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

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

NEA/CNRA/R(2003)1  
Unclassified

**REGULATORY INSPECTION ACTIVITIES RELATED TO INSPECTION OF EVENTS AND INCIDENTS, INSPECTION OF INTERNAL AND EXTERNAL HAZARDS, AND INSPECTION ACTIVITIES RELATED TO CHALLENGES ARISING FROM COMPETITION IN THE ELECTRICITY MARKET**

**PROCEEDINGS FROM INTERNATIONAL WORKSHOP**

**Held at Veracruz, Mexico, from 28th April to 2nd May 2002**

**JT00139875**

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## 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.

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## **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 and for the review of developments that could affect regulatory requirements.

The Committee is responsible for the NEA programme, concerning the regulation, licensing and inspection of nuclear installations. The Committee reviews developments that could affect regulatory requirements with the objective of providing members with an understanding of the motivation for new regulatory requirements under consideration and an opportunity to offer suggestions that might improve them or avoid disparities among member countries. In particular, the Committee reviews current practices and operating experience.

The Committee focuses primarily on power reactors and other nuclear installations currently being built and operated. It also may consider the regulatory implications of new designs of power reactors and other types of nuclear installations.

In implementing its programme, the CNRA establishes co-operative mechanisms with the NEA Committee on the Safety of Nuclear Installations (CSNI), responsible for co-ordinating the activities of the Agency concerning the technical aspects of design, construction and operation of nuclear installations insofar as they affect the safety of such installations. It also co-operates with the NEA Committee on Radiation Protection and Public Health (CRPPH) and the NEA Radioactive Waste Management Committee (RWMC) on matters of common interest.

## ABSTRACT

The NEA Committee on Nuclear Regulatory Activities (CNRA) believes that an essential factor in ensuring the safety of nuclear installations is the continuing exchange and analysis of technical information and data. To facilitate this exchange the Committee has established Working Groups and Groups of Experts in specialised topics. The Working Group on Inspection Practices (WGIP) was formed in 1990 with the mandate "... to concentrate on the conduct of inspections and how the effectiveness of inspections could be evaluated...".

These proceedings cover the 6<sup>th</sup> International Workshop held by WGIP on regulatory inspection activities.

The focus of this workshop was regulatory inspection activities in 3 main areas: the inspection of events and incidents, the inspection of internal and external hazards and inspection activities related to challenges arising from competition in the electricity market.

The workshop is sponsored by the Mexican Secretaria de Energia (SENER) and hosted by the Comision Nacional de Seguridad Nuclear y Salvaguardias (CNSNS-CNLV) and will take place in Veracruz, Mexico from the 28<sup>th</sup> April – 2<sup>nd</sup> May 2002. This document presents the proceedings from the workshop. An appendix has also been produced, which provides a complete compilation of the questionnaire responses.

## FOREWORD

The main purpose of the Workshop is to provide a forum of exchange of information on the regulatory inspection activities. Participants will have the opportunity to meet with their counterparts from other countries and organisations to discuss current and future issues on the selected topics. They will develop conclusions regarding these issues and hopefully, identify methods to help improve their own inspection programmes.

The NEA Committee on Nuclear Regulatory Activities (CNRA) believes that safety inspections are a major element in the regulatory authority's efforts to ensure the safe operation of nuclear facilities. Considering the importance of these issues, the Committee has established a special Working Group on Inspection Practices (WGIP). The purpose of WGIP is to facilitate the exchange of information and experience related to regulatory safety inspections between CNRA Member countries. This Workshop, which is the fifth in a series, along with many other activities performed by the Working Group, is directed towards this goal. The consensus from participants at previous Workshops, noted that the value of meeting with people from other inspection organisations was the most important achievement.

The Workshop addressed the following three (3) main topics concerning inspection activities:

- inspection of events and incidents,
- inspection of internal and external hazards, and
- inspection activities related to challenges arising from competition in the electricity market.

Members of Organising Committee wish to acknowledge the excellent planning and arrangements made by the Mr. Luis Miguel Gutierrez as well Ms. Adriana Perez Granados and the staff of CNSNS-CNLV. Mr. Yves Balloffet, Chairman of WGIP presided as Workshop Chairman.

Special acknowledgement is given to the members of WGIP who worked as facilitators and recorders for each of the topics:

- Events and Incidents: Mr. André Vandewalle (AVN), Mr. Douglas Coe (NRC), Ms. Seija Suksi (STUK), Mr. Hiro+yoshi Koizumi (JAPEIC), Mr. Staffan Forsberg (SKI), Mr. Radomir Rehacek (SONS) and Mr. Yoji Arikura (METI).
- Internal and External Hazards: Dr. Hartmut Klonk (BfS), Mr. George Philip (IAEA) and Mr. Luis Miguel Gutierrez (CNSNS)
- Challenges Arising from Competition in the Electricity Market: Mr. Fredrich Kaufmann (HSK), Mr. J. Lynn Summers (NII), Mr. John Detorakis (CNSC), Mr. Gyula Fichtinger (HAEA), Mr. Yves Balloffet (DRIRE) and Julio Crespo (CSN)

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## 1. EXECUTIVE SUMMARY

The main objectives of the Workshop are to meet with inspectors from other organisations, to exchange information regarding regulatory inspection practices, to discuss the selected topics, to discuss current inspection issues and to develop conclusions and commendable practices (if possible) on the selected topics.

Forty-five (45) participants from fourteen (14) different countries and a delegate from the International Atomic energy Agency (IAEA) took part in the workshop (see Appendix III). Countries included: Belgium, Canada, Czech Republic, Finland, France, Germany, Hungary, Japan, Mexico, Spain, Sweden, Switzerland, the United Kingdom and the United States.

Five (5) discussion groups were established for the working group sessions. Each group was organised of inspectors from different countries, to ensure diversity of views for each of the topics. Discussions groups met for 3 separate sessions to review the various topics. Exchange between participants was active and the groups formulated conclusions on the various issues selected for the discussion topics.

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

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

The complete compilation of questionnaire responses is contained in the appendix (separate report) to this document.

## CONCLUSIONS

Overall discussions between the various participants both in discussion group sessions and throughout the workshop were extensive and meaningful. Ideas and practices regarding regulatory inspection activities were exchanged and it can be foreseen that these ideas will provide improved expertise when being applied in the future. Based on follow-up discussions, WGIP members agreed that:

*As the sixth workshop on regulatory inspection practices held by the CNRA Working Group on Inspection Practices, this venue, provides a unique opportunity for inspectors and inspection managers of nuclear power plants to meet together to share and exchange information.*

The main conclusions consist of list of commendable practices for each topic that were developed by the discussions groups. These are fully listed within the report and not repeated here.

## **2. ORGANISATION / OVERVIEW OF WORKSHOP**

### **2.1 PLANNING**

Preliminary planning for this workshop, the sixth in a series, of International Workshops on Regulatory Inspection Activities began following the conclusion of the last workshop in Baltimore, Maryland, United States in May 2000. Formal planning started following approval by the CNRA at its annual meeting in June 2000.

Members of the Working Group reviewed comments and suggestions made at previous workshop and considered and discussed ways to improve the format of the workshop. Several elements were noted. These included: the necessity to provide advance information on the technical issues and country practices; changes in the opening session presentations, modifying the closing sessions to enhance the discussions and participation by participants.

### **2.2 LOCATION**

The workshop was sponsored by the Mexican Secretaria de Energia (SENER) and hosted by the Comision Nacional de Seguridad Nuclear y Salvaguardias (CNSNS-CNLV) and took take place in Veracruz, Mexico.

### **2.3 TOPICS**

Participants at the last workshop [reference: NEA/CNRA/R(2000)4/5] suggested numerous topics for discussion at a future workshop. The Working Group considered the topics suggested by the workshop participants and also reviewed various proposals on other topics. They also reviewed the type of format to be to used at the workshop. A list of topics were developed and proposed to the CNRA. Consensus and approval was reached at the December 2000 CNRA meeting on the topics to be addressed. Members of the workshop committee further defined the issues to be discussed under each of these topics as summarised in the following paragraphs:

#### ***2.3.1 Inspection of Events and Incidents***

Incidents and events make a substantial part of the inspection activities of the Regulatory Body. This topic is intended to cover inspection methods to analyse events and incidents, including ways to rank as far as necessary the importance of these in order to put regulatory resources where it is most important. Risk informed selection criteria or other tools used to define the importance of the analysis made by the REGULATORY BODIES should be presented. Besides the usual methods already known and used all over the world such as root cause analysis, participants will also be requested to present original methods to analyse events and/or incidents, to identify or analyse the lessons learned from very low level events (near-misses) up to important incidents. The use of additional tests performed to investigate in detail the



incident or the event, possibly on mock-ups, should be discussed. The methods presented should also cover the analysis of human factors and/or organisational factor contributing to the occurrence or to the consequences of the event. Ways to analyse events and incidents accurately and fairly should be presented. The use of inputs from independent expert groups such as chemical, mechanical engineers and psychologists in the investigation process should be considered. Emphasis should be given to practical tools and methods (“how to”) that can be used by regulatory inspectors having no throughout knowledge of psychology or organisational matters.

### **2.3.2 *Inspection of Internal and External Hazards***

Internal hazards (i.e., fires, explosions, etc.) or external hazards (i.e., earthquakes, missile/airline crashes, extreme cold, floods, etc.) are taken into account in the design of nuclear power plant reactors as well as in safety reports, safety assessments, etc. However, inspecting the licensee’s compliance with these regulations or prescriptions, not only during construction but also during operation may be deemed not only necessary but also mandatory. The question is; what to inspect, when to inspect and especially how to inspect

### **2.3.3 *Inspection Activities Related to Challenges Arising from Competition in the Electricity market.***

The CNRA Task Group on Nuclear Regulatory Challenges arising from competition in electricity markets indicated that there are a number of challenges to Regulators from competition in the electricity market. The crucial issue is how Inspectors need to change their practices in order to respond to these challenges so as to gain reasonable assurance that the plants continue to be managed safely. The CNRA task group was of the opinion that these challenges were likely to affect all countries nuclear industries eventually.

Regulatory authorities around the world are being faced with licensees who are re-structuring, merging, de-layering and de-staffing in response to privatisation and/or pressures of economic de-regulation. Discussion of this topic at the workshop will focus on how inspectors can make judgements on Licensees changing management arrangements for organisational change; Licensees continued maintenance of their competence; Licensees use of external resources, both for engineering work and technical analysis; and What types of regulatory enforcement may or not be necessary

## **2.4 ANNOUNCEMENT**

The workshop announcement was transmitted in August 2001. As part of the registration form, participants were requested to submit issues of particular interest in regard to the selected topics to be addressed at the Workshop. These issues were used to prepare the scope and the schedule for the group discussions. Additionally, participants were asked to provide answers to a questionnaire describing practices within their own countries on the various topics for inclusion as pre-workshop information.

## **2.5 PRE-WORKSHOP**

### **2.5.1 *Facilitator Training***

Prior to the start of the workshop, facilitators and recorders attended a training session. Mr. Yves Balloffet chaired this session. Mr. Balloffet reviewed the general objectives of the workshop and outlined the various characteristics required of a good facilitator and recorder (copy of slides provided in Appendix 1).

He noted the importance of their role in guiding the group and the methods required to manage an effective discussion. Facilitators and recorders for each topic broke out in separate groups to review the various issues transmitted by the participants and to outline the major points to be covered in the discussion sessions.

### **2.5.2 Reception / Dinner**

A reception and dinner was held following delegate registration at the workshop hotel. Participants were given the opportunity to socialise and exchange information in an informal setting in order to familiarise themselves with each other. Mr. Vincente Ramírez Cortes made a few short remarks welcoming participants to the Workshop.

