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

**NEA/CNRA/R(2005)4
Unclassified**

**PROCEEDINGS OF THE INTERNATIONAL WORKSHOP ON RISK INFORMED INSPECTION,
INSPECTION OF PERFORMANCE OF LICENSEE ORGANISATION, AND INSPECTION ASPECTS
OF PLANT NEAR OR AT END-OF-LIFE**

Hosted by the Hungarian Atomic Energy Authority (HAEA)

**Hotel Silvanus, 2025-Visegrad, Fekete-hegy (near Budapest), Hungary,
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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.

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.

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 7TH International Workshop held by WGIP on regulatory inspection activities.

The focus of this workshop was regulatory inspection activities in 3 main areas:

- Risk Informed Inspection,
- Inspection of Performance of Licensee Organisation, and
- Inspection Aspects of Plant Near or at End-of-Life

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 seventh 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:

- Risk Informed Inspection,
- Inspection of Performance of Licensee Organisation, and
- Inspection Aspects of Plant Near or at End-of-Life

Members of Organising Committee wish to acknowledge the excellent planning and arrangements made by the Mr.Fichtinger. Dr. Hartmut Klonk, 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:

- **RISK INFORMED INSPECTION: Bauke Visser**, Julio Crespo and Radomir Rehacek.
- **INSPECTION ASPECTS OF PLANTS NEAR OR AT END-OF-LIFE: Steve Lewis**, Gyula Fichtinger, Hiroyoshi Koizumi and Hartmut Klonk.
- **INSPECTION OF PERFORMANCE OF LICENSEE ORGANISATION: Friederich Kaufmann**, Andre VandeWalle, Luis Gutierrez Ruiz, John Detorakis, Seija Suksi and Staffan Forsberg.

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1. EXECUTIVE SUMMARY

The main objectives of the WGIP Workshop are enabling inspectors 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-four (44) participants from fourteen (14) different countries took part in the workshop (see Appendix III). Countries included: Belgium, Canada, Czech Republic, Finland, France, Germany, Hungary, Japan, Korea, Mexico, Netherlands, Russian Federation, Slovak Republic, Spain, Sweden, Switzerland, Ukraine, the United Kingdom and the United States.

Five (5) discussion groups were established for the working group sessions. Each group was consisted 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 workshop results are based on questionnaire responses received from the participants at the closing of the workshop. The evaluation showed that as in the past workshops, the highest value perceived, was in meeting and exchanging information with inspectors from other organisations. Responses also showed that the format selected was highly favoured and that more workshops of this type are supported in the future.

The results of the evaluation also reflected that participants in exchanging information 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 where 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 seventh 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 and 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 in Chapter 6.2.

2. ORGANISATION / OVERVIEW OF WORKSHOP

2.1 Planning

Preliminary planning for this workshop, the seventh in a series, of International Workshops on Regulatory Inspection Activities began following the conclusion of the previous workshop in Veracruz, Mexico in May 2002. Formal planning started following approval by the CNRA at its annual meeting in June 2002.

Members of the Working Group reviewed comments and suggestions made at previous workshops 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 Hosted by the Hungarian Atomic Energy Authority (HAEA) and held at the Hotel Silvanus, 2025-Visegrad, Fekete-hegy (near Budapest), Hungary, 26th to 29th April, 2004.

2.3 Topics

Participants at the last workshop [reference: NEA/CNRA/R(2003)1/2] 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 used at the workshop. A list of topics were developed and proposed to the CNRA. Consensus and approval was reached at the December 2002 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 *Risk Informed Inspections*

Since the NEA/WGIP international workshop of 1998 included this topic, risk-informed inspection processes have been evolving rapidly in many NEA member countries. This includes the development of risk models and use of their results in inspection programmes. While the 1998 workshop recognised the increasing value of risk information, the intent of the 2004 workshop is to exchange information on changes in this area during the past six years and to imagine new and forward-looking ways for Regulatory Bodies to better utilise this information for the purpose of improving the effectiveness and efficiency of inspections for reactor safety.

Objectives of the workshop discussions are to suggest useful combinations of probabilistic and deterministic information that can aid the Regulatory Inspector in efficiently and effectively identifying Licensee performance issues of greatest significance, to be used during inspection planning, performance of inspections, reporting inspection results, and evaluation of the significance of inspection findings. This

should include a determination of whether the commendable practices from the 1998 WGIP workshop are still valid, as well as what additional or more specific commendable practices can be agreed to.

2.3.2 *Inspection of Performance of Licensee Organisation*

The safety of nuclear power plants greatly depends on the successful interaction between technical systems and human and organisational aspects. A good organisation supports safety-driven activities and promotes the safety culture. The inspections of the performance of the Licensees organisation should ensure that it is focused on safe operation and on the identification and remediation of problems related to safety. This can be done by use of several approaches, e.g. by direct evaluation of the outcome of the organisation, by assessment of the working of important processes in normal operation and in case of events, etc.

Such inspection approaches as expected to be implemented or planned by the participants may show their own way to perform inspection in this area. Exchanging views and practices should be basis to develop commendable practices.

2.3.3 *Inspection of Aspects of Plant Near or at End-of-Life*

The regulator's major interest is to maintain safety during operational life. At or near "end of life" operation particularly challenges this position in two ways: at a defined end of life and for an unknown but expected end of life.

The first is how to A) maintain corporate expertise and B) ensure objective decision making on improvements, as plant approaches a known end of life. The particular need from item A) is to maintain both the numbers of staff and the quality of expertise to an adequate standard during a period where quality staff will be attempting to move to better opportunities. And for point B), can a regulator accept a reduced standard of investment in improvement on an economic argument.

The second issue is what additional inspection practices need to be introduced as we move to an unknown but expected end of life point. In essence the workshop should discuss what methods exist to identify additional concerns arising during later periods of operation and what actual inspection requirements have already, or will need to be, introduced.

2.4 *Announcement*

The workshop announcement was transmitted in August 2003. 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. Dr. Hartmut Klonk chaired this session. Dr. Klonk reviewed the general objectives of the workshop and outlined the various characteristics required of a good facilitator and recorder (copy of slides provided in Attachment 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. Dr. Ivan Lux 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

Dr. Klonek, Chairman of WGIP opened the workshop by welcoming the participants. 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 Dr. Klonek 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. Visser (risk informed inspections), Mr. Kauffman (inspection of performance of licensee organisation) and Mr. Lewis (inspection of aspects of plant near or at end-of-life).

3.2 Risk Informed Inspections

Mr. Visser presented an overview of the issue of Risk Informed Inspections and the results of the questionnaire on Risk Informed Inspections. The presentation was based on the responses by national organisations to a questionnaire issued with the workshop announcement. A brief summary his presentation slides is as follows:

Risk on the Internet

An internet survey on hits provided interesting results

Risk	47,888,000 hits
Safety	57,000,000 hits
Risk / Nuclear	7,790 hits (.005%)
Risk / Nuclear / Inspection	0 hits
Risk / Informed / Inspection	390 hits

He noted that the sites found in the hits covered such many areas (not just nuclear related) as food, drugs, finance, hazardous industry, transport.....nuclear (safeguards)

Risk Management

Based on the United States Office of Pipeline Safety, Risk-management is much more than the technical models used to calculate probabilities and consequences. It notes that to be useful as an alternative approach, risk management is an integral program of activities institutionalized into the way that the company conducts its business on the day-to-day basis.

Why Risk Informed Inspections by Regulators

Mr. Visser listed several questions on why Risk Informed Inspections are being considered and/or used by Regulators, including:

- Are the plants safe enough (Plants maybe 25 years old and have been inspected)?
- Are we sure we do the right inspections/assessments?
- Are current inspections not effective?
- Are there too many incidents occurring?
- Are there economical reasons for the licensee?
- Is it a management (efficiency) problem?
- Is there another way to do the same things?
- Is it used as a tool to better inform the public and politics?
- Is it a management tool to manage experts (priorities)?

Deterministic versus Probabilistic

Standardization of deterministic rules, guides etc.

- Setup by experts, researchers, licensees, Regulatory Bodies, manufacturers, following a strict process.
- Knowledge and experience is laid down in the law, guides and rules.

