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NUCLEAR ENERGY AGENCY
COMMITTEE ON NUCLEAR REGULATORY ACTIVITIES

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REGULATORY INSPECTION ACTIVITIES RELATED TO RADIATION PROTECTION, LONG SHUTDOWNS AND SUBSEQUENT RESTARTS, AND THE USE OF OBJECTIVE INDICATORS IN EVALUATING THE PERFORMANCE OF PLANTS

Hosted by United States Nuclear Regulatory Commission
Sponsored by Committee on Nuclear Regulatory Activities (CNRA) and
The Working Group on Inspection Practices (WGIP)

Workshop Proceedings
Baltimore, MD, United States
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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 (14th 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 27 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, 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.

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 which could affect regulatory requirements.

The Committee is responsible for the programme of the NEA, concerning the regulation, licensing and inspection of nuclear installations. The Committee reviews 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 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, CNRA establishes co-operative mechanisms with NEA's 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 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 5th International Workshop held by WGIP on regulatory inspection activities. The focus of this workshop was regulatory inspection activities in 3 main areas: activities related to radiation protection inspections, regulatory inspections required for long shutdowns and subsequent restarts, and the use of objective indicators by the regulatory authority in evaluating the performance of plants.

The workshop was hosted by the United States, Nuclear Regulatory Commission (US NRC) Office of Nuclear Reactor Regulation (NRR) and took place in Baltimore, Maryland from the 15th through the 17th of May 2000. This document presents the proceedings from the workshop, including: workshop programme, results and conclusions, papers and presentations and the list of participants.

A compilation of responses to workshop survey is contained in a separate appendix to this report.

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:

- Radiation Protection Inspections
- Regulatory Inspections Required For Long Shutdowns and Subsequent Restarts
- Use of Objective Indicators by the Regulatory Authority in Evaluating the Performance of Plants

The Workshop was held in Baltimore MD, USA, from the 15th to 17th May 2000 and was hosted by United States Nuclear Regulatory Commission (NRC). Members of Organising Committee wish to acknowledge the excellent planning and arrangements made by Mr. Michael Johnson and Mr. Douglas Coe as well Ms. Sharon Bell and the staff of NRC. Mr. Yves Balloffet, Chairman of WGIP presided as Workshop Chairman.

These proceedings were prepared under the guidance of the workshop facilitators and recorders. Special acknowledgement is given to the lead facilitators for each of the topics: Dr. Hartmut Klonk (BfS) – Radiation Protection Inspections; Mr. François Rinfret (CNSC) – Long Shutdowns and Subsequent Restarts; and Mr. Michael Johnson (NRC) - Use of Objective Indicators. WGIP members and other participants who worked as facilitators and recorders included: Dr. J.J. Van Binnebeek, (AV Nuclear), Mr. H. Koizumi (JAPEIC), Mr. E. C. des Bouvrie (KFD), Mr. L.M. Gutierrez Ruiz, (CNSNS), Mr. J.L. Summers, (NII), Mr. S. Forsberg (SKI), Mr. F. Kaufmann (HSK), Mr. S. Navert (HSK), Mr. G. Fichtinger (HAEA), Mrs. S. Suksi (STUK), Mr. D. Coe (US NRC) and Mr. R. Pederson (US NRC).

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1. EXECUTIVE SUMMARY

1.1 OBJECTIVES

The main objectives of the Workshop were as follows:

- To meet with inspectors from other organisations.
- To exchange information regarding regulatory inspection practices.
- To discuss the selected topics.
- To discuss current inspection issues.
- To develop conclusions and commendable practices (if possible) on the selected topics.

1.2 WORKSHOP TOPICS

Topics for discussion were proposed by the workshop committee, reviewed by WGIP members and approved by the CNRA. The main focus for all topic discussions was regulatory inspection activities. The topics selected were:

- Radiation Protection Inspections.
- Regulatory Inspections Required For Long Shutdowns and Subsequent Restarts.
- Use of Objective Indicators by the Regulatory Authority in Evaluating the Performance of Plants.

1.3 WORKSHOP PARTICIPATION

Fifty-two (52) participants from sixteen (16) different countries took part in the workshop (see Appendix III). Countries included: Argentina, Belgium, Canada, Czech Republic, Finland, France, Germany, Hungary, Japan, Mexico, the Netherlands, Spain, Sweden, Switzerland, the United Kingdom and the United States.