## **2.6 OVERVIEW OF WORKSHOP**

The format of the workshop used a process, which was first utilised in 1992 at Chattanooga and has evolved over the continuing series of workshops. Following an opening session to 'set the scene', participants are divided into small discussions groups of 7 to 10 members, to discuss in detail the various topics selected. A closing session is held to review the results of the discussions and commendable practices that have been derived.

Based on the success of the last workshop and in order to continue improving the exchange of information and assist participants in their preparation WGIP members volunteered to compile and analyse the responses to these questionnaires as well as act as lead facilitators during the workshop. These results were transmitted to participants one month in advance of the workshop. A compilation of these papers is produced as Appendix I to this report, and was used as background material for the group discussions.

### **2.6.1 Opening Session**

Following the welcoming remarks from the host country, the opening session included a brief introduction of workshop objectives by the Chairman and presentation of the three (3) workshop topics including the results of the survey.

### **2.6.2 Group Sessions**

Participants were divided into small discussion groups based on their pre-selection, to discuss topics. Three (3) half-day sessions were held. A trained facilitator and recorder worked with each group to stimulate and encourage discussions. The results are provided in Chapter 4.

### **2.6.3 Closing Session**

Following the completion of the group discussions, facilitators and recorders met and developed a set of conclusions based on the discussions. One facilitator from each topic presented the conclusions and recommendations that were developed by their respective groups. A question and response period followed each topic. Following the presentations, an open panel discussion was held on the results of the Workshop. This was followed by general conclusions made by the workshop Chairman.

### 3. OPENING SESSION

#### 3.1 WELCOMING REMARKS

Mr. Balloffet opened the workshop by welcoming the participants and Mr Juan Eibenschutz Hartman, Director General, Comision Nacional de Seguridad Nuclear y Salvaguardias. He noted the importance and relevance of this type of workshop and the excellent opportunity it presented to both inspectors from OECD Member countries and non-member countries to meet and exchange information on important issues. He also stated that the topics were very relevant, especially in his country and he hoped the results would provide many insights for the inspectors present. He noted the excellent participation and expressed his hope for meaningful discussions and successful workshop.

Mr. Kaufer provided a short introduction and Mr. Yves Balloffet presented the main objectives of the workshop, basic information on the set-up of the programme, the expected products and different roles of the facilitators, recorders and participants (slides presentation included as Appendix 2).

Presentation of the results from the pre-work shop surveys were made by Mr. Vandewalle (events and incidents), Mr. Balloffet (internal and external hazards) and Mr. Kaufmann (inspection activities related to challenges arising from competition in the electricity market),

#### 3.2 INSPECTION OF EVENTS AND INCIDENTS

Mr. Vandewalle presented the results of the questionnaire on Inspection of Events and Incidents. The presentation was based on the responses by national organisations to questions asked on background, requirements, inspection programmes and feedback.

##### 3.2.1 *Background*

The responses showed that 4 main inputs are used to determine what inspections are to be performed: use of risk (importance ranking), inspector response, timeliness and management and/or technical review committees. Elements provided in these areas included:

##### *Risk / Importance Ranking*

- reliance on the inspectors judgement
- use of INES or specific ranking method
- guidance
  - types of event (e.g., safety system actuations)
  - PSA tools (conditional core damage probability, conditional early release probability, etc.)
- evaluation during regular meetings or by review committees

### *Inspector Response*

- number of inspectors varies according to event significance
- inspector(s) and experts depending on event complexity and facility involved
- assessment of licensee's report and/or site inspection

### *Timeliness*

- no existing tools to determine the urgency of investigation
- first reaction by (resident) inspectors, usually between 1 day and 1 month after the event
- inspection teams investigate with some longer delays.

### *Management/technical review committees*

- some countries have a (permanent) review committee (Belgium, Finland, Spain, Switzerland, Mexico and United Kingdom and some organise 'ad-hoc' review committees such as Czech Republic and Hungary.

## **3.2.2 Requirements**

Requirements consisted mainly of regulatory requirements and legal requirements.

### *Regulatory requirements for reporting events and/or incidents*

- legal documents (i.e., technical specifications, laws, decrees YVL guides, etc.) exist in every country to specify reporting criteria.
- Reporting criteria can be very detailed in some cases (~ 80 items in Germany)
- INES is sometimes used as a reporting criteria
- Some countries (France and Germany) require reports on low safety significant events.

### *Legal Basis to conduct inspections on events and incidents*

- Legal documents (i.e., technical specifications, laws, decrees YVL guides, etc.) exist in every country to specify reporting criteria.
- Legal requirements (if any) are very general in nature.

## **3.2.3 Inspection Programmes**

This part of the questionnaire looked at 3 areas: gathering and assessing information from licensees, determining the influence of human and organisational factors and the communication of inspection results. Some of the key elements of each of these were described as follows:

*Gathering and assessing information from licensee*

- Use of procedures and checklists: (some countries including Belgium, Czech Republic, Finland, Mexico, Russia, Switzerland and the United States) are using procedures and/or checklists to assess the information on events.
- Reliance on inspectors: All countries consider that the (resident) inspector is important to collect and validate information on events
- Incident investigation methods: Most countries use traditional root cause analysis and some also use full scope simulator in certain cases, The hazard-barrier analysis is used by Canada and PSA Event Analysis by Belgium.
- Reliance on licensee analysis: Some countries have an independent analysis performed and other analyse the licensee analysis themselves.

*How to determine the influence of Human and Organisational Factors*

This is performed by:

- Interviews and other tools: Interviews are commonly used in many countries along with walkdowns and walkthrough task analysis measurements made by inspectors.
- investigative tools: HPES (human performance evaluation system) is used by Canada and Mexico while other countries use their own methods.
- Most countries use specialists in human and organisational factors from the regulatory authority while some rely on the licensee.

*How to communicate inspection results*

The following aspects were identified:

- Initial communication: In some countries the licensee communicates the event to the public. In Finland and France the regulator communicates events >1 on INES scale.
- Factual information is normally given by press releases and/or web sites. Some countries publish the regulatory position as well.
- Inspection teams are not usually directly involved in communication with the public.
- INES is used in all countries.
- Co-ordination with the licensee is generally done (formerly or informally)

### **3.2.4 Feedback**

The questionnaire asked for information on lessons learned from inspections such as communication (generic) with industry, changes to inspection programmes and procedures, etc. Response showed that incorporation of experience from inspection of events and incidents into the regulators self-assessment programme led to adjustments in the inspection programme, changes in the frequency of review and revisions in the level of events considered. More specific response showed that:

- Communication of findings from the inspection of events (to industry) is not routinely applied in all countries. IRS is often mentioned as the communication tool to the industry.
- Changes to inspection programmes and procedures are generally performed under the QA process (on a regular basis), the frequency varies from twice a year to every 3 years, and some countries use indicators to assess the effectiveness of inspection programmes.

### **3.2.5 Discussion Group Questions**

Mr Vandewalle presented a list of potential issues to be discussed as follows:

- Ranking methods: Is INES an appropriate tool, Use of risk significance or PSA?
- Independent event analysis or assessment of analysis made by the licensee?
- Should new inspection methods/procedures be developed?
- Should the regulatory authority communicate events/inspection results to the public?
- Should inspection consider low safety significance events?

## **3.3 INSPECTION OF INTERNAL AND EXTERNAL HAZARDS**

Mr. Balloffet presented the results of the questionnaire on Inspection of Internal and External Hazards. The presentation was based on the responses by national organisations to questions asked on background, requirements, inspection programmes and feedback. He noted that 12 countries did answer (including Russian Federation). The following points were highlighted:

- Both internal and external hazards are inspected
- Fire hazards is the main one to be inspected
- Other hazards have been mentioned like :
  - explosions (for example, from neighbouring railway tracks)
  - water hazard from leaking roofs
- Use of PSA approach is quoted
- Witnessing drills or tests is sometimes mentioned as a way to inspect
- Some countries mention the difference between NPP and other facilities
- International feedback mentioned once only

He compiled the following tables compiling the responses received:

Regulatory Requirements on Internal Hazards					
Country	General Features	Fire	Dropping of Heavy Loads	Turbine Missiles	Internal Flooding
Belgium	10CFR50 App A	X	X	X	
Canada		X			
Finland		X (VNP 391)	X	PSA	X
France		X (RFS V.2j and I.4.a)		X (RFS I.2.b)	To be added
Germany		X (KTA)	X (KTA)	X	
Hungary		X	X	X	X
Japan		X (Guide)	X (Excessive loading)	X	
Mexico	10CFR50	X	X	X	X
Russia		X	X		X
Spain	(For Fire Only)	X (10CFR48 / 10CFR50)			
Sweden		X	X		X
Switzerland		X (HSK)	X (HSK)	X (HSK)	To be added
United States		X (10CFR50)	X (10CFR50)	X (10CFR50)	X (10CFR50)

Regulatory Requirements on Internal Hazards (continued)					
Country	Internal Explosions or Chemical Reactions	Pipe Rupture	Harsh Environment	Dropping of Fuel Casks	Other
Belgium					High Energy Line Break
Canada		X	X		
Finland	PSA	PSA	PSA		
France	To be added				
Germany	X (KTA)				
Hungary					
Japan					
Mexico	X				
Russia					
Spain					
Sweden					Steam line Break
Switzerland					
United States		X (10CFR50)	X (10CFR50)		Segregation of safety trains Human Error

Regulatory Requirements on External Hazards					
Country	General Features	Seismic Event	Flood	Extreme Climate Conditions	Tornado / Hurricanes / Tsunami
Belgium	National Regulations	X	X		High Winds
Canada					
Finland	VNP 395 Section 20	X	X (YVL 43)	PSA	
France		X (RFS I.2.c)	X (RFS I.2.e)	X	
Germany		X (KTA 2201)	X (KTA 2201)	X	X
Hungary	Frequency $< 10^{-4}$ for natural events / $10^{-7}$ for other events	X		X	
Japan	Regulatory Requirements	X	X	X	
Mexico	10CFR50	X	X	X	X
Russia	Prescriptions / Regulations	X	X		X
Sweden	Deterministic or PSA	X	X	X	
Switzerland		X	X	X	X
United States		X (10CFR50)	X (10CFR50)		X (10CFR50)

Regulatory Requirements on External Hazards (continued)					
Country	Aircraft or Missile Crash	Explosion	Toxic Chemicals	Industrial (Transportation)	Other
Belgium	X	X	X		Contamination External Fires
Canada		X (Darlington – from a train)			
Finland	X (VNP 395 Section 17)	PSA	PSA	PSA	
France	X (RFS I.2.a and I.1.a)	To be added	Case by Case	X (RFS I.2.D and I.1.B)	
Germany	X	X	X		
Hungary	X	X	X		
Japan					
Mexico			X	X	
Russia		X (From transport)			Loss of supporting water
Sweden					
Switzerland	To be added (PSA)	To be added (PSA)	To be added (PSA)		
United States					Sabotage / Terrorism (10CFR73)



Inspection Activities on Internal / External Hazards							
Country	General Features	Resident Inspectors		Inspections			Main Feedback
		Main Topics	Frequency	Type	Topics	Frequency	
Belgium		Self evaluation of operation	Unannounced walk downs	Specific	Fire, Emergency	Once or twice a year	Fire 1 <sup>st</sup> intervention team, transient fire loads
Canada	Compliance verification	Fire, Seismic, water leaks on roofs	Monthly				
Finland		Fire. leaks	Routine walkdowns	Periodic	Fire, liquid tanks	1/year	Use of PSA for safety improvement.
				Unannounced		Outages	
France	Design verification and operation	No		Periodic	Fire	1/year	Flood at Blayais
					Other	3/year	
				Walk downs		1 or 1 ½ / year	
Germany	Design requirements and 10 year PSR			Testing Manual		1 week to 8/year	Internal (ex. Fire) and foreign (Blayais)
				Walk downs		1 year	
Hungary	Internal				Fire	1/month	PSR has induced fire protection improvements and seismic modifications
					Flood	4-8/year	
	External				Other	10 years (PSR)	

