

**Unclassified**

**NEA/CNRA/R(2007)2**



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

**27-Mar-2007**

**English text only**

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

**NEA/CNRA/R(2007)2  
Unclassified**

**8TH INTERNATIONAL NUCLEAR REGULATORY INSPECTION WORKSHOP ON  
HOW REGULATORY INSPECTIONS CAN PROMOTE, OR NOT PROMOTE, GOOD SAFETY  
CULTURE, INSPECTION OF INTERACTIONS BETWEEN THE LICENSEE AND ITS  
CONTRACTORS, AND FUTURE CHALLENGES FOR INSPECTORS (E.G., NEW TECHNIQUES,  
DEVELOPING COMPETENCE, ETC.).**

**APPENDIX – COMPILATION OF SURVEY RESPONSES**

**1st – 3rd May 2006, Toronto, Canada**

**Hosted by the Canadian Nuclear Safety Commission (CNSC)**

**JT03224525**

**Document complet disponible sur OLIS dans son format d'origine  
Complete document available on OLIS in its original format**

**English text only**

## ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Pursuant to Article 1 of the Convention signed in Paris on 14th December 1960, and which came into force on 30th September 1961, the Organisation for Economic Co-operation and Development (OECD) shall promote policies designed:

- to achieve the highest sustainable economic growth and employment and a rising standard of living in Member countries, while maintaining financial stability, and thus to contribute to the development of the world economy;
- to contribute to sound economic expansion in Member as well as non-member countries in the process of economic development; and
- to contribute to the expansion of world trade on a multilateral, non-discriminatory basis in accordance with international obligations.

The original Member countries of the OECD are Austria, Belgium, Canada, Denmark, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The following countries became Members subsequently through accession at the dates indicated hereafter: Japan (28th April 1964), Finland (28th January 1969), Australia (7th June 1971), New Zealand (29th May 1973), Mexico (18th May 1994), the Czech Republic (21st December 1995), Hungary (7th May 1996), Poland (22nd November 1996), Korea (12th December 1996) and the Slovak Republic (14 December 2000). The Commission of the European Communities takes part in the work of the OECD (Article 13 of the OECD Convention).

## NUCLEAR ENERGY AGENCY

The OECD Nuclear Energy Agency (NEA) was established on 1st February 1958 under the name of the OEEC European Nuclear Energy Agency. It received its present designation on 20th April 1972, when Japan became its first non-European full Member. NEA membership today consists of 28 OECD Member countries: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Luxembourg, Mexico, the Netherlands, Norway, Portugal, Republic of Korea, Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The Commission of the European Communities also takes part in the work of the Agency.

The mission of the NEA is:

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

Specific areas of competence of the NEA include safety and regulation of nuclear activities, radioactive waste management, radiological protection, nuclear science, economic and technical analyses of the nuclear fuel cycle, nuclear law and liability, and public information. The NEA Data Bank provides nuclear data and computer program services for participating countries.

In these and related tasks, the NEA works in close collaboration with the International Atomic Energy Agency in Vienna, with which it has a Co-operation Agreement, as well as with other international organisations in the nuclear field.

### © OECD 2007

Permission to reproduce a portion of this work for non-commercial purposes or classroom use should be obtained through the Centre français d'exploitation du droit de copie (CCF), 20, rue des Grands-Augustins, 75006 Paris, France, Tel. (33-1) 44 07 47 70, Fax (33-1) 46 34 67 19, for every country except the United States. In the United States permission should be obtained through the Copyright Clearance Center, Customer Service, (508)750-8400, 222 Rosewood Drive, Danvers, MA 01923, USA, or CCC Online: <http://www.copyright.com/>. All other applications for permission to reproduce or translate all or part of this book should be made to OECD Publications, 2, rue André-Pascal, 75775 Paris Cedex 16, France.

## **COMMITTEE ON NUCLEAR REGULATORY ACTIVITIES**

The Committee on Nuclear Regulatory Activities (CNRA) of the OECD Nuclear Energy Agency (NEA) is an international committee made up primarily of senior nuclear regulators. It was set up in 1989 as a forum for the exchange of information and experience among regulatory organisations.

The committee is responsible for the programme of the NEA, concerning the regulation, licensing and inspection of nuclear installations with regard to safety. The committee's purpose is to promote cooperation among member countries to feedback the experience to safety improving measures, enhance efficiency and effectiveness in the regulatory process and to maintain adequate infrastructure and competence in the nuclear safety field. The CNRA's main tasks are to review developments which could affect regulatory requirements with the objective of providing members with an understanding of the motivation for new regulatory requirements under consideration and an opportunity to offer suggestions that might improve them or avoid disparities among member countries. In particular, the committee reviews current management strategies and safety management practices and operating experiences at nuclear facilities with a view to disseminating lessons learned.

The committee focuses primarily on existing power reactors and other nuclear installations; it may also consider the regulatory implications of new designs of power reactors and other types of nuclear installations.

In implementing its programme, the CNRA establishes cooperative mechanisms with the Committee on the Safety of Nuclear Installations (CSNI) responsible for the programme of the Agency concerning the technical aspects of the design, construction and operation of nuclear installations. The committee also co-operates with NEA's Committee on Radiation Protection and Public Health (CRPPH) and NEA's Radioactive Waste Management Committee (RWMC) on matters of common interest.

**TABLE OF CONTENTS**

ABSTRACT / FOREWORD .....	6
A. HOW REGULATORY INSPECTIONS CAN PROMOTE, OR NOT PROMOTE, GOOD SAFETY CULTURE .....	7
SURVEY RESPONSES .....	8
Belgium .....	8
Canada .....	10
Finland .....	12
France .....	15
Germany .....	16
Hungary .....	19
Japan .....	20
Korea .....	21
Mexico .....	23
The Netherlands .....	24
Slovak Republic .....	25
Sweden .....	26
Switzerland .....	27
United Kingdom .....	29
United States .....	30
APPENDIX A .....	32
HAEA NSD’s Safety Policy .....	32
B. INSPECTION OF INTERACTIONS BETWEEN THE LICENSEE AND ITS CONTRACTORS .....	39
SURVEY RESPONSES .....	41
Belgium .....	41
Canada .....	44
France .....	46
Germany .....	49
Hungary .....	51
Japan .....	53
Korea .....	57
Mexico .....	60
The Netherlands .....	62
Slovak Republic .....	64
Spain .....	66
Switzerland .....	68
United Kingdom .....	70

FUTURE CHALLENGES FOR INSPECTORS (E.G., NEW TECHNIQUES, DEVELOPING COMPETENCE, ETC.).....	74
SURVEY RESPONSES .....	75
Belgium .....	75
Canada.....	77
Finland.....	79
France.....	80
Germany.....	82
Japan.....	84
Korea .....	85
Mexico.....	87
The Netherlands .....	90
Slovak Republic .....	91
Spain.....	92
Switzerland.....	93
United States .....	94

## **ABSTRACT / FOREWORD**

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

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

Notes:

- Only one response per country is required. If more than one person from your country is participating, please co-ordinate the responses accordingly.
- Please provide responses on separate sheet and clearly identify the questionnaire part and topic.
- Please provide Submittal prior to 1 February 2006. Submittals should be sent by email to: [barry.kaufer@oecd.org](mailto:barry.kaufer@oecd.org)

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

## **A. HOW REGULATORY INSPECTIONS CAN PROMOTE, OR NOT PROMOTE, GOOD SAFETY CULTURE**

### ***Introduction to the Questionnaire:***

Strong compliance based regulation just delivers absolute compliance. The attributes of a mature organisation, however, are that it develops a self-learning and developing approach.

It is important that a regulatory body carries out its inspections in a way that promotes this attitude and does not inadvertently upset it.

This workshop topic has been adopted to allow inspectors to discuss and determine a) where we should carry out inspection, and b) how we inspect, such that our actions and behaviour promote this positive attitude rather than disrupt it.

### ***Questions***

- 1) Please explain what you believe the term safety culture means.
- 2) Does your organisation recognise that its inspection practices and the behaviour of its inspectors can influence a Licensee's safety culture? Explain both positive and negative aspects.
- 3) Explain how your inspection practices and inspectors behaviours are designed to maximise their positive influence and minimise their negative influence.
- 4) Explain what factors are monitored to detect the existence of and change to these influences.
- 5) Has your Regulatory Body discussed the existence of this effect? Are there any additional points arising from those discussions not covered by your response so far that you find worth sharing prior to the workshop.

## SURVEY RESPONSES

### Belgium

#### *[Association Vinçotte Nuclear (AVN)]*

- 1) Please explain what you believe the term safety culture means.

It is the collective and individual ability of Licensee's personnel, at each level of the organisation, to act properly when facing any event that could compromise or weaken the safety level of the nuclear facility. This means for everybody to have a questioning and proactive attitude when a problem is encountered in order to detect any abnormal safety related situation and to report it for implementing the adequate and necessary corrective actions.

Safety culture goes far beyond the strict compliance with laws, rules and guides. It is a permanent spirit focused on safety that must be encouraged and sustained by management.

- 2) Does your organisation recognise that its inspection practices and the behaviour of its inspectors can influence a Licensee's safety culture? Explain both positive and negative aspects.

The way in which verbal and written inspector's recommendations<sup>1</sup> are presented could influence the Licensee safety culture. The Regulatory Body can promote the licensee's safety culture and inspectors have some influence by showing "good example" when discussing cases involving safety aspects.

The mechanism is to induce a self-improvement process of the Licensee safety culture for future cases (at all level of the organisation, not limited to technical field but also at organisational level).

To have a positive influence, inspectors should make pertinent (safety related) but not too prescriptive recommendations in order to push Licensee to think, to enlarge its own analysis and to find himself global solutions (not one shot).

Too precise from the Regulator Body recommendations will receive only a punctual answer from licensee without performing a deep analysis. Inspectors should also avoid giving solutions to their own questions. When doing so, the risk (negative aspect) is that the Regulatory Body could be seen as doing the feedback, discharging Licensee partially of its responsibilities. This will induce a lack of questioning in the future.

The recommendations based to the (strict) compliance with rules are not subject to challenge. For recommendations made on the basis of inspector's judgement (e.g. defence in depth), it could be less

---

<sup>1</sup> In Belgium, recommendations made by inspectors during each kind of inspection (routine inspections, specific or reactive inspections and thematic inspections) are written in reports sent to Utility.

obvious to demonstrate to licensee the need to act and to take corrective measures. The impact on safety should be justified to reach this goal (to convince).

Another negative aspect is the risk, when inspectors are making recommendations having limited impact on safety, to deviate the Licensee's priorities and human resources on these minor cases (in order to satisfy the Regulatory Body) rather than concentrate them on significant safety issues. This attitude will also give a wrong image to Licensee of what safety culture should be.

- 3) Explain how your inspection practices and inspectors behaviours are designed to maximise their positive influence and minimise their negative influence.

Inspectors should not be too intrusive or prescriptive. They can illustrate weaknesses in safety culture on the basis of concrete cases and suggest areas of improvement but Licensee remains responsible for the choice of the corrective actions. The message to deliver is much more to convince the personnel from the Licensee to perform activities related to safety than trying to enforce them to do.

We think that the capacity of inspectors to maximise their positive influence depends strongly on their professional experience in the field of nuclear safety and on the way they developed their relationship with licensee (credibility).

- 4) Explain what factors are monitored to detect the existence of and change to these influences.

We believe it is not possible to measure directly the impact (outcome) of the inspector's behaviour and their influence on the Licensee's safety culture. Nevertheless, some factors could be used indirectly and are all signs of safety culture:

- a) Improvement of Licensee organisation: development of new systems and procedures that have a positive impact on safety culture (from top to bottom of the hierarchy).
- b) Increasing number of events reported and more openness and transparency in the declaration of events, adequate corrective actions in order to avoid recurrences (experience feedback).
- c) Hierarchy going frequently on the field to evaluate the real situation.
- d) Better housekeeping<sup>2</sup>, efforts undertaken for building and equipment maintenance.
- e) Quality of work and services of contractors (see questionnaire B).
- f) Effective and efficient operation of safety committees and meetings in general.
- g) Importance given to knowledge management.
- h) Involvement in emergency preparedness.

---

<sup>2</sup> The link between housekeeping and safety is not obvious but it is commonly admitted that a good environment contributes to "a safety mood" for the licensee personnel and for the contractors.

- i) Improvement of safety analysis quality performed by Licensee (event and incident reports, modification projects preparation, JCO<sup>3</sup> justifications, INES evaluations...).
  - j) Better questioning attitude of Licensee personnel in case of unusual situation (human aspects).
- 5) Has your Regulatory Body discussed the existence of this effect? Are there any additional points arising from those discussions not covered by your response so far that you find worth sharing prior to the workshop.

No.

## **Canada**

### ***[Canadian Nuclear Safety Commission (CNSC)]***

- 1) Please explain what you believe the term safety culture means.

Safety culture refers to the characteristics of the work environment, such as the values, rules, and common understandings that influence employees' perceptions and attitudes about the importance that the organisation places on safety.

- 2) Does your organisation recognise that its inspection practices and the behaviour of its inspectors can influence a Licensee's safety culture? Explain both positive and negative aspects.

The CNSC recognises that its processes and the way that its inspectors go about their work can impact the licensee organisations, and accordingly has stressed the importance of consistency, transparency, processes and good ethics in its activities. This includes a non-prescriptive approach whereby a licensee must take responsibility to address the CNSC's findings, in alignment with promoting organisational self-learning and development.

The CNSC's Regulatory approach shows commitment to the consideration of safety culture and promotes this concept among CNSC staff and in the Canadian nuclear industry. In 2004 the CNSC held a symposium on safety culture for the nuclear industry in Canada. This was followed up by two workshops with licensees, to discuss their safety performance programmes and develop a guidance document for licensees to perform safety culture self-assessments. The CNSC requires licensees to foster a healthy safety culture in their organisations and monitors licensee performance.

Furthermore, the CNSC has developed a systematic and objective method to evaluate organisational influences on safety performance. This method, known as the Organisation and Management (O&M) Review Method, has provided baseline measures of safety performance at the CNSC's major licensee facilities, and includes one follow-up measure of performance at one facility.

Licensees are expected to conduct self-assessment of safety culture within their organisations and to report their findings to the CNSC. This provides opportunity for licensees to gain understanding of their organisations and to initiate and implement follow-up activities as appropriate.

---

<sup>3</sup> JCO : "Justification for Continued Operation".

- 3) Explain how your inspection practices and inspectors behaviours are designed to maximise their positive influence and minimise their negative influence.

The CNSC has a Type I inspection procedure, which aims to achieve a consistent and uniform approach in determination of compliance of a licensee programme, process or practice with regulatory requirements. The criteria that underpin a Type I inspection are selected from documents previously communicated to the licensee as constituting criteria by which the CNSC inspectors will evaluate compliance. The set of criteria is selected to indicate overall performance. This aims to minimise the possibility of the licensee concentrating on achieving good performance only on specific indicators without sufficient management of the underlying issues.

The procedure includes a ‘no surprises approach’, whereby the licensee is kept informed of the inspection progress. Potential non-compliances are reviewed with the Licensee to confirm that the inspection evidence is accurate and that the non-compliances are understood. Every attempt is made to resolve diverging opinions concerning the inspection evidence and/or findings and unresolved points.

Staff competencies are considered when appointing Inspection Team Leaders. New team leaders are trained in auditing or inspection techniques and also receive Lead Inspector training. In addition, staff acting as team leader for the first time must do so with an experienced team leader serving on the team and acting as mentor, before leading an inspection independently. Inspection team members are also trained in auditing or inspection techniques and should first have participated in inspections as observers, to gain experience.

Inspectors focus their efforts on gathering evidence pertinent to the scope and criteria for the specific inspection. However, if an inspector becomes aware of non-compliance in an area outside of the specific inspection scope or criteria, this should be brought to the attention of the team and the team leader. Examples of this include observation of indications of behaviours that may indicate poor safety climate at a facility, such as poor housekeeping, unsafe manual handling practices, or personnel using PPE inappropriately. While such observations do not condemn the safety culture of the entire organisation, they can indicate a deterioration of safety culture and point towards areas that need to be addressed by the licensee.

- 4) Explain what factors are monitored to detect the existence of and change to these influences.

CNSC uses the O&M method to evaluate the safety culture of a licensee’s organisation. Safety culture attributes or indicators include:

- Safety is a clearly recognised value;
- Accountability for safety is clear;
- Safety is integrated into all activities;
- A safety leadership process exists; and
- Safety culture is learning-driven.

Presently the CNSC does not specifically monitor the effect of ‘regulatory activities’ on the licensees’ safety cultures. This type of evaluation is notoriously difficult to conduct in a scientific context, where causality (e.g., between a regulator’s processes and the safety culture measures gathered in a licensee

organisation) is inferred. Large scale research studies conducted over a number of years would be needed to establish a solid effect.

- 5) Has your Regulatory Body discussed the existence of this effect? Are there any additional points arising from those discussions not covered by your response so far that you find worth sharing prior to the workshop.

It seems intuitive that the regulator's inspection processes and the behaviour of inspectors can influence safety culture in the licensees' organisations. The approaches taken in inspections and also in the wider CNSC activities have implicitly considered these issues. However, the CNSC is not aware of any research literature that has reported this effect, and would welcome any information that is available.

## **Finland**

### ***[STUK - Radiation and Nuclear Safety Authority]***

- 1) Please explain what you believe the term safety culture means.

The concept of safety culture is related to the scientific concept of organisational culture, which refers to the uniformity of behaviour, reactions, habits, emotions, values, beliefs and assumptions of organisation members. Culture

- is a by-product of goal-directed activities of any group of people, and emerges without conscious effort of any participant
- is a consequence of mainly unconscious social learning processes of group members, resulting common reactions, habits, attitudes, values and beliefs about reality
- is continuously recreated in group processes; still a mature culture resists changes
- opens for changes, when the basic assumptions are questioned in crisis.

Organisational culture means the shared

- reactions and habits
- values and norms
- beliefs and basic assumptions of the organisation members,

and, in general, the shared way of action and way of solving problems in the organisation.

Safety culture is a subset of organisation culture, including all such factors which have or may have impact on safety. As almost each factor of organisation culture may in some situation have impact on safety, from the scientific point of view it is usually convenient to talk on organisation culture instead of safety culture. Thus: *Safety culture is the organisational culture seen from the safety point of view.*

Often, in relation with nuclear safety, the concept of Safety Culture has a specific meaning: it is used in *normative way*, as a requirement to maintain and support a strong and high-level safety culture in nuclear

industry, with aim to ensure safety in all operations. Thus, we try to avoid the use of the concept *safety culture*, when inspecting events and incidents, and use more neutral terms instead.



*Safety culture* is  
*organisation culture* seen in a safety  
frame.



- 2) Does your organisation recognise that its inspection practices and the behaviour of its inspectors can influence a Licensee's safety culture? Explain both positive and negative aspects.

We have discussed this issue in our inspector training and in development projects. The long lasting goal of STUK is to be an example for utilities in good and strong safety culture.

In principle, the national nuclear safety culture is an attribute of the system formed by the regulatory body and the utilities. The nuclear safety is the common goal of this system. In this system, STUK can strengthen the safety culture of utility organisation by fair regulatory behaviour and by nurturing good and close relations to utility organisations. The relation is shaped by each contact between the regulatory body and the utility organisation - by the regulatory guides, by STUK decisions and by the behaviour, the questions, comments and decisions of inspectors during inspection.

The regulatory body can easily have negative impacts to utility safety culture by prescriptive legislation or guidance or detailed requirements, which leave no room for utility initiative and responsibility. Especially in organisational and cultural issues the use of simplified models (organisation model, safety culture model) can be harmful.

One other common threat for safety culture is the incoherent regulatory policy. This can mean that requirements / decisions / inspections in some issues or in some time are prescriptive and detailed, and in other issues or at different time period stay in principal and generic level. In worst case the utility learns to adapt changing moods of the regulator, and taking only limited responsibility on the safety.

- 3) Explain how your inspection practices and inspectors behaviours are designed to maximise their positive influence and minimise their negative influence.

The task is difficult.

There are, of course, different opinions and working habits among the inspectors in STUK. We have, so far, resisted the yearning for simple models of safety culture or simple and prescriptive requirements on organisational matters. We have discussed widely the organisational issues (e.g. there has been a training course for inspectors on organisational issues, led by Lyn Summers).

The discussion about oversight of human and organisational factors in operation and construction of Finnish nuclear power plants is going on.

- 4) Explain what factors are monitored to detect the existence of and change to these influences.

STUK has a Safety Performance Indicator system describing performance of nuclear power plants. The indicators of the system are divided into three subgroups: quality and safety culture (I); operational events (II); and structural integrity (III). Indicators belonging to the subgroup I illustrate the condition of the plant and performance of different functional groups at the plant; such as functioning of the maintenance unit (failures and their repairs, unavailability of safety systems), safety attitude of operation (non-compliance with the TS ), performance of operation unit (events and their causes, risk significance of events), performance of radiation protection unit (doses and releases), management of change (keeping plant documentation current) and investments on plant maintenance and modification.