Probabilistic

- Experience is structured and integrates qualitative and quantitative
- There is a Structured feed-back in the form of data-bases
- Standardization is in development by; experts, researchers, licensees, manufacturers, Regulatory Bodies (IAEA Safety Report, Review of Prob. Safety assessments by the Regulatory Bodies)

Inspection Areas

Nuclear Power Plants and Research Reactors (During operation and shutdown)

- Reactor Safety
- Barriers
- Radiation Safety
 - Health and Emissions
 - Emergency Preparedness
- Safety Culture and human reliability
- Conventional safety (?)
- Security
- Safeguards
- Fuel Cycle
 - Enrichment,
 - Transports,
 - Waste

PSA Areas*Level 1*

- Full power, shut down ...
- Core damage frequency (Safety systems and procedures)

Level 2

- Magnitude and frequency of releases (Gives insight in emergency operating procedures and containment functions)

Level 3

- Societal risk such as contamination of land or food
- Emergency Preparedness

System of Surveillance (In some countries inspection is a task for assessors)

Walk-down inspections, Specific inspections, Thematic inspections, Audits, Missions (IPSART, OSART, etc.), Incident evaluation, Management meetings, Directors meetings, Assessing periodic operational reports, Licensee inspections, Inspections by the licensee (IAEA-guide NS-G-2.6), In Service Inspections, WANO-performance Indicators,

The Use of PSA as a tool to:

- Manage inspections and assessments (Planning, inspecting, reporting, procedures).
- Gives guidance for the inspectors and licensees (What, why, how).
- Is helpful in decision making (Safety Disposition Process).
- Is a yard-stick for the improvement of the safety of components, systems (Performance Indicators).
- Indication of weak points in systems and components.
- Classification of structures, systems and components.
- Evaluation of incidents and accidents.
- To organize maintenance activities (periodic, preventive, during AOT).
- Etc.

Questionnaire – Some remarks

- For most inspections, the use of PSA is limited versus intensive
- There is a trend to use the PSA
- PSA is mainly plant specific and maintained by licensee
- Much development is done by the Regulatory Bodies and their Research Organisations
- IPEEE's are analysed in some countries with the use of a PSA
- Some Standardization ASME-RA-S-2002, IAEA
- Training of inspectors in PSA-techniques
- For evaluation of incidents the PSA is used intensively
- During the Periodic Safety Review (10-year evaluation) the PSA is used

Questions derived from Questionnaire

- Quantitative criteria to support regulatory decisions.
- Risk focused to much on the results of the PSA
- How is the inspector provided with risk information data.
- SDP used for the evaluation of inspection findings.
- What kind of risk-information should be included in the inspection report.
- Computer codes to evaluate risk-increase/reduction of findings.
- What to do in area's outside the scope of the PRA-computer codes.
- International scale of inspection findings.
- How is risk information being used in the different countries.
- Mandate of Regulatory Body. Can the regulator make the policy risk approach or are other national authorities involved? Nation wide risk targets?

WGIP Workshop

- The workshop can give some additional (practical) commendable practices, to help the inspector, expert and the inspection manager.
- Goal: Improve the safety of Nuclear Power and fuel cycle and do our job better

Focus of Workshop Discussions (Suggestion)

- Focus on inspection aspects
- Focus not on the PSA technical strong or weak points

Be as practical as possible (APAP)**3.3 Inspection of Performance of Licensee Organisation**

Mr. Kaufmann presented the results of the questionnaire on Inspection of Performance of Licensee Organisation. Following an introduction his presentation covered: the role of the Regulatory Body; the role of the Licensee, Monitoring performance, Identifying declining safety performance, Responses to the WGIP questionnaire and a summary based on the responses on how to inspect the performance of Licensees' organization?

Introduction

Investigations consistently show that an inadequate safety culture and deficiencies in the safety management belong to the important contributing factors of major events:

- Chernobyl
- Three Mile Island
- Tokai Mura
- Sellafield MOX records incident

More recent events include:

- Davis-Besse event (2002) showed a less than adequate implementation of its corrective action program
- Paks incident (2003) reveals organizational weakness, among them deficient work procedures
- Non nuclear area:
 - The Space Shuttle Columbia is an example of the deleterious effects that inadequate organizational structures can have
 - Railroad accidents in UK: A high proportion of accidents, incidents and near misses follow unsafe acts by people, whether front line workers or managers

Major events have their root causes in Safety Culture and organizational deficiencies

The Question that remains is:

- Do we have to live with major events occurring periodically, or
- Is it possible to predict casualties or quantify organisational factors with respect to safety deficiencies and take corrective actions?

The Universal features for an effective safety management system are already developed and are contained in INSAG-13 (1999): Management of Operational Safety in NPPs. This report also provides guidance on various topics of current interest, including:

- Introducing a safety management system
- Management of safety during organizational change (including personal changes)
- Monitoring effectiveness using performance indicators
- Identifying declining safety performance

Role of the regulator (Regulatory Body)

Can the Regulatory Body require arrangements for the management of safety?

Not in detail as these will need to reflect the particular legislative requirements in the respective country and the culture of the organization (the way things go round in this plant and country).

But the regulator has to ensure that the licensee has an effective self regulating safety management system.

- The Regulatory Body should not exercise direct control over the management of safety within the Licensees' organization
- The Regulatory Body should not impose detailed requirements on the form of the Licensees' safety management system.
- This could be counterproductive by weakening the system of self-regulation and diminishing and diluting the responsibility for safety assumed by the Licensee
- The Regulatory Body ensures that the Licensee has an effective self regulating safety management system.
- The Regulatory Body monitors the effectiveness of the Licensees' safety management system as part of its scrutiny of safety performance.
- The Regulatory Body takes action if ever the safety management system becomes ineffective or the Licensees' safety performance declines.
- The Regulatory Body needs to be technically competent, and will be most effective if it works in a manner that is non-bureaucratic and avoids excessive detailed regulation.

It is interesting that the word inspection is not mentioned in the INSAG-13

Role of the Licensee

The Licensee has a clear safety management framework with well defined safety requirements:

- to ensure safety
- to satisfy legal and regulatory requirements
- to satisfy requirements of the operating organization

There have to be:

- Statements of safety policy (including standards, resources and targets)
- Management structures (including responsibilities and accountabilities)

Planning and control of work is effective and support is given to tasks and to ensure that activities are carried out safely

- Planning (including risk assessment)
- Control of safety related activities
- Ensuring competence
- Communication and team support
- Supervision

Implementation

The effectiveness of the safety management system is vitally dependent on the contribution of individuals responding

The desired response of individuals is:

- A questioning attitude
- A rigorous and prudent approach
- Communication

Audits and reviews performed by licensee

The objective is to provide an assessment of the effectiveness of the safety management system and identify opportunities for improvements.

Types of audits and reviews carried out internally:

- Quality audits and management reviews (Compliance with task procedures and guidelines by IAEA and Regulatory Body)
- Safety management (Assessment against national and international good practices)
- Safety culture (Judgment about the effectiveness of the safety management system)
- OSART, WANO

Monitoring performance - Reactive measures

Reactive measures make use of information on past performance to gauge current safety performance. Examples of reactive measures include performance indicators based upon

- the incidence of safety related events and e.g. cases of occupational illness
- measures of the degradation of safety related systems
- probabilistic risk assessment techniques. They can provide a useful tool for this purpose.

The analysis of events to identify their root causes is also an important aspect of performance monitoring as a means of identifying weaknesses in the Licensees' safety management system.

Monitoring performance - Proactive measures

Proactive measures make use of information on the achievement of plans and the compliance with safety standards to assess current safety performance.

Examples of such measures include:

- the findings from inspections of premises, plant and equipment by supervisors or managers
- the use of findings from questionnaire surveys which seek to assess employee attitudes towards health and safety.

Identifying declining safety performance

Declining performance typically exhibits the following pattern

1. Overconfidence: e.g. good past performance
2. Complacency: minor events begin to occur and insufficient self-assessments are performed; Regulatory Bodies self satisfaction leads to delay or cancellation of some improvement programmes
3. Denial is often visible when the number of minor events increases further and more significant events begin to occur. However, there is a prevailing belief that they are still isolated cases. Negative findings by internal audit organizations or self-assessments tend to be rejected as invalid. Programmes to evaluate root causes are weakened. Corrective actions are not systematically carried out. Improvement programmes are incomplete or are terminated early.
4. Danger sets in when a few potential severe events occur but when management and staff tend consistently to reject criticisms coming from internal audits, regulators or other external organizations.
The belief develops that the results are biased and that there is unjust criticism of the plant. As a consequence, Regulatory Bodies are often silent and afraid to be the bearers of bad news and/or to confront the management.
5. Collapse can be recognized most easily. This is the phase where problems have become clear for all to see. The REGULATORY BODY and other external organizations need to make special diagnostic and augmented evaluations. Management is overwhelmed and usually needs to be replaced. A major and very costly improvement programme usually needs to be implemented.