Other Regulatory Requirements on Hazards (i.e.; submission of documents) (* = For information only)								
Country	Safety Analysis Report (SAR)	Other Safety Assessments	Periodic Safety Reviews (PSR)	Technical Specification	Operating Manuals	Emergency Operating Procedures (EOP)	Periodic tests	Other
Belgium	X					*	*	* Organisation, Procedures
Finland	X (FSAR)	X (PSA)	X (License renewal)	X	*	X		
France	X		X (Design conformity)			X (Partial)	X	
Germany	X		X (10 year)		X	X	X	
Hungary		X (modifications)	X (10 year)			X	X	
Mexico	X (PSAR/FSAR)	X (Environmental Impact)				X (External hazards)		X Emergency Action Levels
Russia	X (PSAR)		X (Annual)	X				X Guide beyond design basis accidents
Spain	X (Fire)	X (Safety evaluation and Fire mods.)	X	X (Fire)	X	X		
Sweden	X	X (PSA)	X					
Switzerland	X	X (PSA)	X		X	X		
United States	X (PSAR/FSAR)	X (safety systems, SSCs)		X				

### **3.4 INSPECTION ACTIVITIES RELATED TO CHALLENGES ARISING FROM COMPETITION IN THE ELECTRICITY MARKET**

Dr. Kaufmann presented the results of the questionnaire on Inspection of Events and Incidents. The presentation was based on the responses by national organisations to questions asked on background, requirements, inspection programmes and feedback and the following referenced documents:

- NUREG/CR-6735: Effects of Deregulation on Safety: Implications Drawn From the Aviation, Rail, and UK Nuclear Power Industries
- OECD/NEA: Nuclear Regulatory Challenges Arising from Competition in Electricity Markets

#### **3.4.1 Introduction**

- A worldwide trend has been developing to introduce competition in electricity markets (deregulation)
- In some countries privatisation of state owned companies is also taking place
- Virtually all NPPs are feeling competitive pressures to reduce operating costs
- The operators conclude that nuclear safety, regulatory compliance and efficient economic performance are not in conflict, but complementary
- Regulatory Body are neutral regarding the introduction of competition, as long as safety is not jeopardised
- Deregulation can provide a wide range of safety challenges for NPPs and R.B.
  - Regulatory Body should consider whether new inspection response strategies are required

#### **3.4.2 Effects of Previous Deregulations**

Case Studies were presented using examples from the US-Aviation Industry, US-Rail Industry and UK and US NPP Industry

##### **3.4.2.1 Corporate Expenditures**

- US-Aviation Industry
  - Increasing the amount of time between engine overhauls (that did not experience a higher rate of engine failures)
- US-Rail Industry
  - Annual capital expenditures on track maintenance increased by a factor of five, while employment was cut in half

- UK: NPP Industry
  - Dramatic downsizing coupled with increased use of contractors. Problems were identified in the aftermath of these changes
- US: NPP Industry
  - Downsizing has begun and can be expected to continue

#### 3.4.2.2 *Corporate Safety culture*

- US-Rail Industry
  - Concerns about under-reporting of safety problems
- UK: NPP-Industry
  - Lost of industrial memory due to extensive use of contractors
- US-Industry, especially NPP
  - Mergers and acquisitions in other deregulated industries have sometimes resulted in safety problems. Problems can be dramatic in the NPP-industry if mergers and acquisitions are planned inadequate

#### 3.4.2.3 *Financial Pressures*

- US: Rail and Aviation Industry
  - The link between poor profitability and safety problems appears strongest for small and unprofitable companies

Financial difficulties may be an indicator of declining safety margins in the NPP industry

#### 3.4.2.4 *Safety Impacts of Downsizing*

- US-Rail Industry
  - Investigations in mayor railroad accidents in recent years have identified inadequate staffing levels and fatigue as contributing factors
  - R.B. raised concern about increased use of overtime
- UK-NPP Industry
  - R.B. raised concern that excessive downsizing has led to loss of institutional memory and excessive reliance on contractors

*3.4.2.5 Experiences of R.B.*

- US-Aviation
  - R.B. experienced staff and budget cuts, and later found that its staffing levels were insufficient
- UK-NPP
  - NII anticipated that regulatory workload would increase somewhat, and staffed up modestly in preparation for the changes
- US-Rail and UK electricity industries
  - R..B. is requiring regulatory approval of significant corporate changes such as downsizing or major mergers and acquisitions
  - This approach requires that regulated parties present an adequate plan for maintaining safety

*3.4.2.6 Conclusion:*

- Economic deregulation needs not to be incompatible with a reasonable safety record, especially in those aspects of safety that are positive correlated to productivity
- However, safety cannot be taken for granted after deregulation, since safety problems were observed in aspects of each of the three case studies

**3.4.3 Output from Questionnaire**

*3.4.3.1 Examples of changes*

- Corporate mergers - (almost all countries)
- Corporate splits – U.K
- Corporate restructuring – Can, Fin, Jap, UK, Germ
- Downsizing – (almost all countries)
- Contractors (outsourcing) – Bel,Fr, Hung, Sp, UK

*3.4.3.2 Examples of structural issues*

- Bonuses for economic performance – Can
- Less research – Can, UK

- Lack of funds – Russ
- Loss of coopertaion between licensees – Sp
- Design Authority/competence/knowledge – Can, Belg, Swed, UK

3.4.3.3 *Examples of technical issues*

- Shorter outages – Fr, Swiz
- Fuel cycles (fuel rating, burnup) – Fr, Hung, Sp, Swiz
- Life extension – Jap, UK
- Maintainence changes – Bel, Fr, Swiz, Swed, UK
- Online maintenance – Sp
- Non-qualified parts – Bel

3.4.3.4 *Examples of Regulatory responses*

- New guidance – UK
- New regulation – UK
- Training of inspectors – SP, UK
- Indicators – Fin, Hung, Sp, Swiz, US
- Specialists (Psync, HF) – Fin, Germ, Swiz, UK

3.4.3.5 *Examples of Inspection approaches*

- Compliance inspections - Bel, Can, Fin, Russ, US, UK
- Team/audit (QA, HF) – Bel, Can, Fr, Russ,Sp, UK
- Focussed inspections - Fin, Fr

### 3.4.4 *Outline of Deregulation*

#### 3.4.4.1 *Development of the electricity price due to deregulation*

Actions	Reaction of the Electricity Price (E.P.)
Launch of deregulation	E.P. is coming down rapidly (25-50%) – NPP has to focus on short term to survive this phase
Reduction of operational costs Increasing of capacities and lifetimes of the existing NPPs Unprofitable capacities are closed It is not profitable to build new capacities	E.P. is creeping up over the years. E.P. even can come up higher than before deregulation
New <u>profitable</u> capacities have to be build	E.P. is stabilizing

#### 3.4.4.2 *Deregulation is different in each country, but*

- Increased and persistent competitive pressures to reduce costs are the same in all countries in areas as
  - operation
  - maintenance
- On the other hand NPPs are focused on increasing electricity production by upgrading plant generation capacity
- reduce outage times e.g. by extending functional tests periods
- extend the lifetime of plants
- cont.

#### 3.4.4.3 *PROS and CONS of deregulation:*

- PROS: There are examples of better
  - outage planning
  - overall management
- CONS : There are examples of
  - substantial staff reduction

- greater use of less skilled contractors
- termination of skilled NPP-personel due to economic reasons
- What is clear is that deregulation poses new challenges to the R.B.

#### *3.4.4.4. Role of Safety Management*

- Pros of Deregulation
  - high safety standards get high priority, because
  - availabilities of the plants have to be high
  - greater periods of shutdowns due to failures are unaccepttable
- Cons of Deregulation
  - strong cost reductions are resulting in safety problems
  - management is more involved in matters of economy than safety
- There is a feeling that NPPs having a strong safety management may find it easier to adapt to these circumstances

### **3.4.5 How to Maintain Safety Inspections?**

#### *3.4.5.1 Feedback from Inspections*

1. What methods of inspections are used?
  - More safety management inspections are performed putting questions concerning
    - adequate recourses of the L.
    - competence of the L.
    - organisation of the L.
    - qualification of the contractors
2. How do inspectors get findings?
  - reports from on-site or site-dedicated inspectors
  - findings from specific inspections
  - event investigation

3. How do findings related to safety management feed into the RB`s strategy?

- discussions with the L.
- planning of inspections of the coming year
- developing a risk informed inspection planning method

3.4.5.2 *Inspection Practices*

4. What types of inspections are reasonable?

- Process- and resultoriented inspections
- Teaminspections

5. What fields of inspections are of interest?

- Identified main changes and links of the three case studies
- Safety management

3.4.5.3 *Identified main changes and links of the three case studies of previous deregulations*

1. Main changes

- Maintenance - (more or less)
- Downsizing - (in all cases)
- Loss of industrial memory - (especially in UK-NPP)
- Reliance of contractors - (especially in UK-NPP)
- Under-reporting of safety problems - (US-Rail)

2. Identified Links

- Poor profitability and safety problems
- Mergers and acquisitions have sometimes resulted in safety problems

3.4.5.4 *Inspections of the safety related processes concerning deregulation*

- Management
  - Organisational changes
  - Resource planning



- Actions for improving safety culture
- Changes of maintenance strategies
- Training and qualification
  - Training and qualification of own staff
  - Qualification of contractors
- Evaluation of experiences
  - Interior and exterior events
  - Improving of processes
  - Self assessment

**3.4.6** *What has the R.B. to do?*

- Make shure that there is sufficient competence and enforcement to deal with deregulation issues
- Develop the guidances of the own inspectors and in dealing with contractors
- Add the qualifications of the own staff to deal with deregulation issues < safety management
- Develop observable performance indicators
- Introduce a performance informed inspection planning method
- More weight has to be given to inspections of safety management

## 4. DISCUSSION GROUPS - SUMMARY OF RESULTS

### 4.1 INSPECTION OF EVENTS AND INCIDENTS

#### 4.1.1 *Groups*

GROUP 1	GROUP 2
A. Vandewalle, Belgium *	D. Coe, United States *
H. Koizumi, Japan *	R. Rehacek, Czech Republic, *
S. Forsberg, Sweden *	S. Suksi, Finland *
C. Morin, Canada	L. Schäffler, Germany
C. Marois, France	Y. Arikura, Japan
W. Bergbauer, Germany	J. C. Santoyo Pérez, Mexico
C. M. Pachett, United Kingdom	F. Valencia, Mexico
A. Maldonado Hernández, Mexico	R. Isasia, Spain
A. Merino Hernández, Mexico	

* Facilitators/Recorders
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#### 4.1.2 *Background*

Incidents and events make a substantial part of the inspection activities of the Regulatory Body. This topic is intended to cover:

- Inspection methods to analyse events and incidents, including ways to rank the importance of these in order to put regulatory resources where it is most important.
- Risk informed selection criteria or other tools used to define the importance of the analysis made by the REGULATORY BODIES should be presented.
- Besides the usual methods already known, it is asked for participants to present original methods to analyse events and/or incidents, to identify or analyse the lessons learned from very low level events (near-misses) up to important incidents, and how they analyse human factors and/or organisational factor contributing to the occurrence or to the consequences of the event.

- Ways to analyse events and incidents accurately and fairly should be presented. The use of inputs from independent expert groups such as chemical, mechanical engineers and psychologists in the investigation process should be considered.
- Emphasis should be given to practical tools and methods (“how to”) that can be used by regulatory inspectors having no throughout knowledge of psychology or organisational matters.