1.4 WORKSHOP DISCUSSION GROUPS

Six (6) discussion groups, two for each topic 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.

Discussion groups are an integral part of WGIP workshops. The process, which was first utilised in 1992 at the Chattanooga workshop, has evolved over the continuing series of workshops. Participants are divided into small discussions groups of 7 to 10 members, to discuss in detail the various topics selected.

Exchange between participants was active and the groups formulated conclusions on the various issues selected for the discussion topics.

1.5 WORKSHOP EVALUATION

Evaluation of the results were based on questionnaire responses from participants. An 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.

1.6 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 fifth 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.

1.6.1 Radiation Protection Inspections

In many countries radiation protection inspections and enforcement is distributed among different authorities. The communication between the parties involved and their co-operation was identified as a key issue.

As ALARA is a general principle, it is important that ALARA be integrated into the operational radiation protection programme of the licensee. As a consequence, the role of the inspector is to dialogue with the licensee and to promote a questioning atmosphere that identifies and evaluates alternatives to ensure that radiation doses as well as radioactive releases are ALARA.

The regulatory inspection authority assures that the necessary elements for an effective radiation protection organisation, i.e., qualified personnel, adequate facilities and equipment and proper training are provided by the licensee and function effectively.

The overall approach for regulatory inspection in the field of radiation protection is a combination of general observances, inspection of equipment and facilities, review of documents and procedures and interviews with staff in a questioning atmosphere promoting ALARA attitudes. This will provide the confidence to the inspection authority that the licensee has full control of the radiological situation on the site.

1.6.2 Regulatory Inspections Required For Long Shutdowns and Subsequent Restarts

Long shutdowns can elicit possible risks and concerns, which need to be identified and reviewed by the regulatory body. The groups looked at and developed a list of issues relating to restarting a plant that has been shut down for a long period. They also provided a catalogue of requirements on both licensees and regulatory bodies relating to long shutdowns and for restarts.

Regulatory bodies indicated that one of their main concerns was related to uncertainty with regards to the decision to restart (political or economical reasons).

Included as commendable practices for licensees during long shutdowns were the development and use of shutdown PSAs, identification of risk-significant activities performed during shutdown and performance of self-assessment of shutdown activities to assure that safety margins are maintained. For restart it was suggested that licensees review design basis of risk-significant systems, assess suitability of management and organisation factors, perform independent assessment of restart issues and take steps to properly inform the public.

Commendable actions for regulatory inspectors included identification of appropriate regulatory improvements and development of long shutdown inspection procedures. Also regulators can use PSA to develop systematic inspections and inspectors can provide oversight of licensees risk-informed activities. Timely completion of inspection and or audit of managed processes and verification of necessary organisational structures and processes are in compliance were recommended as well as timely identification and communication of additional requirements to licensees.

1.6.3 Use of Objective Indicators by the Regulatory Authority in Evaluating the Performance of Plants

The use of objective indicators varies from country to country, different types and approaches are used from those used to monitor trends to those for measuring ‘outcomes. Consensus was reached in several areas including criteria for good performance indicators and cautions to use in the development and use of performance indicators.

Good criteria for developing performance indicators includes a clear concise and precise definition such that different users, given the same input will produce the same results. Performance indicators should be simple and have a logical relationship to the performance being measured. They should also be measurable and quantifiable to the extent possible. It is also recommendable that some performance indicators be able to provide timely detection of safety degradation.

Performance indicators should always be combined with other objective data and subjective inputs, and be evaluated in a mutually respectful manner. In developing and using performance indicators it is important to recognise they may not be predictive, there may be lag time between declining safety performance and changes in the indicators and it is important to have as complete a set of indicators as possible. Additionally, it should also be understood that setting performance indicator goals may lead the licensee towards unsafe behaviour.

2. ORGANISATION / OVERVIEW OF WORKSHOP

2.1 PLANNING

Preliminary planning for this workshop, the fifth in a series, of International Workshops on Regulatory Inspection Activities began following the conclusion of the last workshop in Prague, Czech Republic in May 1998. Formal planning started following approval by the CNRA at its annual meeting in June 1998.

Members of the Workshop Committee reviewed comments and suggestions made at previous workshop and considered opinions made during WGIP meeting on 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 United States Nuclear Regulatory Commission (NRC) offered to host the workshop. The location selected was the Best Western Hotel and Conference Center, 5625 O'Donnell Street, Baltimore, Maryland.