Individual indicators in many cases can be considered as “low level” indicators but aggregation / combination of individual indicators of the system are applicable to detect underlying deficiencies or degradation of separate areas and attitudes of functional groups at the plant.

In addition, the inspectors are collecting signals which may reflect the culture and the safety-related attitudes of the utility organisations. Thus, the personnel functions, the management practices, the quality of operational event analysis or plant modification process are considered in relation to cultural issues. However, it is hard to distinguish the root causes of some cultural trend, whether it comes from regulatory impacts or other external influences or is endogenous in the utility organisation.

When a “weak signal” on possible disturbing trend is detected by inspectors, an analysis process is carried out by experienced inspectors and experts in human and organisational factors. We have felt a need for flexible ways to deal such situations with utility organisation. Thus, we have developed a special set of meetings for this purpose. Usually, the regulatory body invites the utility to a meeting with a memo giving the outline of the issue, describing the findings and setting questions for the utility. The meeting starts with the presentation(s) of utility organisation, giving their approach and answers, and a common discussion follows. As a result of the discussion, the utility describes the plans to correct the situation and confirms the commitment to improvement.

STUK assigns its own independent investigation team to analyse in details operational events deemed to be of a special importance e.g. due to the nature of an event or due to deficiencies in licensee's performance (safety culture). STUK assesses also its own activities in connection with an event to find out whether deficiencies in STUK's activities have contributed to the initiation of the event, and to use that information to improve its operations. An investigation report is prepared with recommendations for corrective actions addressed both to the licensee and STUK. The report is sent to the licensee. An action plan with proposals for improvements to respond to these recommendations is later provided by the licensee. The follow-up and implementation of licensee's actions for improvements to handle individual recommendations are performed as a part of regulatory control and in connection with specific inspections of the periodic inspection programme. STUK also makes an action plan for improvements as a reply for the recommendations focused on the performance of its own.

- 5) Has your Regulatory Body discussed the existence of this effect? Are there any additional points arising from those discussions not covered by your response so far that you find worth sharing prior to the workshop.

I think that one key issue is that the regulatory body has enough resources to deal with organisational and cultural issues. Thus, all inspectors should have basic competences to detect possible cultural problems and also to question own working habits and own impacts to the target organisation. And, there should be enough inspectors with expertise in organisational sciences/social psychology/psychology. The inspections should be carried out by a team of technical and organisational experts.

## France

### *[Autorité de Sûreté Nucléaire (ASN)]*

1) Please explain what you believe the term safety culture means.

Safety culture is a state of mind with respect to safety: it deals with

- the value which is granted to safety,
- the priority which is given to safety;
- the interest which taken in safety.

This state of mind conditions the attitudes and the practice.

Safety culture is not individual: it is a value that must be shared by a group or the whole employees of an operator. This value must be shared and spread out through the management.

Safety culture depends on professionalism and stringency in the application of procedures, but it is related to the individual and collective behaviour of the operators.

Safety culture appears:

- by the place granted to safety in the priorities of the company, from the operator's management point of view;
- by responsible behaviour (stringency in the action, self-questioning attitude, information sharing...) from the individual point of view.

2) Does your organisation recognise that its inspection practices and the behaviour of its inspectors can influence a Licensee's safety culture? Explain both positive and negative aspects.

Positive aspects:

- an inspection highlights defects which lead the operator to re-examine its procedures;
- the nuclear safety authority points out the weaknesses of the owner and allows it to improve itself

Negative aspects:

- the operator tends to satisfy the Regulatory Bodies requests, without understanding the bases of the requests. In that case, the operator does not question itself anymore.
- the operator can consider the Regulatory Body as an external controller and not as an inspector. It means that the operator can neglect its verification process by relying on the Regulatory Body control.
- The inspectors can be tempted to take part into technical analyses, which would lead to share responsibility with the licensee

- 3) Explain how your inspection practices and inspectors behaviours are designed to maximise their positive influence and minimise their negative influence.

Inspections are systematically carried out by two inspectors and by an expert of the Technical Support Organisation (TSO): That makes it possible to have the most exhaustive possible vision on the activities of the operator and to cross the points of view.

The inspectors must underline in their conclusion both the positive and the negative aspects of their observations.

The inspectors should not advise or suggest any solution to the licensee.

The inspectors should explain and give details about the remarks and the findings, to make sure that the operator's management shares their conclusion as much as possible.

- 4) Explain what factors are monitored to detect the existence of and change to these influences.

The parameters could be:

- the number of findings and remarks per inspection (and the trends)
- the inspections planning;
- the operator's answer quality (and the trends)

- 5) Has your Regulatory Body discussed the existence of this effect? Are there any additional points arising from those discussions not covered by your response so far that you find worth sharing prior to the workshop.

The evaluation of an operator is not based solely on quantified indicators. Each year, the inspector makes a judgement about the operator thanks to evaluation grids. This evaluation is not transmitted to the operator, but it makes it easier to determine the weaknesses of the owner and thus, easier to target the topics of inspection.

Moreover, we would be interested in other Regulatory Bodies practices to monitor the operators' safety culture.

## **Germany**

***[Bundesamt für Strahlenschutz Fachbereich Sicherheit in der Kerntechnik (BfS/SK)]***

### ***General Remarks:***

Germany is a federal state, with the authorities at the state level being responsible for licensing and inspection of nuclear facilities. Regulatory Guidelines are issued on the federal level by the Federal Ministry for Environment, Nature Conservation and Nuclear Safety (BMU).

In this particular field BMU has issued recommendations for Safety Management Systems (SMS) for Nuclear Power Plants. These recommendations are to be applied by the licensees for development and

implementation of their SMS. Further guidelines are currently being developed. Meanwhile, all regulatory inspection authorities at the state level, recognising that safety management and safety culture are important issues that require regulatory response, internally and for their relation to the licensees apply further strategies and methods which are not yet fixed by regulatory guidelines.

The following answers given to the questionnaire were prepared by one particular state; as such answers are only meaningful if given in a coherent manner. Nevertheless, these answers may be an indication about the procedures and developments applied in Germany.

1) Please explain what you believe the term safety culture means.

We use the definition of safety culture from INSAG-4.

A strong safety culture has the effect that special attention is paid to safety issues. Main characteristics of a strong safety culture are a questioning attitude, safety oriented thinking and acting, and open and intense communication.

To maintain a strong safety culture effective, sustainable measures for the promotion and regular self-assessments are necessary.

Safety culture is a special form of the organisation culture. It consists of several levels (according to E. Schein): the level of basic assumptions, the level of espoused values and the level of artefacts.

Inspections of the Regulatory Body deal mainly with the level of the artefacts. Findings are spotlights. They are not easy to assess, their interpretation is often ambiguous. It is therefore necessary to discuss the findings and the interpretations with the operator.

2) Does your organisation recognise that its inspection practices and the behaviour of its inspectors can influence a Licensee's safety culture? Explain both positive and negative aspects.

Negative aspects:

- a. Extensive inspections and the requirement of many large reports may cause managers of the operator to work mainly to fulfil the requirements of the Regulatory Body and not do their work within the operator organisation.
- b. Extensive assessments e.g. of technical modifications by TSO may lead to weak own assessments by the operator.
- c. The requirement of fast and detailed evaluations of findings may cause that the information about a finding or an incident is given not before the evaluations are performed. This may affect the open communication.
- d. Prescriptive regulations in the area of safety culture may undermine the operator's responsibility for the safe operation and thus his safety culture.

Positive aspects:

- e. The acceptance of self-assessments in the operator organisation is enhanced if it is clear that no detailed information is required by the Regulatory Body.
  - f. The internal reporting of near misses is enhanced if it is clear that this information is not reported to the Regulatory Body.
  - g. Regular meetings of operator and Regulatory Body to discuss safety culture issues may promote an open communication and give a feed back about the Regulatory Bodies influence.
- 3) Explain how your inspection practices and inspectors behaviours are designed to maximise their positive influence and minimise their negative influence.

In general: The leading principle is that the operator is responsible for the safety and safety culture of the plant and that the Regulatory Body should ascertain that the operator meets his responsibility.

In the personnel / organisational area inspections are mainly concerned with the processes of the operator. In many cases the plant personnel presents its acting, the procedures etc. Afterwards questions of the inspector are answered and discussed. The goal of inspection is that the inspector convinces himself of and encourages the operator's in-depth, permanent and correct handling of the inspected topic.

Example: The Regulatory Body requires a self-assessment of the safety culture. The operator presented the self-assessment system and how it is applied. On the other hand the Regulatory Body formulated requirements the self-assessment should fulfil. A stepwise procedure in a dialog with the operator is agreed and performed.

- 4) Explain what factors are monitored to detect the existence of and change to these influences.

The interacting of Regulatory Body and operator is a topic of the quarterly meetings of the plant managers with the Regulatory Body. The meetings are arranged on an informal basis so that not only facts but also conjectures can be exchanged and discussed.

In the on-site-inspections the inspectors pay attention to special indicators for safety culture like housekeeping, observance of regulations, work load and leadership behaviour. One indicator is "interaction with the regulator". The indicators are evaluated in a four level scale (exceeds expectations, meets expectations, expectations not fully met, deficiency). On the basis of a trend analysis changes in the operator-regulator interaction can be detected.

## Hungary

*[Hungarian Atomic Energy Authority (HAEA)]*

*See appendix A for HAEA Safety Policy*

- 1) Please explain what you believe the term safety culture means.

The valid domestic safety regulations define safety culture as the following:

- All those features and characteristics of organisations and individuals and their adherence to its activities that assures utmost priority of safety and that safety related concerns are dealt with due importance.
- The definition above mirrors what we think about the concept of safety culture.

- 2) Does your organisation recognise that its inspection practices and the behaviour of its inspectors can influence a Licensee's safety culture? Explain both positive and negative aspects.

Inspectors' behaviour has a major role in influencing the Licensee's safety culture. It is clearly recognized and considered in our procedures and inspections (see our safety policy). On one hand the Regulatory Body as an inspectorate is advancing the safety culture in its operations, e.g. we lay emphasis on safety culture during our event investigations, and our management is expecting safety conscious behaviour of its inspectors. On the other hand the HAEA could show example through its inspectors firstly by presenting a questioning attitude ("safety above all") on the personal meetings as well as by curiously detailed and comprehensive work and also keeping all dead-lines that cannot compromise the quality of the work.

- 3) Explain how your inspection practices and inspectors behaviours are designed to maximise their positive influence and minimise their negative influence.

We do not design inspectors' behaviour for specific cases (e.g. inspection by inspection). The general behavioural expectations are declared in our safety policy. Each of our inspectors is expected to know our safety policy (we hold trainings). Monitoring the effectiveness of the training in this aspect is quite difficult both from the licensee and the regulatory side.

- 4) Explain what factors are monitored to detect the existence of and change to these influences.

Currently we do not have any means to measure the direct influence – mentioned above - on Licensee's safety culture. Whereas, in the frame of our quality management system we regularly (quarterly and yearly) evaluate our self-assessment performance indicators (e.g. compliance of schedules, dead-lines etc). We also monitor the Licensees' safety performance – currently on a yearly basis – through our Safety Performance-indicators' System (BMR). The safety culture attitude comprises one major area – in accordance with the IAEA recommendations – of the BMR. Changes of this area reflect on the changes of the Licensee's safety culture. However, it can not be determined, for how much the regulatory attitude influences the positive or negative changes.

- 5) Has your Regulatory Body discussed the existence of this effect? Are there any additional points arising from those discussions not covered by your response so far that you find worth sharing prior to the workshop.

We have not made discussions on the effect of Regulatory Body behaviour on the Licensees' safety culture, separately. But we considered this issue many times e.g. during the shaping of our philosophy, during our integrated inspections and some general project as a major contributory factor.

## **Japan**

### ***[Japan Nuclear Energy Safety Organisation (JNES)]***

- 1) Please explain what you believe the term safety culture means.

The discussion about the definition of Safety Culture has just started in Japan. Before the discussion Japan had adopted IAEA definition, ISAC. Under the discussion, safety culture will be checked by the regulatory body's activity of routine intelligence. Organisational climate which is in the scope of safety culture will be additionally defined from the viewpoints of the safety inspection done by the regulatory body to comprehend the licensee's periodic safety review (PSR) on every 10 years.

- 2) Does your organisation recognise that its inspection practices and the behaviour of its inspectors can influence a Licensee's safety culture? Explain both positive and negative aspects.

It is thought that the idea of regulatory body for safety culture is reflected on licensee's safety culture. It is important for the regulatory body to emphasize the quality management system at the site after comprehensive understanding of it, to improve regulation more rational and effective. The Regulatory Body needs to pay attention that the possibility of retreating safety culture exists due to the regulatory activities on the contrary, depending on the case such as the regulation which demands effort especially exceeding requirements on safety as for time or cost, or regulatory staff go by the rules disregarding reality and regardless of the effectiveness for safety. It is important to regulate effectively and efficiently the licensee's safety activities based on the safety significance that is to regulate the right object by the right method.

- 3) Explain how your inspection practices and inspectors behaviours are designed to maximise their positive influence and minimise their negative influence.

For a licensee in order to work with volition and to make it urged to an improvement, it is important that the quantity and the quality of inspection are suitable. For example, while judgment and criteria of inspection are rational, it is necessary to be clear for the regulatory body as well as licensees.

Various inspections and audits are carried out by the third party, licensee itself as well as the regulatory body. These inspections and audits must be performed for necessary and sufficient items, and duplication and congestion of inspection activities must be avoided. It is also necessary to take into consideration incentives, such as taking flexible measures of rationalizing the inspection and audit by the regulatory body, to the plant where licensee's safety activity is fully carried out and the effect comes into play.

- 4) Explain what factors are monitored to detect the existence of and change to these influences.

It is important to recognize that safety culture begins degradation from the moment that it is thought developed. Regulatory body, on the other hand, should ensure that the safety management activities have been performed appropriately on the site by their audit and if necessary, enforcement. “Ensure ease of mind for the general public” in itself should not be self-purpose. It is necessary to recognize that the general public can enjoy “ease of mind for nuclear power” for the first time by the regulator’s accountability that they perform effective and rational monitoring of safety performance of the licensee and explain the accurate regulation by various methods. In here, the transparency and the accountability for regulation are important.

- 5) Has your Regulatory Body discussed the existence of this effect? Are there any additional points arising from those discussions not covered by your response so far that you find worth sharing prior to the workshop.

Accidents caused by safety culture such as JCO accident and falsification issues of TEPCO (Tokyo Electric Power Company) and secondary pipe break of KEPCO (Kansai Electric Power Company) have gradually increased recent years

By the trigger of TEPCO issue safety culture has been discussing among regulatory bodies, licensees and academic sides in Japan, and reported last year the document of “Discussion on how to implement safety culture sufficiently and possible recommendation” which is one of the regulatory actions against TEPCO issue.

## **Korea**

### ***[Korea Institute of Nuclear Safety (KINS)]***

- 1) Please explain what you believe the term safety culture means.

The definition of “Safety culture” can be referenced as INSAG did as follows; “Safety culture is assembly of characteristics and attitudes in organisations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance.”

In addition to the above, KINS defines the safety culture to be “mindset that could affect personal or organisational attitudes in the decision making process as putting priority to safety”.

- 2) Does your organisation recognise that its inspection practices and the behaviour of its inspectors can influence a Licensee's safety culture? Explain both positive and negative aspects.

Yes, KINS recognize that the inspection practices and inspectors behaviour could influence Licensee’s safety culture.

KINS conducted two surveys to address the recognition of safety culture in KINS staff and in licensee’s employees in May 2002 and in November 2004, respectively. KINS staffs are content with overall features of safety culture in the KINS. They are favourable in the assessment of KINS staff’s working attitude, but need some improvement in giving more time for scrutinizing technical issues and for developing staffs’ expertise. Also, the clear guidance for performing regulatory works and the clear understanding of staff on the substance of regulation would be the most important elements for

promoting safety culture and, as next liners, the climate welcoming questioning attitude and the institutional barriers to prevent external influence on the regulatory decision making process were rated.

On the licensee's side, the NPP staff highly appreciates KINS staff's commitment to the policy goal of safety first, having clear understanding of substance and principle of regulation, and that KINS staff has strong barriers against licensee's influence but responds relatively in a sensitive way to media, local people, and NGO.

- 3) Explain how your inspection practices and inspectors behaviours are designed to maximise their positive influence and minimise their negative influence.

In terms of inspection practices and inspectors behaviours, in Korea, we have no specific way to maximise the positive effects. However, the climate of welcoming questioning attitude and the environment of paying attention to the staff's safety concerns are a key way to maintain relatively high level of safety culture. Nevertheless, in quality assurance area, KINS has an internal evaluation process on the QA inspection results to give credit to the licensee's voluntary efforts for improving safety focus attitude as follows.

In Korea, the operating nuclear power plants should receive QA inspection every two years. To encourage the effort of licensee in the quality assurance activities, it was allowed in 2000 that QA audit inspection could justify the increase of inspection interval from every two years to every four years, if the evaluation of QA inspection results showed high grade. This measure showed some positive influence on the behaviour of licensee in terms of safety culture and promoted some competitive climate between the top managers of nuclear power plants. However, when the results were open to the public it was troublesome in arguing that the local people around the nuclear power plants rated at relatively low grade raised big concerns about the safety even though the grade itself had nothing to do with imminent nuclear safety. The graded approach is in use in the QA inspection but the relative ranking among the nuclear power plants was discarded to avoid misleading the public.

- 4) Explain what factors are monitored to detect the existence of and change to these influences.

Besides the eighteen criteria of quality assurance programme provided in ASME NQA, KINS developed an internal evaluation guidelines accounting for NPP staff's attitude toward QA as follows:

- Recognition of NPP staff on quality assurance activities;
- Plan for quality improvement;
- NPP staff's quality including appropriate knowledge and attitude to QA activities;
- Manner of willingness to cooperation with not only inside staff but also outside stakeholders;

To encourage the licensee's safety culture, it should be considered in the regulatory decision making process such as event scale evaluation. As well described in the INES user's manual of IAEA, the lack of safety culture could result in operators performing in ways overriding sacrificing safety. Accordingly, safety culture should be considered as part of the defence in depth, and a deficiency in safety culture could justify upgrading the rating of an event by one level. As an example, in Korea total 208 events have been reported and subjected to event scale rating for the past decade (1995 to 2005).

Most of them but 7 events were rated to be zero. Three of seven events rated greater than level zero were upgraded by one level being resulted from the lack of safety culture. Examples of such indicators are same as described in INES user's manual as follows:

- A violation of operational limits and conditions or a violation of a procedure without justification;
  - A deficiency in the quality assurance process;
  - An accumulation of human errors;
  - A failure to maintain proper control over radioactive materials, including release into the environment or a failure in the systems of dose control;
  - The repetition of an event, indicating that either the possible lessons have not been learnt or the corrective actions have not been taken after the first event.
- 5) Has your Regulatory Body discussed the existence of this effect? Are there any additional points arising from those discussions not covered by your response so far that you find worth sharing prior to the workshop.

To change the mindset of operators or licensee from results-oriented toward safety-first, the governmental initiatives play very important roles. In Korea during the past several decades, so called, "hurry-up culture" was predominant in almost all the social sectors and this culture was interpreted as one of the strong motives in the fast economic achievement. In nuclear arena, this "hurry-up" culture was much less apparent, however, the government took several initiatives to change this culture to putting priority to safety, such as "Declaration of nuclear safety charter", designating 10<sup>th</sup> of September as the "Nuclear Safety Day" and the first Tuesday of every month as "Safety Check Day", and so on. On the "Nuclear Safety Day" the government awards appropriate prizes to organisations and individuals having any distinguished achievement for securing safety. This is done to encourage relevant organisations and employees to recognize the importance of safety and to further contribute toward nuclear safety.

## **Mexico**

### ***[Comision Nacional de Seguridad Nuclear Y Salvaguardias (CNSNS)]***

- 1) Please explain what you believe the term safety culture means.

The term safety culture means the set of practices in organisation and individuals which consider that safety issues in nuclear installations have to receive all the attention, it means, safety issues have the first priority.

- 2) Does your organisation recognise that its inspection practices and the behaviour of its inspectors can influence a Licensee's safety culture? Explain both positive and negative aspects.

My organisation recognises that its inspection practices and behaviour of the inspectors can influence a Licensee's safety culture and the impact of the regulator on the licensee's safety culture, depends on the type of regulatory strategy.