Declining performance has to be recognized after the first two stages!

Response to the WGIP questionnaire (12 countries responded)

1. Do you inspect the following organisational structures? Nearly all organisational structures are inspected. An exemption mentioned by a few is the inspection of the plants own safety committee.
2. Do you inspect the following working processes? Most working processes are inspected. Exemptions mainly are “personnel management” and “industrial safety measures.

3. Do you inspect the management of organisational changes, in the following domains? The management of organisational changes is inspected in nearly all domains. You have to look more to the details: What kind of inspection?
4. Do you also inspect aspects of the organisational culture? All of the answering countries are performing inspections in some aspects. Most emphasis is given to inspections of the safety culture. But again you have to look more to the details: What kind of inspection?
5. How do you establish and maintain competence in performing inspections? All of the answering countries are establishing and maintaining competence in some aspects. But only three of the 12 answering countries have established a guideline for the organisation of the nuclear power plants.
6. When do you inspect the performance of the Licensees organisation? In cases of events and organisational changes all answering countries perform inspections. One country extended it also to projects. Six out of 12 countries are doing this according to a basic inspection program.

How to inspect the performance of licensee's organisation ?

1. **Is the legal framework sufficient?** Has the Regulator insight in all relevant documents (e.g. NPPs indicators, budget planning)?
2. Has the regulatory body a guideline for the arrangements of the Licensees` organisation and a questionnaire for performing inspections?
3. Has the regulatory body the sufficient competence for an independent evaluation of the performance of Licensees` organisation?
4. Has the regulatory body to establish a baseline inspection program for this type of inspection for all NPPs? Are they team inspections; process- or result oriented?
5. Are the types of inspections of this area the same as technical inspections checking results (soft against hard parameters)?
6. Has the regulatory body to develop own indicators for monitoring Licensees` performance?
7. In what way the regulatory body gets insight in the self assessment results of the Licensee?
8. Should the regulatory body take part in Licensees` audits and reviews?
9. In what way the inspector's work effective (e.g. as a policeman or as a good communicator)?

3.4 Inspection of Aspects of Plant Near or at End-of-Life

Mr. Lewis presented the results of the questionnaire on Inspection of Aspects of Plant near or at End-of-Life. He notes that there was a wide variation in the responses received to the questions, but he had derived a number of themes concerning inspection practices, which the group could discuss with an aim of developing common practices.

He noted that in many of the countries the original designs did not place an end-of-life and plants are regulated throughout their lifetimes. As noted in the topic description, one of the regulator's major

concerns is to maintain safety during operational life. At or near “end of life” operation particularly challenges this position in two ways: at a defined end of life and for an unknown but expected end of life. Responses showed that when a fixed date is set the following inspections practices remain relatively the same as before for the period in which the plant remains in operation. However, it was noted that the regulator becomes more cognizant of organisational changes and some have inspections to monitor these situations. Several of the key issues mentioned in the responses included:

- Adequacy of licensees resources
- Reactivity capacity in case of important events
- Material integrity problems (ageing issues)
- Water chemistry

For plant with an unknown end of life date the issues are very similar to those listed above. Additional issues listed included:

- Seismic resistance of the installations and resistance to other external hazards
- Accident scenarios
- Life extension plans
- Enhanced irradiation embrittlement of reactor pressure vessel materials.

Some of the other major inspection concerns noted in the responses included:

- Ageing of staff and loss of technical competence
- Digital I&C issues

The objective of the group discussions will be to review the following issues, considering these issues and the overall responses to the questionnaire:

- Baseline inspection requirements at or near end-of-life.
- Inspection needs to ensure licensee’s safety related organizational structure and staffing levels is good practice at or near end-of-life, including potential reduction in financial investment.
- Inspection requirements of the physical aspects and results of aging at or near end-of-life, including effects of irradiation on metals.
- Changes to periodic safety reviews and/or life management plans at end or near end-of-life.

4. DISCUSSION GROUPS - SUMMARY OF RESULTS

4.1 Risk Informed Inspection

4.1.1 Discussion Groups

GROUP 1	GROUP 2
Bauke Visser, Netherlands *	Julio Crespo, Spain *
Brant McNeish, Canada *	R. Rehacek, Czech Republic, *
Ari Julin, Finland	Yves Boulaigue, France *
Maldonado Antonio Hernández, Mexico	Hirozo Shiomi, Japan
Peter Babics, Hungary	Ynte Stockmann, Netherlands
Gunter Prohaska, Switzerland	Grygoriy Gromov, Ukraine
	Sonia Burgess, United States
* WGIP Members	

4.1.2 Group Discussions

The discussions within both groups evolved in similar manner, such that following a final joint session, the facilitators and recorders were able to combine the results into a single presentation. The results, which included commendable practices along with some advantages and challenges in using risk informed inspection was presented by Mr. Visser.

4.1.3 Final Results

Experience of Members

- Risk assessment
- Testing programs
- Licensing
- Inspection

- PSA development and implementation
- Licensing
- Accident analysis
- Total experience 188 years in the nuclear field

Commendable Practices

1. Risk-informed inspections may be used to compliment deterministic inspections required by regulations, for greater effectiveness and efficiency.
2. Experience shows that shifting to risk-informed inspection process benefits from a pilot program, a minimum period for the transition, and the commitment of the Regulatory body management and staff. Licensee cooperation to support the risk-informed inspection process is considered essential.
3. To ensure effective risk-informed inspections high quality, site-specific PSAs are needed. Conditions such as external events and shutdown operation need to be considered for complete risk-informed inspection applications. Review and benchmarking of the PSA enhance the accuracy of risk-informed inspections. Be aware of the PSA limitations.
4. Risk information can influence or enhance inspection planning, event assessment, evaluation of findings (categorization and completion of corrective actions), and used to communicate with inspectors, licensees and the public. Areas where PSA can and cannot be used should be clearly identified.
5. To enhance risk awareness, PSA information may be used for licensee's and regulatory inspectors' training programs

Use of Risk-Informed Inspection Process

ADVANTAGES	CHALLENGES
<ul style="list-style-type: none"> • efficiency • new insights on plant vulnerabilities • increased effectiveness • better understanding of the safety significance of systems and components • state-of-the-art tool • characterization of inspection findings improved and are more consistent • increase objectiveness of inspection findings 	<ul style="list-style-type: none"> • complicated process • managing change of the regulatory framework • could become risk-based and may not consider deterministic aspects • false sense of accurateness • difficult to evaluate process-type findings e.g. quality management, safety culture, poor engineering. • Defining legal requirements for PSA

4.2 Inspection of the Performance of Licensees Organisations

4.2.1 Discussion Groups

GROUP 1	GROUP 2
Friedrich Kaufmann, Switzerland *	John Detorakis, Canada *
Luis Gutierrez Ruiz, Mexico *	André VandeWalle, Belgium *
Lyn Summers, United Kingdom *	Staffan Forsberg, Sweden *
Bruno Boxho, Belgium	Seija Suksi, Finland *
Kaisa Åstrand, Finland	Gyula Fichtinger, Hungary *
Benoît Zerger, France	Luboš Pelikán, Czech Republic
Ludwig Schäffler, Germany	Timo Eurasto, Finland
Judit Silye, Hungary	Walter Bergbauer, Germany
Benito Gil, Spain	Erzébet Urai, Hungary
Claire Goodman, United States	Takafumi Maehara, Japan
* WGIP Members	

4.2.2 Group Discussions

While similarities existed in the results of the both group discussions, it was decided that the results be presented in separate presentations. Mr. Lyn Summers reported on the results of Group 1 and Mr. Detorakis provided the conclusions of Group 2.

4.2.3 Group 1 Results

What is Inspection?

- For technical Inspection, we look at a process and confirm by looking at output and compare with criteria, standards etc.

Can we do this for organisations?

- Ensure it is a valid process
- Verify that the process is carried out as intended
- Confirm through results

What do we expect from a process for Safety Management (What is a process)?