2.3 TOPICS

Participants at the last workshop in Prague [reference: NEA/CNRA/R(99)2] suggested numerous topics for discussion at a future workshop. The first formal meeting of the Workshop Committee was held in October 1998. The Committee considered the topics suggested by the workshop participants and 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 1998 CNRA meeting on the following topics to be addressed concerning inspection related activities:

- Radiation Protection Inspections.
- Regulatory Inspections Required for Long Shutdowns and Subsequent Restarts.
- Use of Objective Indicators by the Regulatory Authority in Evaluating the Performance of Plants.

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 Radiation Protection Inspections

Although Radiation protection may be considered as the ultimate objective of nuclear safety to protect workers, the public and the environment, this topic of the workshop relates to the more specific measures in that field, carried out by the licensee and inspected by the regulatory body.

In some countries radiation protection inspection at nuclear power plants is carried out by special agencies, either individual authorities acting on different legislation or acting on behalf of the nuclear regulatory inspection authority. These inspections should also be covered by this workshop.

The operation of nuclear power plants as well as its related maintenance activities require radiation protection measures to be performed by the licensee and to be inspected by the regulatory authority. Important areas of interest are the radiation protection measures applied to system operation, fuel exchange, routine inspection, maintenance and repair works, the regular surveys of surface and airborne contamination and dose rates in accessible areas, the control of radioactive effluents as well as radiological process instrumentation. Important are the measures applied to cope with situations after incidents like the support of fire fighting or the clean-up of contaminated areas.

Results of the personnel radiation exposure, like individual and collective doses, job doses and associated measurements as well as data on radioactive effluents are considered valuable indicators to assess the safety performance of the nuclear power plant.

The organisation of the licensee's radiation protection activities, the training of the plant personnel in radiation protection matters, involvement of radiation protection specialists during planning and performing of maintenance and modifications give important insight to the plant's application of the ALARA principle and to the plant's management of safety.

The workshop discussions on this topic can give valuable exchange of information on the approaches used by other countries on how to incorporate radiation protection requirements and activities into the regulatory inspection on nuclear power plants.

2.3.2 Regulatory Inspections Required For Long Shutdowns and Subsequent Restarts

A number of nuclear power plants around the world are temporarily shut down, for various reasons, for prolonged periods of time. Licensees expect to restart some of these plants eventually. Restarting these nuclear power plants after prolonged shutdowns may reveal hazards which are greater or different in nature than those initially anticipated for. Regulatory agencies must plan the right and timely regulatory inspections to gain reasonable assurance that the plants are maintained in a safe state during the shutdown and subsequent restart.

Are long shutdowns (or lay-ups) considered as a possible state in the current regulatory regime? What are the particular regulatory requirements for long shutdowns? What criteria (such as duration of shutdown, commitment to restart) justify using these particular regulatory requirements, if any? Should the regulatory authority approve the request to lay-up and expect commitments from the licensee during that period? Should the licensee submit lay-up and restart plans for regulatory approval? What are the basic or important elements of such plans? What criteria are used by the regulatory agency to verify the plans? What are the essential elements of regulatory inspection plans? These are typical questions to be discussed.

For the purposes of this workshop, the term «inspections» refer to types of activities ranging from field observations to analysis and review of licensee events, design, operational programs and reports.

2.3.3 Use of Objective Indicators by the Regulatory Authority in Evaluating the Performance of Plants

The regulatory authority needs to obtain information about licensees' performance in order to ensure that plants are being operated safely and in accordance with regulatory requirements. This performance information is obtained through various means including, audits and direct inspections, licensee event

reporting, and licensee self-assessments. Performance indicators provide an additional potentially valuable source of objective information that can be used.

Discussion of this topic area at the workshop will focus on the feasibility and effectiveness of using performance indicators, along with other information sources, to evaluate licensee performance. Areas of discussion may include; the objective of using performance indicators, benefits and limitations, types of information available, implications of the use of performance indicators for the inspection programme, and methods of combining performance indicators with other performance results. Participants will share experiences and insights regarding these areas and will identify «best practices» where possible.

2.4 ANNOUNCEMENT

The workshop announcement was transmitted in October 1999. 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 FACILITATOR / RECORDER TRAINING SESSION AND RECEPTION /DINNER

A training session for all facilitators and recorders was held in advance of the workshop on Sunday, 14th May. A reception was held in the evening to allow participants to meet each other prior to the getting together in discussion groups. Mr. Jon Johnson, Associate Director for Inspections and Programs at NRC welcomed the participants (see Chapter 3).