Positive aspects

- a) Responsibility for safety must always rest with the operating organisation
- b) Activities and questions should be designed in a way that fosters the self-reflection and the learning process of the licensee's organisation
- c) Self regulations and self assessment by the operator increases its motivation

Negative aspects

- Regulatory body must not take the responsibility for safety from the operating organisation
  - Safety culture can not be prescribed
  - There is not "one best way" in the area of safety culture
- 3) Explain how your inspection practices and inspectors behaviours are designed to maximise their positive influence and minimise their negative influence.

By analyzing the inspection's results to know what are the safety aspects which are affecting safety culture and promoting meetings to enhance communication with the licensee to initiate a self-reflection process, at the same time we are promoting that requirements for corrective actions will be formulated in a less prescriptive way and process oriented

- 4) Explain what factors are monitored to detect the existence of and change to these influences.

During the analysis of the inspection's results we have found that some inspectors are very prescriptive because they always have been worked in this way and during the meetings with the licensee usually some body complain about this kind of inspectors

- 5) Has your Regulatory Body discussed the existence of this effect? Are there any additional points arising from those discussions not covered by your response so far that you find worth sharing prior to the workshop.

At the present time our Regulatory Body have not discussed the existence of this effect.

**The Netherlands**

*[Inspectorate of the Ministry of Housing, Spatial Planning and the Environment Nuclear Safety department (VI/KFD)]*

- 1) Please explain what you believe the term safety culture means.

Safety Culture means: the sum of all safety related assumptions and norms that are shared by the majority of an organisation's members, and which find their expression in the way safety is actually dealt with in all areas of the organisation.

Safety Culture means: that assembly of characteristics and attitudes in organisations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance.

Both answers are quoted definitions (Schein's model and INSAG-4). Nuclear safety is understood to be more than just plant safety.

- 2) Does your organisation recognise that its inspection practices and the behaviour of its inspectors can influence a Licensee's safety culture? Explain both positive and negative aspects.

We recognise that inspection practices can and will influence licensees' safety culture. We balance our roles of being an expert- authority and being responsible towards the public

Positive aspects: Give credit for good safety practice; ensure staff is heard by management.

Negative aspects: Blame licensee for small reported failures, apply unnecessary enforcement

- 3) Explain how your inspection practices and inspectors behaviours are designed to maximise their positive influence and minimise their negative influence.

Inspectors and inspection practices are not specifically designed on safety culture impact.

- 4) Explain what factors are monitored to detect the existence of and change to these influences.

We do not monitor the effect of regulatory activity on the safety culture aspects.

- 5) Has your Regulatory Body discussed the existence of this effect? Are there any additional points arising from those discussions not covered by your response so far that you find worth sharing prior to the workshop.

We discuss this effect often. We have no structured way to adapt inspection practices and inspectors' behaviour in relation to safety culture implications.

## **Slovak Republic**

### ***[Nuclear Regulatory Authority of the Slovak Republic (UJD SR)]***

- 1) Please explain what you believe the term safety culture means.

The safety culture means we consider the regulations, directions, guides, the training plans and other documentations with respect to nuclear safety.

- 2) Does your organisation recognise that its inspection practices and the behaviour of its inspectors can influence a Licensee's safety culture? Explain both positive and negative aspects.

We are persuaded, that our inspection practice and inspectors influencing very positively the licensee's safety culture.

Several shortcomings e.g. in documentation system were remedied after inspectors finding and warning.

- 3) Explain how your inspection practices and inspectors behaviours are designed to maximise their positive influence and minimise their negative influence.

Mainly, resident inspectors during their routine inspections observe the personal behaviour and attitude to safety culture. The inspector's remarks are highlighted in protocols or in records, which are subsequently discussed with the licensee's management.

We are not aware about negative influence of regulatory body inspectors.

- 4) Explain what factors are monitored to detect the existence of and change to these influences.

We do not have any exactly stated factors, which are monitored.

- 5) Has your Regulatory Body discussed the existence of this effect? Are there any additional points arising from those discussions not covered by your response so far that you find worth sharing prior to the workshop.

No.

## Sweden

### *[Swedish Nuclear Power Insp. (SKI)]*

- 1) Please explain what you believe the term safety culture means.
- a) Safety culture is the term used to describe the aspects of an organisation's reliability which depends on "shared values and norms of behaviour articulated by senior management and translated with high uniformity into effective work practices at the front line".<sup>4</sup>

This definition emphasises the direct and powerful influence of an organisation's leadership group on the particular attitudes and behaviour of employees in regard to safety.

- b) Safety culture is most easy to define and characterize once it has disappeared.<sup>5</sup>

"Culture is what remains in a man when he has forgotten everything"

Edouard Herriot

- 2) Does your organisation recognise that its inspection practices and the behaviour of its inspectors can influence a Licensee's safety culture? Explain both positive and negative aspects.

Yes and no. We have had discussions from time to time about our influence on the licensee's safety culture. But we have not dealt with this in a structured way within SKI.

---

<sup>4</sup> Gaba, D.M., Singer, S.J., Sinaiko, A.D., Bowen, J.D., & Ciavarelli, A.P. (2003). Differences in safety climate between hospital personnel and naval aviators. *Human Factors*, 45(2), 173-185.

<sup>5</sup> Comments by Andre-Claude LaCoste, Direction generale de la surete nucleaire dt de la radio protection France, Rio de Janeiro, December 2002

- 3) Explain how your inspection practices and inspectors behaviours are designed to maximise their positive influence and minimise their negative influence.

The issue has not been dealt with (inspection practices and inspectors behaviours and their influence on the licensee's safety culture).

- 4) Explain what factors are monitored to detect the existence of and change to these influences.

No monitoring is conducted. SKI monitors the experiences from its inspections and tries to modify the process regularly. But according to the above, this is not being done from a safety culture perspective.

- 5) Has your Regulatory Body discussed the existence of this effect? Are there any additional points arising from those discussions not covered by your response so far that you find worth sharing prior to the workshop.

No.

## Switzerland

### *[Swiss Federal Nuclear Safety Inspectorate (HSK)]*

- 1) Please explain what you believe the term safety culture means.

HSK is currently in a process of reflecting and refining its understanding of safety culture which is based on E. Schein's three level model of organisational culture (artefacts, espoused values, basic assumptions). HSK favours a descriptive definition of safety culture, as opposed to a prescriptive or normative definition. Accordingly, a definition of the term safety culture could be: "Safety culture represents the sum of all safety relevant assumptions and norms that are shared by the majority of an organisation's members, and which find their expression in the way safety is actually dealt with in all areas of the organisation" (Grote & Künzler).

- 2) Does your organisation recognise that its inspection practices and the behaviour of its inspectors can influence a Licensee's safety culture? Explain both positive and negative aspects.

The Human and Organisational Factors Section of HSK has been working for some years on the issue of the influence of the regulatory body on the Licensee's safety culture. The section was also involved in several IAEA activities on the same topic. The section takes the stance that the regulatory body's activities, including inspections, have an influence on the licensee's safety culture. This is especially true for oversight activities in the field of human and organisational factors, but applies also to most of the other oversight fields (e.g. technical, radiation protection etc.). The impact of the regulator on the safety culture, however, can be very different, depending on the type of regulatory approach. This fact must therefore be considered by regulatory bodies when deciding on how to supervise their licensees, since the regulators' activities can possibly have detrimental effects on the licensees' safety culture if they do "the wrong thing". HSK is developing a guideline about oversight over safety culture, based on these basic principles.

Moreover, HSK is introducing a new oversight philosophy (so called Integrated Oversight). In this context a project was carried out to define a new inspection approach. The project team adopted the point of view that inspections and inspectors can have an impact on the licensee's safety culture as it

conceived the inspection approach and the role of the inspector that HSK should strive for. This reflection process within HSK is still in progress.

Possible effects of inspection practices and inspectors' behaviour on safety culture: The impact strongly depends on the oversight approach adopted by the regulatory body, but also on the object of oversight. For instance, a very prescriptive regulatory approach can have detrimental effects on the licensee's safety culture for several reasons: First, the regulator takes over responsibility for safety which in contrast should always stay with the licensee. In areas like organisation and safety culture, where no absolute standards about the correct way of doing things exist, the regulator runs the risk of imposing on the licensee a suboptimal solution to a certain problem and to stop the licensee's own efforts and initiatives to improve its safety and safety culture. Inspections should not only have the aim of examining whether the licensee fulfils all the legal requirements, but also of promoting self reflection and learning processes by the licensee organisation. In this context, also the role attributed to the inspector (e.g. "police", "consultant", "assessor") and the individual behaviour and inspection style of the single inspector can have a positive or negative impact on the safety culture of the licensee organisation.

- 3) Explain how your inspection practices and inspectors behaviours are designed to maximise their positive influence and minimise their negative influence.

HSK is still developing its new inspection philosophy and practice. An important element, which still has to be conceived and developed, will be a thorough training of the inspectors. The reflection on the inspector's potential positive or negative impact on the licensee's safety culture should be part of this training.

- 4) Explain what factors are monitored to detect the existence of and change to these influences.

HSK regularly requests feedback from its licensees about its regulatory and oversight practice. This feedback can give information about the kind of influence of the inspections.

HSK started in the year 2005 conducting shop talks with the licensees about safety culture on a regular basis. These talks explicitly don't take place in the form of inspections, but of an open dialogue with the aim of stimulating self-reflection and learning processes within the licensee's organisation. The feedback of the participants regarding the usefulness of such dialogues is positive. Some of the participants also stressed the importance of the fact that these dialogues are explicitly not conducted as inspections. The shop talks, which were conducted in two "rounds" – a first presentation of the licensee's activities and efforts in the field of safety culture as well as discussion about the licensees understanding of safety culture, and a follow-up discussion some months later – also showed that the safety culture issue gained stronger prominence within the licensee organisation.

- 5) Has your Regulatory Body discussed the existence of this effect? Are there any additional points arising from those discussions not covered by your response so far that you find worth sharing prior to the workshop.

Discussions on this effect have already taken place within the Project on Inspection Philosophy within the framework of Integrated Oversight, as mentioned in question 2. Nevertheless, the discussion is not completed yet (and should never be!). Currently, the issue is topic of discussion as HSK is regulating oversight on safety culture in a guideline, which is being developed by the Human and Organisational Factors Section (cf. question 2).

To promote a positive safety culture, the regulatory body disposes not only of inspections, but also of other types of oversight tools. HSK, for instance, makes use of regulatory "shop talks", particularly on

topics such as safety culture, organisation and safety management (cf. question 4), in order to create and promote an open and constructive dialogue with the licensee and to foster self reflection and learning processes of the licensee's organisation. Additional "tools" for and ways of doing oversight by the regulator in order to promote a good safety culture.

## United Kingdom

### *[Health & Safety Executive / Nuclear Installations Inspectorate (HSE/NII)]*

- 1) Please explain what you believe the term safety culture means.

There are several definitions of safety culture in circulation – for example, those generated by IAEA and one which was produced in 1993 by the U.K. (the ACSNI study on "Organising for Safety"). These are not restated here. The IAEA definitions are most widely used, and should probably be regarded as the starting point for discussions within the international community. However, it is the practical interpretation of these definitions which is important, and they can be operationalised in different ways. There may therefore be limited benefit in discussing definitions further at the workshop.

- 2) Does your organisation recognise that its inspection practices and the behaviour of its inspectors can influence a Licensee's safety culture? Explain both positive and **negative aspects**.

The need to consider the impact a regulator can have on a licensee's safety culture was highlighted in the 1993 ACSNI study on Organising for Safety. Since then, there have been case studies with lessons for nuclear regulators notably Millstone, Ontario Hydro and Davis Besse. However, NII has not yet developed any structured approach to address the core issue or apply the regulatory lessons. A key issue for regulators is the 'dependency culture' wherein licensees are focused on delivering what individual inspectors have asked for (because the regulator can stop them doing what they want to do). Once the regulator has been satisfied on these issues, and consent/agreement etc granted, there is a risk that the licensee believes everything is done or sees no driver to do anymore. Moreover, the more scrutiny the regulator gives to an issue, the more this approach is reinforced. Regulators could therefore consider spending more time focusing on the key decision-makers in licensees, especially in high pressure situations. For example: are senior managers/Board Members aware of the safety implication; where are they getting their information from; who is challenging in the interests of safety; are they being heard? etc.. There are some case studies which provide a template for an approach which could be taken (e.g. the AIB report on Columbia).

- 3) Explain how your inspection practices and inspectors behaviours are designed to maximise their positive influence and minimise their negative influence.

See the answer to Q2. Currently, NII's inspection practices and inspectors' behaviour are not explicitly designed to address positive and negative influences. However, NII has a Training Group which is considering this issue and the need to feed in lessons from case studies has been brought to the Group's attention. The roll-out of the new Safety Assessment Principles on Management for Safety should also play a part in heightening awareness.

- 4) Explain what factors are monitored to detect the existence of and change to these influences.

There is no systematic monitoring or collation of information within NII. The creation of a new unit in recent restructuring of NII might help in this respect. The unit will have a cross-NII focus on safety management/safety culture and will be developing NII's approach.

- 5) Has your Regulatory Body discussed the existence of this effect? Are there any additional points arising from those discussions not covered by your response so far that you find worth sharing prior to the workshop.

See response to Point 4: We intend that NII should take a 'top-down' approach starting with the new Safety Assessment Principles on Management for Safety. These should feed into inspection and assessment activities, including training of inspectors. This should encompass increased awareness of cultural issues and the positive and negative influence of the regulator.

## **United States**

### ***[Nuclear Regulatory Commission (NRC)]***

- 1) Please explain what you believe the term safety culture means.

The U.S. NRC has adopted the INSAG 4 definition of safety culture which is defined as “That assembly of characteristics and attitudes in organisations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance.”

- 2) Does your organisation recognise that its inspection practices and the behaviour of its inspectors can influence a Licensee's safety culture? Explain both positive and negative aspects.

Yes. The U.S. NRC does recognize that our inspection programme can potentially impact a licensee's safety culture. On the positive side, the fact that inspectors will be reviewing/inspecting aspects of licensee performance that are important to safety culture helps to ensure that licensee's will address these aspects. When the staff was identifying what are the attributes of safety culture that should be included in the Reactor Oversight Process (ROP), they screened them for possible unintended or negative consequences on licensee performance.

A potential negative outcome which may exist is that a licensee may unnecessarily adjust their priorities based on what the inspectors are reviewing as a routine inspection sample rather than focus their resources on more significant issues.

- 3) Explain how your inspection practices and inspectors behaviours are designed to maximise their positive influence and minimise their negative influence.

Inspectors are trained to engage on an important performance issue at the right level of the organisation and at the right time. The inspector does not normally engage in the middle of a licensee activity unless an immediate safety concern exists, but will wait until the licensee has completed the activity to discuss the performance. Further, the inspector assesses licensee activities to ensure they are consistent with the licensee's own expectations and with the regulations. Therefore, the inspector does not assess the licensee against the inspector's individual standards or expectations.

- 4) Explain what factors are monitored to detect the existence of and change to these influences.

The changes to the inspection programme to more fully address safety culture is within the existing framework of the inspection programme. Since the inspectors are trained to be sensitive so as not to have a negative influence, the same holds true for when they are reviewing cross-cutting aspects (i.e., components of safety culture relative to problem identification and resolution, human performance, and safety conscious work environment) of findings in the enhanced inspection programme.

- 5) Has your Regulatory Body discussed the existence of this effect? Are there any additional points arising from those discussions not covered by your response so far that you find worth sharing prior to the workshop.

The first 18 months of the enhanced ROP to more fully address safety culture will be assessed based on specific criteria. These criteria will include any negative or unintended consequences that may have occurred due to the changes in the ROP. In addition, the NRC annually receives and considers comments from both internal and external stakeholders on the ROP as part of its annual self-assessment.

## APPENDIX A

### HAEA NSD's Safety Policy

#### *1. Introduction*

*101.* HAEA NSD acts as overseer of the nuclear facilities in Hungary. Its most important task is the enforcement of safety requirements incorporated in the provisions of law. The aim of this document is to introduce the principles, which allow HAEA NSD to contribute in the most effective way to the safety of nuclear facilities during their whole lifecycle.

*102.* The Nuclear Safety Directorate (NSD) of HAEA, as the nuclear safety authority of first instance, plays a determining role in the regulatory system for the guarantee of safety of nuclear facilities. Its' work is controlled by laws and decrees. In spite of the existence of the legal framework, it is important to declare the safety policy of HAEA NSD in order for the organisation to work on the basis of homogeneous principles, and its work to depend to a less extent on subjective judgements of the inspectors. Thus, the work of the authority becomes more unambiguous and predictable for licensees.

*103.* The documents issued by the International Atomic Energy Agency (Safety Fundamentals, Safety Requirements, INSAG-reports) set the safety principles which are accepted and respected by the majority of the member states. HAEA NSD considers these principles binding and applies them in the course of its work. The safety policy of NSD is also based onto this, bearing in mind that every country — Hungary as well — follows its own specific approach in the realisation. This characterises especially the practices of authorities, which show remarkable differences when compared. The main reason for this is that regulatory activity has to comply with the national administrative and legal system.

*104.* Thus safety policy is country- and organisation-specific therefore this paper can be considered as the constitution of HAEA NSD. Beyond the present practice, it also contains elements, which reflect the demand for modernisation.

#### *2. Goals of HAEA NSD*

*201.* The primary goal is to ensure that the population, environment and operating staff will not suffer any harm caused by nuclear facilities. In the interest of this, HAEA NSD follows internationally accepted safety principles and criteria.

*202.* HAEA NSD also aims to guarantee full execution of duties originating from the responsibilities obliging Licensee to ensure the full-scope safety of the nuclear facility for its entire lifespan. HAEA NSD performs primarily on technical grounds its administrative supervisory activity in the interest thereof, which consists of licensing, supervision, enforcement as well as their review, assessment and evaluation.

**203.** It also falls within aims of HAEA NSD to effectively apply its resources – given the modern technical, scientific, organisational and managerial information at hand – while not to limit the activity of licensees without due cause. Thus it strives to continuously improve the safety culture of its own organisation and require the same from the organisations under its supervision.

### ***3. Responsibility of HAEA NSD***

**301.** HAEA NSD is responsible for the licensing and inspection of nuclear facilities, systems, and equipment and for the enforcement of regulatory requirements.

**302.** In the interest thereof HAEA NSD has to be authorised, independent, competent, and has to avoid taking any responsibility beyond its official activity. It has to understand the processes controlled and to be open towards the society and other authorities. It has to acquire and keep the confidence of the population, has to make itself understood with the lay public and with the environmentalist movements.

**303.** It is the responsibility of HAEA NSD to follow the realisation of legal regulations and safety goals. Taking this and the attempt to follow the successful international practice into consideration, HAEA NSD is to initiate the amendment of legal regulations and safety requirements and draw up new plans.

**304.** The responsibility of HAEA NSD encompasses the process of nuclear accident prevention. Therefore, it participates in the emergency activity of the Coordination Committee of the Government, where it performs independent assessment and advisory function by diagnosing the causes and prognosticating the consequences of the accident. It approves the nuclear emergency response plan of Licensee and inspects the emergency preparedness thereof.

### ***4. Scope of authority of HAEA NSD***

**401.** The scope of authority of HAEA NSD is defined by Government Decrees No.114/2003.(VII.29.) and No.108/1997.(VI.25). The administrative framework of its work is based on Act No. IV/1957 amended several times.

**402.** As an authority of first instance, HAEA NSD carries out the control of nuclear facilities, which consists of nuclear safety licensing, inspection, supervision, review and assessment. The regulatory activity covers the entire lifecycle of the nuclear facilities: site selection, design, construction, commissioning, operation and decommissioning. Enforcement is also included in the scope of authority of HAEA NSD, in the course of which it applies enforcing and sanctioning measures if necessary.

**403.** The scope of authority of HAEA NSD covers the nuclear safety aspects of nuclear facilities, systems, structures and equipment, licensing and monitoring their technical radiation protection, but does not extend over the regulatory activity in the field of radiological safety of living organisms and environment.

**404.** HAEA NSD deals with issues of nuclear safety on-site of the facility, but its activity covers to a limited extent the protection area of the facility and the forwarding agents of the nuclear facilities as well.

**405.** HAEA NSD performs its duty on the basis of legal regulations and technical considerations.

### **5. Tasks of HAEA NSD**

**501.** The tasks of HAEA NSD are defined by Government Decrees No.114/2003(VII.29),108/1997.(VI.25.), 213/1997(XII.1.) and 240/1997(XII.18). These decrees enumerate up-to-date nuclear regulatory duties as follows:

- Processing, analysis and objective evaluation of safety information submitted by Licensee
- issuing, amending, and cancelling licences
- performing inspections, and the objective evaluation of their findings
- imposing measures necessary on the basis of information available to the authority
- enforcing sanctions with due consideration for violation of safety standards
- supervising the required emergency preparedness system
- collection, processing and storage of data related to nuclear safety
- drawing up documents and setting-up requirements regulating the activity of Licensee
- monitoring the qualifications and training of the operating staff
- launching research and development projects, incorporating their results into the regulatory work
- co-operation with international organisations
- co-operation with co-authorities and with foreign partners
- supporting PR work

**502.** HAEA NSD has special responsibility as the professional authority in the field of radioactive disposal facilities, fire and physical protection as well as environmental protection.