### 4.1.3 *Discussions*

#### **How do you determine what inspection is to be done?**

- Use of risk / importance ranking (differences between important and less important event ranking)
- Inspector response
- Timeliness
- Management / technical review committees

#### **Common practices**

1. Licensees always **report** events that the REGULATORY BODIES can review
2. Events are **ranked** in importance to help decide inspection response
3. Inspections use pre-written procedures, guidance, or policies
4. Licensees are responsible to do **Root Cause Analysis** that the Regulatory Body can review
5. Regulatory Body determine adequacy of corrective actions
6. Regulatory Body expectation is that timely, accurate, and consistent information is provided to public. (common expectation)
7. Feedback can be to improve either inspection process or regulatory requirements.
8. Regulatory Body encourages (expect) licensees to learn from events and to improve.
9. Lessons learned from events are **shared** within Regulatory Body and Licensees.
10. Regulatory Body has access to licensee corrective action programme and can review low-level events.
  - recurring events
  - related events
  - public interest
11. Human factors are considered in an integrated way during event investigations (methods vary).

## **Definitions**

1. Events and incidents include **non-normal conditions**.
2. Inspection includes information gathering by inspectors and determining if requirements were met.
3. Inspection does not include event monitoring while plant is unstable.

## **Commendable practices**

### *Ranking*

- The Licensee is responsible for the initial ranking of safety importance of events. The initial evaluation of the safety importance by the Regulatory Body relies mainly on the inspector. Taking into account his/her experience, he/she is able to recognise the safety importance of events. Initial event ranking and initial Regulatory Body response is confirmed by Regulatory Body discussions with Licensee input.
- After an initial notification, Licensees' written reports are required to provide specified categories of (structured / complete) information necessary for the Regulatory Body to classify, rank, and fully understand the event.
- Specific guidance should be used to support the inspector and Regulatory Body initial response.
- PSA may be used, with other known information, to help determine inspection response to event, but best use is to help rank event after all details of event are fully known.

### *Timeliness*

- Following notification from the Licensee, information is gathered by the Regulatory Body in a timely manner (e.g. operator interviews), but this should not interfere with actions being taken by the Licensee to operate the plant.

### *Inspection Methods*

- Following an initial notification of a reportable event the inspector records details of the event and the actions being taken by the licensees and actions proposed by an inspector, and he/she provides this to the Regulatory Body management.
- Regulatory Body develops and maintains event evaluation methodologies, techniques, guidance, and training to organise information to gain best understanding of root causes.
- A balance is made between proactive (inspection of Licensee activities and processes) and reactive inspection (inspection of events): due consideration is given to the inspection of the process. Reactive inspection is not the only response of the Regulatory Body.

*Human Factors*

- Training and guidance are given to inspectors to allow them recognise Human Factors, organisational, and safety culture issues and to obtain complete information through interviews.
- The existence of a no-blame culture by the Licensee is a prerequisite for efficient application of HF analysis of events. Since the majority of the events and incidents are related to HF issues, the Regulatory Body encourages the Licensee to implement a no-blame culture in their organisation.

## Low level events

- The inspection organisation encourages the Licensee to collect and analyse low-level events for the following: trends of low level events, recurring events, continuing weaknesses, and “near –misses”.
- If the Licensee has a process, inspection evaluates the adequacy of the process and ensures the Licensee is following this process.
- Inspectors use judgement to evaluate a sample of the outputs of this process, but are careful when making conclusions based only on a sample.

## Training

- It is important for inspectors to initially accurately evaluate the safety significance of an event. Senior inspectors mentor less experienced inspectors when evaluating and investigating events.

## Feedback

- The Regulatory Body maintains an easily accessible database of reportable events that inspectors and other Regulatory Body persons may use for trending, inspection plans, modify testing, or requirements (either licensee or Regulatory Body), and to identify root causes that have not been corrected (e.g. training, human performance etc).
- The Regulatory Body ensures that sharing of information on events and incidents is working properly, by encouraging the industry to share information (e.g. organising periodic information exchange meetings, shared databases).

## Public and Regulatory Body communication

- Regulatory Body establishes policy/procedure that is the only authority to make public final classifications & ranking of events.
- Regulatory Body considers using available methods to communicate events both publicly and with other Regulatory Bodies & Licensees (e.g. IRS, INES, NEWS, etc.).

## 4.2 INSPECTION OF INTERNAL AND EXTERNAL HAZARDS

### 4.2.1 Group

GROUP 1
H. Klonk, Germany *
G. Philip, IAEA, Austria *
L. Gutierrez, Mexico *
P. Tiippana, Finland
Y. Boulaigue, France
R. Gómez Monterrubio, Mexico
D. Tabares López, Mexico
G. A. Aveleyra Monroy, Mexico
J. Blasco, Spain
C. Karlsson, Sweden
R. Matthew, United States

\* Facilitators/Recorders

### 4.2.2 Discussions

The discussion started with the three initial questions:

- What is inspected and When are inspections carried out?
- What are the limits of events taken or not taken into account?
- What are the consequences of the inspections for:
  - rules and regulations (requirements with respect to the design basis)
  - plant modifications (correction of identified deficiencies)

The participants were asked to identify the main hazards to be inspected from their individual perspectives. One remarkable spontaneous answer was:

***“The one we did not take into account!”***

The participants suggested that all external hazards need to be looked at for the inspectors perspective, whereas in the case of internal hazards fire was identified as the primary area of concern. Subsequent discussions lead to identifying a few further internal hazards like dropping of heavy loads, turbine missiles and the issue related to gas storage.

In order to demonstrate the different aspects of precautions to be taken against internal or external hazards the group conducted a brain storming session regarding as an example the area of fire protection. About 30 different related items could be identified that need to be carefully looked at by the inspector.

The inspections themselves on safety precautions against external and internal hazards were classified into:

- Compliance oriented
- Proactive to avoid the “forgotten” hazard
- Reactive with respect to events and operational experience.

In the discussion special consideration was given to the information exchange on events which occurred at plants both at the national and at the international level. The information sources discussed in this context were IRS-Reports, and international Working Groups such as CNRA, WGIP and WGOE. The mechanisms to feed back the lessons learned may consist of the following steps:

- Asses the applicability of the event for the plant
- Request that the problem, if applicable, be fixed
- Broaden the scenario of the event to identify potential risks
- Assess the applicability for the plant again.

Being reactive with respect to lessons learned at one plant would be considered being proactive for improving the safety of other plants. It is a task of the Regulatory Body Inspector to ensure that the licensee performs the necessary actions and to review the results.

Being proactive to avoid the “forgotten” hazard was discussed. One example with respect to a proactive review of new or already existing hazards is the issue related to other industrial facilities in the neighbourhood of the NPP. Again, the Regulatory Body Inspector is looking after the licensees activities in reviewing internal and external hazards and their possible changes (*Commendable Practice No. 1*).

In judging the risks posed by internal and external hazards the given prescriptions and regulations on the design requirements may not be exhaustive under all circumstances. Therefore, “Common Sense”, which is obvious but likely to be forgotten, needs to be exercised.

Examples are limiting the amounts of toxic chemicals, gases and combustibles and explosive materials stored at the site to the minimum required for their intended use, and the use of alternatives or substitute materials which are less dangerous (*Commendable Practice No. 2*).

(Note: The discussion of this commendable practice at the final plenary session showed that it is necessary to find a balance between reducing the storage of such material on site, and ensuring the operational safety of the plant for the time required also under adverse operational conditions through the availability of the material.)

The discussion in the group on the hazards related to the dropping of heavy loads brought up the issue of safety culture. Daily normal operations on transport of heavy loads are to be performed according to prescriptions and Technical Specifications, whereas unusual operations are to be pre-planned and reviewed for safety prior to execution. In both cases a constant awareness of safety is vital and part of safety culture (*Commendable Practice No. 3*).

Discussions on the topic of external fires, e.g., a forest fire that could affect the accessibility of the plant for the required personnel and the possible loss of offsite power, lead to the identification of other potential

site-specific hazards, which had not been analysed so far. The example discussed was an oil tanker accident under stormy weather at a coastal NPP-site. In general, if environmental conditions change, the assumptions made in the original design bases regarding the protection of systems, structures and components due to external hazards may no longer be valid. This needs to be re-evaluated and addressed by the licensee (*Commendable Practice No. 4*).

This approach is equivalent to the re-evaluation of the site, which is also required in Article 17 of the Convention on Nuclear Safety (CNS). In discussing Article 17 the Group also identified that Articles 14 & 18 of the CNS were relevant as well when considering external hazards (*Commendable Practice No. 5*).

The discussion of Article 14 of the Convention on Nuclear Safety automatically lead to the question of Periodic Safety Reviews (PSR) and their importance in assessing the contribution of internal and external hazards to the total risk of the plant. Operational experience feedback, modifications to the plant and changes in the plant surroundings, which are typical elements of a PSR, were already covered in earlier discussions.

Nevertheless PSR is an instrument which can give important insight into the plant safety as a whole and identify areas of weaknesses also with respect to internal and external hazards which need to be addressed (*Commendable Practice No. 6*).

Inspection of instrumentation related to the detection of internal and external hazards was discussed briefly. Important are, e.g., the inspection of seismic instrumentation, fire detection equipment etc.).

In summarising the group sessions, the participants felt that the discussions were open and constructive and were beneficial to all members. In particular the group was of the opinion that it was useful discussing hazards and the related inspection activities as a whole rather than getting into the details and technicalities of each one of these individual hazards. Consequently, the commendable practices identified by the group although derived from individual hazards apply to the broad spectrum of internal and external hazards.

The group developed and agreed the following Commendable Practices.

1. The Regulatory Body Inspector verifies that the licensee is proactive and is continuously looking at any new evolving hazards around the plant.
2. The Regulatory Body Inspector encourages/verifies that the licensee keeps hazardous materials stored on site to a minimum (ALARA) even below prescribed limits.
3. The Regulatory Body Inspector verifies that the licensee is following all plant rules and procedures and is constantly aware of all safety implications. A “surplus” of safety is produced by good safety culture. The Regulatory Body Inspector encourages the licensee to perform a self-assessment.
4. The Regulatory Body Inspector conveys information on potential new hazards to the licensee and to the Regulatory Body for further evaluation and possible action.
5. The Regulatory Body Inspector looks at the requirements laid down in Articles 14 (Assessment of Safety), 17 (Siting) and 18 (Design) of the Convention on Nuclear Safety. Reference to other National Reports under this Convention can give valuable information on continuous improvement of safety.
6. The Regulatory Body Inspector verifies the implementation of measures to be taken as a result of a Periodic Safety Review (PSR).



