient oversight of licensee activities will be maintained during the transition phase
Introduction

• Commendable practices (CP) were established relative to the transition phase which is defined, for the purposes of this workshop, as the time frame between the licensee’s commitment to permanently cease power operations and final defueling of the reactor vessel.
• It is possible that these CPs may be applicable beyond the transition phase.
• Not all CPs are specific to inspection activities but were deemed applicable to this workshop topic.

Challenges

• Is the NPP really shutting down?
• Shutting down could be a sudden licensee decision.
• Transition periods may vary widely (e.g. 5 years vs. 3 months).
• How would the RB deal with a licensee faced with significant financial resource challenges (e.g. bankruptcy)?

Observation

• Licensee financial resources should be a factor which is considered by the RB to understand licensee decisions during the transition phase.
Major Focus Areas

- RB’s Programme
- Technical Inspection Activities
- Safety Culture

RB’s Programme

- **CP1**: The RB should be prepared for the transition phase.
  - Define the information needed from the licensee to establish an appropriate inspection programme (e.g. proposed changes to technical specifications, plant modifications and the licensee’s organisation etc.)
  - Establish communication scheme with the licensee to ensure appropriate awareness of future licensee actions (e.g. provide sufficient time for inspection planning)
  - Ensure that adequate licensee performance indicators are in place
  - Conduct an analysis to determine RB inspection programme changes
  - Conduct an analysis of necessary RB organisational changes (preferably prior to an announcement of a plant closure)
RB’s Programme (cont’d)

- **CP2**: The RB’s inspection programme should be optimized to ensure appropriate oversight of licensee activities during the transition phase.
  - Available inspection resources should be focused in areas of most benefit
  - Inspection programme should have sufficient flexibility to allow moving inspection resources from areas of less importance to areas that increase in importance
  - Some inspections may not be necessary if the plant is only to be operated for a short period of time (e.g. certain design basis inspections)

RB’s Programme (cont’d)

- **CP2**: The RB’s inspection programme should be optimized to ensure appropriate oversight of licensee activities during the transition phase. (cont’d)
  - The RB inspection effort should be proportional to the licensee’s activities (e.g. increase or decrease level of effort of inspections - major plant modifications)
  - Changes to the inspection programme take into account inspection findings
RB’s Programme (cont’d)

- **CP3**: Inspection resources should not be reduced until the transition phase is complete.
  - Still a fully functional reactor

**RB’s Programme (cont’d)**

- **CP4**: The RB should establish a programme to evaluate the licensee’s safety culture during the transition phase.
  - RB inspectors should receive adequate safety culture training
  - The RB should ensure it has sufficient expertise to assess safety culture issues
  - RB programme should develop safety culture indicators (e.g. motivation, morale, staff workload, relationship between RB and licensee)
  - Includes a process to analyse and trend safety culture data
  - The programme should recognise that at multi-unit sites/licensees where at least one unit remains operational, the safety culture consequences (e.g. resulting from job losses) may not be so important or significant
Technical Inspection Activities

- **CP5**: The RB should increase oversight and inspection of the licensee’s safety culture during the transition phase.
  - Baseline inspection data is obtained
  - Immediate inspection upon announcement of NPP shutdown
  - Safety culture inspections are performed at sufficient intervals to obtain data for trending
  - Assessment scope should be sufficiently diverse to obtain an overall image of the licensee’s safety culture

Technical Inspection Activities (cont’d)

- **CP6**: The RB should inspect outstanding regulatory commitments that continue to remain applicable up to the end of the transition phase.
  - Licensee should identify regulatory commitments that are no longer applicable, justify why, and obtain RB approval
Technical Inspection Activities (cont’d)

• **CP7**: The RB should assess and inspect the licensee’s evaluation of actions to be taken in response to identified non-compliances. More specifically, the RB should provide special consideration in the following areas during the transition phase:
  - What is the safety relevance or safety significance of the finding?
  - How firm is the commitment to shutdown the NPP?
  - What are the alternative compensatory measures proposed by the licensee?
  - How long does it take the licensee to make the change?
  - How long will the licensee’s actions be in effect before end of life?
  - Will the action or change be useful beyond the transition phase?
  - What are the external pressures to implement changes (e.g. public)?

Technical Inspection Activities (cont’d)

• **CP8**: During the transition phase, the RB should conduct inspections to verify that the licensee has control and understands the configuration of systems, structures and components (SSC).
  - Systems that have a safety function, that are functional or that are abandoned are defined and labeled
  - System boundaries are clearly defined (e.g. when a system is modified and part of it is abandoned)
Technical Inspection Activities (cont’d)

• **CP9**: The RB should inspect for changes to the licensee’s maintenance programme to identify reductions in maintenance activities of safety related SSCs that could negatively impact the level of safety.
  - Which safety related SSCs are required pre shutdown and which are required post shutdown?