- Process is a systematic and organised way of doing tasks
- Developmental loop: needs - plan - action - review
- Presents a commitment for L. to do activities in the way described
- Applies at every level and for every type of activity

Commendable Practice (1)

Ensure that Licensees have systematic and organised processes for managing their activities - a 'Safety Management System'- which represents a commitment for the Licensee to do its activities in the way described

Inspector Competencies

Who can inspect Safety Management? - specialists and generalists

- generalists have a role and need to be trained in HOF
- often, generalists (e.g. Resident Inspectors) are the first to recognise SM deficiencies
- Specialists need training in managing inspection etc.

Inspector Attitude

Inspectors need questioning attitude because usually there are no firm requirements or regulations for Safety Management

- Even with no firm detailed requirements, because safety depends on good organisation, Regulatory Bodies have a **duty** to pay attention to the way safety is organised by Licensees

Commendable Practice (2)

Inspectors need to approach Safety Management with common sense and an open and questioning attitude in the absence of firm, detailed requirements - it is not effective to approach inspection in a bureaucratic manner (INSAG 13)

Staff Matters

- All Inspectors need to be trained, to some level, in Human and Organisational Factors
 - All Inspectors have the opportunity to discover Safety Management deficiencies
- Also, there is presently a deficiency in the number of Human and Organisational Factors specialists in Regulatory Bodies

Commendable Practice (3)

Regulatory Bodies should ensure that the numbers of Human and Organisational Factors professionals (psychologists and Safety Management) they employ are adequate. Human and Organisational Factors professionals should work as Inspectors, who are well integrated into the organisation

Commendable Practice (4)

Regulatory Bodies should ensure that all Inspection staff are adequately trained in Human and Organisational Factors and Safety Management issues

Relationship with Licensees

- Nurture trust between Licensees and the Regulatory Body
 - A questioning approach reinforces trust
- Communication process must aim to create a confident relationship
 - Inspectors must not ONLY provide adverse comments + punishment
 - Provide positive as well as negative findings - e.g. highlight good practice as an exemplar
 - Avoid detailed and excessive regulations

Commendable Practice (5)

Inspectors should include positive reinforcing comments in findings to encourage improvement in licensee's process, for example by highlighting good practice in one part of the organisation which could be extended elsewhere

Comments on Process

- Process is systematic approach and applies everywhere in Licensee organisation
- Hence it can apply to Licensee investment decisions, to Licensee Organisational change, to Licensee self assessment

Processes originate in the „head' of the organisation - the „controlling mind"(Mintzberg) – Regulatory Bodies do not pay enough attention to this

Commendable Practice (6)

Regulatory Bodies should pay more attention to gaining insight into Licensees' „Development Loop" - applying it in all of the Licensees' processes, including the investment process, self assessment process and controlling processes of the organisation itself

Organisational Change

- Organisational change can be a challenge to safety
- Organisational change is amenable to control by the Licensee through a developmental loop process
- Organisational change is more difficult to do and to regulate compared to technical matters, **therefore** it is important that Regulatory Bodies pay attention to it

Legal Powers of the Regulatory Body

- What does it say in the Safety Case about the organisation?
- Powers to permission change rather than be informed on it

Commendable Practice (7)

Regulatory bodies should make a requirement for Licensees to implement a systematic and organised process for Organisational Change (further information on good practice in this matter is found in NEA???)

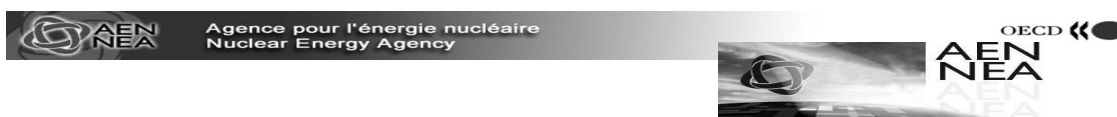
4.2.4 Group 2 Results

Key Considerations

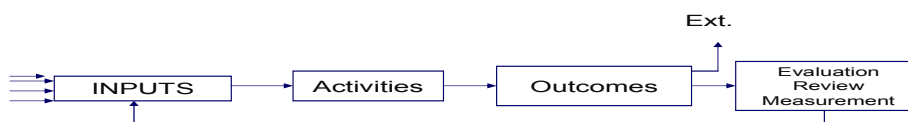
- The challenge for the Regulator is to recognize early signs of declining performance before nuclear safety is significantly compromised.
- The two available elements for assessment of safety performance of licensee organization are direct evaluation of outcomes and assessment of licensee processes.

Measurements of Safety Performance

- Records of surveillance testing
- Failure records of equipment
- Other relevant performance indicators



Process model



5

Commendable Practice (1)

Integration of site inspection findings and specialist assessments can reveal early signs of declining safety management performance.

Commendable Practice (2)

Planning of inspections of safety management should not be influenced by the licensee's good business performance. Deep seated problems in safety culture can be masked by high plant capacity factors while problems build up.

Commendable Practice (3)

Inspection of safety management processes should be proactive and rely on a balanced effort of performance measurements and process evaluation.

Commendable Practice (4)

Regulatory inspections should be reviewed on a regular basis to assess their influence on Licensee safety management priorities.

Commendable Practice (5)

An effective inspection of safety management processes requires knowledge of human and organizational practices. Such knowledge can be achieved either by deploying experts or by training technical staff.

Notable Findings

- Good safety management is a manifestation of good safety culture.
- Direct measurements of safety margins are not practicable but trends of relevant indicators can assist regulatory assessment of licensee safety management.
- There is substantial diversity in inspection guidance for observing licensee safety management processes.

4.3 Inspection Aspects of Plants Near or at End-of Life

4.3.1 Discussion Group

GROUP 1
Stephen Lewis, United Kingdom *
Hiroyoshi Koizumi, Japan *
Sweng – Woong Woo, Korea *
Pauli Kopiloff, Finland
Richard Escffier, France
Helmut Stepan, Germany
Béla Topor, Hungary
Jose Balmisa, Spain
* WGIP Members

4.3.2 Group Discussion

The group discussion covered all of the main points raised during the opening session. that the results be presented in separate presentations.

4.3.3 Results

End of Life

The group considered that, once the date for closure of a plant is declared, Licensees may attempt to reduce staffing levels to unacceptable levels in nuclear safety related areas. The group recognized the need for Licensees to define their organizational structure and staffing levels in an organizational plan which is visible to the regulators. The group also recognized the need for Licensees to have processes, where changes to this plan were both justified by the Licensee and, where significant, presented to the regulatory body.

The group further considered it important that the Regulatory Bodies introduced inspections to monitor these changes and their potential impact on safety.

Commendable Practice (1)

The workshop recognizes that the establishment of a base line plan of licensee’s safety related organizational structure and staffing levels is good practice. This is especially important “at the end of or near end of life” ! Regulatory bodies should consider the introduction of the process for licensees’ provision of this data. Furthermore, regulatory bodies should consider introducing a process for inspecting the management of significant changes of this plan.

The group identified a concern that, at end of life, Licensees may try to reduce the level of financial investment needed to ensure safety of the plant. Concern was expressed that although individual projects may be carried out, the level and quality may not be to the level expected. This being the case, it would be difficult to determine this over the totality of activities. A suggestion was introduced which the group thought worthy of recommendation as a commendable practice. This was that if a cost projection was included for Licensees' commitments, this could be used as an indicator. Changes to this indicator would be visible to the Regulatory Body and so inspection would reveal the change allowing the Regulatory Body to investigate its cause.

Commendable Practice (2)

Consideration should be given to the use of the level of internal investment as an indicator of the change of commitment of a licensee "at end of or near end of life" operation.

Near End of Life

The presence of licensees' staff and Regulatory Body inspectors out on the plant provides a route for observation of the physical aspects and results of aging. Davis Besse, amongst others, is a clear example, where failure to do this results in problems escalating well beyond where they needed to. The group therefore concluded that greater site inspection presence on the plant in the "end or near end of life" period was necessary. Furthermore that in areas where observation was difficult, due to temperature or radiological limitation, remote observation should be considered or plant modifications made to better facilitate this process.

Commendable Practice (1)

For many reasons, the workshop recognized the significant benefits from continued site inspections by the regulatory body. In particular, this assists in the detection of the effects of the aging on the plant at an early stage. This should remain a clear focus of regulatory body activities. Where physical access is limited, remote observation methods and design changes should be considered to better facilitate this work.