### **6. Requirements for professionals and managers of HAEA NSD**

**601.** The technical staff of HAEA NSD should meet the following requirements:

- university or college degree
- adequate knowledge of nuclear technology
- commitment to nuclear safety
- deep expertise in one of special fields related to the work of the authority

- continuous improvement of his/her knowledge by internally and/or externally organised training and reading of technical literature
- command of languages, especially English
- command of computer skills, necessary in the work of the authority
- knowing and applying rules and standards
- inclination to empathy
- co-operative readiness
- initiation, discipline, honesty, discretion
- civilised appearance and behaviour

**602.** Further requirements to be met by senior management:

- organisational and co-operative skills
- objective discernment, good faculty of judgement and decision
- personal exemplification

### ***7. Relationship with Licensee***

**701.** Clear, unambiguous requirements have to be set avoiding their over-prescriptive and regulative character (prescribing „what” instead of „how”). The requirements should be in congruence with standard international recommendations.

**702.** Our decisions should be constructive, while our criticism and objections well-founded and justified.

**703.** We shall enforce our resolutions and take due measures against work performed without license or deviating from the license.

**704.** Licensee is required to submit its documents in a complete (including all the necessary information), precise (containing the appropriate information), targeted (containing the information in the prescribed form) and comprehensive (discuss the problem in its complexity) form.

**705.** Besides inspecting the activity of Licensee related to safety, the authority also inspects whether the omission of an activity has safety consequences or not.

**706.** Our relationship with Licensee should be characterised by the atmosphere of openness, mutual confidence and respect. Mutual understanding has to be advanced by means of frequent meetings, but any behaviour hinting at the expected decision has to be avoided.

**707.** Legitimate claims of Licensee must be taken into consideration, however compromise at the expense of the safety cannot be allowed. We should be open to consider well-grounded, new propositions, flexible in choosing the means ensuring safety goals, but conduct strict regulatory control over safety related activities.

### **8. Basic principles of the work of HAEA NSD**

**801.** Regulatory work is based on rules and standards. Both the rules/standards and regulatory work are aimed to minimise risk, however the principle of reasonably low risk has always to be kept in mind.

**802.** Deterministic and the probabilistic approaches have to be applied together as complimentary methods when judging safety and identifying strengths and weaknesses.

**803.** One of the means for judging safety is the application of the principle of defence in depth. Avoiding damages of protecting barriers is of primary importance. Quality assurance and the availability of the engineered safety systems serve this purpose. The full knowledge of technology and hypothetical accident scenarios are necessary for the judgement in case of both internal and external initiating events. Using the principle of single failure criteria is possible.

**804.** In the probabilistic approach the initiating events of accidents are defined as equipment failures and/or human failures, so the minimisation of their frequency is a primary task (prevention). Mitigation of severe consequences originating from multiple failures is the secondary task. Therefore, we should be aware of the importance of the components in the escalation of accidents scenarios and the availability of systems suitable for mitigating interventions as accident management measures. The reliability of human, organisational and managerial factors also play an important role in the processes.

**805.** The permanent reduction of risk is the task of Licensee. However, in the field of the safety upgrading, HAEA NSD should also have a priority list. Priority has to be examined in relation of risk reduction vs. cost.

**806.** Our regulations and everyday practice is to reflect a non-prescriptive character. In practice, it is realised in the properly stated conditions of licences.

**807.** We should at all times take into consideration standard international recommendations and practices in drawing up and applying regulations.

### **9. The practice of work of HAEA NSD**

**901.** We should strive to weight cases according to their importance. This importance is determined by its relation to safety. The definition thereof can take place on the grounds of either deterministic or probabilistic approaches. In the former approach the damage of safety barriers, in the latter case the contribution to the core melt frequency and significant environmental diffusion are the bases of judgement. Relevant recommendations of the International Atomic Energy Agency provide the standards for categorisation according to safety importance. Safety categorisation also reflects the importance.

**902.** The weighting according to importance cannot be a reason for either violation of rules or neglecting tasks prescribed by rules.

**903.** Requirements of costly investments resulting in minor safety improvement should be avoided.

**904.** Efforts should be made for the quick and precise arrangement of matters, however the expedience cannot be at the expense of thoroughness. In case of uncertainty, the decision has to be made in the interest of higher safety level. It is important to reveal problems and risks, and to initiate measures to solve or decrease them.

**905.** In course of the administration, the aspects of Licensee have to be taken into consideration. The authority should show consideration and empathy in specially requested cases, and make an effort to conclude the case as soon as possible with due diligence. However, out of turn cases are only justified, if the case requiring intervention on the part of HAEA NSD could not be planned, emerged unexpectedly, and its special treatment contributes to the termination of a clearly unfavourable safety condition. Furthermore, the loss of time due to the standard procedure of administration would result in a significant surplus in risk considering safety consequences, and this surplus risk did not accumulate during a delay in the preparation of the case. HAEA NSD enforces the requirements of nuclear safety to the utmost degree when considering requests.

Connection with unexpected events and it does not mean that the licensee compensates its delay with hurrying on the authority's work.

Effort has to be made for using the cost-benefit principle. This means that resolutions, which require costly investment and have as a result only minor improvement of safety level have to be avoided.

**906.** The probabilistic/risk methods should be used more comprehensively in regulatory work. Efforts have to be made to reduce the undue burden of Licensee.

**907.** We should have a clear picture of the Licensee's performance, of its strengths and weaknesses, and their changes in time (improvement-deterioration). We should use indicators for monitoring them (performance indicators).

**908.** The severity of the incidents has to be judged on the basis of the thorough assessment of the incidents and initiatives should be taken in feeding back the lessons learned to the operational process.

**909.** Setting up unrealistic requirements and conditions is not allowed.

**910.** We should refrain from the superior sermonising of Licensee, just as from the over-emphasising of unimportant formal mistakes.

**911.** Do not let us be overcome by the feeling of (sometimes virtual) power, do not misuse our position, and talk condescendingly to Licensee.

**912.** We should find the right extent to which we can comply with Licensee's requests for exemption and after which we are unyielding.

**913.** We should avoid unnatural impersonal/passive sentence structures as well as difficult, multiple attributive constructions. Our style should be clear-cut, unambiguous, understandable and grammatically correct.

**914.** Instead of multiple formal exchanges of letters we should make use of consultations, nevertheless obligations can only be undertaken by authorised personnel. Consultation however cannot substitute the required sound documentation of administration.

**915.** Any information that might hint at later decisions or might be interpreted as the expression of Authority's opinion is not to be disclosed at consultations with Licensee.

**915.** Close co-operation and information flow have to be developed within HAEA NSD. High quality work has to be ensured by setting up, introducing, operating, continuously maintaining, and developing our internal quality assurance system.

**916.** We should mutually appreciate and respect each other's work within the organisation but should not tolerate slackness, negligence, and work-shyness. We should apply positive criticism.

## **B. INSPECTION OF INTERACTIONS BETWEEN THE LICENSEE AND ITS CONTRACTORS**

### ***Introduction to the Questionnaire:***

The use of contractors at nuclear plants is increasing, with a possible dilution of the knowledge base. Recent incidents have highlighted the importance of maintaining a close eye on contractors. Verification steps by the regulator and licensee must be planned, controlled and evaluated. At the same time difficulties in the interaction between the regulator, licensee and contractor have been experienced. The workshop will review the issue and determine some commendable practices when dealing with this interface.

Please note any significant differences to the results from the survey carried out by the WGIP “Inspection of Contracted Work” in 2003, which may be relevant for the workshop, which is available through the NEA\CNRA website.

### ***Questions:***

- 1) What is the regulatory framework for inspecting contractors (short answer)?
- 2) How do you inspect the interfaces between licensee and contractors?
- 3) How do you inspect the procedures or quality assurance system of both licensee and contractor regulating the interactions between the licensee and its contractors?
- 4) Regulatory Inspections results
  - a) How does your Regulatory Body maintain confidence in the way Licensees control the work done by the contractors?
  - b) What type of inspections does your Regulatory Body carry out to verify the effort spent by the Licensee doing contractors supervision?
  - c) Have you noticed a trend in the quality of the work and documents prepared by the contractors?
  - d) If you do witness activities by contractors, does the Regulatory Body carry this out systematically following any specific trend or other methods?

5) Inspections

- a) Do you visit contractors or manufacturers sites? If not, why not?
- b) For contractors located away from the nuclear power plant, in what capacity do you visit the contractor's site?
- c) Do you visit the contractor as visitor or as an inspector?
- d) Does your Regulatory Body (Regulatory Body) have regulatory authority over the contractors and subcontractors of licensees?

6) Incidents and events

- a) What trends has your Regulatory Body noticed in the incidents / events attributed to contractors?
- b) How did the Regulatory Body respond?

7) What do you do to make sure that safety related recommendations by contractors are assessed and implemented if necessary

8) Are there any other related topics, which you would like to be discussed during the breakout session?

## SURVEY RESPONSES

### Belgium

#### *[Association Vinçotte Nuclear (AVN)]*

#### 1) What is the regulatory framework for inspecting contractors (short answer)?

In Belgium, except for pressure vessels, there is no regulatory framework to support the inspections of contractors. Some documents related to the inspection of contractors can be referring to because their respect is explicitly prescribed by the License.

- Safety Analysis Report (Chapter 17.2 "Quality Assurance during operation"), part of the Royal Decree of Authorisation (License) for each Belgian NPP.
- For pressure vessels, the ASME code as well as other equivalent construction codes (French RCCM) can be used instead of Belgian regulation on pressure vessels.

#### 2) How do you inspect the interfaces between licensee and contractors?

Licensee's organisation related to contractor's relationship and control comprises 3 interconnected systems (working in a closed loop):

- Qualification of contractors.
- Work/service evaluation of contractors (from preparation to final result and comparison with expected quality level and/or standard).
- Reporting and follow-up system in order to initiate an improvement process (corrective actions).

Regulatory (thematic) inspections verify the compliance with Licensee organisation and procedures and its effectiveness.

#### 3) How do you inspect the procedures or quality assurance system of both licensee and contractor regulating the interactions between the licensee and its contractors?

The interaction between QA systems is discussed during thematic inspection (see point 2 above). Regulatory Body does usually not inspect or audit QA systems of contractors. The Licensee or its Architect engineer performs an audit of the contractor at least every 3 years, in order to renew its qualification certificate.

4) Regulatory Inspections results

- a) How does your Regulatory Body maintain confidence in the way Licensees control the work done by the contractors?

Careful investigation of events can deliver valuable information on the way the Licensee controls and masters the work done by contractors.

Although not performed by now, this could also be achieved by controlling contractors on the spot (verification of the existence of a work permit and qualification certificate, respect of the safety, fire protection and radiation protection rules during the work on site).

- b) What type of inspections does your Regulatory Body carry out to verify the effort spent by the Licensee doing contractors supervision?

Thematic inspections (QA, Maintenance), see point 2 above.

- c) Have you noticed a trend in the quality of the work and documents prepared by the contractors?

Presently, Regulatory Body does not examine documents prepared by contractors. Concerning the quality of work, Regulatory Body does not make statistics (there is no performance indicator attached to this matter). It is thus difficult to identify any clear trend (negative or positive) in that respect. Nevertheless, Regulatory Body noticed recently a lack of quality control during the fabrication of new safety related electrical boards, even if the contractor was internationally recognised and fully qualified (QA audited).

- d) If you do witness activities by contractors, does the Regulatory Body carry this out systematically following any specific trend or other methods?

There is no systematic follow-up of contractor's activity by Regulatory Body. Licensee performs a global evaluation of contractor's performances. Regulatory Body is examining these evaluations with Licensee in the frame of thematic inspections.

5) Inspections

- a) Do you visit contractors or manufacturers sites? If not, why not?

We do not visit contractors or manufacturers sites to check for the quality of their work or to verify their capabilities in the nuclear field. The Licensee performs QA audits that should verify that the contractor is capable to work according to the specifications in matter of QA. Since the Licensee is to be the responsible for the safety on the site, we consider that it is its responsibility to verify that contractors are able to perform the activity or to deliver the product as specified by the Licensee.

Nevertheless, we visit sometimes manufacturer sites for some specific project and activities (i.e. attendance to qualification tests of new equipments or repairing methods).

- b) For contractors located away from the nuclear power plant, in what capacity do you visit the contractor's site?

It depends on the legal requirements (ASME) and/or the importance of the project for nuclear safety.

- c) Do you visit the contractor as visitor or as an inspector?

In Belgium, no direct recommendations to the contractors are made (see d). The recommendations are made to the Licensee that should take them into account.

- d) Does your Regulatory Body have regulatory authority over the contractors and subcontractors of licensees?

No.

6) Incidents and events

- a) What trends has your Regulatory Body noticed in the incidents / events attributed to contractors?

A recent event (rated INES 2) showed that the main contractor was not well aware of the importance to safety of his equipment (new electric boards) and that he had a poor knowledge of the nuclear specificity. He was not helped by the equipment specification prepared by the Architect engineer, which was incomplete. The basic problem was possibly a lack of ownership by the Licensee (less implicated in the project, resting too much on the Architect engineer).

- b) How did the Regulatory Body respond?

Regulatory Body asks corrective actions to Licensee in the frame of the experience feedback process.

- 7) What do you do to make sure that safety related recommendations by contractors are assessed and implemented if necessary?

It is the Licensee's responsibility to assess and to decide the implementation of the recommendations. Except in the frame of the experience feedback process review, Regulatory Body does not inspect this area.

- 8) Are there any other related topics, which you would like to be discussed during the breakout session?

No.

## Canada

### *[Canadian Nuclear Safety Commission (CNSC)]*

1) What is the regulatory framework for inspecting contractors (short answer)?

The Nuclear Safety and Control Act clause 32 allows for the inspection, examination and recording of any record that is required to be kept, and for questioning any person found in or having a connection with any inspection under the act. The Class I Nuclear Facilities Regulations requires a record to be kept of all operating and maintenance procedures, including that of contractors. An important element of the regulatory framework is also the license condition requiring a quality management system (QMS) to be implemented by the licensee. The reference standards for QMS require the licensees to manage procurement of items and services, this includes contractors. CNSC has the authority to inspect compliance with this license condition, including the arrangements set up by the licensee for control of contractors.

2) How do you inspect the interfaces between licensee and contractors?

The inspection of interfaces between licensee and contractor looks at the contract documentation issued by the licensee to the contractor. The contract documentation is reviewed for completeness. Records of acceptance by the contractor and revision data are also reviewed. Then records regarding the licensee's acceptance and verification of contractor services and/or items are reviewed. The inspection also includes interviews with key individuals responsible for the interfacing.

3) How do you inspect the procedures or quality assurance system of both licensee and contractor regulating the interactions between the licensee and its contractors?

The techniques for the inspections would consist of interviews with various individuals and the inspections of records. Generally the CNSC relies on the licensee to inspect and approve the contractor quality assurance system which is verified by reviewing the records of the activity carried out by the licensee. The CNSC has on occasions observed these activities when carried out by the licensee and with co-ordination by the licensee has interviewed the contractor directly. The licensee is involved with any CNSC activity regarding their contractors.

4) Regulatory Inspections Results

a) How does your Regulatory Body maintain confidence in the way Licensees control the work done by the contractors?

Monitoring the Licensees internal and external audit reports and conducting inspections to verify compliance of the services or items. Also by requesting to attend Licensee/Contractor oversight meetings to determine, the statues of the contract, problems encountered and the resolution of the problems.

b) What type of inspections does your Regulatory Body carry out to verify the effort spent by the Licensee doing contractors supervision?

By regularly sitting in on the licensees opening and closing audit meetings, also by periodically being an active participant in licensee internal and external audits. Also, inspections of the work that is being done to check to see that the as built item matches the approved design drawing or specification.

- c) Have you noticed a trend in the quality of the work and documents prepared by the contractors?

We have noticed a trend of the contractors producing more documentation to justify their position. The work might not be of better quality, but there is more documentation.

- d) If you do witness activities by contractors, does the Regulatory Body carry this out systematically following any specific trend or other methods?

Yes, the CNSC will witness things like commissioning tests and field walk downs. Regulatory Hold points are added to the licensee's inspection and test plan where needed.

## 5) Inspections

- a) Do you visit contractors or manufacturers sites? If not, why not?

Yes, if the contractor is located at the nuclear power plant regular visits are conducted; if the contractor is located off site then the regulator will occasionally accompany the licensee during their inspection or to witness tests.

- b) For contractors located away from the nuclear power plant, in what capacity do you visit the contractor's site?

As the regulator doing an inspection for which the contractor is connected. The Nuclear Safety and Control Act clause 32 allows for questioning any person found in or having a connection with, any inspection under the act.

- c) Do you visit the contractor as visitor or as an inspector?

During an inspection the CNSC staff visit the contractor as an inspector under the Act. Usually these visits are prearranged with the licensees.

- d) Does your Regulatory Body have regulatory authority over the contractors and subcontractors of licensees?

No, however the CNSC can inspect contractors to gather information, but any requests or orders would be made to the licensee.

## 6) Incidents And Events

- a) What trends has your Regulatory Body noticed in the incidents / events attributed to contractors?

There is a trend of increased use of contractors by the licensees, but at this time a trend of incidences or events attributed to these contractors has not been established.

- b) How did the Regulatory Body respond?

When the CNSC determines that incidents or events are attributed to contractor errors, the CNSC will request corrective action from the licensee to more effectively control their contractors.

- 7) What do you do to make sure that safety related recommendations by contractors are assessed and implemented if necessary?

The licence condition that covers reporting (S-99) requires the licensee to report any potential problem or hazard that is different in nature, or greater in probability or magnitude than was previously represented to the regulator. Including things found or recommended by a contractor. Other than that, the only way CNSC staff would know that a contractor made recommendations would be if the recommendations appeared in a report that was being reviewed by the CNSC. In this case, if the reviewer thought the recommendation was very worthwhile, a letter would be written to the licensee requesting them to respond with what their actions would be regarding the recommendation.

- 8) Are there any other related topics, which you would like to be discussed during the breakout session?

- How does your regulatory body know that contractors or subcontractors are doing work? Are your licensees, contractors and subcontractors obligated to tell the regulatory board that they are doing work?
- Should the regulatory body be involved on a regular basis with work being performed by a licensee's contractor; if so why?
- If the regulatory body does get involved, what should that activity consist of?
- How would a regulatory body determine what contracted service would require their oversight and which would not?
- What would be the requirements the regulatory body would look at and how would that be communicated to the licensee's contractors?

## France

### *[Autorité de Sûreté Nucléaire (ASN)]*

- 1) What is the regulatory framework for inspecting contractors (short answer)?

The regulatory framework is :

- a 1984 ministerial order about Quality Assurance for safety related activities.
- a 2003 ministerial order about radiation protection of workers (including contractors)
- ministerial orders about the manufacturing of primary and secondary cooling system component.

- 2) How do you inspect the interfaces between licensee and contractors?

There are different ways to inspect these interfaces :

- “on the field” inspections during the refuelling outages : surveillance and/or technical control performed by the licensee on the contractors is checked

- inspections dedicated to a technical item : we check the consistence between the contractor's procedures and the licensee's technical specifications.
- Inspections dedicated to subcontracting: choice of the contractors, contractors qualification, contractors evaluation,...
- Inspections in supplier's facilities: surveillance of the licensee on manufacturing quality.

3) How do you inspect the procedures or quality assurance system of both licensee and contractor regulating the interactions between the licensee and its contractors?

We check the compliance of the interactions with the licensee's technical specifications and/or specific interface procedures.

Moreover, we inspect the central services of the licensee to verify how they deal with the qualification and the evaluation of the contractors.

4) Regulatory Inspections results

a) How does your Regulatory Body maintain confidence in the way Licensees control the work done by the contractors?

The confidence is maintained thanks to the results of the inspections which are described in § 2.

b) What type of inspections does your Regulatory Body carry out to verify the effort spent by the Licensee doing contractors supervision?

This effort can be verified during specific inspections about subcontracting : we check that the planned supervision activities have been achieved, that the corrective actions are followed up, that the evaluation of the work and of the contractors is well done.

c) Have you noticed a trend in the quality of the work and documents prepared by the contractors?

It's difficult to identify a general trend in the quality of works and documents because the contractors are very different and we don't monitor every single contractors, which is the licensee's responsibility.

However, the licensee has been contracting for a couple of years "turnkey" services (including several activities, logistics, radiation protection, surveillance..), which led to problems of interfaces between contractors, of competence and manpower. This situation causes also new challenges for inspectors.

d) If you do witness activities by contractors, does the Regulatory Body carry this out systematically following any specific trend or other methods?