• **CP10**: The RB should inspect licensee organisational changes for the transition phase.
  - Review the licensee’s analysis of organisational changes
  - Are the changes appropriate and effective?
  - Are sufficient staffing levels maintained?

Technical Inspection Activities (cont’d)

• **CP11**: The RB should increase inspections of the licensee’s oversight of contractor performance during the transition phase.
  - High probability of less licensee staff and more contractors
  - Contractor staff is integrated into the licensee’s safety culture and is trained on human performance tools and safety culture expectations
Technical Inspection Activities (cont’d)

- **CP12**: If the licensee increases fuel handling activities, the RB should increase inspections in that area.
  - Fuel handling in spent fuel pool
  - Dry cask loading activities
  - Heavy load lifting
  - Additional radiation protection inspections
- **CP13**: If the licensee increases its effort in waste management, the RB should increase inspections in that area.
  - May also need additional radiation protection inspections

Safety Culture

- **CP14**: The RB should ensure that the licensee has implemented a process/programme for two-way communication between licensee management and staff.
  - Reaffirm safety expectations and future changes
  - Methods of communication may include verbal, website, etc.
15. TOPIC B: OPENING PRESENTATION

Inspection of Modifications

Committee on Nuclear Regulatory Activities (CNRA)
Working Group on Inspection Practices (WGIP)

13th International Nuclear Regulatory Inspection Workshop

Leader: Paul Smith, United Kingdom
Co-Leader: Pierre Barras, Belgium

Hosted by Belgian Federal Agency for Nuclear Control and Bel V
Bruges, Belgium: April 17-21, 2016
Background


- This workshop task builds on previous work and gives particular attention to temporary modifications.

- This task also considers the regulatory approach to non-identical replacement parts.

Current Commendable Inspection Practices - Modifications (1994 WGIP workshop)

All modifications should be classified by the licensee according to safety significance. This may indicate to both the licensee and the regulatory body the degree of safety assessment that is needed.

Assessment by the regulatory body may comprise of:

- applicability of design standards, safety classifications and reasons for modification
- review of licensee’s safety assessment, design calculations, documentation and arrangements for radiation protection, where appropriate
- risk assessment
- quality assurance plans
- component qualifications and construction testing, e.g., weld examinations
- commissioning programmes and results
- limits and conditions both during commissioning and during subsequent normal operation
- maintenance and testing arrangements
- operability and plant status (particularly during commissioning)
Current Commendable Inspection Practices - Modifications (1994 WGIP workshop) - Continued

The regulatory body authorises modifications of high safety significance before they are brought into full operation. Large and complex modifications are often authorised in stages, by separately authorising the manufacturing, construction, commissioning, and full operation phases.

The regulatory body can sample planned modifications of lower safety significance and intervene where necessary.

The regulatory inspection authority monitors the plans and progress of all modifications of both major and minor safety significance, and intervenes as necessary. By this means, the regulatory body may require modifications of low safety significance to be assessed and authorised by the regulatory body before being implemented.

The regulatory inspection authority checks:
- Implementation of quality assurance programmes
- the fabrication, testing and commissioning activities including design, installation, assembly control and implementation
- installation procedures
- operator training activities
- changes to operating and emergency procedures
- as-built-documentation
- test and commissioning procedures
- test and commissioning results

The regulatory inspection authority witnesses checks at hold points specified by the regulatory body, such as hold points during manufacture, installation, and commissioning. This inspection approach may apply particularly during large and complex modifications.
Review of Questionnaires

Questionnaire B

- Temporary modifications
- Non-identical replacement parts

What do we learn from the questionnaire responses?

Responses from 20 countries

Temporary Modifications

Q1 - Does your RB have a definition of a temporary modification (e.g. limited in time)? If so, please supply the definition.

A number of countries have a definition for temporary modifications (Belgium, Canada, Czech Republic, Germany (one RB), Hungary, Mexico, Slovenia and Spain).

The definition of temporary modification is not consistent:
- Time limited, typically: few weeks (Germany), 3 months (Mexico) to 1 year.
- Required for unforeseen operational or safety needs (Spain, Mexico).
- Low safety significance (Germany, Slovenia).
Temporary Modifications
Q2 - Does your RB have a different oversight process for temporary modifications and permanent modifications? If yes, what are the key differences?

The majority of countries adopt the same regulatory approach for temporary and permanent modifications.

Some countries have less stringent requirements for temporary modifications (Belgium, Hungary, Germany (one RB), Slovenia), generally because they are of lower safety significance.

Some countries that reported a different regulatory approach for temporary modifications noted a need to monitor compliance with time limits (Canada, Mexico, Slovenia, Sweden).