The group considered the process in place which enabled consideration of factors that affected continued safety operation. It was satisfied that Periodic Safety Reviews (PSR) and the life management plans arising from them were good practice. However, the group were concerned that at "end or near end of life" this period was too long. A number of the group already had a process to compensate for this. These members held annual review meetings, with their Licensees, at which they discussed events and experiences of the previous year and considered the impact of these on the original findings of the PSR and thus revised their strategy for the forthcoming year. The group considered this of significant benefit to share as a commendable practice.

Commendable Practice (2)

The workshop recognizes the importance of the Periodic Safety Review and, especially for the "at or near end of life" period, the need to have a life management programme. However, we believe that for this particular period of life, regulatory bodies should consider the introduction of annual review with licensees which considers the impact of recent experiences and developments both local and international on this life management process.

At "end or near end of life" much work is carried out to validate the continued safety case of operation in the field of metallurgical inspection. The known effects of irradiation on metals (i.e. Embrittlement) has

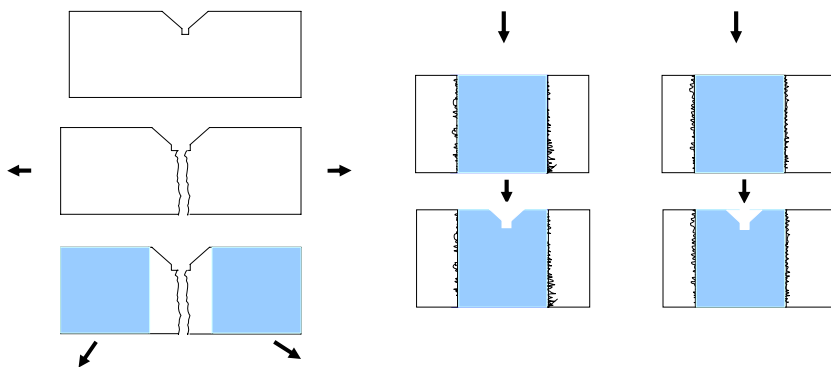
brought this focus. However a number of events throughout the world have exposed the fact that defects can go undetected until they cause damage one way or another. The group considered that, even with the best test and examination techniques, significant defects may exist without notice. One member country offered a process for consideration which they are currently looking at which could assist in this area. They have monitored activation products of potassium in the containment building. It will be detected from the smallest of cracks in welds and other locations and, with a half life of about 12 hrs, will indicate current and not legacy effects. Another member stated that they were using the detection of a Nitrogen isotope in the secondary circuit to detect leakage from primary circuit. The group thought that this was a major innovation and therefore agreed to make this a commendable practice.

Commendable Practice (3)

Regulatory bodies should consider the use of short half-life isotope (i.e. K-42, N-16) detection of the atmosphere local to the reactor to monitor the general integrity of the pressure boundary.



Commendable Practices- Near End of Life



13

A member of the group raised a concern about the number of available metal samples that had been placed in reactors. These samples are removed periodically to allow analysis of the effects of irradiation on the material properties of the metals. The number of samples and their rate of removal were designed for the original design life of the plant. Life beyond this period was not catered for. As a consequence this country was intending to reduce the number of samples removed each year to ensure sufficient were left. These samples provide validation of immediate safety and also feed the International Programme for generating a prediction model for life damage. The Japanese member of the group noted that they had also identified the same problem and had a novel but effective solution. The specimens, after testing, end up in two parts. They remove the area of fracture of the test and weld additional material to the sides and insert a new v notch into the old material. For each sample removed, two new samples are now created. These are then returned to the reactor for further irradiation.

Commendable Practice (4)

To ensure that adequate specimens are available at “end or near end of life”, regulatory bodies should consider the reuse of in-vessel specimens, installed for monitoring changes to material properties from exposure to radiation, after their initial use.

A significant issue discussed was that of steam generator tube integrity. Failure of the tubes are a significant issue. As a consequence all countries carry out detailed inspection of the tubes using eddy current probes. For most countries, a coarse single field probe has been considered adequate to detect a disturbance in the magnetic field of the probe when passing close to a defect. However, Korea identified that it had experienced a failure of a tube which, because of its alignment, had gone undetected. They stated that because of this they now use a probe with four radially aligned coils with a rotating head to ensure better coverage. Japan identified that they also had this experience and had adopted the same solution. The group decided to make this a commendable practice for general use of most adequate and effective methods.

Commendable Practice (5)

Regulatory bodies should examine the existing techniques that licensees use for steam generator tube inspection, and consider the introduction of currently available sensitive modern equipment to improve the probability of defect detection where appropriate.

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

Dr. Klonek 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 have shown that:

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

In closing the work, Dr. Klonek thanked the Hungarian Atomic Energy Agency (HAEA) staff who worked so hard to develop the plans and ensure the success of the workshop. In particular, he thanked Mr. Fichtinger along with all the other inspectors from Hungary 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, Dr. Klonek 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. CONCLUSIONS

6.1 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 seventh 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.

6.2 Commendable Practices

6.2.1 *Risk Informed Inspections*

1. Risk-informed inspections may be used to compliment deterministic inspections required by regulations, for greater effectiveness and efficiency.
2. Experience shows that shifting to risk-informed inspection process benefits from a pilot program, a minimum period for the transition, and the commitment of the Regulatory body management and staff. Licensee cooperation to support the risk-informed inspection process is considered essential.
3. To ensure effective risk-informed inspections high quality, site-specific PSAs are needed. Conditions such as external events and shutdown operation need to be considered for complete risk-informed inspection applications. Review and benchmarking of the PSA enhance the accuracy of risk-informed inspections. Be aware of the PSA limitations.
4. Risk information can influence or enhance inspection planning, event assessment, evaluation of findings (categorization and completion of corrective actions), and used to communicate with inspectors, licensees and the public. Areas where PSA can and cannot be used should be clearly identified.

5. To enhance risk awareness, PSA information may be used for licensee's and regulatory inspectors' training programs

6.2.2 Inspection of Performance of Licensee Organisation

Group 1

1. Ensure that Licensees have systematic and organised processes for managing their activities - a 'Safety Management System' - which represents a commitment for the Licensee to do its activities in the way described
2. Inspectors need to approach Safety Management with common sense and an open and questioning attitude in the absence of firm, detailed requirements - it is not effective to approach inspection in a bureaucratic manner (INSAG 13)
3. Regulatory Bodies should ensure that the numbers of Human and Organisational Factors professionals (psychologists and Safety Management) they employ are adequate. Human and Organisational Factors professionals should work as Inspectors, who are well integrated into the organisation
4. Regulatory Bodies should ensure that all Inspection staff are adequately trained in Human and Organisational Factors and Safety Management issues
5. Inspectors should include positive reinforcing comments in findings to encourage improvement in licensee's process, for example by highlighting good practice in one part of the organisation which could be extended elsewhere
6. Regulatory Bodies should pay more attention to gaining insight into Licensees' „Development Loop” - applying it in all of the Licensees' processes, including the investment process, self assessment process and controlling processes of the organisation itself
7. Regulatory bodies should make a requirement for Licensees to implement a systematic and organised process for Organisational Change (further information on good practice in this matter is found in NEA???)

Group 2

1. Integration of site inspection findings and specialist assessments can reveal early signs of declining safety management performance.
2. Planning of inspections of safety management should not be influenced by the licensee's good business performance. Deep seated problems in safety culture can be masked by high plant capacity factors while problems build up.
3. Inspection of safety management processes should be proactive and rely on a balanced effort of performance measurements and process evaluation.
4. Regulatory inspections should be reviewed on a regular basis to assess their influence on Licensee safety management priorities.

5. An effective inspection of safety management processes requires knowledge of human and organizational practices. Such knowledge can be achieved either by deploying experts or by training technical staff.

Notable Findings

- a) Good safety management is a manifestation of good safety culture.
- b) Direct measurements of safety margins are not practicable but trends of relevant indicators can assist regulatory assessment of licensee safety management.
- c) There is substantial diversity in inspection guidance for observing licensee safety management processes.

6.2.3 *Inspection of Aspects of Plant Near or at End-of-Life*

The group further considered it important that the Regulatory Bodies introduced inspections to monitor these changes and their potential impact on safety.