We do not really "witness" an activity (there isn't any witness point for inspectors) but we carry out inspections about the activities of the contractors. These inspections are not carried out on the base of a systematic method but on the base of the importance of the activities regarding the safety or the radiation protection.

5) Inspections

- a) Do you visit contractors or manufacturers sites? If not, why not?

We do visit contractors and manufacturers sites.

- b) For contractors located away from the nuclear power plant, in what capacity do you visit the contractor's site?

This is not really a problem in France where there are no resident inspectors dedicated to a plant. The site can be visited by the Regulatory Body central services or regional offices everywhere in France and even abroad.

- c) Do you visit the contractor as visitor or as an inspector?

We don't inspect directly the contractors: we inspect the licensee on the contractor's site to check how its supervision is performed.

- d) Does your Regulatory Body have regulatory authority over the contractors and subcontractors of licensees?

No, except for the manufacturing of the components of the main and secondary cooling systems which have to comply with specific regulations.

6) Incidents and events

- a) What trends has your Regulatory Body noticed in the incidents / events attributed to contractors?

It's difficult to identify trends in incidents which are due to different contractors. Moreover, the incidents can involve more or less the licensee (surveillance or interfaces problems...)

- b) How did the Regulatory Body respond?

The Regulatory Body can ask the licensee to improve its surveillance or its organisation but cannot ask corrective measures directly to the contractors.

- 7) What do you do to make sure that safety related recommendations by contractors are assessed and implemented if necessary?

This is quite a new issue in France and we don't have a very precise idea of this process yet.

- 8) Are there any other related topics, which you would like to be discussed during the breakout session?

We would be interested in the actions carried out by other Regulatory Bodies about the industrial policy of the licensees (criteria's to choose contractors, relationships between the purchase department and the operating department...)

## Germany

### *[Bundesamt für Strahlenschutz, Fachbereich Sicherheit in der Kerntechnik (BfS/SK)]*

#### 1) What is the regulatory framework for inspecting contractors?

Inspecting contractors is based on the KTA-Safety Standard 1401 of the German Safety Standards Commission and applicable specifications. This Safety Standard contains requirements which are comparable to those specified by the DIN EN ISO 9001:2000 Series.

#### 2) How do you inspect the interfaces between licensee and contractors?

The interactions and interfaces between the licensee and its contractors are inspected within the framework of the regulatory inspection programme on in-service inspections, done by spot checks. The legal framework is mentioned above (KTA-1401). The inspections are also based on the quality assurance programme of the licensee.

#### 3) How do you inspect the procedures or quality assurance system of both licensee and contractor regulating the interactions between the licensee and its contractors?

Licensees QA system is inspected as mentioned above under question 2. The inspections are carried out by the independent experts (TÜV) on behalf of the regulatory inspection authority. The contractors get evaluated on the base of German Safety Standards (e. g. KTA 3201.1, 3201.3). In accordance to KTA 1401 the licensee is obliged to choose only evaluated contractors which fulfil the requirements of the regulatory framework.

#### 4) Regulatory Inspection results

##### a) How does your Regulatory Body maintain confidence in the way Licensees control the work done by the contractors?

The regulatory body gets continuously information by the independent technical experts about the licensee and the work done by the contractors. Inspections are carried out on the NPP during implementation of plant modifications and upgrades as well as during manufacturing of parts and components.

##### b) What type of inspections does your Regulatory Body carry out to verify the effort spent by the Licensee doing contractors supervision?

There are mainly inspections performed by the independent experts on behalf of the regulatory body to verify the efforts of the licensee doing contractors supervisions. The regulatory body is informed by monthly or quarterly reports.

##### c) Have you noticed a trend in the quality of the work and documents prepared by the contractors?

Quality depends on the individual contractors' experience.

- d) If you do witness activities by contractors, does the Regulatory Body carry this out systematically following any specific trend or other methods?

The approval of contractors is part of the German regulatory inspection philosophy derived from conventional areas (steam boilers, pressure vessels) in the past. Visits at licensee's site are mainly managed by the independent experts (TÜV) in periodic intervals. A system for specific evaluation of indicators to recognize trends is planned.

## 5) Inspections

- a) Do you visit contractors or manufacturers sites? If not, why not?

Contractors or manufacturers activities are inspected by the independent experts if required in the framework of the applicable rules and specifications. Corresponding inspections are mainly done by spot checks whereas the regulatory body is informed about the results.

- b) For contractors located away from the nuclear power plant, in what capacity do you visit the contractor's site?

The number of inspectors depends on the amount and complexity of components to be inspected for plant modifications or upgrades and the used methods (e.g. welding inspection, non-destructive tests, material testing). Normally one independent expert is visiting the contractor's site for a certain time.

- c) Do you visit the contractor as visitor or as an inspector?

According the German Atomic Energy Act independent experts have equal legal rights and obligations as the regulatory body and therefore these experts visit contractor's site as inspectors.

- d) Does your Regulatory Body have regulatory authority over the contractors and subcontractors of licensees?

The regulatory body can address its findings (requirements, recommendations) only to the licensee and therefore it has no authority over contractors or subcontractors. Only the licensee has the responsibility for contractors.

## 6) Incidents and Events

- a) What trends has your Regulatory Body noticed in the incidents / events attributed to contractors?

Quality assurance problems or lack of experience to manage the requirements of the specifications are noticed by reportable events (meldepflichtige Ereignisse). These events were evaluated case by case by the independent experts. An evaluation system by the authority is planned. All reportable events from all German NPPs are documented and assessed by the Federal Office for Radiation Protection on behalf of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU). If necessary, BMU requests further generic assessment by its expert organisation GRS or by the Reactor Safety Commission (advisory body).

b) How did the Regulatory Body respond?

The authority responds in requesting e.g. the installation of a nuclear safety deputy or specific safety management systems. In many cases audits on QA programmes were intensified.

7) What do you do to make sure that safety related recommendations by contractors are assessed and implemented if necessary?

For safety related recommendations made by the contractor the licensee has the sole responsibility to assess and implement them as appropriate.

Safety related recommendations made by the regulatory body are address to the licensee, who is responsible for further implementation and assessment in its own organisation or by the contractors. This is controlled by independent experts on behalf of the authority.

8) Other related topics to be discussed

## **Hungary**

### ***[Hungarian Atomic Energy Authority (HAEA)]***

1) What is the regulatory framework for inspecting contractors (short answer)?

Act CXVI of year 1996 on Atomic Energy and statutory order 89/2006 (V.5.) gives the authority to Regulatory Body to inspect licensee and its contractors. By statutory order the licensee and contractor is obligated to „cooperate during the inspection and facilitate its efficiency”.

2) How do you inspect the interfaces between licensee and contractors?

Regulatory Body can inspect the interfaces between licensee and its contractors on some levels, as inspecting regulation from the side of contractors under the quality management review, and from the side of licensee inspecting with in site inspections and during comprehensive reviews. Practically, the inspections of interfaces are performed on more inspection levels, as manufactured product supervisions and in site work supervision.

3) How do you inspect the procedures or quality assurance system of both licensee and contractor regulating the interactions between the licensee and its contractors?

The inspection is performed during the supervision of the regulation system, and the work supervision.

4) Regulatory Inspections results

a) How does your Regulatory Body maintain confidence in the way Licensees control the work done by the contractors?

An inspection can be direct or indirect as well. In case of direct inspection, the inspection of compliance is performed during the presence of Regulatory Body, while during an indirect inspection the quality management documentations of licensee are inspected. Direct inspections can be the in site inspection of qualification process, in site work supervision, while indirect

inspections can be the inspection of incoming qualifying documents, or in case of a concrete work, the inspection of certifying documents, required by authority.

- b) What type of inspections does your Regulatory Body carry out to verify the effort spent by the Licensee doing contractors supervision?

Regulatory Body is monitoring licensee regulatory documents, and participate at the supervisions, where inspects the licensee supervision practise as well.

- c) Have you noticed a trend in the quality of the work and documents prepared by the contractors?

Lately the number of contractors has increased, so that the number of registered problems and deviations increased as well. These problems are mostly connected to the quality management systems of new contractors. In some cases, the requirements come from nuclear laws and internal instructions of licensee aren't integrated into their quality management documentations. These problems and deviations occur during the quality management system supervision process. So that, licensee exercise strict supervision during the in site works, in this case no negative tendencies can be noticed.

- d) If you do witness activities by contractors, does the Regulatory Body carry this out systematically following any specific trend or other methods?

According to the actual domestic regulations, licensee is responsible for certifying its contractors. The Regulatory Body participate in the supervision of contractors as supervisory authority, authorized for inspecting and required interventions. Responsibilities are laid in the legal background, moreover licensee and the authority has their own regulations, recording their charges, responsibilities and the view-points of selection for inspections. While the Hungarian nuclear laws are also referred to contractors and suppliers of the licensee, the Regulatory Body has the congruous rights as against the licensee.

## 5) Inspections

- a) Do you visit contractors or manufacturers sites? If not, why not?

The Regulatory Body visits the contractors and manufacturing sites during the supervision of the certifying process and the manufactured product supervisions. The Regulatory Body does not supervise all contractor and manufacturing sites, the authority selects the manufactured products for inspection by the view-points, laid down in the internal regulations.

- b) For contractors located away from the nuclear power plant, in what capacity do you visit the contractor's site?

For contractors located away from the nuclear power plant, the in site supervisions are performed - considering available means - by the view-points, laid down in the internal regulations (effect on safety, type of activity). Lately, the Regulation Body has participated on the 30% of the supervisions of the external contractors and suppliers.

- c) Do you visit the contractor as visitor or as an inspector?

During the supervisions the deputy inspector of the authority visits the contractors having all rights, provided by the legal background.

- d) Does your Regulatory Body have regulatory authority over the contractors and subcontractors of licensees?

According to the actual domestic laws, the Regulatory Body has supervisory and regulatory authority over contractors and suppliers of licensee.

6) Incidents and events

- a) What trends has your Regulatory Body noticed in the incidents / events attributed to contractors?

Because of the growing number of the contractors and the increase of actions, performed by them, the number of events, attributed to contractors increased as well. The growth rate was not too large, and thanks to some improvements, the quality management and monitoring system of licensee could handle the problems had risen up. In some case, contractor's responsibility can not be defined obviously.

- b) How did the Regulatory Body respond?

The Regulatory Body inspires licensee towards stricter regulation, requirements, and supervising procedure, and to raise the in site supervisions. The Regulatory Body has the authority to perform extraordinary reviews, for what there was no example in the last period, the Regulatory Body participated at the extraordinary reviews, performed by licensee.

There have been introduced as new type of inspection activities, the supervision not within site audit performed certifications, as there has been some changes in the requirements of licensee.

- 7) What do you do to make sure that safety related recommendations by contractors are assessed and implemented if necessary?

The Regulatory Body inspects the completion and supervision of the regulations with monitoring the quality management system and the control the work of contractors.

## Japan

### *[Japan Nuclear Energy Safety Organisation (JNES)]*

- 1) What is the regulatory framework for inspecting contractors?

In Japan, the inspection and review for the operation of nuclear power plants are implemented mainly by JNES, under the control of the Nuclear and Industrial Safety Agency (NISA), the Ministry of Economy, Trade and Industry (METI), according to the Law Concerning Regulation of Nuclear Raw Materials, Nuclear Fuel Materials, and Nuclear Reactors and the Electricity Utilities Industry Law.

Among nine types of inspection and review under those laws, those that involve checking relations with contractors include periodic inspections, periodic safety management reviews and welding safety management reviews. Some items in inspections such as the pre-use inspection and fuel assembly inspections may be inspected at the manufacturer's factory..

2) How do you inspect the interfaces between licensee and contractors?

In the periodic inspection, competence of licensee's inspectors including contractors and inspection instruments are checked by witnessing about 60 items of inspection made by the licensee or by verification inspection records.

In the periodic safety management review, effectiveness of QMS is checked by reviewing documents and practices for about 12 inspection items sampled among those made in the periodical licensee inspection(130 items), in which control of contractors by the licensee are reviewed.

In the welding safety management review, the quality of organisation, inspection methods, record keeping, control of contractors are ensured by witnessing inspections for the parts with pressure resistance of electric facilities made at each process by the licensee. Some licensees and manufacturers may have established QMS for manufacturing welding structures, and thus reducing review frequency for each process after being subjected to a total review. In those cases, QMS as a whole is subjected to re-review every three years.

3) How do you inspect the procedures or quality assurance system of both licensee and contractor regulating the interactions between the licensee and its contractors?

In the periodic inspection, the competence of licensee's inspectors is checked in terms of:

- names of inspectors and number of inspectors by reviewing framework of the inspection,
- a rule to designate inspectors and records of the designation by reviewing documents,
- requirements for an inspector such as official certificates and practical experience by reviewing documents, and
- deployment of inspectors during inspection as planned.

The competence of inspection instruments are checked in terms of:

- determining that the function and accuracy of instruments are in accordance with the inspection manual, and are identified, and,
- calibration of inspection instruments by reviewing a calibration record.

In the periodic safety management review, the control of contractors by the licensee is checked in terms of:

- control methods and practices of consignment and procurement of materials and services, by reviewing relevant documents and records, and
- compliance with requirements in JAEC 4111 and JAEC 4209 respectively, by using a detailed checklist.

In the welding safety management review, organisation, inspection methods, record keeping and control of contractors in practice are checked by reviewing an organisation chart and inspection records, or witnessing inspections, using checklists prepared in accordance with the review criteria established by NISA.

## 4) Regulatory inspections results

- a) How does your regulatory body maintain confidence in the way licensees control the work done by the contractors?

The periodic inspection and periodic safety management review are applied to every plant once a year, during refuelling. For the results of the periodic safety management review, NISA will rate the practice of QMS by the licensee as A, B or C, based on the review report by JNES. The rating by NISA will be made public.

The welding safety management review is applied to each of processes including materials, grooves, welding work, NDT and pressure test of welding structures concerned. A final review report will be submitted to NISA by JNES, and conformity or non-conformity will be announced to the licensee.

- b) What type of inspections does your regulatory body carry out to verify the effort spent by the licensee doing contractors supervision?

In case of non-conformity in the periodic inspection, periodic safety management review or welding safety management review, if the causes are attributable to contractors, or some events may be acknowledged that require any measures by the controlling contractors, it will be checked whether investigation of the causes, and measures to prevent recurrence has been made.

- c) Have you noticed a trend in the quality of the work and documents prepared by the contractors?

The regulatory framework in Japan was widely revised in October 2003, when a system in which a regulatory body would check the safety activities made voluntarily by licensees was introduced. Consciousness of licensees and contractors has significantly been improved since that time.

Licensee's periodic inspection had not been required in the previous regulation. However, about 130 items among those in the licensee's periodic inspection are subjected to the periodic safety management review now, and effectiveness of QMS needs to be verified. Rules and record keeping have also been improved.

- d) If you do witness activities by contractors, does the regulatory body carry this out systematically following any specific trend or other methods?

Items to be checked in the periodic inspection, periodic safety management review and welding safety management review have been identified clearly. These are listed in the form of checklists for performing a systematic inspection.

## 5) Inspections

- a) Do you visit contractors or manufacturers sites? If not, why not?

The periodic inspection and periodic safety management review are carried out at the power station concerned, except the check of ECT analysis for a steam generator performed at the manufacturers' site.

In the welding safety management review, since the licensee's welding inspection for most processes are carried out at the manufacturers' site, depending on the size of the welding structure, the review is also often carried out at the manufacturers site.

The review of QMS as a whole, performed every three years, is carried out at manufacturers' site.

Pre-use inspection and fuel assembly inspection are often carried out at manufacturers' site, though they are not intended to check the management condition of contractors.

- b) For contractors located away from the nuclear power plant, in what capacity do you visit the contractor's site?

We often visit contractor's site for the welding safety management review. No difference in visit frequency is made with regard to distance.

When structures are manufactured outside of Japan, they will, in principle, be inspected by checking inspection records overseas after arriving at Japan.

- c) Do you visit the contractor as visitor or as an inspector?

We, in principle, do not visit contractor's (manufacturer's) site other than as inspectors or reviewers.

- d) Does your regulatory body have regulatory authority over the contractors and subcontractors or licensees?

JNES has an office at each plant site for the inspection team during the periodic inspection, but has no resident inspector.

Last year in October, an office with 15 resident inspectors (three teams) was established in Fukui Prefecture where many nuclear power plants are located.

NISA has set up a safety inspector's office near each of nuclear power plants to check operation of the plant as well as undertaking a safety inspection four times a year.

## 6) Incidents and events

- a) What trends has your regulatory body noticed in the incidents/events attributed to contractors?

Currently no trend or characteristic in non-conformity attributable to contractors is identified.

- b) How did the regulatory body respond?

No particular response was made.

- 7) What do you do to make sure that safety related recommendations by contractors are assessed and implemented if necessary?

In case of non-compliance in the periodic inspection, periodic safety management review or welding safety management review, if the causes are attributable to contractors, or some events might be acknowledged that necessitate taking any measure in the control of contractors, it will be determined whether investigation of the causes, measures to prevent recurrence and lateral spread has been made or not.

Information exchange has been made among inspection teams, and thus when improvements made by operators could not be checked during the inspection (review) concerned, then they will be checked in the subsequent inspection (review).

8) Are there any other related topics, which you would like to be discussed during the breakout session?

Nothing in particular, for now.

## **Korea**

### ***[Korea Institute of Nuclear Safety (KINS)]***

1) What is the regulatory framework for inspecting contractors (short answer)?

Regulatory body conducts quality assurance audit and inspection on a regular basis on the major contractors such as architecture engineering (A/E) company, nuclear steam supply system (NSSS) designer, major components manufacturer, plant construction organisations, and nuclear fuel fabrication company.

2) How do you inspect the interfaces between licensee and contractors?

Licensee should submit the Quality Assurance Program and the Safety Analysis Report where the Licensee provides commitments on how to make sure the QA requirements are to be met. The licensee's QA programme describes the interfaces between the licensee and contractors in line with QA requirements. Regulatory body conducts QA inspection not only on the licensee but also on the important contractors based on the inspection schedule set up every year by the regulatory body.

3) How do you inspect the procedures or quality assurance system of both licensee and contractor regulating the interactions between the licensee and its contractors?

As described in the above, the procedures and quality assurance system are inspected by the regulatory body to make sure that the important contractors' quality assurance activities be in compliance with the commitments provided in the QA programme and the SAR. Until the year of 2000, the Atomic Energy Law in Korea required that the manufacturers of heavy components, such as reactor pressure vessels, steam generators, primary piping, and so on, should have a special license so that the regulatory body conducted inspections during the manufacturing process. However, as part of deregulation policy of the government, the manufacturing inspection was eliminated and replaced by strengthened QA inspection. Therefore, today the manufacturer should receive the QA inspection on a quarterly basis whereas the licensee receives it on a biannual basis.

4) Regulatory Inspections results

a) How does your Regulatory Body maintain confidence in the way Licensees control the work done by the contractors?

The Regulatory body confirms it in two ways. First, the licensee is required to establish an appropriate QA system with which the contractors also comply. All of the details should be described in the QA programme and the Safety Analysis Report. Second, the regulatory body conducts QA inspection not only on the Licensee but also on the contractors to make sure that the Licensee control works done by the contractors as committed in the licensing documents.

- b) What type of inspections does your Regulatory Body carry out to verify the effort spent by the Licensee doing contractors supervision?

As mentioned above, the Regulatory body conducts QA inspections to confirm that the Licensee comply with the QA requirements delineated in licensing documents. In general, every nuclear power plant is subjected to a QA inspection every two years but the primary manufacturer may receive QA inspection on a quarterly basis. Of course, it does not account for the QA inspection of the Licensee on its contractors. When some safety significant problems are identified, a special inspection is carried out at the decision of the Regulatory body. For the components important to safety and manufactured in foreign countries under the contract of the primary manufacturer in Korea, the regulatory body conducts QA inspection on a yearly basis; therefore, the KINS inspectors visit the foreign shops as inspectors.

- c) Have you noticed a trend in the quality of the work and documents prepared by the contractors?

The inspection findings are annually analyzed to identify the weak areas and also to find good practices. As the experiences build up, the number of significant findings tends to decrease whereas some new issues emerge. For example, the Licensee introduced the Enterprise Resource Planning (ERP) so that all the paper documents are converted to digitalized files. However, the administrative process to handle the digital documents does not fully meet the QA requirements and the employees of the Licensee and the contractors are not in ease to use this system. This issue is under discussion between the regulatory body and the Licensee.

The analysis of QA inspection findings over the past five years does not show any apparent trend in the quality of the work and documents prepared by the contractors.

- d) If you do witness activities by contractors, does the Regulatory Body carry this out systematically following any specific trend or other methods?