Temporary Modifications
Q3 - Does your RB inspect temporary modifications? If yes, how does the RB inspector choose which temporary modifications to inspect?

All countries inspect temporary modifications as part of their compliance programmes.

The majority of countries use the same inspection approach for temporary and permanent modifications. This will include change control processes and sampling of specific modifications.

Most countries select (temporary) modifications for inspection based on safety significance.

Inspection of (temporary) modifications may also be based on:
- Previous experience (Slovak Republic).
- Location (housekeeping) (Sweden).
- As they occur (USA).
Temporary Modifications
Q4 - How is the aggregation of modifications considered by the RB? (for instance the fact that multiple “small” modifications can interact)

A number of countries reported that the aggregation and interrelation of temporary modifications should be considered by the licensee in the safety analysis.

There are opportunities for the RB to consider the aggregation/interaction of temporary modifications at safety review of the modification, routine inspection and periodic review.

Quality management principles and the competence of the design organisation may be considered by the RB (Finland).

Checks are made by the RB that temporary modifications do not interact with other SSCs (Germany).

RB requires limits on the number and duration of temporary modifications (Sweden).

Some countries noted that the matter is not specifically addressed or that such a check may be difficult.

Temporary Modifications
Q5 - Is permission needed from the RB before a temporary modification is started, extended, removed or made permanent?

The majority of countries require RB permission for a temporary modification, depending on the safety significance, licensing basis or screening criteria.

Generally, no specific permissions were identified for starting, extending, removing or making permanent a temporary modification.
Temporary Modifications
Q6 - What is the scope of the inspections performed by the RB during the lifetime of a temporary modification?

Temporary Modifications - Examples of inspection scope:
- Sample based on risk informed insights
- Check modification is classified/graded correctly
- Check that a safety evaluation has been completed
- Check that interactions assessed if several temporary modifications exist
- Check compensatory measures are in place and assumptions correct
- Check implementation is in accordance with safety case/technical standards/documentation
- Check compliance with legal requirements and licensee procedures
- Check adequacy of documentation
- Check commissioning, inspection and testing
- Visually inspect temporary modification on site

Temporary Modifications - Examples of inspection scope (continued):
- Check adequacy of operator aids (labels and tags)
- Check awareness of operators of temporary modifications
- Check if temporary modifications have caused problems or negative impact
- Check if temporary modifications are still necessary
- Check licensee has a system for tracking, review and removal
- Check removal within the approved time period
- Check any extensions to time period are justified
- Check that number of temporary modifications is minimised
Temporary Modifications
Q7 - What experience does the RB have of difficulties or problems associated with temporary modifications? Do you perform analysis of this experience and what are the main causes of problems associated with temporary modifications?

Temporary Modifications - Examples of difficulties:
- Process for approval not formalised
- Temporary modifications remain in place longer than intended
- Discrepancies in documentation or technical justification
- Temporary modifications not identified on plant
- Compensatory actions or controls not adhered to
- Technical standards do not meet nuclear safety requirements
- Implementation before safety evaluation completed
- Operators not aware of temporary modifications
- Temporary (weld) repairs difficult to assess for limited life
- Circumstances may be unique and therefore difficult to evaluate
- Same as for permanent modifications

Non-Identical Replacement Parts
Q8a - What variation compared to the original is permitted? (E.g. considering the specification, manufacturer, quality standard, safety function, materials, technology, shape, size, connections, etc.).

There was a wide range of responses to this question.

Treated as a replacement rather than a modification if:
- Safety function is unaffected
- Original specification/design/performance requirements met
- Same fit, form and function
- Original specification met and manufacturer is the same
- Original specification and qualification requirements met
- Technical requirements met and supplier is approved
- Component/part has been qualified
- Component part is identical
Non-Identical Replacement Parts
Q8b - What is the oversight process of your RB to ensure the licensee maintains the safety of such changes?

Examples of RB oversight activities:
- Inspection of engineering change/modification process
- Inspection of maintenance
- Inspection of quality assurance process and records
- Inspection of compliance with qualification process
- Inspection of safety management system

Additional topics
Related topics that you want to discuss at the workshop?