Commendable Practice (1)

The workshop recognizes that the establishment of a base line plan of licensee's safety related organizational structure and staffing levels is good practice. This is especially important "at the end of or near end of life" ! Regulatory bodies should consider the introduction of the process for licensees' provision of this data. Furthermore, regulatory bodies should consider introducing a process for inspecting the management of significant changes of this plan.

The group identified a concern that, at end of life, Licensees may try to reduce the level of financial investment needed to ensure safety of the plant. Concern was expressed that although individual projects may be carried out, the level and quality may not be to the level expected. This being the case, it would be difficult to determine this over the totality of activities. A suggestion was introduced which the group thought worthy of recommendation as a commendable practice. This was that if a cost projection was included for Licensees' commitments, this could be used as an indicator. Changes to this indicator would be visible to the Regulatory Body and so inspection would reveal the change allowing the Regulatory Body to investigate its cause.

Commendable Practice (2)

Consideration should be given to the use of the level of internal investment as an indicator of the change of commitment of a licensee "at end of or near end of life" operation.

Near End of Life

1. For many reasons, the workshop recognized the significant benefits from continued site inspections by the regulatory body. In particular, this assists in the detection of the effects of the aging on the plant at an early stage. This should remain a clear focus of regulatory body activities. Where physical access is limited, remote observation methods and design changes should be considered to better facilitate this work.
2. The workshop recognizes the importance of the Periodic Safety Review and, especially for the "at or near end of life" period, the need to have a life management programme. However, we believe that for this particular period of life, regulatory bodies should consider the introduction of annual

review with licensees which considers the impact of recent experiences and developments both local and international on this life management process.

3. Regulatory bodies should consider the use of short half-life isotope (i.e. K-42, N-16) detection of the atmosphere local to the reactor to monitor the general integrity of the pressure boundary.
4. To ensure that adequate specimens are available at “end or near end of life”, regulatory bodies should consider the reuse of in-vessel specimens, installed for monitoring changes to material properties from exposure to radiation, after their initial use.
5. Regulatory bodies should examine the existing techniques that licensees use for steam generator tube inspection, and consider the introduction of currently available sensitive modern equipment to improve the probability of defect detection where appropriate.

7. EVALUATION

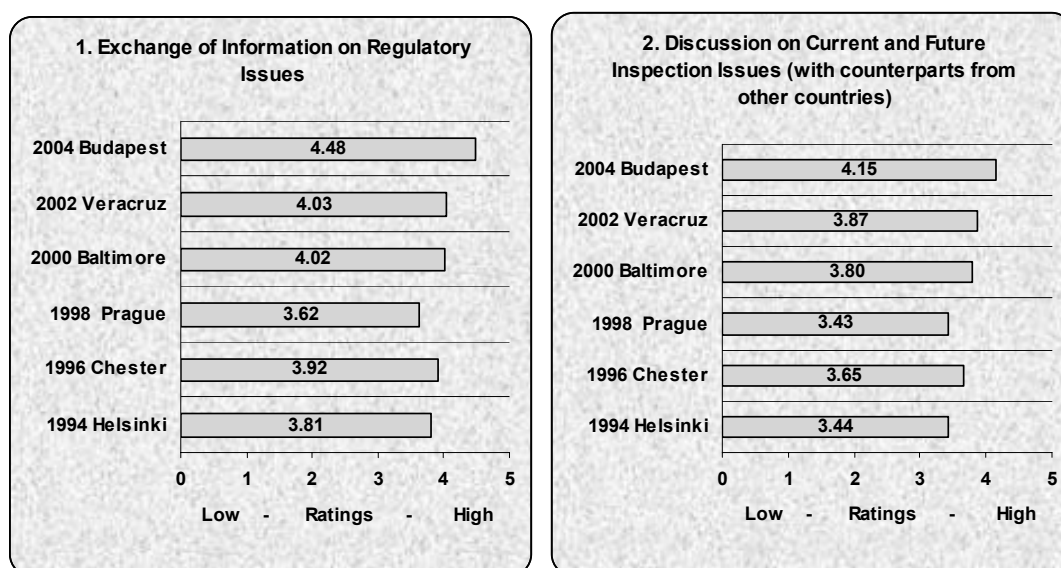
7.1 Evaluation Form

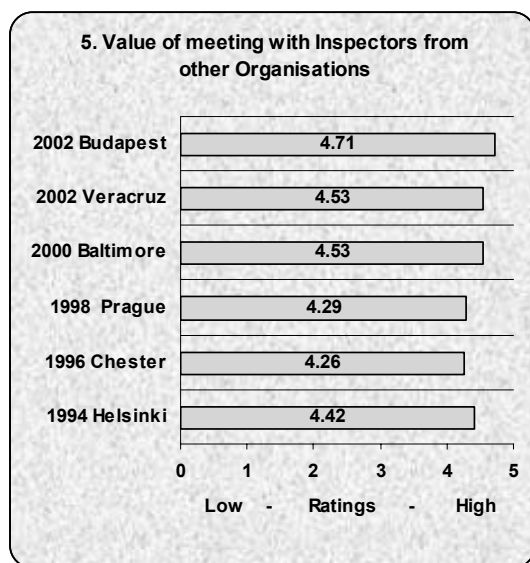
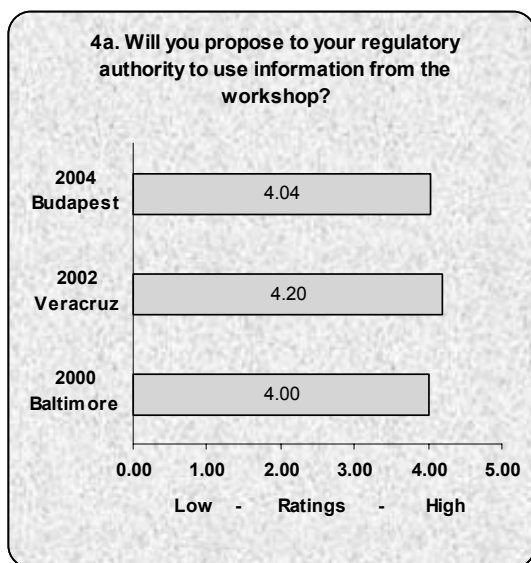
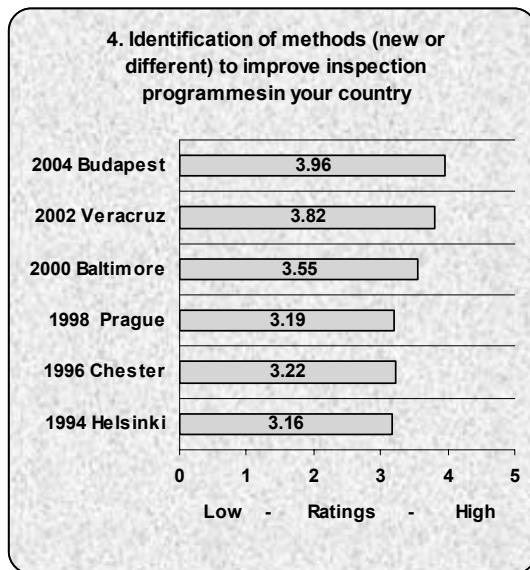
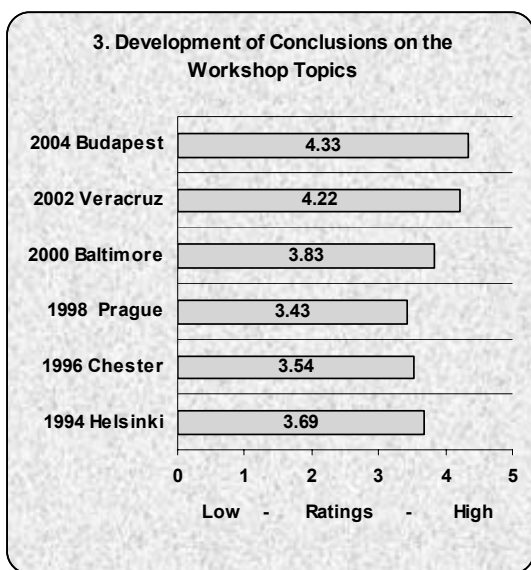
All participants at the workshop were requested to complete an evaluation form. The results of this questionnaire summarised below, are utilised by WGIP in setting up future workshops and to look at key issues for in the programme of work over the next few years. Of the 45 total participants 29 responses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

7.2 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.