### 4.3 INSPECTION ACTIVITIES RELATED TO CHALLENGES ARISING FROM COMPETITION IN THE ELECTRICITY MARKET

#### 4.3.1 Groups

GROUP 1	GROUP 2
F. Kaufmann, Switzerland *	L. Summers, United Kingdom *
J. Detorakis, Canada *	G. Fichtinger, Hungary *
Y. Balloffet, France *	J. Crespo, Spain *
P. Goedewrtier, Belgium	H. Stepan, Germany
P. Kopioff, Finland	F. Robles Márquez, Mexico
H. Enrich, Germany	J. L. Delgado Guardado, Mexico
V. Gonzalez Mercado, Mexico	L. Karlsson, Sweden
G. E. Palencia León, Mexico	C. Marschall, United States

\* Facilitators/Recorders

#### 4.3.1 Introduction

The discussions by the two groups took independent paths as described in the following paragraphs. The results of the independent discussions were compiled and synthesised final group of commendable practices

#### 4.3.2 Group 1

Group 1 started by receiving a presentation from Belgium on the inspection performed following the reorganisation of Tihange and Doel NPPs. Following the presentation the group looked at 3 main issues and developed elements for each. The 3 main issues were:

- When to inspect,
- What to inspect, and
- How to inspect

##### *When to Inspect?*

- Significant changes of licensee's organisation or business processes (either at corporate level or/and at NPP)
- Noteworthy staff reductions or staff structure
- Changes in licensee's policy with respect to the use of contractors

- Changes in normal licensee's operational, maintenance and support processes
- New legislation on electricity market

*What to Inspect?*

Specific indicators showing trends on:

- Budgets, Safety Culture, Competence, Management culture (organisation and Staff motivation and stress

Maintenance Strategies include:

- Outage management
- On line maintenance
- Reliability centred maintenance
- Availability of spare parts
- Management of ageing
- Competence and training (licensee)
- Supervision of contractors
- Budget vs. Safety like:
  - Staff motivation initiatives
  - Budget for plant modifications

*How to Inspect?*

- Well qualified and trained inspectors
- Use of independent experts on organisation, budget, etc
- Use of questionnaires
- Use of interviews/audits
- Use of possible acceptance criteria, such as:
  - Cost/Benefit; Risk; Minimum licensee's management competence; Minimum licensee's personnel; Minimum competence/knowledge at corporate headquarters and /or NPP; and Stress of the individuals.

*Suggestions for Licensee*

- Self assessments (continuous process, and especially in case of changes in organisation, staff reduction, etc.)
- Inform the Regulatory Bodies of budgets on safety, plant modifications, etc
- Inform the Regulatory Bodies of changes of organisation, staff reduction, use of contractors, etc

*Other suggestions for Regulatory Bodies*

- Improve legal framework
- Establish agreements between Regulatory Bodies and licensees on the steps of deregulation.
- Promote safety culture

**4.3.3 Group 2**

The method of working was established to review the outputs from the questionnaire in the following areas:

- Examples of changes
- Examples of structural issues arising
- Examples of technical issues arising
- Examples of regulatory responses
- Examples of inspection approaches

It was agreed by the group to concentrate on the first three areas. Next the group established themes for the discussions and developed key elements for each. The themes were:

- Outages and the financial pressure on licensees
- Competence of licensees
- Management of change
- The increasing use of contractors

*Outages*

- Pressure to reduce frequency/length
- Pressure to cut corners if run late

- Resident (or site) inspectors as a major source of insight
- More training needed to help inspectors
- Realisation that the issue is more general than outages
  - It applies to all inspection activities

#### *Competence of Licensees*

- Key issue, licensee's competence is threatened by the effects of competition
- How can licensees demonstrate their continued competence
- Competence profile:
  - Licensee analyses the knowledge and skill it needs and the numbers of staff with those skills
  - Licensee records the number, knowledge, and skills it has
  - Demonstrates that these match
  - Competence profile is documented
- Document can be inspected against

#### *Management of Change*

Licensees need to have a formal process:

- Analysis of proposed organisation of change
  - Planning the change
  - Implementing the change
  - Performance indicators
  - Review
  - Remedial work, if necessary
- The steps of this process are inspectable

#### *Increasing use of Contractors*

- Licensees must maintain their capability to oversee contractors' work
- They must not lose ability to set standards and review outputs

- There is therefore a limit to the use of contractors
  - The limit is determined by the competence a licensee must keep in-house
- Inspectors confirm licensee has processes
  - To specify standards
  - To review outputs
  - And use competence profile to identify who does it

#### **4.3.4 Synthesis of Groups**

Each group developed a list of commendable practices (Group 1 – 7 and Group 2 – 5). The commendable practices were reviewed and discussed and a final list of 6 commendable practices was developed. The groups agreed to provide a preamble for each practice. It was noted that the methodologies used by the groups were very different, but the outputs converged very well. The commendable practices were as follows:

##### *Commendable Practice 1*

A Licensee should maintain a documented Competence Profile to establish the skills, knowledge, and experience necessary to fulfill the requirements of its safety management system [see NEA/CNRA/R(2001)9]

*The Regulatory Body should establish that a Competence Profile exists and inspect against it*

##### *Commendable Practice 2*

The increasing use of contractors is an important outcome of deregulation and competition. A Licensee must have and utilise a basic capability to oversee, by QA and/or supervision, contractors' activities [see NEA/CNRA/R(2000)2, page 13].

*The Regulatory Body should inspect to confirm that the Licensee maintains the capability in house to set standards and ensure the quality of Contractors work (qualification system, etc). The Inspectors should scrutinise the Licensees policy for the use of contractors and its supervision of Contractors' work*

##### *Commendable Practice 3*

Safety problems can arise from organisational stress. Resident or site inspectors are an important resource for providing insights into Licensee safety performance. All inspectors need to improve their ability to respond to these kinds of safety problems.

*The Regulatory Body should give basic instruction and training to all of its inspectors on human factors and about the issues and effects of competitive markets. Inspectors should be able to*

*move from conclusions about the particular or technical issues to the general such as safety culture, management and processes.*

*Commendable Practice 4*

A previous workshop (Prague) noted the Licensee should have management of change arrangements [see NEA/CNRA/R(2000)2, page 13].

*The Regulatory Body should inspect the whole process of organisational change to insure that the Licensee maintain its competencies. In particular, during the planning phase, Inspectors should review documents to insure competencies are maintained. During implementation, Inspectors should interview key personnel to ensure that hold point requirements in its plans are met. Similarly, after implementation Inspectors should examine products from the reorganised departments and licensee's post-change self assessment and Performance Indicators and any remedial actions that were required.*

*Commendable Practice 5*

It is important that the Regulatory Body has the earliest possible knowledge about organisational changes the licensee plans to make

*The Regulatory Body should implement periodic high level regulatory meetings with Licensees. Preparations for the meetings should include questionnaires on ongoing and further changes*

*Commendable Practice 6*

Regular review meetings are a vehicle for the Regulatory Body to carry out an internal holistic assessment in order to integrate information about a licensee's safety performance

*The Regulatory Body should emphasise specific consideration of organisational issues and signs of organisational stress in their review meetings and feed the outputs into their inspection plans.*

## 5. CLOSING PLENARY SESSION

### 5.1 PRESENTATION OF TOPICS

A presentation on each of the workshop topics was made by relevant facilitators. Each presentation was followed by general questions and comments from the floor. Each of the groups developed a set of commendable inspection practices based on their discussions. *[Reference Chapter 4]*

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

### 5.2 CLOSING REMARKS

Mr. Y. Balloffet remarked on the success of the discussions. His impression was that there had been full and frank exchanges of views both during the plenary and break-out discussion sessions. He also noted that the informal sessions provided many additional opportunities for bilateral exchanges.

Discussions on the Workshop topics had shown that:

In closing the work, Mr. Balloffet thanked the Mexican Secretaria de Energia (SENER) and the Comision Nacional de Seguridad Nuclear y Salvaguardias (CNSNS-CNLV) who worked so hard to develop the plans and ensure the success of the workshop. In particular, he thanked Messrs. Gutierrez Ruiz, Maldonado Hernández and Tabares Lopez along with all the other inspectors from Mexico who worked so hard the past few days. He also thanked the secretaries for their work in organising the sessions and ensuring all arrangements were successful.

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

## 6. EVALUATION

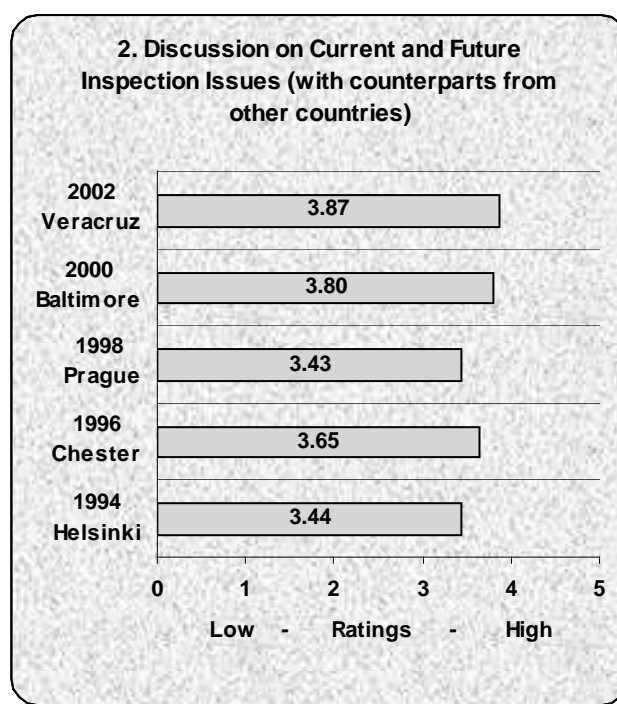
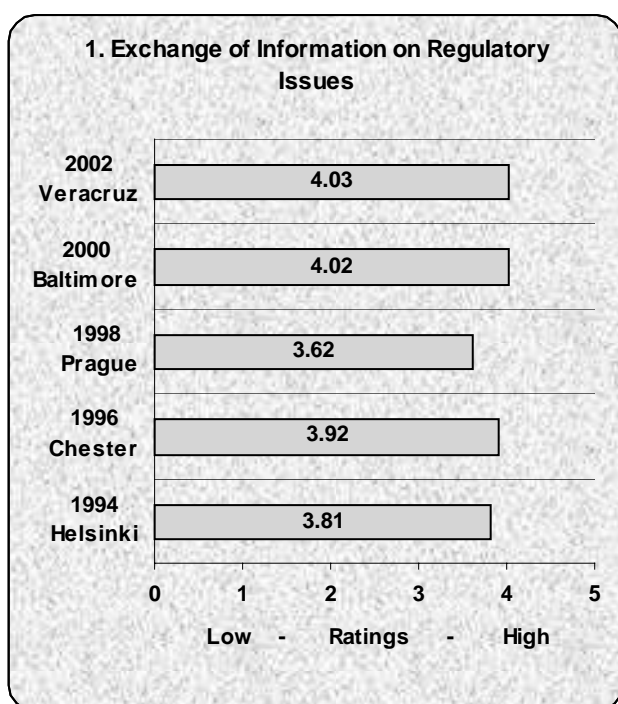
### 6.1 EVALUATION FORM

All participants at the workshop were requested to complete an evaluation form. The results of this questionnaire summarised below, are utilised by WGIP in setting up future workshops and to look at key issues for in the programme of work over the next few years. Of the 45 total participants 29 responses were received.