- Transposition of generic modification to other similar units (Belgium)
- Software modification (Belgium)
- Organisational modification (Belgium)
- Use of operations controlled change process (Canada)
- Equipment qualification (France)
- Impact of ageing (Poland)
- Status of post Fukushima modifications (Slovenia)
Sub-Groups

Group 3:
- Paul Smith, United Kingdom
- Didier Degueldre, Belgium
- Jara Depuydt, Belgium
- Dean Hipson, Canada
- Martti Vilpas, Finland
- István Mészáros, Hungary
- Yusuke Kasagawa, Japan
- Marek Jastrzebski, Poland
- Petr Rubtsov, Russia
- Adnan Kozarcanin, Sweden

Group 4:
- Pierre Barra, Belgium
- Gilles Hermans, Belgium
- Nicolas Noterman, Belgium
- Hana Renova, Czech Republic
- Kim Wahlstrom, Finland
-Paul Berenguier, France
-Simone Stramann, Germany
-A.P. (Arvind Paul) Garg, India
-Francisco José Gallardo Macia, Spain

Topics for discussion

You may wish to consider the following in your group:
- Definition of a temporary modification
- Definition of a replacement part
- Commendable inspection practices for modifications (1994 workshop)
- Information from the questionnaires
- Additional related topics suggested by some countries
Workshop Discussions

Workshop Goal - Identify commendable inspection practices by R6s concerning:
- Temporary modifications
- Non-identical replacement parts

Select topics to be discussed

Ground Rules
- Stay on topic
- Share experiences and ideas
- Equal opportunity to talk
- Listen to others
16. TOPIC B: CLOSING PRESENTATION

Inspection of Modifications
Committee on Nuclear Regulatory Activities (CNRA)
Working Group on Inspection Practices (WGIP)

13th International Nuclear Regulatory Inspection Workshop

Closing Presentation

Leader: Paul Smith, United Kingdom
Co-Leader: Pierre Barras, Belgium

Hosted by Belgian Federal Agency for Nuclear Control and Bel V
Bruges, Belgium: April 17-21, 2016
**Workshop Discussion Groups**

**Group 3:**
- Paul Smith, United Kingdom
- Didier Degueldre, Belgium
- Jara Depuydt, Belgium
- Dean Hipson, Canada
- Martti Vilpas, Finland
- István Mészáros, Hungary
- Yusuke Kasagawa, Japan
- Marek Jastrzebski, Poland
- Petr Rubtsov, Russia
- Adnan Kozarcanin, Sweden

**Group 4:**
- Pierre Barras, Belgium
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- Nicolas Noterman, Belgium
- Hana Renova, Czech Republic
- Kim Wahlstrom, Finland
- Paul Berenguier, France
- Simon Stratmann, Germany
- A. P. Arvind Kulkarni, India
- Francisco José Gallardo Macía, Spain

**Groups 3 and 4**
Workshop Objectives

Build on previous commendable inspection practices concerning the conduct of inspections for plant modifications addressed at International WGIP-Workshop Helsinki, 23-25 May 1994, NEA/CNRA/R(94)4.

Share information and experience between workshop participants to identify commendable inspection practices for regulatory bodies concerning:

- Temporary modifications
- Non-identical replacement parts

Discussion Areas

1. Definition of temporary/permanent modification or temporary configuration
2. Factors taken into account when considering a graded approach to temporary modifications
3. The validity of commendable inspection practices for modifications from the 1994 workshop and their applicability to temporary modifications.
4. Additional inspections for temporary modifications
5. The appropriate balance between process based and performance based inspections by the RB (document/desktop review versus field verification)
6. Ensuring that temporary changes in plant configuration are controlled and time limited to prevent them from remaining in the field for an extended period of time.
7. The oversight process that the RB can use to check that non-identical replacement parts will not affect safety
8. Specific considerations on temporary modifications of software-based equipment
1. Definition of temporary/permanent modification or temporary configuration

Observations

Based on the answers from the questionnaires, there is no consistent definition of a temporary modification (or configuration change), but they are characterised by the following features:

- Temporary modification is a change in plant configuration, SSC’s, procedures, organization, practices, ... for a limited period of time specified beforehand and justified.
- Temporary modifications shall not lead to violation of existing license.
- It may be necessary to implement a temporary modification in response to operational requirements, as a short term solution until a permanent modification can be appropriately reviewed and implemented.
- They are preferably applicable to low safety significant changes (e.g. operational/economic requirements).
- Due to emergent issues, there may be a need for a temporary modification before a permanent repair can be implemented.

1. Definition of temporary/permanent modification or temporary configuration (continued)

Commendable Inspection Practices

- CP1 - The inspector should review licensee documentation to ensure that there is a satisfactory definition of temporary modifications and ensure that the licensee has a process in place accordingly.
- CP2 - The inspector should verify by sampling that the licensee is following their temporary modifications process and maintaining any necessary records.
- CP3 - The inspector should review trends in the licensee’s performance in controlling temporary modifications (e.g. compliance with specified time limits).
- CP4 - The inspector should verify by sampling that the licensee has documented the justification before extending time limits for temporary modifications.
2. Factors taken into account when considering a graded approach to temporary and permanent modifications

**Observations**

The graded approach used by licensees for classifying permanent and temporary modifications is a key factor in determining whether a submission is made for review by the RB.