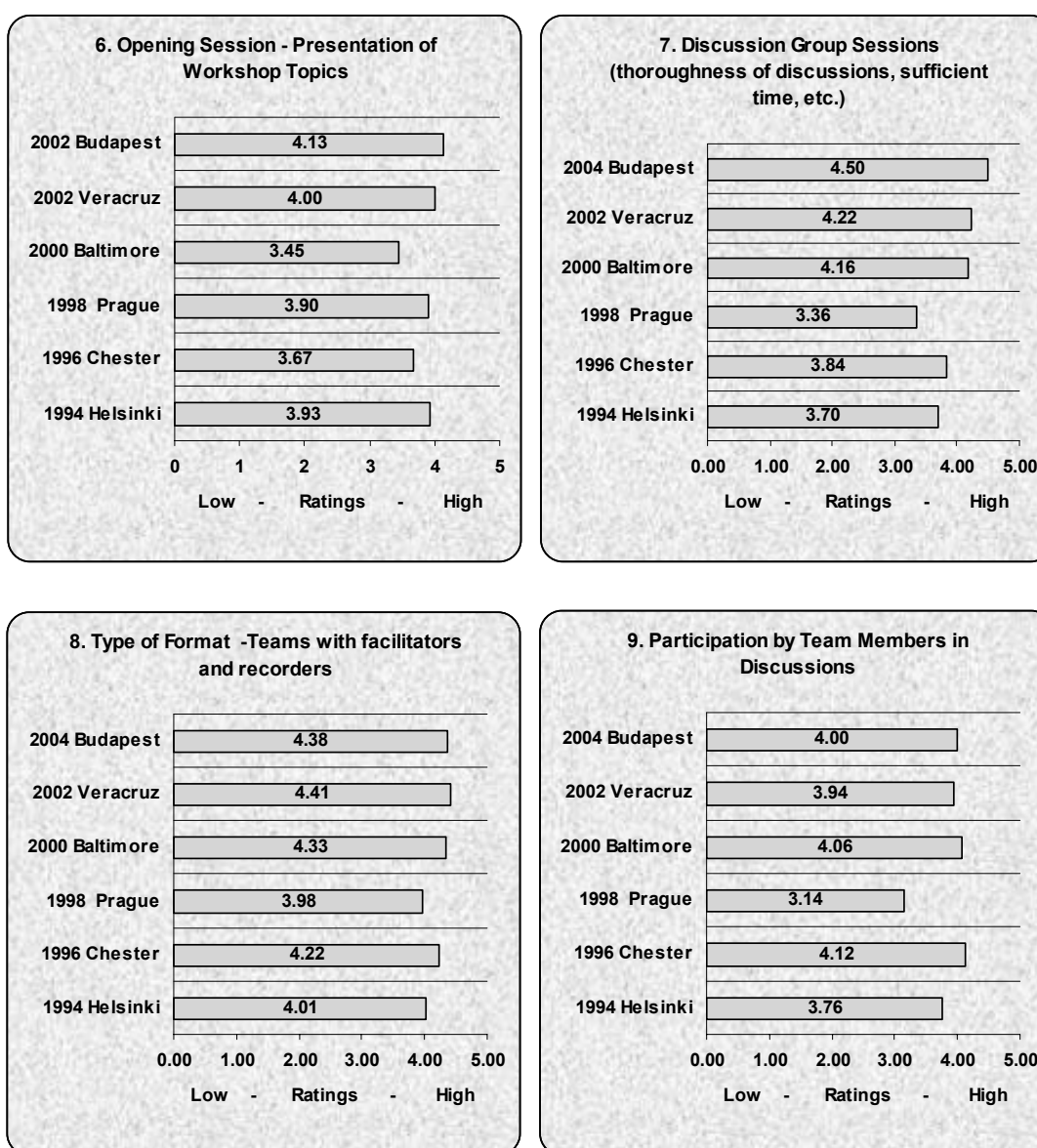
The results show a continuing upward trend in how participants see the value of these workshops. In all but one question, improvement has been made. Significant increases are shown in tables 1, 2 and 5: exchange of information on regulatory issues, discussion on current and future inspection issues and the value of meeting with other inspectors. This reflects, in part, the experience and knowledge WGIP has attained in preparing and organising these workshops. More specifically, in table 1 the participants show a value of 4.48 (compared to 4.03 at the Veracruz workshop) for exchange of information. This is highly commendable achievement since this is one of the most important objectives of all NEA Committees and Working Groups.

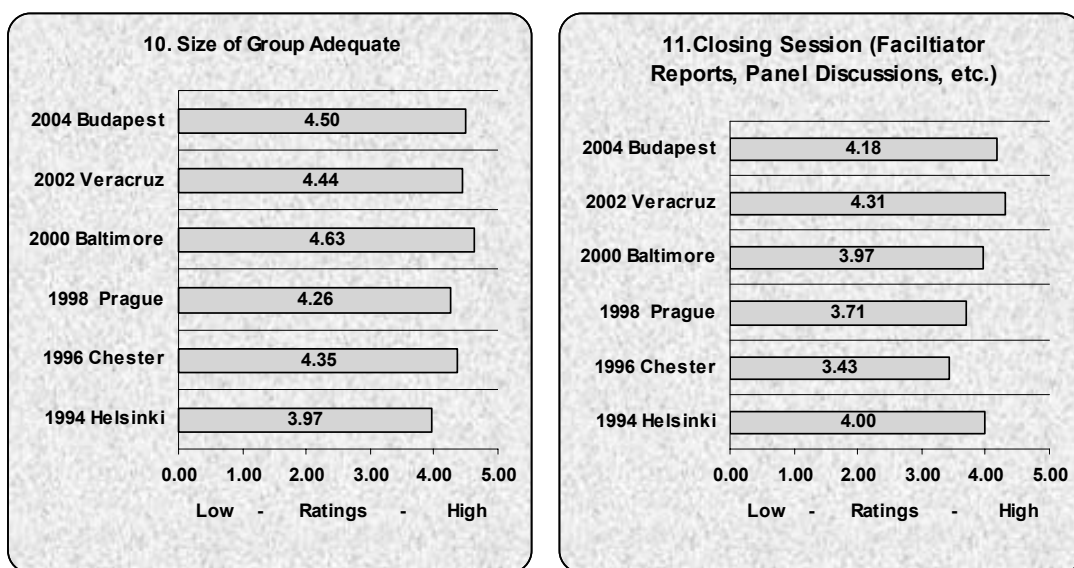
The only decrease in value is depicted in Table 4a (4.2 to 4.04). This question has only been posed in the last 3 workshops and the results will need careful evaluation as to how to improve in this area. One must be

careful, however, in evaluating this result, as it must be analysed along with results. As has been stated in the last 2 proceedings, the results reflect that participants, in exchanging information are afforded an opportunity to ‘calibrate’ their own inspection techniques against those from other countries. Taken in this context, this decrease may not be as significant. WGIP Members will need to assess this in planning the next workshop.

7.3 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 type of format and closing session reports (questions 8 and 11). The decreases in these two areas are extremely small and are not considered to reflect that either of these areas was deficient.

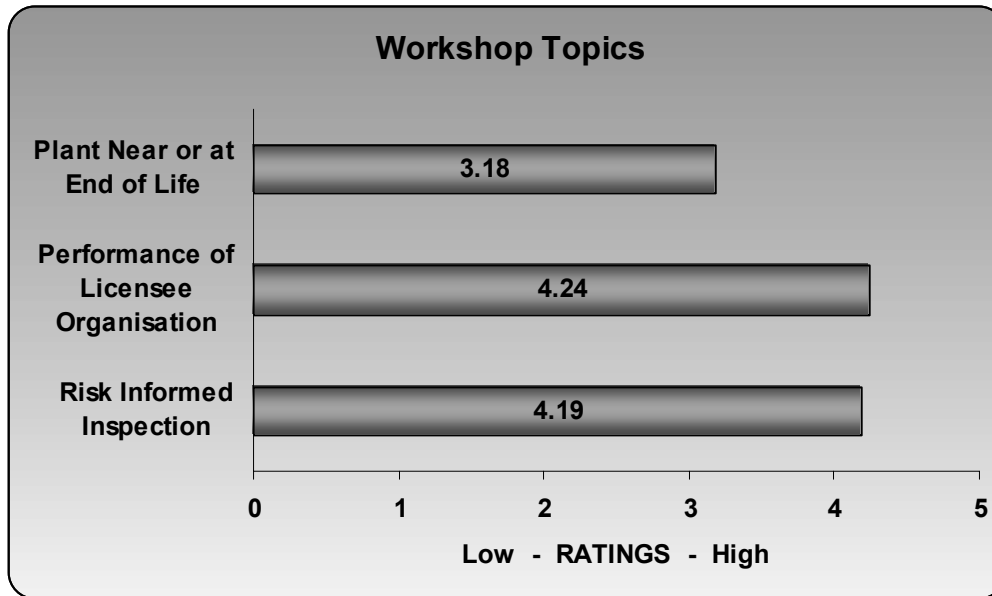
The success of the workshop is clearly dependent on the preparations made by the group and the scores in these areas show that the group was successful. The issuance of questionnaires on each topic provided the ability to focus on key elements and participants were able to discuss and make valuable conclusions. 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.