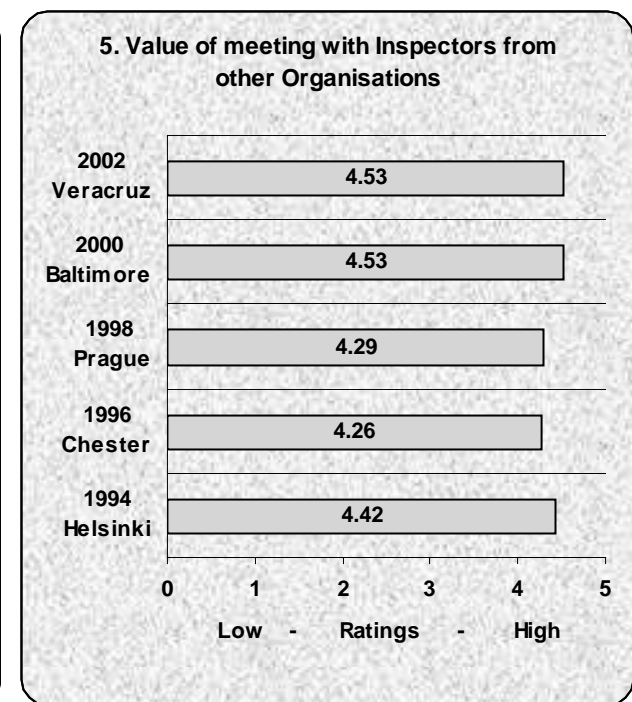
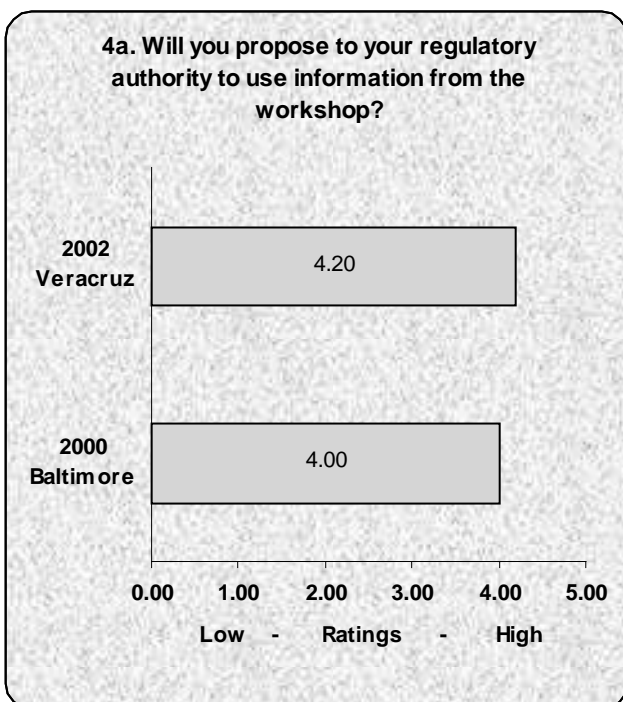
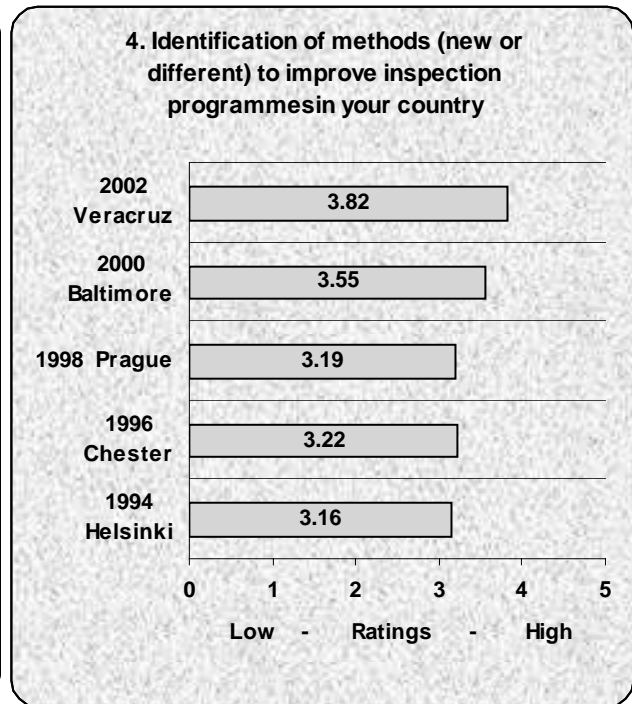
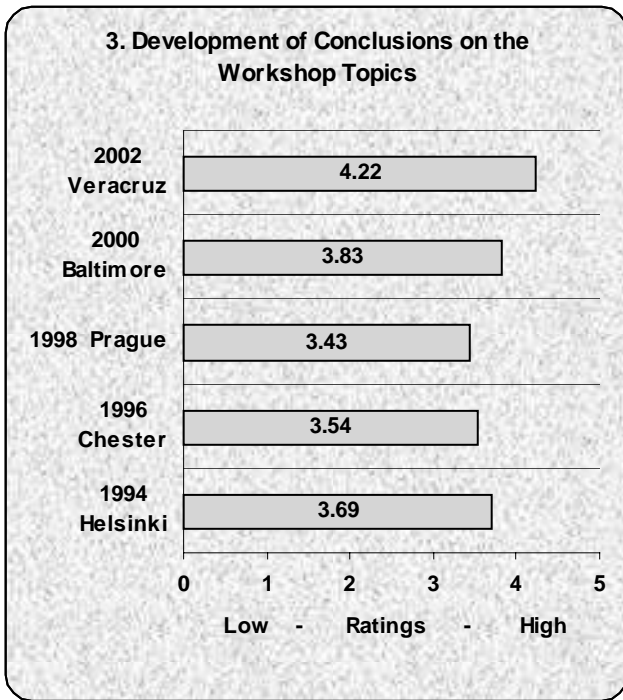
The evaluation form, which was similar to ones issued at previous workshops, asked questions in 4 areas: general - workshop objectives, workshop format, workshop topics and future workshops. An additional question was added to determine to what extent the information gained from the workshop is used within the Member countries. Participants were asked to rate the various questions on a scale of 1 to 5 (with 1 being a low (poor) score and 5 being a high (excellent) score). Results are provided in the following charts (which also reflect scores from the previous workshops - for comparison purposes) along with a brief written summary.

### 6.2 GENERAL

Each chart or table shows a specific objective in relation to the generally worded lead question on how well were the following objectives meet.







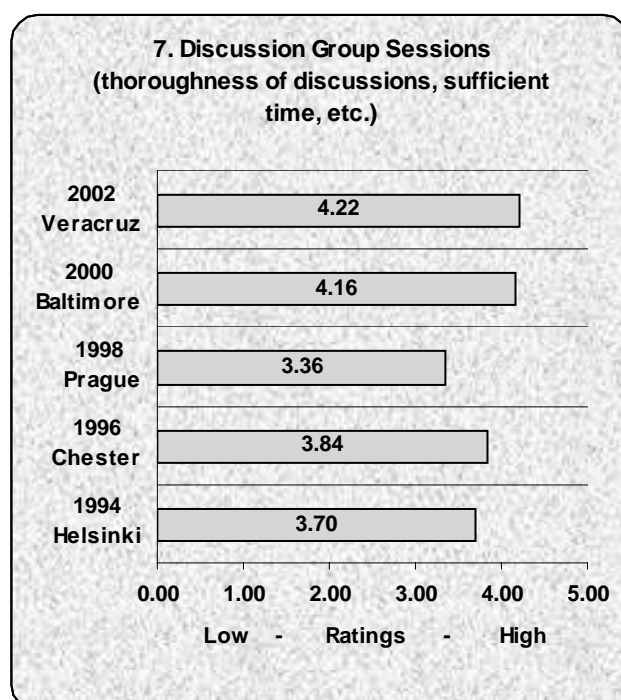
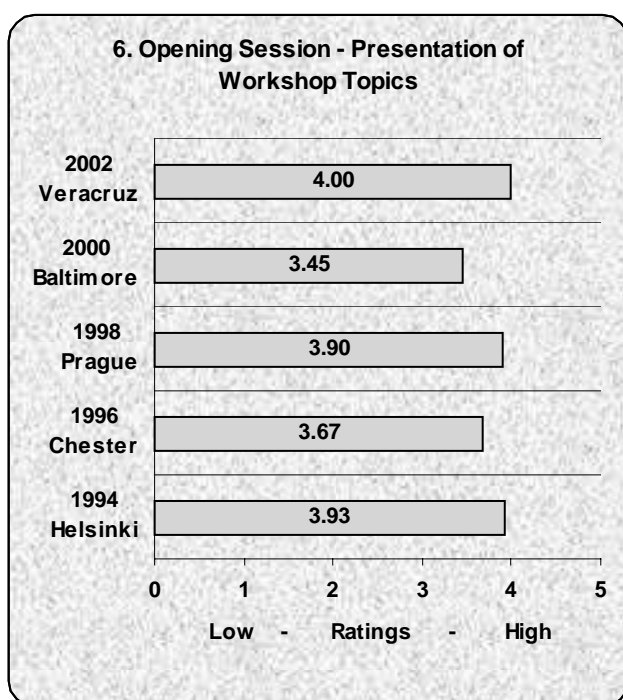
The results show that the value of holding these workshops continues to increase. This reflects that in organising the workshop, WGIP has enabled participants to have good discussions on the selected topics establishing a good exchange of information, which in turn shows the value of having such workshops.

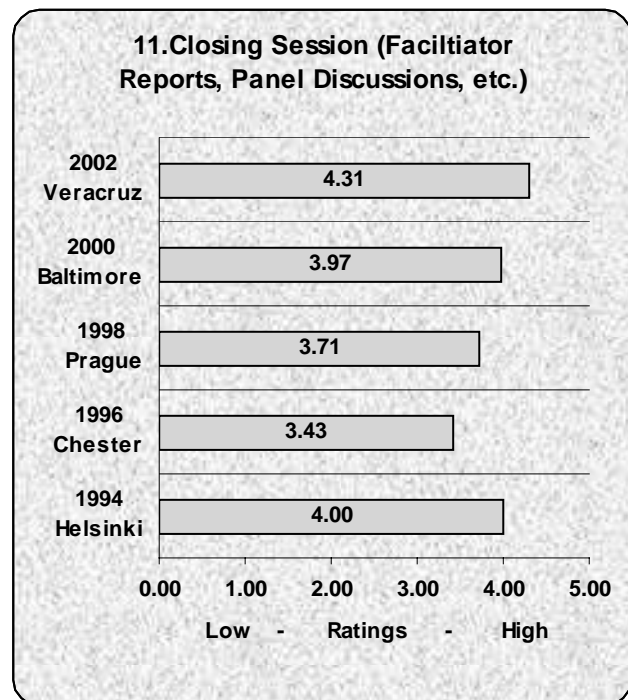
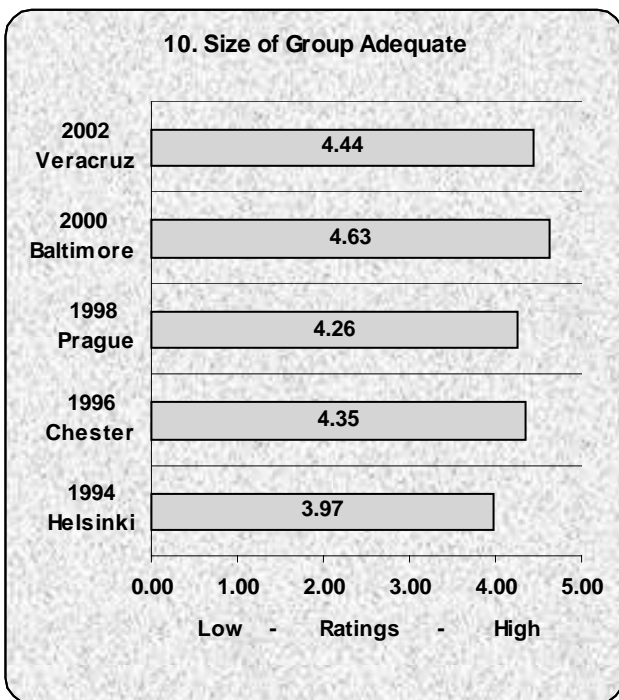
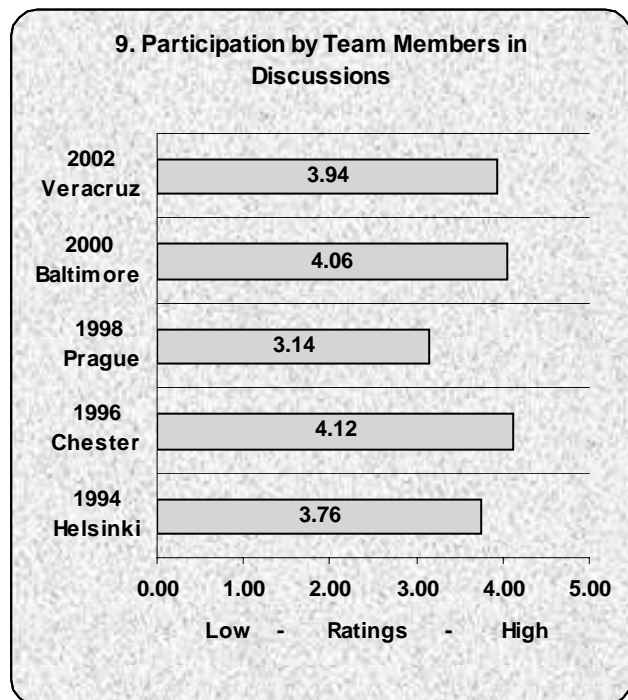
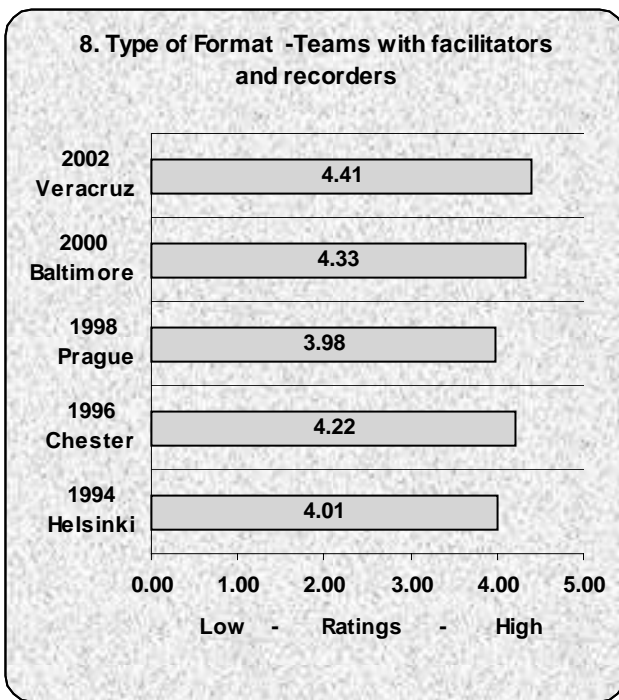
The results from questions 3, 4 and 4a provide a good sense of this value. Participants noted that the conclusions were more developed (4.22 versus 3.83) than in the previous workshop. Better conclusions lead to the ability of inspectors to identify methods used by others that can be used by their own organisations, as seen by the results to question 4. Additionally, a key question that was first posed in Baltimore (4a) on the actual use of information gained at the workshop showed a large increase (4.00 to 4.20).