The graded approach used by licensees for classifying permanent and temporary modifications is often not well defined.

**Commendable Inspection Practices**

CP5 - The RB should evaluate the licensee's graded approach to classifying modifications, taking the following factors into account:

- How the approach considers SSCs
- How the approach takes account of equipment category and classification
- How the approach takes account of plant systems credited in the technical specifications
- How the approach makes use of quantified risk assessment
- How the approach takes account of complexity and the use of proven methods
- How the approach takes into account the worst case consequences of implementing the modification
3. The validity of commendable inspection practices for modifications from the 1994 workshop and their applicability to temporary modifications.

Observations
Review of the 1994 commendable inspection practices for modifications is relevant because the majority of countries use the same inspection approach for temporary and permanent modifications.

The 1994 commendable inspection practices have an emphasis on large and complex modifications which are planned well in advance and may be authorized in stages. Whereas temporary modifications are typically associated with emergent issues and are less complex.

Issues such as plant status and operability are more important in the case of temporary modifications.

Necessary changes to the existing (1994) commendable practices for modifications were identified at the 2016 WGIP workshop (WGIP summary version).

1994 commendable inspection practices — All modifications — Changes
All modifications should be classified by the licensee according to safety significance. This may indicate to both the licensee and the regulatory body the degree of safety assessment that is needed.

Assessment by the regulatory body may comprise of:
- applicability of design standards, safety classifications and reasons for modification
- review of licensees safety assessment, design calculations, documentation and arrangements for radiation protection, where appropriate
- risk assessment
- licensees consideration of OpEx
- quality assurance plans
- component qualifications and construction testing, e.g., weld examinations
- commissioning programmes and results
- limits and conditions both during commissioning and during subsequent normal operation
- maintenance and testing arrangements
- operability and plant status (particularly during commissioning)
3. The validity of commendable inspection practices for modifications from the 1994 workshop and their applicability to temporary modifications.

The regulatory body authorises modifications of high safety significance before they are brought into full operation. Large and complex modifications are often authorised in stages, by separately authorising the manufacturing, construction, commissioning, and full operation phases.

The regulatory body should review the licensee’s processes and procedures for controlling modifications and that it is applied correctly.

The regulatory body can sample planned modifications of lower safety significance and intervene where necessary.

The regulatory inspection authority monitors the plans and progress of all modifications of both major and minor safety significance, and intervenes as necessary. By this means, the regulatory body may require modifications of lower safety significance to be assessed and authorised by the regulatory body before being implemented.

3. The validity of commendable inspection practices for modifications from the 1994 workshop and their applicability to temporary modifications.

The regulatory body/authorised inspection authority checks:
- Implementation of quality assurance programmes
- The fabrication, testing and commissioning activities including design, installation, assembly control and implementation, installation procedures, operator training activities, changes to operating and emergency procedures, as-built documentation, test and commissioning procedures, test and commissioning results, compliance with legal requirements and licensee procedures, visual inspection of the modification on site, if possible.

The regulatory body/authorised inspection authority witnesses checks at hold points specified by the regulatory body, such as hold points during manufacture, installation, and commissioning. This inspection approach may apply particularly during large and complex modifications.
4. Additional inspections for temporary modifications

Observations:

- There is a need for the RB to be more proactive when dealing with temporary modifications.
- Some inspection activities may be delegated by the RB to an inspection agency.
- The temporary modification process should not be used to bypass the permanent modification process.

Commendable inspection Practices - Temporary Modifications:

- **CP6**: The RB should develop inspection procedures related to temporary modification.
- **CP7**: The RB should use a graded approach when selecting a sample of temporary modifications for inspection.
- **CP8**: Check that the licensee has used an approved process for the implementation of temporary modifications.

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4. Additional inspections for temporary modifications

Commendable inspection Practices - Temporary Modifications:

- **CP9**: Check that temporary modifications are classified/graded correctly and that a safety evaluation has been completed and documented.
- **CP10**: Check that interactions have been assessed by the licensee if several modifications exist.
- **CP11**: Check that any required compensatory measures are in place and effective.
- **CP12**: Check that documentation affected by temporary modification is appropriately marked in master documentation and controlled copies.
- **CP13**: Check the adequacy of operator aids (labels/tags/instructions).
- **CP14**: Check that operators are aware of any temporary modifications, as appropriate, especially:
  - The impact on plant operation.
  - Safety limits and conditions of the implemented temporary modification.
4. Additional inspections for temporary modifications

Commendable Inspection Practices - Temporary Modifications

CP15 - Check that licensee staff pays the same attention for temporary modification as for permanent modifications (safety culture issue)