As in the past several workshops additional effort was made to co-ordinate members from different countries 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.

Social interaction outside the workshop session has been found to enhance the discussions. The results show that this change, first made following the Helsinki workshop (1994) 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.

7.4 Workshop Topics

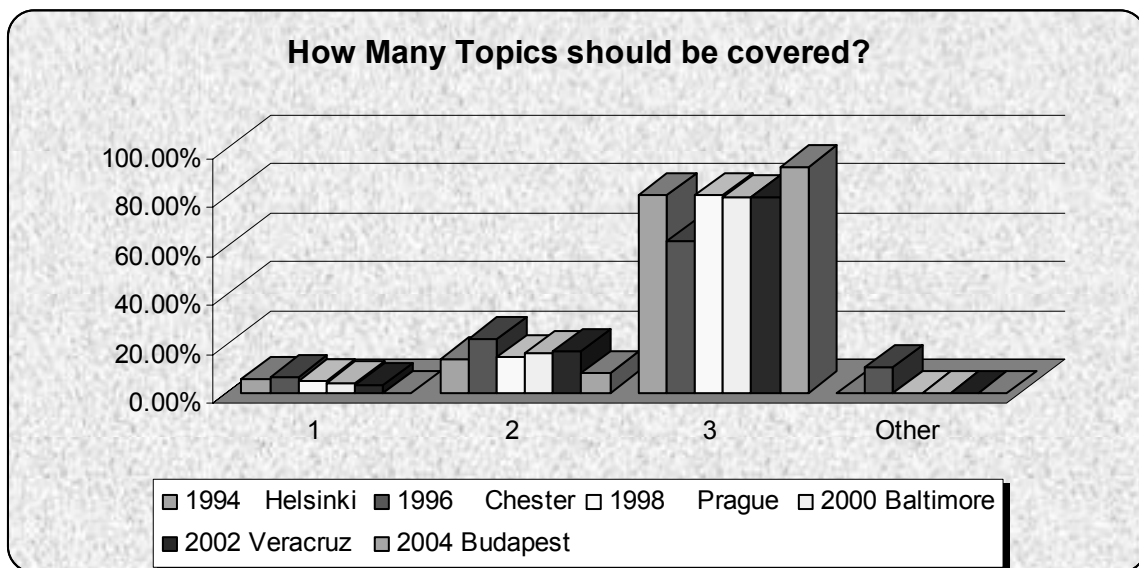
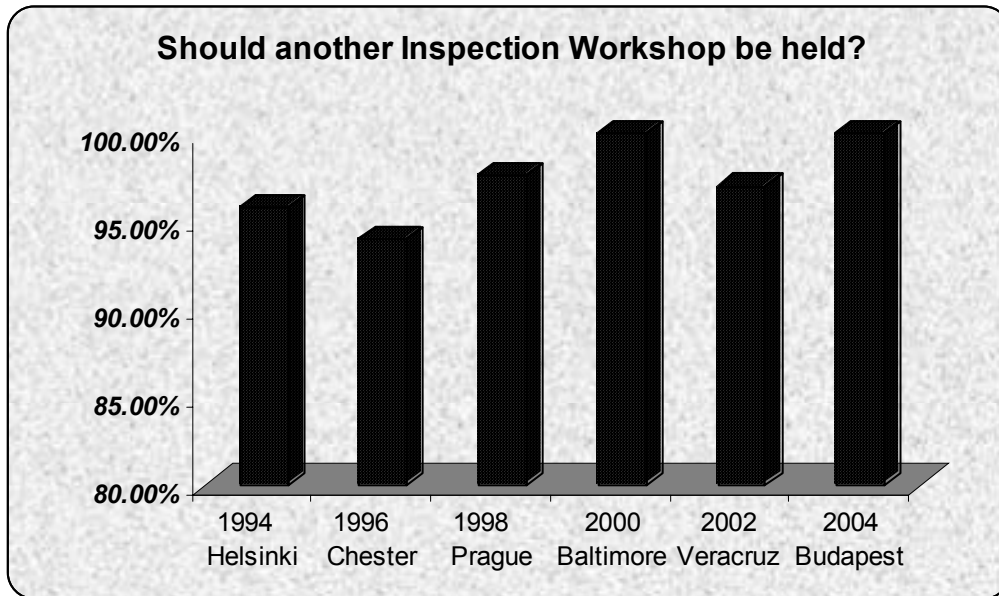
In order to assess how well the topics have been addressed, participants are asked to give a rating on whether they perceived the topics were covered adequately.

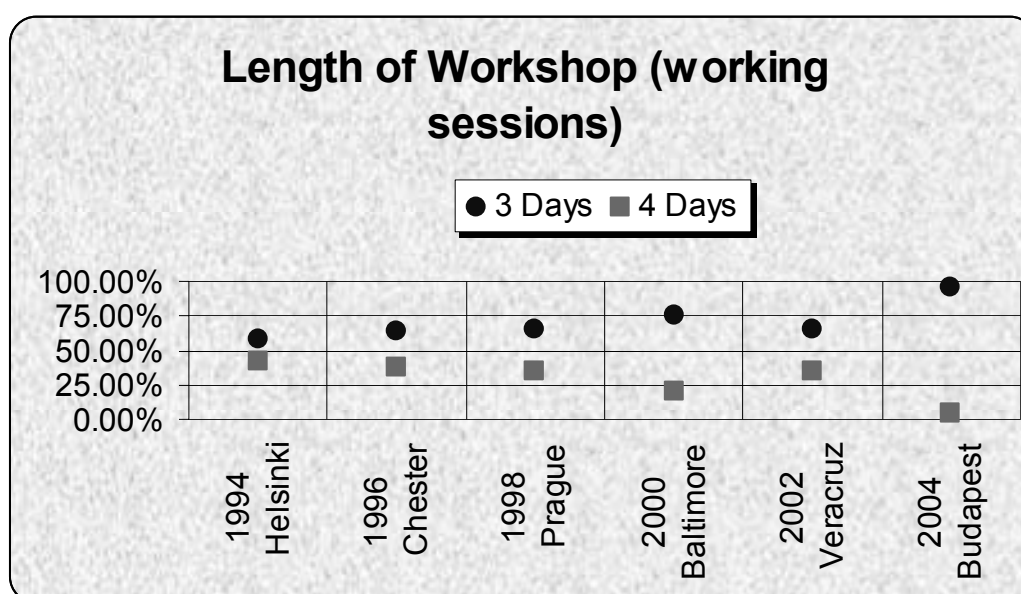


In general, participants continue to show satisfaction how the topics are addressed during the workshop. The scores for performance of licensee organisation and risk informed inspection are comparable with those on topics from previous workshops. A major reason for this appears to be the high interest in these issues. The lower score for plant near or at end of life seems, based on discussions with the facilitators, to reflect the complexity of this issue. 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.

7.5 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 100% 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.

7.6 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.

Suggested inspection related topics suggested for the next workshop included:

- Surveillance of contractors by licensees
- Problem Identification and Resolution
- Corrective Actions
- Inspector training
- Inspection of Human and Organisational Factors
- How inspectors influence safety culture (deliberate and inadvertent)
- Inspection of plant maintenance and modifications

7.7 Workshop Participants' Comments

Similar to the last 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 comments that dealt with the workshop, only a few dealt directly with a specific area (the others were comments on individual topics requesting additional information). One of the concerns noted in these comments was that it could be beneficial to have more focused questionnaires that could then be used to guide the discussion groups.

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