From the results of QA audits performed on major contractors, a trend of quality of contractors' activities is analyzed and then utilized in a future audit plan for reference. If degradation of QA system or activities are revealed by QA inspection or trend analysis, an interval of QA inspection will be shorten and inspection item will be increased. On the contrary, if contractor maintains good practice in QA system, the burden of QA inspection will be lessened.

## 5) Inspections

- a) Do you visit contractors or manufacturers sites? If not, why not?

The Regulatory body visits major contractors for inspection purposes. Until the year of 2000, the Atomic Energy Law in Korea required that the manufacturers of heavy components, such as reactor pressure vessels, steam generators, primary piping, and so on, should have a special license so that the regulatory body conducted inspections during the manufacturing process. However, as part of deregulation policy of the government, the manufacturing inspection was eliminated and replaced by strengthened QA inspection. Therefore, today the manufacturer should receive a QA inspection on a quarterly basis whereas the nuclear power plant receives it on a biannual basis. The QA inspections on the contractors, such as design and maintenance companies, are carried out at biannual basis by the regulatory body. In addition, the regulatory inspectors visit foreign manufacturers on a annual basis as part of regulatory QA inspection.

- b) For contractors located away from the nuclear power plant, in what capacity do you visit the contractor's site?

In general, three to five inspectors make up a team for QA inspection on a major contractor, which takes a week. Of the total manpower for QA inspection in a year, about 60 percent is allotted for contractors.

- c) Do you visit the contractor as visitor or as an inspector?

The Regulatory body visits the contractors as an inspector.

- d) Does your Regulatory Body have regulatory authority over the contractors and subcontractors of licensees?

Yes, but it is limited to major contractors who are architecture engineering (A/E) organisation, nuclear steam supply system (NSSS) design organisation, major components manufacturing factory, plant construction organisation, and nuclear fuel fabricating company. Subcontractors are under the control indirectly through licensee activity control.

## 6) Incidents and events

- a) What trends has your Regulatory Body noticed in the incidents / events attributed to contractors?

All the incidents/events occurred in nuclear installations are investigated and their causes are analyzed. However, the contribution of contractors to the incidents/events can not be accounted for explicitly so that the trend of incidents/events attributed to contractors is not clearly visible so far.

- b) How did the Regulatory Body respond?

When an incident/event attributed to a contractor occurs, the regulatory body requires that the Licensee should identify the cause of trouble and take proper corrective actions to avoid repetition of troubles because the Licensee has final responsibility of safety. However, when the regulatory body decides that the incidents/events is important to the safety or draw relatively great public concerns, the regulatory body could conduct some special inspection with a specially organized experts from industries or universities.

- 7) What do you do to make sure that safety related recommendations by contractors are assessed and implemented if necessary

The QA inspection results are shared with not only QA teams but also other inspectors who do not participate in QA inspection but participate in safety inspections. It helps to do cross-check whether any important recommendations are not addressed. On the other hand, when KINS staff conduct periodic inspection on nuclear installations, they have to look into the operational capability of operators, which is mainly focused on the QA matters.

- 8) Are there any other related topics, which you would like to be discussed during the breakout session?

None.

**Mexico**

***[Comision Nacional de Seguridad Nuclear Y Salvaguardias (CNSNS)]***

- 1) What is the regulatory framework for inspecting contractors (short answer)?

Appendix B 10CFR50 VII. Control of Purchased Material, Equipment, and Services

Additionally, procedures related with the celebration of contests and elaboration of contracts is used.

- 2) How do you inspect the interfaces between licensee and contractors?

By carrying out periodical inspections, mainly, during outages to the process of contracting and supervising of contractors. During these inspections it is verified the contractor work specification, the contractor qualification and the communication and interface between the contractor and the area requiring the contractor services.

- 3) How do you inspect the procedures or quality assurance system of both licensee and contractor regulating the interactions between the licensee and its contractors?

By verifying that the QA Department had reviewed and released all the documentation belong to the contractors. An independent review of some of these documents is done through a sampling.

- 4) Regulatory Inspections results

- a) How does your Regulatory Body maintain confidence in the way licensees control the work done by the contractors?

We have not had many contractors involved in safety related works and as a consequence of this no plant events or findings which impact plant safety has arisen from work done by contractors.

- b) What type of inspections does your Regulatory Body carry out to verify the effort spent by the licensee doing contractors supervision?

Due to we have few contractors, routine inspections are carried out during outages focused on verifying contractors supervision and its control by the licensee.

- c) Have you noticed a trend in the quality of the work and documents prepared by the contractors?

We do not have performance indicators related with contractors work however; we have detected some repetitive problems. For example: Unqualified contractors, procedures deviation, lack of communication, etc.

- d) If you do witness activities by contractors, does the Regulatory Body carry this out systematically following any specific trend or other methods?

None trend is applied, but we use the following method:

To verify:

- Pre-job briefings, contractors qualification, equipment and instrumentation used, communication between workers, interface with Quality Control, procedures application, etc.

5) Inspections

- a) Do you visit contractors or manufacturers sites? If not, why not?

Yes.

- b) For contractors located away from the nuclear power plant, in what capacity do you visit the contractor's site?

When significance problems are detected

- c) Do you visit the contractor as visitor or as an inspector?

Both, but mainly as an inspector.

- d) Does your Regulatory Body have regulatory authority over the contractors and subcontractors of licensees?

Yes, through the licensee, which is responsible for the overall safety of the contracted service and the work done by contractors at Laguna Verde Nuclear Power Plant.

6) Incidents and events

- a) What trends has your Regulatory Body noticed in the incidents / events attributed to contractors?

We have not noticed trends.

- b) How did the Regulatory Body respond?

By carrying out reactive and investigation inspections

- 7) What do you do to make sure that safety related recommendations by contractors are assessed and implemented if necessary?

At the beginning of each new inspection, we review that these recommendations and corrective actions have been implemented.

- 8) Are there any other related topics, which you would like to be discussed during the breakout session?

We wonder how is inspected the contractors training.

## The Netherlands

### *[Inspectorate of the Ministry of Housing, Spatial Planning and the Environment Nuclear Safety department (VI/KFD)]*

1) What is the regulatory framework for inspecting contractors (short answer)?

The nuclear safety inspectorate (KFD) has the opportunity to inspect the work done by contractors on the licensee's site.

This is not specially regulated but follows from the licensee's responsibility for safety.

2) How do you inspect the interfaces between licensee and contractors?

The Regulatory Body requires a quality management system be out in place by the licensee and inspects the interaction between licensee and contractor, by following the 'paper trail'. KFD sometimes visits the contractor's site to review acceptance tests of parts or to review services.

3) How do you inspect the procedures or quality assurance system of both licensee and contractor regulating the interactions between the licensee and its contractors?

The KFD reviews the interaction from the licensee's point of view and at the licensee's site. The KFD can demand certain assurances in contractors' plans or in reviews by independent Notified Bodies.

4) Regulatory Inspections results

a) How does your Regulatory Body maintain confidence in the way Licensees control the work done by the contractors?

The KFD inspects the work carried out by contractors and how the licensee supervises their contractors;

The KFD inspects certificates by Notified Bodies and stays in close contact with Notified Bodies;

The KFD reviews plans before they are carried out, and can insist on meeting the contractor's representatives.

b) What type of inspections does your Regulatory Body carry out to verify the effort spent by the Licensee doing contractors supervision?

KFD inspects the organisation of the purchasing process and the reviews services of suppliers. Before modifications, the decision process may be reviewed, and also the content of the review plan.

c) Have you noticed a trend in the quality of the work and documents prepared by the contractors?

In general the quality is high, however there is a trend to contract out to non-nuclear companies for certain non- nuclear work, both in the power plant, and even more in the research reactors.

Lately KFD sees more signs of complacency, but this may be due to the fact that KFD is focusing on those areas.

- d) If you do witness activities by contractors, does the Regulatory Body carry this out systematically following any specific trend or other methods?

Contractors' activities are followed in reaction to signals and on the basis of presumed risk.

5) Inspections

- a) Do you visit contractors or manufacturers sites? If not, why not?

Sometimes, as an inspector of the licensee.

- b) For contractors located away from the nuclear power plant, in what capacity do you visit the contractor's site?

As an inspector, always in presence of the licensee.

- c) Do you visit the contractor as visitor or as an inspector?

As an inspector, but only inspecting the licensee or plans or parts for the licensee.

- d) Does your Regulatory Body have regulatory authority over the contractors and subcontractors of licensees?

The KFD has only direct regulatory authority over the licensee, but the licensee must make sure that the KFD can get access to the licensee

6) Incidents and events

- a) What trends has your Regulatory Body noticed in the incidents / events attributed to contractors?

Up to now, no direct incidents and/or events have occurred. Signs of sloppy workmanship/ design etc have been encountered.

- b) How did the Regulatory Body respond?

The KFD insists on better internal review by the licensee and sometimes rejects plans for modifications.

- 7) What do you do to make sure that safety related recommendations by contractors are assessed and implemented if necessary

KFD can ask to see recommendations by contractors and sometimes demands their implementation.

KFD audits the process by which recommendations are reviewed internally by the licensee.

In the PSR this process is reviewed and updated every 10 years, also recommendations are listed and assessment of those recommendations is reviewed.

## Slovak Republic

### *[Nuclear Regulatory Authority of the Slovak Republic (UJD SR)]*

*What is the regulatory framework for inspecting contractors (short answer)?*

The regulatory framework is the new atomic law 541/2004, regulation 56/2006 and inspection guide and licensee internal documents agreed by regulatory body (QA). How do you inspect the interfaces between licensee and contractors?

In the old law 130/1998 we had the possibility to inspect contractors directly. According to independent IAEA review we have cancelled this provision in new atomic law 541/2004. The reason for this was the fears of influence of free market.

1) How do you inspect the interfaces between licensee and contractors?

According to the new law we inspect the licensee's selection and inspection system of contractors (QA approved by Regulatory Body) and we can require the participation in licensee's inspection of contractors. Licensee have to put in each contract the provision concerning involving the Regulatory Body inspectors in licensee's inspections of contractors.

2) How do you inspect the procedures or quality assurance system of both licensee and contractor regulating the interactions between the licensee and its contractors?

The licensees have to have the QA for selection and inspection of contractors and Regulatory Body approves this document. The QA document contains the procedures for selection contractors and requirements, which have to be fulfilled. Regulatory Body in inspection plans also licensee's inspection. During inspection are controlled procedures, conditions from QA document. During selection process the inspector can put additional questions to contractors about knowledge from legislative documents, standards or guides.

3) Regulatory Inspections results

a) How does your Regulatory Body maintain confidence in the way Licensees control the work done by the contractors?

The Regulatory Body maintains its confidence only by inspection of licensee or by taking part at licensee's inspections of contractors. Technical level of contractors Regulatory Body assesses through technical documents, which are submitted to Regulatory Body for approval before realization.

b) What type of inspections does your Regulatory Body carry out to verify the effort spent by the Licensee doing contractors supervision?

The regulatory body carry out planned and team inspections.

c) Have you noticed a trend in the quality of the work and documents prepared by the contractors?

All documents submitted to Regulatory Body have a standard level, we didn't notice any changes. Every deviation from standard level, which was in submitted documentation, is consulted.

- d) If you do witness activities by contractors, does the Regulatory Body carry this out systematically following any specific trend or other methods?

If the inspector wants to take part at any contractor's activities, there is a standard procedure, which require the preparation of inspection programme and this must be sent in advance to licensee. The licensee informs and sends the inspection programme to the contractor and agrees with him the date of inspection.

#### 4) Inspections

- a) Do you visit contractors or manufacturers sites? If not, why not?

Yes, but not very often. The inspection were rapidly reduced due to the new atomic law doesn't contain requirements for licensing contractors.

- b) For contractors located away from the nuclear power plant, in what capacity do you visit the contractor's site?

The contractors are located mainly outside the power plant and we do not regulate them directly. The volume of inspections was very low, because the new system established by a new atomic law wasn't up to now fully implemented to praxis.

- c) Do you visit the contractor as visitor or as an inspector?

We visit contractors as inspectors.

- d) Does your Regulatory Body have regulatory authority over the contractors and subcontractors of licensees?

No, we are not entitled by our atomic act.

#### 5) Incidents and events

- a) What trends has your Regulatory Body noticed in the incidents / events attributed to contractors?

We didn't observe incident/ events directly attributed to contractors.

- b) How did the Regulatory Body respond?

There wasn't such situation, but the respond in this case also should be taken again the licensee.

- 6) What do you do to make sure that safety related recommendations by contractors are assessed and implemented if necessary?

The safety related recommendations from contractors can be implemented by regulatory body decision and this is binding for licensee.

- 7) Are there any other related topics, which you would like to be discussed during the breakout session?

How can influence the contractors licensing and subsequent contractors inspections the free market?

Who is responsible to cover expenditures for Regulatory Body staff in cases of participation at licensee's contractor's inspections?

Standardization of requirements (level of technical equipments, permanent numbers and qualification of staff, economical and assurance background, etc.).

## Spain

### *[Consejo de Seguridad Nuclear (CSN)]*

- 1) What is the regulatory framework for inspecting contractors (short answer)?

The CSN can inspect Licensee by Law. By Royal Decree (1836/1999) all NPP must have a Quality Assurance Manual. The suppliers of equipment and services to a NPP must be qualified by Licensees.

The same Royal Decree establishes that the Licensees must provide access for the inspectors to the work centres of suppliers of equipment and services relating to the safety of the installation.

- 2) How do you inspect the interfaces between licensee and contractors?

By inspecting and reviewing by sampling:

- Processes of qualification and selection of suppliers of equipment and services related to the safety.
- Quality Plans required by Licensees to its contractors.
- Outcomes of audits and inspections carried out by the Licensees on the contractors.
- Final reports of work orders and the quality indicators.
- Assessment of corrective actions established by Licensees and by the contractors themselves.
- Training and formation plans established for contractors.

- 3) How do you inspect the procedures or quality assurance system of both licensee and contractor regulating the interactions between the licensee and its contractors?

The documents establishing the interactions between the licensees and its contractors and the quality systems are checked periodically.

4) Regulatory Inspections results.

- a) How does your Regulatory Body maintain confidence in the way Licensees control the work done by the contractors?

Firstly because the Licensees are responsible for the control of any issue related to the safety.

By inspecting and reviewing by sampling the activities of control of suppliers performed by the Licensees, and the results of works carried out in the NPP by the contractors.

See also the reply to question 2.

- b) What type of inspections does your Regulatory Body carry out to verify the effort spent by the Licensee doing contractors supervision?

Resident inspectors inspect the works of contractors, occasionally during normal operation.

Inspectors from the main Offices perform inspections concerning the oversight of contractors mainly during the outages verifying by sampling the work done by contractors as well as how effective is the control over them carried out by the Licensees.

- c) Have you noticed a trend in the quality of the work and documents prepared by the contractors?

It is difficult to demonstrate the contribution of the contractors to events and incidents.

- d) If you do witness activities by contractors, does the Regulatory Body carry this out systematically following any specific trend or other methods?

The inspections are carried out taking in account the significance for the safety, and other factors as the complexity of the work to be done and its planning, and the background of the contractor.

5) Inspections

- a) Do you visit contractors or manufacturers sites? If not, why not?

Yes, but occasionally, and mainly related to Engineering services or manufactures of components of high safety significance.

- b) For contractors located away from the nuclear power plant, in what capacity do you visit the contractor's site?

As inspectors, but the inspection must be facilitated by the Licensee.

- c) Do you visit the contractor as visitor or as an inspector?

As inspector. It has been also planned to act as observer in the inspections performed by Licensees.

- d) Does your Regulatory Body have regulatory authority over the contractors and subcontractors of licensees?

No directly, the authority is always established always through the Licensees. (See answer to question 1).

6) Incidents and events

- a) What trends has your Regulatory Body noticed in the incidents / events attributed to contractors?

It not has been noticed the increase of problems caused directly by contractors.

- b) How did the Regulatory Body respond?

Due the increase of the number of contractors, it has been established a special inspection programme devoted to activities performed by contractors during outages. It also has been decided to recommend the increase of the control performed by Licensees on the contractor's activities in the NPP.

- 7) What do you do to make sure that safety related recommendations by contractors are assessed and implemented if necessary?

Through the revision of procedures of maintenance and design modifications where contractors are involved.

By the supervision of the Licensee Plan for Corrective Actions.

By reviewing the reports made by contractors after the end of the outage.

- 8) Are there any other related topics, which you would like to be discussed during the breakout session?

None

**Switzerland**

***[Swiss Federal Nuclear Safety Inspectorate (HSK)]***

- 1) What is the regulatory framework for inspecting contractors (short answer)?

Nuclear energy law; Art 20 & 22; Decree; Art. 30, paragraph 1; letter i; Art 31; Art 32, paragraph 3.

- 2) How do you inspect the interfaces between licensee and contractors?

NPP in operation: Team inspection 2005 e.g. oversight areas: quality assurance system + radiation protection + electrical maintenance + non destructive testing + fuel element examination.

Large backfitting projects for NPPs: HSK requires a quality plan from the licensee; different oversight areas inspect their correct implementation.

- 3) How do you inspect the procedures or quality assurance system of both licensee and contractor regulating the interactions between the licensee and its contractors?

NPP in operation: Team inspection 2005: Only the QA system of licensee has been inspected, but a large question list was send in the announcement letter for the licensee preparation which covered a lot of related aspects (list derived from IAEA document IAEA Regulatory Peer Review: Regulatory control of the use of contractors by operating organisation).

Large backfitting projects: The quality plan of licensee for the project is mainly based on the Quality assurance system of supplier. Therefore it is part of the quality plan and may be inspected

4) Regulatory Inspections results

- a) How does your Regulatory Body maintain confidence in the way Licensees control the work done by the contractors?

By inspections or audits, event analysis, shop talks etc.

- b) What type of inspections does your Regulatory Body carry out to verify the effort spent by the Licensee doing contractors supervision?

A combination of process and result oriented inspection.

- c) Have you noticed a trend in the quality of the work and documents prepared by the contractors?

No trend observed. The quality depends of the individuals preparing the documents.

- d) If you do witness activities by contractors, does the Regulatory Body carry this out systematically following any specific trend or other methods?

Generally our relation to the licensees is open and we get the information if problems with contractors exist. Events give sometimes indications of problem areas.

In the field of mechanical engineering and civil engineering some activities of contractors are witnessed by experts who are contractors of HSK. This is done systematically according to specific guidelines.

5) Inspections

- a) Do you visit contractors or manufacturers sites? If not, why not?

Yes, in the course of backfitting or new component manufacturing or qualifying

- b) For contractors located away from the nuclear power plant, in what capacity do you visit the contractor's site?

Depending on the subject, e.g. fuel manufacturing at overseas, the control is done by a HSK contractor.

- c) Do you visit the contractor as visitor or as an inspector?

Both are possible: Inspection: e.g. on hold points during manufacturing of a component or the qualification of a method as non destructive examination. Visitor: e.g. if licensee performs an audit of the contractors quality assurance system

- d) Does your Regulatory Body have regulatory authority over the contractors and subcontractors of licensees?

No; but the licensee needs approval by HSK, therefore an indirect authority exists.

6) Incidents and events

- a) What trends has your Regulatory Body noticed in the incidents / events attributed to contractors?

No specific statistic prepared but the impact on incidents is low. As the licensee is committed for safety the root cause on such events is also the weakness in the licensee oversight.

- b) How did the Regulatory Body respond?

By event reports which are analysed according our reporting guidelines.

- 7) What do you do to make sure that safety related recommendations by contractors are assessed and implemented if necessary

We do not deal with such recommendations. Is it meant that between contractor and licensee is a safety conflict?

- 8) Are there any other related topics, which you would like to be discussed during the breakout session?

The CNRA chairman has mentioned 2004 on the conference with the industry that international guidance will be prepared on the “intelligent licensee”; meant what core competences are necessary the take safety commitment in dealing with contractors. Is there any activity on the way?

## United Kingdom

### *[Health & Safety Executive / Nuclear Installations Inspectorate (HSE/NII)]*

- 1) What is the regulatory framework for inspecting contractors (short answer)?

In the UK, there are two main strands of legislation which affect safety of operations on nuclear sites. Nuclear and conventional safety. The Health and Safety at Work Act 1974 covers all work activities of employers and is overarching legislation, which subsumes both nuclear and conventional safety. The Health and Safety Executive (HSE) regulates both aspects.

For Nuclear safety – Legislation for Nuclear Safety in the UK derives from the Nuclear Installations Act 1965. One of the provisions is that all UK nuclear sites are required to have a Nuclear Site Licence (NSL) with associated Licence Conditions (LCs) [processes are not ‘licensed’]. Licensees are the users of the site and must have arrangements in place to comply with the LCs and must comply. Contractors are bound by the same LCs and compliance requirements when on site. The Licensee has to maintain ‘Intelligent Customer’ status – the user of the site has to be in control of the site and the activities that take place there.