CP16 - Check that adequate maintenance, inspection and testing of temporary modifications is in place and conducted appropriately

CP17 - Licensee periodically reviews the state of temporary modification taking into account the safety limits and changes in operational states

CP18 - Check that the licensee has a system for tracking, review and removal of temporary modifications (Database for global overview)

CP19 - Consistency between field observation and information within database

CP20 - Check that temporary modifications have been removed within the approved time period (hardware and documentation) and that removal is complete

CP21 - Check that plans developed by the licensee (especially outage activities) gives adequate priority to removal of temporary modification as soon as possible

CP22 - Check that the number of temporary modifications in place is minimised.
5. The appropriate balance between process based and performance based inspections by the RB

Observation
It is important for the RB to have a balanced approach between the inspection of (document/desktop based) processes and performance (field) based inspection activities.

6. Ensuring that temporary changes in plant configuration are controlled and time limited to prevent them from remaining in the field for an extended period of time.

Observation
Addressed by commendable inspection practices generated from discussion points 1 to 4.
7. The oversight process that the RB can use to check that non-identical replacement parts will not affect safety

Observations

The variation of a non-identical replacement part, compared to the original, that is permitted by RBs for a replacement to be exempt from the modifications process is not consistent. But all approaches require the safety function to be unaffected.

Issues that potentially require or result in licensees using non-identical replacement parts include:

- The loss of original equipment manufacturers/suppliers
- The introduction of fraudulent components into the supply chain
- The potential for manufacturers/suppliers to change the specification of equipment without alerting the licensee

Commendable Inspection Practices

CP23 - In order to ensure that non-identical replacement parts do not affect safety through plant obsolescence, the RB should verify implementation of an ageing/asset management process by the licensee.

CP24 - The RB should verify the implementation of a appropriate quality control/management programme for suppliers/vendors.

CP25 - Inspectors should sample check that replacement parts meet the specified safety requirements. This may be done during inspection of maintenance, modifications, QA/QC or equipment qualification.
8. Specific considerations on temporary modifications of software-based equipment

Commendable Inspection Practices
CP26 - RB inspections should include the verification of:
- Temporary modification of software-based equipment should be limited to changes of user configurable parameters (and not the changes that can be performed by the programmers)
- Temporary modification of software-based equipment by review of logbooks or system logs to ensure the correct implementation

Recommendation - WGIP Commendable Practices

It is recommended to WGIP that the working group summary document of all commendable inspection practices be published.

WGIP should revisit the topic on “non-identical” replacement parts.
Questions ?
17. TOPIC C: OPENING PRESENTATION

Committee on Nuclear Regulatory Activities (CNRA) Working Group on Inspection Practices (WGIP)

13th International Nuclear Regulatory Inspection Workshop

Topic C
The Inspectors’ Role in the Enforcement Process

Bruges, Belgium
Hosted by Federal Agency for Nuclear Control and Bel V
April 2016
Introduction / Background (1)

Enforcement is a key regulatory function [IAEA GSR Part 1 Req. 30, 31].

The WGIP already dealt with this topic in 2005 and published a report called “Regulatory Inspection Practices to bring about Compliance” [NEA/CNRA/R(2005)1]. It was noted in the report that it would be beneficial to do further work on the issue.

However, this have not been really done yet. So, the idea was to do that in a Workshop and to focus on the inspector’s role in the enforcement process.

In practice, inspectors and RB work and encounter problems and issues that need to be improved or corrected every day.

Can we share our experiences of the best practices of enforcement? Openly and honestly!

Introduction / Background (2)

A main result of the previous report in 2005 was that in most OECD/NEA countries a series of graded enforcement options are available for the RB
* giving advice
* oral and written cautions
* letters
* requirement to make improvement
* prohibition on activities
* directly imposed fines
* direction to shut down
* refusal to approve or permission an activity
* license withdrawal
* prosecution in courts

Where do you stand as an inspector?
What is your practice?
Evaluation of Questionnaires - General

Responses from 19 Countries – Thanks a lot!

Content of Questionnaire
1. Inspectors’ role in evaluating the safety significance of findings
2. Inspectors’ role in the enforcement process
3. Inspectors’ role in the follow-up on the licensee’s response
4. What issue would you like to discuss during the Workshop?

Answers from questions 1 to 3 show both:
- quite similar practices in some countries
- but also variation and differences, of course

Answers from question 4 present a lot of good proposals for the discussion!

1. Inspectors’ role in evaluating the safety significance of findings

Question 1.1
What is the starting point for the enforcement process in regulatory inspections conducted by the inspector (e.g. a finding, a non-compliance, a violation, a wilful violation, etc.)?