2.6 OVERVIEW OF WORKSHOP

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

The three lead facilitators made opening presentations based on the results of the questionnaire. For this workshop a representative from the NRC, Mr. Jon Johnson, Associate Director for Inspections and Programs, NRR welcomed the participants and briefly described the current initiative on reactor oversight being undertaken at NRC. Another invited presentation was provided to give the inspectors a slightly different perspective on the issues to be discussed. Mr. Steven Floyd of Nuclear Energy Institute (NEI) provided a presentation outlining the licensee's viewpoint in regard to inspection indicators.

2.6.2 Group Sessions

Participants were divided into small discussion groups (2 for each topic) 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.

2.6.3 Workshop Dinner

A workshop dinner was held on Monday evening. Dr. Richard A. Meserve, Chairman of the US NRC was the invited speaker. He briefly discussed the importance of a workshop such as this in which inspectors can come together and exchange information. He also noted the importance of the topics being discussed and how the discussions could provide insights into the current changes being implemented by the NRC.

2.6.4 Closing Session

Following the completion of all group discussions, the facilitators from presentations, 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.

2.7 POST-WORKSHOP

Facilitator /Recorder meeting to finalise reports and regular meeting of WGIP

On Thursday and Friday, 18th-19th May, the 19th meeting of the WGIP was held. As part of the agenda discussions were held on the results of the workshop.

3. PRE-WORKSHOP

3.1 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. 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.

3.2 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. Jon Johnson, Associate Director for Inspections and Programs at NRC made a few short remarks welcoming participants to the Workshop.

3.3 FACILITATOR / RECORDER TRAINING SESSION - SLIDE PRESENTATION

CNRA

Committee on Nuclear Regulatory Activities

PRE-WORKSHOP BRIEFING

International Workshop on Regulatory Inspection Activities related to

Radiation Protection Inspections,
Regulatory Inspections Required For Long Shutdowns and Subsequent Restarts
and
Use of Objective Indicators by the Regulatory Authority in Evaluating the Performance of Plants

1

Conduct of Group Discussions

- AIM FOR EFFECTIVE MEETING WHERE:
  - Desired aims are met
  - Agenda is defined and owned
  - Roles are clear
  - There has been preparation
  - There is unbiased leadership
  - There is total involvement
  - Different views are brought out and respected
  - There is shared responsibility for conclusions

2

Roles of Facilities, Recorders and Participants

- **ROLES ARE IMPORTANT TO OBTAIN EFFECTIVE DISCUSSION**
- **FACILITATORS, RECORDERS AND PARTICIPANTS HAVE DIFFERENT ROLES**
- **NECESSARY TO REACH CONCLUSIONS**
- **NECESSARY TO WORK TO WORKSHOP TIMETABLE**

3

Conduct of Group Discussions

- **PARTICIPANTS SHOULD:**
  - Express honest opinions
  - Respect and listen to others
  - Keep an open mind
  - Stay focused on topic
  - Be courteous
  - Share experience
  - Participate
- **PARTICIPANTS SHOULD NOT:**
  - 'Sell' Ideas

4

Conduct of Group Discussions

- **FACILITATORS SHOULD:**
  - Be a neutral servant of the group
  - Not evaluate and rarely contribute ideas
  - If you know answer, call on someone else
  - Focus group on common task
  - Protect individuals and their ideas from attack
  - Encourage all to participate
  - Help group find 'WIN/WIN' solutions

5

Conduct of Group Discussions

- **RECORDERS SHOULD:**
  - Write down everything
  - Not editorialise
  - Write legibly
  - Capture thoughts (key points)
  - Seek clarification
  - Stay in role (Don't facilitate)
- **SUGGESTED TECHNIQUES:**
  - Flip Charts
  - Colour

6

Management Aspects of Group Discussions

- FACILITATOR MEETING ON MONDAY EVENING TO REVIEW PROGRESS
- FACILITATOR GROUP MEETINGS ON TUESDAY EVENING AND WEDNESDAY MORNING TO MERGE GROUP FINDINGS AND TO BRIEF LEAD FACILITATORS FOR HIS CLOSING PRESENTATION
- ADMINISTRATIVE SUPPORT AND FACILITIES PROVIDED BY US NRC
- LEAD FACILITATORS TO DRAFT CONTRIBUTION FOR WORKSHOP PROCEEDINGS