Off-site, the regulator expects the licensee to remain as intelligent customer – by this means, the regulator can track and check what is being done by contractors on the licensees’ behalf – and whether it is being done properly – work can be tracked down the procurement chain.

A standard LC is the requirement to have adequate Quality Assurance arrangements. So the regulator expects the licensee to put in place a hierarchy of controls amongst other things – pre-qualify suppliers and carry out ‘delivery’ audits & inspections;

For conventional safety, there remains the requirement to have adequate quality assurance arrangements, together with the Construction (Design and Management) Regulations 1994 (CDM) which set controls for how construction (and decommissioning) work is managed and introduces the concept of a Principal Contractor and the supervisory chain.

Note that the UK regulatory regime is non prescriptive and one of sampling licensees' arrangements and activities, and those of their prime/main/suppliers contractors. Regulatory involvement will be dictated by safety significance and sensitivity of the activities.

2) How do you inspect the interfaces between licensee and contractors?

Look for the specification of the work and how the contractor undertakes it – looking for controls across the interface – the key elements are: work specification, people specification, work delivery. The licensee sets up the arrangements, the contractors deliver and we inspect how that is done and how well. Examples are: maintenance outages, major modifications, new build projects.

3) How do you inspect the procedures or quality assurance system of both licensee and contractor regulating the interactions between the licensee and its contractors?

First of all – assess the procedures and check that a structured hierarchy of documents and controls are reputed to be in place and that arrangements for responsibilities are clearly identified. Then inspect the actuality that it is working and that the right safety and quality are being delivered.

4) Regulatory Inspections results

a) How does your Regulatory Body maintain confidence in the way Licensees control the work done by the contractors?

As well as carrying out our inspections, we expect the licensees to carry out their own inspections and gain assurance that what has been put in place is working. The contractor should also be operating its own assurance processes – a tiered hierarchical approach. We sometimes undertake shadowing of these licensee processes. We hold annual reviews of safety with the licensees on both a site basis and plant basis (for large sites). We expect the licensee to review the safety performance for the year and to highlight where, for example, contractors have impacted on that performance. We also expect radiological safety information to be presented for all workers.

b) What type of inspections does your Regulatory Body carry out to verify the effort spent by the Licensee doing contractors supervision?

Team inspections and individual inspections as part of the routine inspection plan, together with discussion with the licensee and contractors. We liaise with the licensees site contractor managing team. We also carry out observations of licensees undertaking their own audits.

c) Have you noticed a trend in the quality of the work and documents prepared by the contractors?

Difficult to make one statement – there are many contractors from large to small. Some contractors produce high quality documents, e.g., work specifications and method statements. Sometimes fall down on e.g., Training records and control of documents – peripheral arrangements. Most licensees have developed partnering to reduce numbers of contractors – e.g., it reduces the constant turnover of people to be trained on site and in the licensees' arrangements.

- d) If you do witness activities by contractors, does the Regulatory Body carry this out systematically following any specific trend or other methods?

Do it as part of an agreed inspection programme, or as a reaction to an event or reported poor quality/safety of work. Sometimes done to give confidence that the systems are working properly, e.g., for high safety significance or high profile work. – graded application – IAEA 50CQ.

5) Inspections

- a) Do you visit contractors or manufacturers sites? If not, why not?

Yes we do visit, but depends on the significance of the job. E.g., for specialist design projects – civil engineering and construction assessment; cranes; pressure vessels; electrical control systems; specialist decommissioning equipment.

- b) For contractors located away from the nuclear power plant, in what capacity do you visit the contractor's site?

As Her Majesty's appointed – health and safety inspectors – either nuclear inspectors or as conventional safety inspectors. However, we usually go with a member of the licensee's organisation, as they represent the responsibility as 'intelligent customer' and have contractual relationships.

- c) Do you visit the contractor as visitor or as an inspector?

See b.

- d) Does your Regulatory Body have regulatory authority over the contractors and subcontractors of licensees?

Yes – see 1 and 5 a & b above.

6) Incidents and events

- a) What trends has your Regulatory Body noticed in the incidents / events attributed to contractors?

We have no specific data on this. However, when a contractor is working on a licensee's site, reporting of events is usually of a high standard via the licensee's reporting arrangements under the NSL.

- b) How did the Regulatory Body respond?

No specific data. For events on site, we follow up or not depending on the significance.

- 7) What do you do to make sure that safety related recommendations by contractors are assessed and implemented if necessary?

On site, ensuring implementation of contractor recommendations is the responsibility of the licensee. Follow-up is done via the formalised licensee corrective action system. If the event was significant, we would follow up in the same way whether licensee or contractor – by on site investigation. If there was significant harm to people, the nuclear and conventional safety inspectors would investigate jointly.

Off-site, the event is likely to be conventional safety and if there was significant harm to people, HSE's conventional safety inspector's would be involved, at the contractor's location,.

8) Are there any other related topics, which you would like to be discussed during the breakout session?

The concept of 'Intelligent Customer'

- our definition – a representative of the company who is suitably competent to specify work, control and supervise the contractor and judge whether the work has been completed correctly and that the required safety and quality level have been achieved.

## **FUTURE CHALLENGES FOR INSPECTORS (E.G., NEW TECHNIQUES, DEVELOPING COMPETENCE, ETC.).**

### ***Introduction:***

Continuous development of nuclear activities, such as new technologies like digital I&C, organisational changes and financial effects of deregulation are some examples of current and new challenges for inspectors.

This requires continuous adjustments in the regulatory inspection programme, including the inspected items, used methodologies and required competence available to the regulator.

This process must be made possible by the country's legal regulatory system and by the guarantee of necessary resources. A regulator's self assessment programme should include the development of expertise based on investigations to define regulatory needs.

Inspectors will review the current situation and determine opportunities to address these future challenges.

### ***Questions***

- 1) What are the future challenges you think that you will have to deal with in your future inspection activities?
- 2) What kind of inspection activities or methodologies do you think you will have to develop in the future?
- 3) Do you think that Regulatory Body could have to extend the scope of the inspection activities in the future?

For example; inspections of part of the Licensee's organisation that you did not inspect up to now; areas that were not submitted to inspected to inspections (financial, human resources management, contractors, safety culture...)

- 4) What kind of competences or skills do you think you will have to acquire or to develop in the future in inspection activities?
- 5) What are potential solutions and plans to address the challenges and/or modify the current inspection practices?

## SURVEY RESPONSES

### Belgium

#### *[Association Vinçotte Nuclear (AVN)]*

- 1) What are the future challenges you think that you will have to deal with in your future inspection activities?

#### *Economical aspects*

Future inspection activities will have to evolve according to the challenges posed to the Licensees. The actual tendency to have organisations based on international group(s) makes that the local power (on sites) has weakened. The inspection organisation has to discuss issues at higher managerial level to be sure that their message on safety will be listen to and taken into account. In addition, financial and economical aspects become much more important that in the past, when investment safety was considered as not to be discussed from the financial point of view. This is also a consequence of the deregulation of the electricity market and more competition between electricity producers, encouraging them to reduce costs.

Inspectors should therefore have some knowledge in the important financial aspects that governs the operation of these international groups. They should also possibly be able to examine accounts book in order to get the conviction that the necessary financial resources are made available to ensure safety operation of the nuclear installation.

In the future, inspectors should be able to discuss financial aspects, identify degradation in decision power on nuclear sites.

#### *New technologies*

The obsolescence of the existing hardware will require its replacement. With the evolution of technology, the replacement with same or similar technology is mostly impossible. This is certainly the case for instrumentation and control equipment, with the use of digital technology. With the improvements in this technology, with miniaturization and further embedding in the components, it becomes even more that before difficult for the inspector to recognize that this kind of technology has been used in a given component. At first sight, it is sometimes very difficult to identify that digital technology has been used.

Wireless technology is another challenge to the operation of the nuclear safety systems. Although related to the use of digital technology, wireless communication between components and system can introduce additional challenges to inspection activities

### ***Evolution in attitudes and behaviour***

Changes in the social behaviour make that attitudes of personnel considered in the past as “normal” (=expected from a well performing worker), have evolved. The use of drugs has become commonplace in some countries. The ways inspections are performed should take into account for this kind of changes.

### ***Extension of safety inspections and assessments to other installations related to the use of ionizing radiations***

Although possibly specific to the Belgian regulatory context and history of inspections in this field, the safety inspection in installations different from nuclear power plants and those related to the fuel cycle, and the radioactive waste treatment should be extended to all uses of ionizing radiations. This covers installations such as linear accelerators, cyclotrons, irradiators, but also use of X-rays devices for medical purposes. In these installations, inspections in Belgium are mostly looking at the radiological aspects, without possibly giving sufficient attention to the safety measures preventing from being exposed to harmful radiation exposure.

2) What kind of inspection activities or methodologies do you think you will have to develop in the future?

Current inspection activities include observations on the field, discussion on technical subjects with plant responsible, examination of log books, and documentation of periodical tests, etc. Future challenges will require new type of inspections and general knowledge of new technologies.

Examples of these future challenges are:

- Knowledge in behavioural attitudes and skill to be able to identify them
- Knowledge and tools to examine accounts and to evaluate the acceptability of financial resources
- Knowledge in new technologies, not to be a specialist in these matters but to be able to identify them, to evaluate their potential impact on safety
- Evaluation of performances of organisations in ensuring safety

3) Do you think that Regulatory Body could have to extend the scope of the inspection activities in the future? For example; inspections of part of the Licensee’s organisation that you did not inspect up to now; areas that were not submitted to inspected to inspections (financial, human resources management, contractors, safety culture...)

Yes, see previous answer.

- 4) What kind of competences or skills do you think you will have to acquire or to develop in the future in inspection activities?

See previous answers.

Competences in financial assessment, human behaviour, new technologies, social changes,

- 5) What are potential solutions and plans to address the challenges and/or modify the current inspection practices?

From a regulatory point of view, some extensions of the inspection activity should be supported by regulations allowing the inspector to examine these aspects with the Licensee.

From a training point of view, appropriate skills and competences should be made available to the inspection organisation in order to train inspectors.

The question whether additional resources should be made available to perform these new inspection activities should be examined. It could be acceptable to devote some of the current resources in inspection activities to these new activities. This depends not only on the regulatory context but also on the local conditions and scope of the inspection activities.

## Canada

### *[Canadian Nuclear Safety Commission (CNSC)]*

- 1) What are the future challenges you think that you will have to deal with in your future inspection activities?

- Knowledge retention is a current problem which creates tomorrow's challenge, as staff is retiring.
- Training of new hires is a challenge to bring them to the requisite knowledge of the new function of inspector in Canada; integrating their knowledge to detect and recognize higher-level issues.

- 2) What kind of inspection activities or methodologies do you think you will have to develop in the future?

- The scope of activities is adequate; however, the integration of information from various inspections needs to be improved, for effectiveness purposes; information flow at the CNSC needs improvement so that the CNSC makes better use of findings.
- Integrating the data and the inspections; streamline the inspection set for efficiency purposes;
- Performance-based criteria need to be developed; currently, evaluation is based on each individual process, not on the outputs or on the outcomes.
- Risk-inform the inspection programme for achieving the outcome of the CNSC

- 3) Do you think that Regulatory Body could have to extend the scope of the inspection activities in the future?

For example; inspections of part of the Licensee's organisation that you did not inspect up to now; areas that were not submitted to inspected to inspections (financial, human resources management, contractors, safety culture...)

The Regulatory Body will have to extend their inspections to look at the areas such as:

- Severe weather;
- Pandemics.

The issue is to reorient inspections to risk considerations, but not forgetting the mandate of the CNSC which is to ensure that the licensee takes reasonable precautions and verify compliance with adequate coverage.

- 4) What kind of competences or skills do you think you will have to acquire or to develop in the future in inspection activities?

The inspectors current need demonstrated competences in 3 areas:

- Personal attributes;
- Legal knowledge (basic);
- Science Fundamentals & Technical.

The inspectors need to acquire a higher level competence in the area of safety management systems and associated programmes oversight, root cause analysis, and associated techniques.

- 5) What are potential solutions and plans to address the challenges and/or modify the current inspection practices?

Within the CNSC, there is a major improvement project for power reactor regulation, and the regulatory framework for the processes which are followed. The processes can be strengthened. To this end CNSC inspectors work with the specialists/analysts to develop cross cutting and integrated inspections. For example in the area of fire protection, specialists familiar with the Fire Safe Shutdown Analysis required by the licence are teaching the inspection staff about the general criteria and translating this into coordinated inspections of the implementation of the licensee programme.

Specialists are working with the inspectors so that the legal/technical basis can be translated into a process that the inspectors can implement in the field.

## Finland

### *[STUK - Radiation and Nuclear Safety Authority]*

- 1) What are the future challenges you think that you will have to deal with in your future inspection activities?

The most challenging area in near future will be the inspection of organisational issues. There is a clear need for more experts on this area in both regulatory and utility organisations, and more conscious management of organisational factors to ensure safety.

The organisational issues cover a large field of themes, but some ones are especially challenging for both utility and regulatory organisations. The developing technology, changing values in society, and generation change set big demands on knowledge management. The mostly ignored gender issue will need more attention. The mostly technology focused, hierarchical and male-dominated organisations may need deep-going cultural change to attract and keep the future young professionals, among which an increasing percentage are female. The regulatory body organisation, and the inspectors, should also find ways to encourage the utility organisations to find and develop own cultural solutions to same questions, which simultaneously challenge and cause confusion in their own organisation.

The issues dealing with outsourcing and management of contractor work call for more attention. The special issue for regulatory organisation is the use of contractors, consults and external expertise in the inspections and development of regulatory practises.

However, there also are challenging issues related to technology.

We already see clear challenges related with validation and verification of technical solutions in use, especially the V&V of man-machine interface and of all digital I&C solutions. There are lots to learn in this field, for regulators but also for utility personnel and designers! As the shared learning process takes time, we suppose that the situation will be challenging for a relatively long period.

We suppose that new - and partly not yet identifiable - challenges are caused by the accumulating knowledge on different specific technical areas, e.g. on ageing effects of materials and more widely ageing management of plants.

- 2) What kind of inspection activities or methodologies do you think you will have to develop in the future?

The emphasis in near future is in developing a coherent inspection approach which all our inspectors share and apply. The vision is that there is *one* STUK visible for utilities, not different attitudes and opinions of different inspectors.

We see that the legislation is developing less prescriptive and more generic, giving the principles and goals but no detailed solutions. Simultaneously, the inspections should be developing to broad assessments. This demands more competent inspectors - it is not enough to have deep specialist skills, also broad general wisdom is needed.

One special challenge is to develop a transparent way to inspect and assess organisational factors. There, expert knowledge on organisational sciences is needed, and such knowledge is unfamiliar to most technical experts both in regulatory bodies and in utility organisations.

- 3) Do you think that Regulatory Body could have to extend the scope of the inspection activities in the future?

For example; inspections of part of the Licensee's organisation that you did not inspect up to now; areas that were not submitted to inspected to inspections (financial, human resources management, contractors, safety culture...)

We already have extended the scope of inspections to some extent in all these areas, and this development will continue.

- 4) What kind of competences or skills do you think you will have to acquire or to develop in the future in inspection activities?

More experts of organisational issues, more human factor knowledge on man-machine interfaces...

- 5) What are potential solutions and plans to address the challenges and/or modify the current inspection practices?

More resources.

## **France**

### ***[Autorité de Sûreté Nucléaire (ASN)]***

- 1) What are the future challenges you think that you will have to deal with in your future inspection activities?

Future challenges for inspection in a context of deregulation and optimisation of production tool, is related to:

- managerial aspects,
- organisational aspects,
- purchase policy
- the development of methodology related to the definition of non-conformity correction priority.
- the ageing of power plants under its material and non-material aspects (management of competences, management of obsolescence of equipments and ability of industry to provide these equipments according to specific "nuclear" requirement for quality),

But challenges are also related to subjects that are insufficiently explored up to now, such as the taking into account of human factor or the evolution of technologies (for instance the use of equipments comprising programmed electronic components).

In addition, in terms of organisation by Regulatory Body of inspections, an important point is to feed an evaluation of power plants. It is thus necessary to take care of the development of an applicable tool

for this evaluation in a homogeneous way by several regional inspection bodies controlling each one several power plants.

Finally, the maintenance of the culture of safety remains a challenge for the future, in a constraining context.

- 2) What kind of inspection activities or methodologies do you think you will have to develop in the future?

The subjects notably to be set up for the future are the subjects insufficiently covered today such as the human factors, organisational aspects, managerial aspects, management of obsolescence of spare parts.

In addition, it is necessary to develop a tool for evaluation of the power plants supplied in particular by inspections, and to develop benchmarking of NPP.

.Nonetheless , it is also necessary to develop the responsibility of the operator, it is thus important to identify the subjects for which this one is subjected to administrative authorisations, to re-examine their legal basis and their need and when possible to transfer him the responsibility for these decisions. This transfer is to be submitted to inspections for the control of correct operation for these internal decision-making processes.

- 3) Do you think that Regulatory Body could have to extend the scope of the inspection activities in the future? For example; inspections of part of the Licensee's organisation that you did not inspect up to now; areas that were not submitted to inspected to inspections (financial, human resources management, contractors, safety culture...).

The rationalization of costs will require the installation of inspections on the spheres of activity not directly related to technical topics, in particular those related to the allowance and optimization of resources and to other non-technical fields, in particular internal organisation.

- 4) What kind of competences or skills do you think you will have to acquire or to develop in the future in inspection activities?

The inspection requires having recourse to new competences in complement of the traditional field of competence of engineers, very represented in the trade of inspection.

It will be thus necessary to have recourse to specialists in the human factor and organisational field, and to develop competences in the field of policy of purchases and some other economical aspects.

However, it is also advisable to continue to develop the technical skill and in particular in the field of the probabilistic evaluation.

Stakes strong lies in the transfer of these competences of specialists to inspectors who are general practitioners, and to provide them reference frames of inspection

- 5) What are potential solutions and plans to address the challenges and/or modify the current inspection practices?

Within the framework of the construction of the annual programme of inspections, there is a fixed base and a variable base, within this framework it is appropriate to develop in an operational way, a tool of evaluation of NPP to supplement the variable part of the programme of inspections.

It is in addition advisable to develop frame of reference for inspection covering the new sets of themes and to make evolve/move the frames covering the subjects already existing

A difficulty for the inspection of seizing new subjects lies in the definition of a reference frame and possibly of criteria for evaluation.

## **Germany**

### ***[Bundesamt für Strahlenschutz Fachbereich Sicherheit in der Kerntechnik (BfS/SK)]***

#### ***Preliminary note:***

Processes-oriented inspections and results-oriented inspections may be considered as two basic principles in performing inspections. The inspector can focus his inspections either on licensees processes flow and thus convince himself that licensees processes lead to good results in nuclear safety or he can focus his inspections directly on the results.

Due to the legal and technical regulatory framework in the Federal Republic of Germany and due to licensing requirements inspections in Germany mainly are performed in a great many of defined results-orientated technical inspections. This is done with the help of technical experts on behalf of the state authorities. This system was optimised continuously over the years considering development in nuclear safety technology and has proved itself in a high level of nuclear safety.

Meanwhile actual demands for Safety Management Systems require a more intense emphasis of the principle of process-oriented inspections. So due to this actual development, future challenges for inspectors in the Federal Republic of Germany primary are seen in the field of process-oriented inspections.

The following answers given to the questionnaire were prepared by one particular state, as such answers are only meaningful if given in a coherent manner. Nevertheless, these answers may be an indication about the procedures and developments applied in Germany.

1) What are the future challenges you think that you have to deal with in your future inspection activities?

The results-oriented inspections as mentioned in the preliminary note also cover aspects of ageing. A challenge for future inspection activities is to develop a more systematic approach for the phenomenon of Ageing. The intention is to detect effects of ageing before they lead to noticeable consequences. Ageing Management also should be considered as an integral part of Safety Management Systems.

In Germany it is intended to shut down the NPPs after they have produced a defined amount of electricity. Although this is prescribed by law, it cannot be excluded for the future that NPPs will have to run for a longer time, depending on development in the power market and on further discussions by the government, followed by decisions to be taken by the parliament. In this case a challenge for future inspection activities is to develop additional inspections that make allowance especially for the aspect of extending operation time.

A general future challenge in inspection activities is the actual demand for Safety Management Systems and the methodologies that have to be developed to inspect and to evaluate licensees Safety Management Systems.

2) What kind of inspection activities or methodologies do you think you will have to develop in the future?

Licensees are developing and implementing Safety Management Systems and criteria for measuring and evaluating their Safety Management Systems. A challenge for future inspection activities is to develop own independent criteria for measuring and evaluating licensees Safety Management Systems. In this connection the following inspection activities and methodologies should be developed:

- Inspection and evaluation of processes
- Development of indicators, that allow to evaluate the compliance of processes
- Development of indicators that allow to identify weak points and potential for improvements in processes
- Development of a method that allows an evaluation of licensees processes at large with regard to a good Safety Management System

3) Do you think that Regulatory Body could have to extend the scope of inspection activities in the future?