• Not generally fixed
• Varies from country to country
• In most countries, in principle any (significant) finding of a non-compliance, deviation or violation to procedures, licences, standards, regulations, requirements or acts etc.
• A higher level kind of offence like “wilful” is not necessary
1. Inspectors’ role in evaluating the safety significance of findings

Question 1.2
What is the inspectors’ role in evaluating the safety significance of the finding, non-compliance or any violation mentioned above?

• In most countries the inspector is responsible for some kind of an “initial safety evaluation”
• In most countries the inspectors’ initial safety evaluation serves as a basis to start the enforcement process by the RB
• In some countries the inspector decide by himself to start the enforcement process
• Some countries noted explicitly that the inspector has to take protection measures in case of immediate danger

2. Inspectors’ role in the enforcement process

Question 2.1
With respect to the graded enforcement options of the RB listed in foreword, what is the limit of the inspectors’ authority?

• In some countries the inspectors’ authority is limited to identifying and assessing of findings
• In some countries the inspectors’ authority is limited to the lower level of enforcement options like giving advice, oral and written cautions, letters etc.
• In some countries, at least in principle, there is no limit, especially in the case of imminent danger
• In most countries the enforcement process may be initiated by the Inspector, but will be adopted and completed by the RB
2. Inspectors' role in the enforcement process

Question 2.2
Does the inspector have discretion to choose enforcement options?

- In some countries the inspector has no discretion, mainly in those countries where the enforcement process is adopted by the RB
- In some countries the inspector has discretion, mainly in those countries where the inspector's authority includes enforcement options

Question 2.3
How is the enforcement power given to inspectors? (i.e. directly by legislative power; indirectly by internal RB processes; etc.)

- In most countries directly by legislative power
- In some countries indirectly by internal RB processes
- In some countries there is no enforcement power given to inspectors
2. Inspectors’ role in the enforcement process

Question 2.4
How does the inspector participate in the enforcement process of the RB once it has started?

• In some countries the inspector does not participate in the enforcement process of the RB, his participation is limited to identifying and assessing of findings and reporting
• In most countries the inspector participates in the enforcement process of the RB from beginning to the end

Question 2.5
Is there any written guidance for the inspectors concerning the RBs enforcement processes? Please describe briefly what kind of guidance or technical tools are available to the inspectors.

• In most countries there is written guidance
• The kind of internal guidance or technical tools varies from country to country, e.g.
  - Overall enforcement policy
  - Enforcement Management Model
  - Enforcement Management Manual
  - Special enforcement procedures or processes
  - Enforcement guidance tables
  - Process maps
  - Databases
  - Inspection procedures or instructions concerning the enforcement process
2. Inspectors’ role in the enforcement process

Question 2.6
How does the RB ensure consistency in the inspectors’ behavior in the enforcement processes?

- In most countries the enforcement process is discussed with or carried out by the RB’s management
- In some countries the enforcement process is detailed in the procedures or written enforcement policy or law

Question 2.7
Are the inspectors specifically trained in the topic of enforcement?

According to national practice of enforcement

- In some countries there is a detailed enforcement process and there usually is topical training on enforcement
- If enforcement is done only by the RB’s management then there is usually a more general type of training
- In some countries inspectors do not have enforcement powers so there is no training
3. Inspectors’ role in the Follow-up on the licensee’s response

Question 3.1
Please describe briefly inspectors’ role.

- In most countries the inspector need to verify closure of the issues
- In some countries there is an inspection to verify closure of the issues

4. What issue would you like to discuss during the Workshop?

Monetary penalties / fines

- Penalties issued by inspector or RB
- Any data on benefits/drawbacks on using “strict” enforcement methods (like penalties)
- Experience of the inspectors on the necessity to use “harsh” enforcement actions compared to “mild” actions like oral advice
- What are the experiences about imposing fines? Are monetary fines considered to be a useful or useless measure?
4. What issue would you like to discuss during the Workshop?

**Graded approach to enforcement**
- Using series of graded enforcement options instead of using fixed enforcement tools
- Effective example of enforcement procedure that considers the graded approach

**Inspectors’ authority**
- Scope of inspectors’ authority in the enforcement process
- Limit of the inspectors’ authority with regard to on the spot enforcement
- Integrity of the inspector’s authority and the licensee’s rights
4. What issue would you like to discuss during the Workshop?