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

### 6.3 WORKSHOP FORMAT

This part of the questionnaire looked at how effective each of the sessions were. The main objective of this question focuses on the way sessions are conducted. The responses provide key information to WGIP in their preparation and planning for future workshops.





The workshop format was the same as used in previous workshops. Ratings in comparison to the last workshop increased in all areas except individual participation and the size of groups (questions 9 and 10). This could be a result of having only one group on internal and external hazards, which had 11 members. Participants at previous workshops have indicated that the ideal size of a discussion group is between 6 and 8. The results tend to confirm this fact.

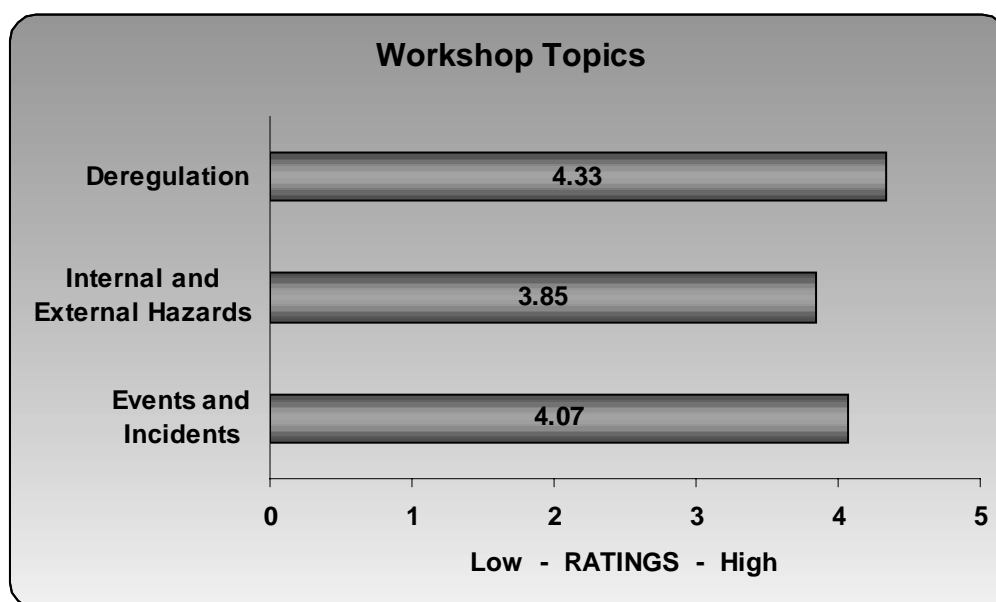
The results showed a marked increase in satisfaction with the opening and closing sessions (questions 6 and 11). WGIP, in planning the workshop, paid special attention to this, especially the opening session, which had a very low mark at the last workshop. The success of the workshop is clearly dependent on the preparations made by the group. The issuance of questionnaires on each topic provided the ability to focus on key elements and participants were able to discuss and make valuable conclusions. Additionally, facilitators and recorders are better prepared to discuss specific issues related to the topics and participants better informed on the focus and objectives to be achieved..

Additional effort was made to co-ordinate the members in each of the discussion groups. The final outcome is still very dependent on each individual providing input. While cultural and language differences are most often cited as the major problems in communicating the results show that the breakout sessions were generally very good. WGIP will continue to focus on this when planning future workshops.

The change made following the Helsinki workshop to have increased social (reception, longer breaks, etc.) times outside the workshop has proved to be a very successful approach. The fact that participants have time to meet and get to know each other prior to sitting down and discussing the issues, provides for better efficiency and effectiveness during the breakout sessions. The added opportunity to meet and discuss informally general inspection issues in such a setting was also rated very high.

#### 6.4 WORKSHOP TOPICS

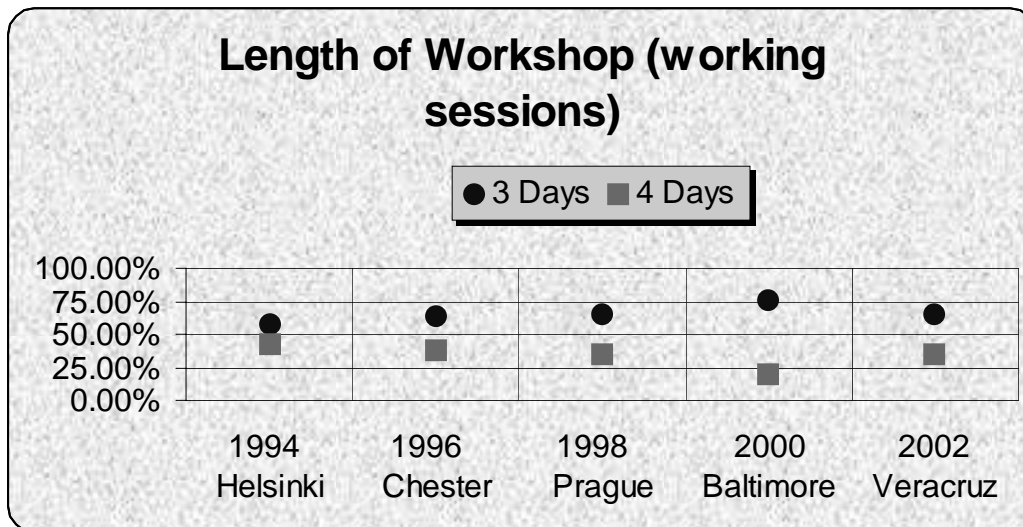
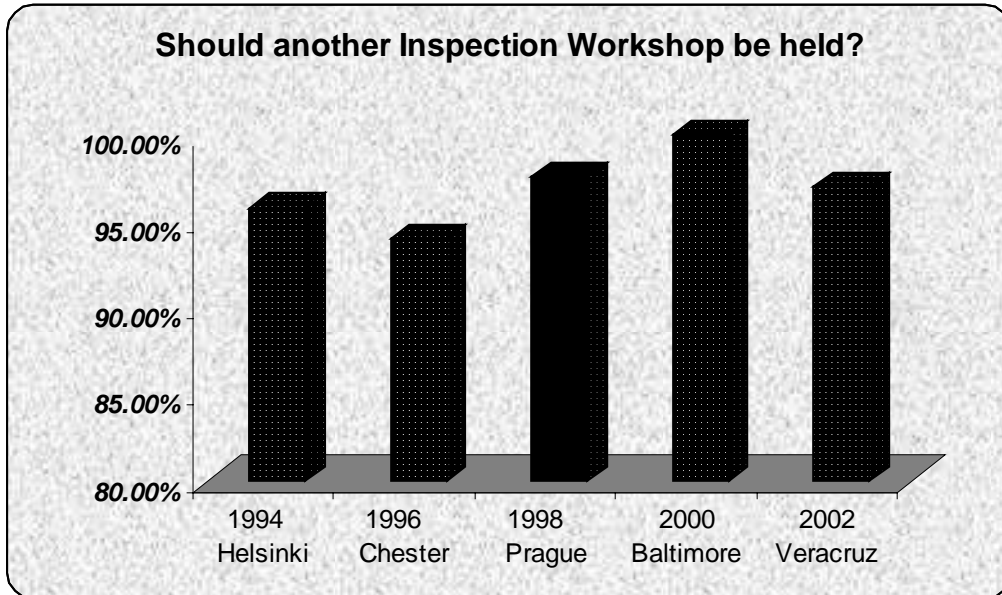
In order to assess how well the topics have been addressed, participants are asked to give a rating on whether they perceived the topics were covered adequately.

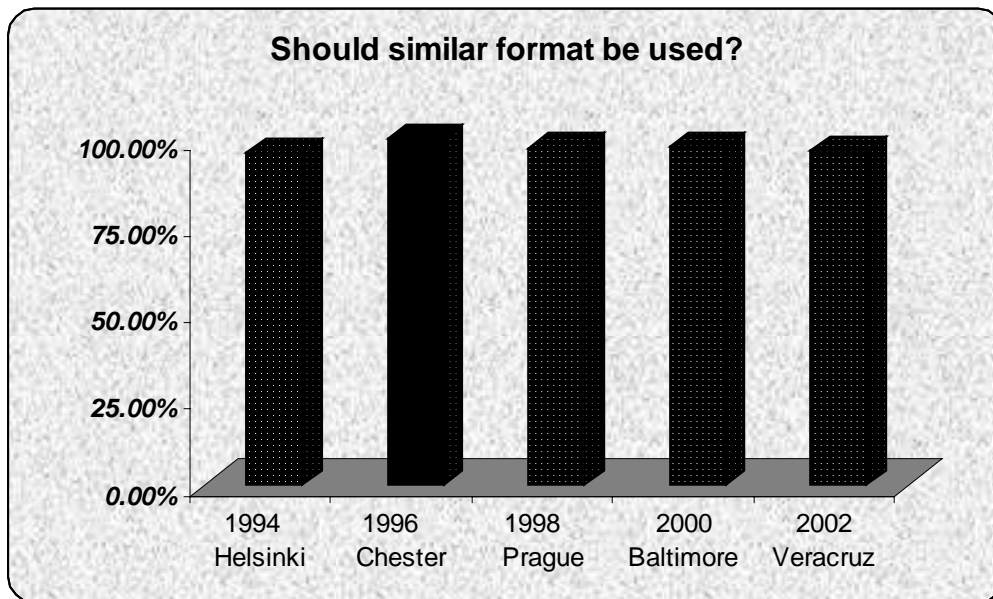


Participants continue to show satisfaction how the topics are addressed during the workshop. These scores are comparable with those on topics from previous workshops. A major reason for this appears to be the high interest in these issues. While many factors are involved in selecting topics, the input received from participants is extremely important. Each of the topics selected was highly rated as a potential future issue by previous workshop participants.