The answer given to Question 2 also includes aspects of extending inspection activities. Beside this more general answer an extension of inspection activities may be considered in the following fields:

- Increased Inspection of MTO aspects
- Increased Inspection of licensees quality assurance systems
- Increased Inspection of the results of licensees self-assessment and the derived conclusions and measures
- Increased inspection of interactions between the licensee and its contractors

4) What kind of competences or skills do you think you will have to acquire or to develop in the future inspection activities?

With reference to mainly question 2 the following competences or skills will have to be acquired or developed in the future inspection activities:

- Auditor Qualifications
- Guiding Interviews / Questions
- Using support of psychologists

5) What are the potential solutions and plans to address the challenges and / or to modify the current inspection practices?

According to the German federal system the State Authorities are responsible for licensing and inspection of NPPs. Any specific answer therefore is specific to the individual state. The following answer is based on

the instrument of so called “Inspection Walks” (planned topical team inspections) as they are performed in some of the German states. Other German states might propose other potential solutions.

Inspection walks are part of the inspection programme and are performed in different defined fields. They include inspections of licensees documentation of procedures, processes and operating documentation, as well as on site inspections. Originally inspection walks were performed on selected technical fields and safety systems, such as shut-down systems, emergency cooling systems, and in technical fields like radiation protection. These Inspection walks were adjusted continuously following actual demands and developments. Starting with Human Factors about 13 years ago and continuing with Safety Management aspects the scope of inspection walks was extended to more general fields. In these more general fields also selected process-oriented inspections were performed. Inspection walks have shown to be a flexible instrument and are suitable also for further modifications to pass the further challenges for inspectors: To develop systematic process-oriented inspections that allow a well-founded evaluation of licensees Safety Management Systems.

## **Japan**

### ***[Japan Nuclear Energy Safety Organisation (JNES)]***

- 1) What are the future challenges you think that you will have to deal with in your future inspection activities?

Sophisticated maintenance systems such as the reliability-centred maintenance (RCM) and the condition-based maintenance (CBM) have been examined. It is necessary to study an inspection system in preparation for introducing such a system.

- 2) What kind of inspection activities or methodologies do you think you will have to develop in the future?

The quality of safety activities by licensees need to be improved in order to reduce the number of troubles. It will be necessary to develop inspection methods and establish an inspection system to promote such safety activities by the licensees.

- 3) Do you think that Regulatory Body could have to extend the scope of the inspection activities in the future? For example; inspections of part of the Licensee’s organisation that you did not inspect up to now; areas that were not submitted to inspected to inspections (financial, human resources management, contractors, safety culture...)

The safety rules under the Japanese regulatory system require licensees to establish and implement a quality assurance programme, which will be checked through the safety inspections. During the periodical safety management review by JNES, organisation and activities for the periodical inspection by licensees will be checked for appropriateness in the light of a commercial standard, JEAC 4111-2003, which was checked for validity by the national authority.

For the inspection system in the future, as described in the answer 2, a method for checking quality assurance programme will be improved to promote efforts by the licensee to enhance safety activities. Also the checking method of climate and safety culture in the organisation that are not covered in the quality assurance programme needs to be studied.

- 4) What kind of competences or skills do you think you will have to acquire or to develop in the future in inspection activities?

As mentioned above, improvement of inspection technology for the quality management system and check for the safety cultures are likely to be required, and therefore inspection capabilities in this field need to be enhanced or developed.

Utilization of risk information in inspections is an important matter. Inspectors need acquire technologies and skills relevant to the utilization.

- 5) What are potential solutions and plans to address the challenges and/or modify the current inspection practices?

The “Study Group on the Way of Inspection” has been set up under the Nuclear and Industrial Safety Subcommittee to discuss how to improve present inspection system. The group will issue an interim report on the strategy for the future in June this year.

## **Korea**

### ***[Korea Institute of Nuclear Safety (KINS)]***

- 1) What are the future challenges you think that you will have to deal with in your future inspection activities?

Technology development for the maintenance activities can make the duration of a refuelling outage shorter, and the extended refuelling cycle can make the interval of outages longer. These lead to shorten time for a periodic inspection, on which KINS largely depends. It is a burden for KINS to ensure the safety of a reactor for quite a long period with a short duration of inspection. Therefore to make sure the safety of longer period with shorter inspection activities would be one of the challenges in Korea.

Around 60% of reactor trips have been induced by the troubles in the secondary side. These do not threaten safety of reactors. However, since the frequent trips often resulted in public concerns, Korean government decided to extend its scope of inspection to the secondary side that are classified as the non-safety-related. The secondary side inspection began last May but the inspectors have been in difficulties with lack of appropriate quality documents. This situation seems unlikely to be improved in the near future. Therefore, balancing the primary and the secondary sides in the sense of the amount and depth of inspection is challenging.

As the reactors are getting old and the ageing progresses, the performances of some systems are degraded and the operational margins decreasing. To maintain the level of safety in those degraded systems, the inspectors have to pay more attention to them. The degradation of system performance, the ageing of technology, and code and standards are important challenging issues.

- 2) What kind of inspection activities or methodologies do you think you will have to develop in the future?

#### Use of Risk Information

- As the secondary side is included in the scope of inspection, we have to select the systems and components that contribute to reactor trip. Risk information would be used in this process.
- Use of risk information is needed to improve the efficiency of inspection activities, either.

#### Feedback of operating and regulatory experiences

- As new technologies are increasingly employed in NPP, the traditional prescriptive regulation has its limits to be applied. It is necessary to feedback the experiences of the inspectors all over the world for event prevention. We have to enhance information exchange and establish an effective feedback system.

- 3) Do you think that Regulatory Body could have to extend the scope of the inspection activities in the future? (For example; inspectors of part of the Licensee's organisation that you did not inspect up to now; areas that were not submitted to inspected to inspections (financial, human resources management, contractors, safety culture...))

#### Human resources management

- Human resources management should be included in the scope of the inspection activities. Hardware for reactor safety has been equipped properly, and technology development is being stabilized. However, although there have been no major accidents for 20 years after Chernobyl, the trend shows that the incidents caused by human errors are increasing. To reduce these, it is necessary to expand the coverage of inspection to the human resources management, including training system, conducts of operators, organisational aspects, communication, and so on.

#### Safety Culture

- Safety culture of an operating organisation is a critical element to improve safety. However, because it is not easy to define the appropriate level, the safety culture itself is not within the scope of inspection so far.
- To promote the operators' safety activities, the regulatory body should extend the scope of inspection to cover the safety culture, encouraging the licensees rather than adding some additional requirements.

- 4) What kind of competences or skills do you think you will have to acquire or to develop in the future in inspection activities?

#### Application of Risk Information

- Risk-informed approaches are going to be systematically introduced in the various regulatory processes. Because their regulatory decisions would be based on risk information, they have to develop skills like a SDP (significance determination procedure).

- Inspectors have to understand more thoroughly what the risk and performance information stand for. They have to be trained on the PSA, its results, and risk-based decision making procedure. With those training, inspectors would be ready to apply risk information in their regulatory activities.
- Inspectors should acquire the skills related to human resources management, such as organisational aspect, operator training, operating capability, communication, and so on.

5) What are potential solutions and plans to address the challenges and/or modify the current inspection practices?

Risk-informed approaches are going to be systematically introduced in the various regulatory processes;

- To improve the efficiency of regulatory activities,
- To focus on the risk significant components and/or systems,
- To make decision makings more transparent and objective.

Training for new technology and approach.

- Competency of inspectors is enhanced through in-service training of future challenges including new technologies and risk-informed inspection methodologies.

Strengthening Experiences Feedback

- It is necessary to prevent an accident by exchanging more experiences of not only the actual events but also near-miss events. We have to make more efforts to pick up and disseminate good practices internally and internationally.

## **Mexico**

### ***[Comision Nacional de Seguridad Nuclear Y Salvaguardias (CNSNS)]***

1) What are the future challenges you think that you will have to deal with in your future inspection activities?

- Integrating human performance into inspection
- Demonstrating inspection effectiveness in order to justify the investment in inspections
- Inspection decision-making in a team environment
- Techniques for the preservation and transfer of inspection knowledge to the next generation of NPP inspectors
- Electronic records

- 2) What kind of inspection activities or methodologies do you think you will have to develop in the future?

Risk-based and performance-based inspections.

- 3) Do you think that Regulatory Body could have to extend the scope of the inspection activities in the future? For example; inspections of part of the Licensee's organisation that you did not inspect up to now; areas that were not submitted to inspected to inspections (financial, human resources management, contractors, safety culture...)

Yes we do.

- 4) What kind of competences or skills do you think you will have to acquire or to develop in the future in inspection activities?

- Probabilistic Safety Assessment techniques
- According with the country's nuclear power plan be aware about the kind of reactor that is planning to construct
- Techniques about risk-based and performance-based inspections
- New Digital I&C software and components

- 5) What are potential solutions and plans to address the challenges and/or modify the current inspection practices?

a) Integrating human performance into inspection

- Develop and implement a human performance event guide through open collaboration between inspectors and managers.
- Provide professional development opportunities to help inspectors become performance consultants knowledgeable about interventions other than inspectors only.
- Establish self-evaluation processes, action plans, performance indicators and inspection advisory committees consistent with regulatory practices.
- Determine an organisation's actual inspection needs as opposed to just what someone might want to inspect, or what inspection tells someone want or is able to develop. Inspection is an investment; but, it must be prudently aligned with organisational objectives.
- Develop and implement a considered job aid / checklist for use by those analyzing inspection results.
- Utilize post-inspection effectiveness interviews and questionnaires with both inspectors and their supervisors.

- Have both line managers and inspectors make observations of in-progress inspections at NPP to determine accuracy and quality; to check inspection effectiveness and to identify additional areas that would seem to require training.
  - Seek advice from resident inspectors and provide progress reports to them on this topic.
- b) Demonstrating inspection effectiveness in order to justify the investment in inspections
- Characterize inspection as an investment in the future of the NPP safety and stress that inspection is a line management responsibility. Consider the merits of having the inspection report to line management, not a staff officer.
  - Collaborate with other functions in the Regulatory Body organisation to apply risk-based management techniques to decisions on whether to inspect or not in given situations and to develop cost-avoidance data similar to techniques used in determining inspection priorities (risk grading).
  - Create efficient owner's plants input and feedback methodologies and use them.
  - Establish a set of performance objectives and ensure that people know what is expected of them as individuals and as a group (team).
  - Benchmark the work of others inside and outside the nuclear industry.
- c) Inspection decision-making in a team environment
- Utilize simulator to train, to teach, to reinforce, and to evaluate inspection skills.
  - Assign mentors from both managers and inspectors to inspection teams.
  - Have inspection teams critique their own inspection performance. Then, have their respective inspector leader also conduct a critique before having the mentor critique the inspector's performance.
  - Refer to library sources on how people make decisions
- d) Techniques for the preservation and transfer of inspection knowledge to the next generation of NPP inspectors
- Establish a Systematic Approach to Training methodology for inspectors which through formal and on the job training, evaluation of the training programme and feedback can support for the preservation and transfer of inspection knowledge to the next generation of NPP inspectors.
- e) Electronic Records
- Define the rules and methodology to use electronic records instead hard copy records

## The Netherlands

### *[Inspectorate of the Ministry of Housing, Spatial Planning and the Environment Nuclear Safety department (VI/KFD)]*

- 1) What are the future challenges you think that you will have to deal with in your future inspection activities?

Two challenges: The possibility of or new-build reactors is imminent. The general trend in inspection in the non-nuclear world is to have a more self-regulated industry.

In the Netherlands there is a trend towards concentrating inspection in one hand, so nuclear safety inspection may become a part of a larger regulatory entity.

- 2) What kind of inspection activities or methodologies do you think you will have to develop in the future?

There may be a change in inspection technique from individual inspections towards team inspections.

- 3) Do you think that Regulatory Body could have to extend the scope of the inspection activities in the future? For example; inspections of part of the Licensee's organisation that you did not inspect up to now; areas that were not submitted to inspected to inspections (financial, human resources management, contractors, safety culture...)

Security issues will be much more integrated into safety inspections.

Financial requirements on newly built reactors are strong and may have to be inspected.

- 4) What kind of competences or skills do you think you will have to acquire or to develop in the future in inspection activities?

During construction of new reactors many new skills relating to inspecting new buildings and design concepts will have to be redeveloped.

- 5) What are potential solutions and plans to address the challenges and/or modify the current inspection practices?

At present the future challenges are assessed and summarized by external advisors.

The Regulatory Body is expanding in areas of Human Factors and Security, while trying to maintain nuclear- safety related knowledge levels.

## Slovak Republic

### *[Nuclear Regulatory Authority of the Slovak Republic (UJD SR)]*

- 1) What are the future challenges you think that you will have to deal with in your future inspection activities?

The construction of final treatment facility of liquid wastes will be finished at Mochovce site this year.

Shut down and decommissioning of both V1 reactors- type 230 will start this year.

In horizon of a few years we expect that the construction of 3<sup>rd</sup> and 4<sup>th</sup> unit will be reopened.

- 2) What kind of inspection activities or methodologies do you think you will have to develop in the future?

Maybe some changes in design for 3<sup>rd</sup> and 4<sup>th</sup> units will require new inspection activities or methodologies, but now we are not able specify them.

- 3) Do you think that Regulatory Body could have to extend the scope of the inspection activities in the future?

For example; inspections of part of the Licensee's organisation that you did not inspect up to now; areas that were not submitted to inspected to inspections (financial, human resources management, contractors, safety culture...)

Our inspection activities are given and limited by our legal documents. In the new law we have rather narrowed our inspection activities, we can't inspect contractors directly as before. From above listened items we can inspect only human resources management.

- 4) What kind of competences or skills do you think you will have to acquire or to develop in the future in inspection activities?

The main future inspection activities will be in following areas:

- Shut down and decommission of both V1 units with reactor V-230
- Construction and commission of liquid wastes new treatment facility
- Reopening of construction 3<sup>rd</sup> and 4<sup>th</sup> units at Mochovce site

- 5) What are potential solutions and plans to address the challenges and/or modify the current inspection practices?

All challenges listened above don't need modification of existing inspection practices.

## Spain

### *[Consejo de Seguridad Nuclear (CSN)]*

- 1) What are the future challenges you think that you will have to deal with in your future inspection activities?

Implementation of a new model of inspection based in ROP (Reactor Oversight Process) of NRC.

The newest Spanish NPP are 17 years old: ageing phenomena, extension life, obsolescence of spare parts.

The effects of deregulation: reduction of costs, less experienced people, less inversion, less contractors and bad paid.

The effects of an open market where international companies can be the owner of NPP.

- 2) What kind of inspection activities or methodologies do you think you will have to develop in the future?

Inspections are based on risk importance using PSA tools.

Be able to analyse all the information, operative experienced that is available nowadays (NRC, INPO, WANO, etc)

Interchange experience among inspectors from different countries.

Computer control in safety systems.

- 3) Do you think that Regulatory Body could have to extend the scope of the inspection activities in the future? For example; inspections of part of the Licensee's organisation that you did not inspect up to now; areas that were not submitted to inspected to inspections (financial, human resources management, contractors, safety culture...)

Yes. Some items are submitted by side. There would be necessary to change the law to adequate competence of Regulatory Body. For example, I think that financial aspects could be a clue to focus inspections on areas where have been reduction of inversion before problems rise.

- 4) What kind of competences or skills do you think you will have to acquire or to develop in the future in inspection activities?

Improve methods of direct inspection

Improve methods of inspection through indicators

Knowledge in PSA, annual training in full scope simulation.

Knowledge in computer networks.

Economic aspects.

- 5) What are potential solutions and plans to address the challenges and/or modify the current inspection practices?

Adequate law framework to adequate competences of Regulatory Body.

Understandable and believable inspection system by everybody (NPP, society and Regulatory Body)

Reduce office work to enhance field work.

## Switzerland

### *[Swiss Federal Nuclear Safety Inspectorate (HSK)]*

- 1) What are the future challenges you think that you will have to deal with in your future inspection activities?

HSK derives from the 300 inspections performed per year an assessment of plant safety and of the effectiveness of its oversight. During the next years the efficiency will be increased by an even more systematic approach. The coverage of the topic related to nuclear safety will be enhanced.

- 2) What kind of inspection activities or methodologies do you think you will have to develop in the future?

Inspections performed by a team of inspectors covering different fields should become more frequent. A systematic approach to training of inspectors is planned to ensure that inspections in different fields will be performed in a consistent manner. Even a standardisation of certain kinds of inspections could be established.

- 3) Do you think that Regulatory Body could have to extend the scope of the inspection activities in the future?

For example; inspections of part of the Licensee's organisation that you did not inspect up to now; areas that were not submitted to inspected to inspections (financial, human resources management, contractors, safety culture...)

According to the new nuclear legislation of 2003 the tasks of HSK remained essentially the same. So there is no immediate need to extend the scope of inspection activities. Currently there is a tendency towards more inspections in the fields of organisation and safety culture. Financial planning of the plants are subject of meetings between Regulatory Body and the plant management.

- 4) What kind of competences or skills do you think you will have to acquire or to develop in the future in inspection activities?

Many inspectors will retire in the next few years. Training of new and professional development of all inspectors will become very important. In-house certification and formal appointment of inspectors are currently discussed. The new system for the assessment of the safety of the plants, which is currently developed, will have a considerable impact on every inspection.

- 5) What are potential solutions and plans to address the challenges and/or modify the current inspection practices?

A comprehensive database covering all aspects of inspections will be established. Long-term planning, short-term planning, human resources, correct accomplishment and analysis will be included. Establishing this database will take several years and will be a very challenging Project. Additionally there is the idea to use digitally transmitted data from the plants to monitor their performance. This would be a partial compensation for the lack of resident inspectors in Switzerland.

## United States

### *[Nuclear Regulatory Commission (NRC)]*

- 1) What are the future challenges you think that you will have to deal with in your future inspection activities?

Future challenges will involve responding to Ageing of existing plants. For example, some older BWRs have significant pitting of the torus walls. There will be significant issue in materials and electrical equipment Ageing. Most inspectors do not have extensive training in these areas nor does the current ROP IP provide the versatility to focus resources in these areas. As license renewal comes into effect, more time may be needed to be spent to validate the licensee's Ageing programmes. This should be a continuing effort.

The wave of new reactors is going to have a significant short as well as long term impact on our current ROP inspection activities. For example, this year one region has selected 20 inspectors and anticipates 3 weeks of training activities for each in 2006.

Hiring training and retaining inspectors.

- 2) What kind of inspection activities or methodologies do you think you will have to develop in the future?

We will need to develop general skills in the digital electrical areas for all inspectors. We also need to continue to develop our inspectors expertise in PRA. With risk informed Technical Specifications and other initiatives, risk knowledge is going to be more important than ever.

The development of more sophisticated ways of routinely adjusting the ROP. We have become more focused on committing the hours estimated for each inspection procedure. Therefore, it's now imperative that we dictate where we want the inspection resources spent.

- 3) Do you think that Regulatory Body could have to extend the scope of the inspection activities in the future? For example; inspections of part of the Licensee's organisation that you did not inspect up to now; areas that were not submitted to inspected to inspections (financial, human resources management, contractors, safety culture...)

The current process is based on the premise that "soft" areas will manifest themselves in performance deficiencies long before safety margins are challenged. By the very nature of these areas, the conclusions would be subjective and not necessarily in keeping with the ROP mandate to strive for more objectivity and less subjectivity in the analysis of ROP findings and associated evaluations. However, the NRC will be incorporating some guidance into the process to evaluate the affects of safety culture especially with

significant performance issues (multiple degraded cornerstones and above), where the a root cause evaluation will examine the potential impact of the licensee safety environment.

- 4) What kind of competences or skills do you think you will have to acquire or to develop in the future in inspection activities?

As stated above 1.) Material / Ageing, 2.) PRA, 3.) Digital Electronic.

Also, with the potential advancement toward the construction of new power plants the regulatory body has to be ready to implement an inspection programme. Much of the expertise in this area has been lost.

- 5) What are potential solutions and plans to address the challenges and/or modify the current inspection practices?

The existing inspection process is relatively new, April 2000, and the programme gets routine re-evaluation at various levels for effectiveness based on lesson learned through implementation. Recently the inspection guidance was reviewed to re-balance inspection hours based on the number and type of findings identified using the various inspection procedures.

Assembling a group of seasoned construction inspectors to develop a knowledge transfer plan is in progress.

Develop close and frequent interactions at all levels that include the resident inspectors and headquarters technical personnel and their managers to solve problems by getting consensus on the resolutions of issues.