Enforcement process

- Types and scope of guidelines related to enforcement process
- How to ensure consistency in the inspectors’ judgment
- What formal arrangements with relevant Government agencies exist in member state where enforcement action requires the involvement of the police, justice ministry, or other authorities
- Evaluation of safety significance of findings
- Inspector’s role in tracking the progress of corrective actions

Inspector skills and training

- Method of education and training for the inspectors who have the authority
- Inspectors training in enforcement

Other

- Fukushima accident and RB enforcement process
Discussions during the Workshop

- Everybody has an opinion
- Everybody's opinion is important, we want to hear from you
- Practical experience is always highly appreciated

- Help your group to succeed
- Give opinions and also listen others

- Come together and combine your expertise into something that can be distributed to wider audience and hopefully for wider use among RB's 
  ➔ Identifying of “commendable inspection practices”
18. TOPIC C: CLOSING PRESENTATION

Committee on Nuclear Regulatory Activities (CNRA)
Working Group on Inspection Practices (WGIP)

Conclusions of
Inspectors Role in Enforcement Process
Groups 5 & 6

13th International Workshop on Nuclear Regulatory Inspection Activities
Hosted by FANC and Bel V
Bruges, Belgium 18-20 April 2016

Lead: Jukka Kupila, Finland
Co-Leads: Julio Crespo, Spain
(Christoph Schneider, Germany)
**Workshop Objectives**

- Exchange of information between workshop participants
- Discuss inspection practices
- Develop conclusions, observations, and commendable inspection practices

**Workshop Discussion Groups**

<table>
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<td><strong>Group 1</strong></td>
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<tr>
<td>Julita Kupila, Finland*</td>
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<td>Yves Van der Boght, Belgium</td>
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<tr>
<td>Anupama Poudel, Canada</td>
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<td>Yves Guenni, France*</td>
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<td>Fabio Schöp, Germany</td>
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<td>Koji Takayshi, Japan</td>
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<td>Martin Dabrowski, Poland*</td>
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<td>Ami Paz, USA</td>
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Use of Previous Work by the WGIP


A main result of the that report was that in most OECD/NEA countries a series of graded enforcement options are available for the RB ranging from giving advice, oral and written cautions into issuing fines, license withdrawal and prosecution in court.

This result was taken as a starting point for the workshop.
Evaluation of Questionnaires - General

Content of Questionnaire
1. Inspectors’ role in evaluating the safety significance of findings
2. Inspectors’ role in the enforcement process
3. Inspectors’ role in the follow-up on the licensee’s response
4. What issue would you like to discuss during the Workshop?

19 country responses show
• quite similar practices but variation according to regulatory framework
• inspectors having no enforcement powers, minor enforcement powers or inspector/RB having well established enforcement powers

Workshop discussions

In questionnaire answers participants expressed interest to discuss the following topics

– Graded approach to enforcement
– Monetary penalties / fines
– Inspectors’ authority
– Inspector skills and training

Discussions were held in two subgroups, both having independent discussions with an opportunity to exchange opinions and results of their work during the workshop. Final conclusions were compiled by the two topic leads from WGIP to reflect the discussions and with an effort to harmonize conclusions.
**Workshop discussions**

The groups identified

- Commendable practices
- Observations

(see as general agreement or already established international safety standards for a RB)

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**Commendable Practices**

**CP1** Regulatory bodies need a transparent enforcement process that is consistently implemented, based on the needs of the regulatory framework, that builds trust with the licensee and other stakeholders.

**CP2** Consistency in the implementation of enforcement actions should be supported by the following:

- a) enforcement policy, procedures etc.
- b) support by management/review panel/enforcement specialist
- c) initial and continuous training on practical implementation of enforcement techniques
- d) knowledge transfer among inspectors by regular meetings, seminars, workshops, electronic forums, cross-site-inspections
**Commendable Practices**

**CP 3** Rß should have a process for addressing differing professional opinions during the enforcement process.

**CP 4** Inspectors should have the questioning attitude and human interaction skills to appropriately challenge licensees when imposing enforcement actions.

**Commendable Practices**

**CP 5** A memorandum of understanding with other Rßs, such as occupational health and safety, should be in place where authority is outside the jurisdiction of nuclear regulatory body.

**CP 6** Rß should carry out a follow-up inspection on licensee’s response to enforcement action to ensure continued compliance.
Observations

1. RB should have effective enforcement tools available to carry out enforcement actions

2. RB should have an evaluation of effectiveness of RB’s enforcement actions (internal/external)

3. Although it is understood that safety is licensee’s prime responsibility, inspectors should have the authority to direct actions when confronted with conditions that pose imminent danger.

4. RB should have the authority to require licensee to address emerging safety issues with implementation within an appropriate timeframe.

Observations

5. RB’s enforcement policy should have the capability to administer monetary penalties and should be legally bounded and a well-defined formal process.

6. The impact of media attention to enforcement actions can be more significant to the licensee than the actual financial impact and it may result in increased public/stakeholder interest and/or high economic side effects.

7. Regulatory bodies should evaluate the timeliness of corrective actions proposed by the licensee.

8. RB should document observations and facts that lead to or have the potential to result in enforcement actions.
Thank you Bruges, Bel V and FANC!