### 6.5 FUTURE WORKSHOPS

While section 6.3 looks at the way workshop sessions are conducted, this section provides a perspective of the type of format, the overall value of having workshops and how they can be bettered.

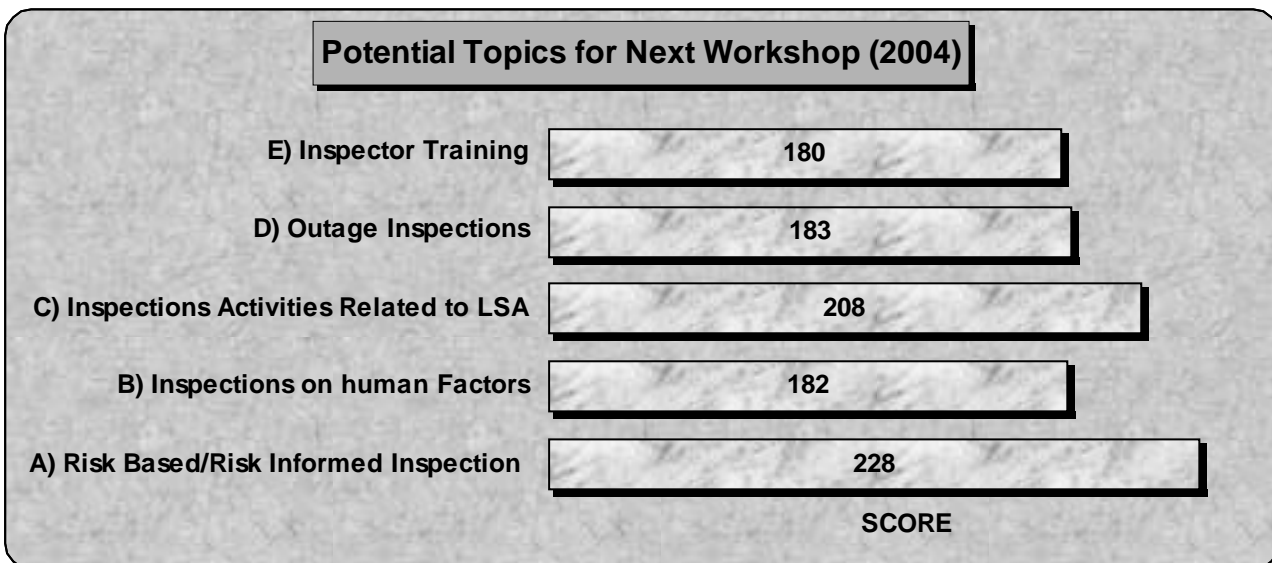




Participants were asked whether additional workshops of this type should be held in the future. The responses show that 98% answered yes. When asked about the number of topics, type of format, and length workshop, participants supported the same format presently used: e.g., 3 discussion topics, 3 day workshop and to maintain the present format.

**6.6 FUTURE TOPICS**

(Participants were given a choice of 6 different topics or could elect to suggest other topics and then asked to prioritise 1,2,3, etc. (final basis was a scale of 1 through 10 with 1 being the highest). These responses were weighted (e.g., 1 equals 10 pts, 2 equals 9 pts, ..... , no response equals 0 pts). The highest possible score is 290 pts (highest rating of 10 times 29 possible responses). The results were as follows:



Several of the topics listed were discussed at earlier WGIP workshop as follows:

- Inspector Training – 1992
- Event Investigation – 1994
- Risk Informed Inspections - 1998

Other suggested inspection related topics suggested:

- Effectiveness of Regulatory Inspections
- Inspection of Emergency Preparedness Plans
- Inspection Tools
- Waste Disposal and Decommissioning Inspection Activities
- Inspection of Fuel Facilities

## **6.7 WORKSHOP PARTICIPANTS' COMMENTS**

Unlike previous workshop, very few written comments were received. Of those that were they generally noted appreciation and congratulations to the host country on their preparations and organisation of the workshop.

Of the 2 or 3 comments that dealt with the workshop, only one dealt directly with a specific area (the others were comments on individual topics requesting additional information). It noted that the commendable practices were extremely useful, but perhaps could be more focused.

## **7. CONCLUSIONS**

### **7.1 GENERAL CONCLUSIONS**

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

- As the sixth workshop on regulatory inspection practices held by the CNRA Working Group on Inspection Practices, this venue continues to provide one of the few opportunities in which inspectors of nuclear power plants can get together to share and exchange ideas.
- Exchange of information on regulatory inspection issues, such as the topics focused on at this workshop provides the chance for inspectors from different countries and backgrounds, to learn and understand new or different inspection methods and applications. This aids in the improvement and development of inspection practices throughout the many countries involved.
- As has been noted in the previous workshops, in spite of differences that exist in organisational, cultural, economic factors etc., all countries represented at the workshop share a common understanding of nuclear safety principles.

### **7.2 COMMENDABLE PRACTICES**

#### **7.2.1 *Inspection of Events and Incidents***

##### *Ranking*

1. The Licensee is responsible for the initial ranking of safety importance of events. The initial evaluation of the safety importance by the Regulatory Body relies mainly on the inspector. Taking into account his/her experience, he/she is able to recognise the safety importance of events. Initial event ranking and initial Regulatory Body response is confirmed by Regulatory Body discussions with Licensee input.
2. After an initial notification, Licensees' written reports are required to provide specified categories of (structured / complete) information necessary for the Regulatory Body to classify, rank, and fully understand the event.
3. Specific guidance should be used to support the inspector and Regulatory Body initial response.



4. PSA may be used, with other known information, to help determine inspection response to event, but best use is to help rank event after all details of event are fully known.

#### *Timeliness*

5. Following notification from the Licensee, information is gathered by the REGULATORY BODY in a timely manner (e.g. operator interviews), but this should not interfere with actions being taken by the Licensee to operate the plant.

#### *Inspection Methods*

6. Following an initial notification of a reportable event the inspector records details of the event and the actions being taken by the licensees and actions proposed by an inspector, and he/she provides this to the Regulatory Body management.
7. Regulatory Body develops and maintains event evaluation methodologies, techniques, guidance, and training to organise information to gain best understanding of root causes.
8. A balance is made between proactive (inspection of Licensee activities and processes) and reactive inspection (inspection of events): Due consideration is given to the inspection of the process. Reactive inspection is not the only response of the Regulatory Body.

#### *Human Factors*

9. Training and guidance are given to inspectors to allow them recognise Human Factors, organisational, and safety culture issues and to obtain complete information through interviews.
10. The existence of a no-blame culture by the Licensee is a prerequisite for efficient application of HF analysis of events. Since the majority of the events and incidents are related to HF issues, the Regulatory Body encourages the Licensee to implement a no-blame culture in their organisation.

#### *Low level events*

11. The inspection organisation encourages the Licensee to collect and analyse low-level events for the following: trends of low level events, recurring events, continuing weaknesses, and “near –misses”.
12. If the Licensee has a process, inspection evaluates the adequacy of the process and ensures the Licensee is following this process.
13. Inspectors use judgement to evaluate a sample of the outputs of this process, but are careful when making conclusions based only on a sample.

#### Training

14. It is important for inspectors to initially accurately evaluate the safety significance of an event. Senior inspectors mentor less experienced inspectors when evaluating and investigating events.

#### Feedback

15. The Regulatory Body maintains an easily accessible database of reportable events that inspectors and other Regulatory Body persons may use for trending, inspection plans, modify testing, or requirements (either licensee or Regulatory Body), and to identify root causes that have not been corrected (e.g. training, human performance etc).
16. The Regulatory Body ensures that sharing of information on events and incidents is working properly, by encouraging the industry to share information (e.g. organising periodic information exchange meetings, shared databases).

#### Public and Regulatory Body communication

17. Regulatory Body establishes policy/procedure that it is the only authority to make public final classifications & ranking of events.
18. Regulatory Body considers using available methods to communicate events both publicly and with other Regulatory Bodies & Licensees (e.g. IRS, INES, NEWS, etc.).

#### **7.2.2 *Inspection of internal and external hazards***

1. The Regulatory Body Inspector verifies that the licensee is proactive and is continuously looking at any new evolving hazards around the plant.
2. The Regulatory Body Inspector encourages/verifies that the licensee keeps hazardous materials stored on site to a minimum (ALARA) even below prescribed limits.
3. The Regulatory Body Inspector verifies that the licensee is following all plant rules and procedures and is constantly aware of all safety implications. A “surplus” of safety is produced by good safety culture. The Regulatory Body Inspector encourages the licensee to perform a self-assessment.
4. The Regulatory Body Inspector conveys information on potential new hazards to the licensee and to the Regulatory Body for further evaluation and possible action.
5. The Regulatory Body Inspector looks at the requirements laid down in Articles 14 (Assessment of Safety), 17 (Siting) and 18 (Design) of the Convention on Nuclear Safety. Reference to other National Reports under this Convention can give valuable information on continuous improvement of safety.
6. The Regulatory Body Inspector verifies the implementation of measures to be taken as a result of a Periodic Safety Review (PSR).

### 7.2.3 *Inspection Activities related to challenges arising from competition in the electricity market*

1. A Licensee should maintain a documented Competence Profile to establish the skills, knowledge, and experience necessary to fulfill the requirements of its safety management system [see NEA/CNRA/R (2001)9]

*The Regulatory Body should establish that a Competence Profile exists and inspect against it*

2. The increasing use of contractors is an important outcome of deregulation and competition. A Licensee must have and utilise a basic capability to oversee, by QA and/or supervision, contractors' activities [see NEA/CNRA/R(2000)2, page 13].

*The Regulatory Body should inspect to confirm that the Licensee maintains the capability in house to set standards and ensure the quality of Contractors work (qualification system, etc). The Inspectors should scrutinise the Licensees policy for the use of contractors and its supervision of Contractors' work*

3. Safety problems can arise from organisational stress. Resident or site inspectors are an important resource for providing insights into Licensee safety performance. All inspectors need to improve their ability to respond to these kinds of safety problems.

*The Regulatory Body should give basic instruction and training to all of its inspectors on human factors and about the issues and effects of competitive markets. Inspectors should be able to move from conclusions about the particular or technical issues to the general such as safety culture, management and processes.*

4. A previous workshop (Prague) noted the Licensee should have management of change arrangements [see NEA/CNRA/R(2000)2, page 13].

*The Regulatory Body should inspect the whole process of organisational change to insure that the Licensee maintain its competencies. In particular, during the planning phase, Inspectors should review documents to insure competencies are maintained. During implementation, Inspectors should interview key personnel to ensure that hold point requirements in its plans are met. Similarly, after implementation Inspectors should examine products from the reorganised departments and licensee's post-change self assessment and Performance Indicators and any remedial actions that were required.*

5. It is important that the Regulatory Body has the earliest possible knowledge about organisational changes the licensee plans to make

*The Regulatory Body should implement periodic high level regulatory meetings with Licensees. Preparations for the meetings should include questionnaires on ongoing and further changes*

6. Regular review meetings are a vehicle for the Regulatory Body to carry out an internal holistic assessment in order to integrate information about a licensee's safety performance

*The Regulatory Body should emphasise specific consideration of organisational issues and signs of organisational stress in their review meetings and feed the outputs into their inspection plans.*

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