7

Output from Discussions

- OUTPUT FROM GROUP DISCUSSIONS PRESENTED BY LEAD FACILITATOR IN CLOSING SESSION
- GENERAL DISCUSSION OF EACH TOPIC IN CLOSING SESSION WITH QUESTIONS AND COMMENTS FROM ALL WORKSHOP PARTICIPANTS
- PREPARATION OF WORKSHOP PROCEEDINGS BY WGIP
- PUBLICATION OF PROCEEDINGS BY CNRA

8

4. OPENING SESSION

Mr. Balloffet opened the workshop by welcoming the participants and introducing Mr. Jon Johnson of the US NRC. Mr. Johnson welcomed the participants to Baltimore. 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 and would provide many insights into current changes taking place both within the NRC and in other countries. He noted the excellent participation and expressed his hope for meaningful discussions and successful workshop. Mr. Michael Johnson of the US NRC and Mr. Barry Kaufer, NEA Secretariat also welcomed the participants.

4.1 PRESENTATIONS

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 Appendix B).

Dr. Hartmut Klonk of Bundesamt fuer Strahlenschutz (BfS), Germany introduced the topic of the Radiation Protection Inspections (Section 4.2).

Mr. François Rinfret of the Canadian Nuclear Safety Commission (CNSC) introduced the topic of Regulatory Inspections required for Long Shutdowns and Subsequent Restarts (Section 4.3).

Mr. Michael Johnson US Nuclear Regulatory Commission (NRC) introduced the topic of the Use of Objective Indicators by the Regulatory Authority in Evaluating the Performance of Plants, based on responses to the questionnaire (Section 4.4).

4.2 RADIATION PROTECTION INSPECTIONS – SLIDE PRESENTATION

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

Radiation Protection Inspections

Baltimore May 15 - 17, 2000

1

Introduction

Radiation protection plays an important part within the operation of nuclear power plants.

- operation procedures
- maintenance tasks,
- the accessibility of systems and components,
- handling of process media, control of effluents,
- handling of operational waste and - of course - of the nuclear fuel.

The goal is to protect health and safety of the workers as well as of the public and the environment.

Radiation protection is closely interconnected with industrial safety.

2

Questionnaire - Part A
Radiation Protection Inspections

1)Legal Matters

2)Administrative aspects of the regulatory bodies inspections on radiation protection

3)Inspection topics at the nuclear power plant

(a)Organisation of the licensee's radiation protection personnel, responsibilities, qualification

(b)ALARA management

(c)Operational radiation protection measures

(d)Radiation protection instrumentation and sampling

(e)Dosimetry

(f)Measures applied or planned to cope with situations after incidents

(g)Training in radiation protection

(h)Other topics of interest to be discussed at the workshop

Fifteen countries have answered the questionnaire. Introduction into this subject is to pick out some interesting details which might be discussed in depth within the subgroups this afternoon and tomorrow.

3

Regulatory inspection authority

In some countries radiation protection inspection at nuclear power plants is carried out by special agencies:

- individual authorities acting on different legislation
- authorities acting on behalf of the nuclear regulatory inspection authority.

These inspections are also considered to be covered by this workshop:

- Co-operation of authorities

4

Details of the licensee's RP-programme to be inspected

- Radiation protection measures to be performed by the licensee
- and to be inspected by the regulatory authorities.

Operational radiation protection measures applied for example to:

- access control
- fuel exchange
- maintenance and repair works
- outage planning
- regular surveys of surface and airborne contamination and dose rates in accessible areas.
- protection measures (protective clothing, temporary shielding etc.)

5

Radiation protection instrumentation and sampling, for example applied to:

- process instrumentation
- stationary equipment for room dose rate survey
- portable instrumentation (doserate, surface- and airborne contamination)
- personnel contamination and incorporation control
- calibration and testing of instrumentation
- control of gaseous and liquid radioactive effluents
- environmental monitoring

6

Dosimetry, for example applied to:

- individual and collective doses (plant personnel, contractors personnel)
- job doses
- partial body dosimetry
- reporting requirements.

7

Coverage of the regulatory inspection practices:

- Inspection of the RP programme and its technical implementation in each and every detail?
- Inspection of the effectiveness of the RP-programme as a whole?
- Verification of the existence of a RP-programme as part of the licensee's safety culture?

8

Radiation protection management, organisation, ALARA-implementation

- How does regulatory inspection deals with different approaches of licensee's RP organisation?
- Is the inspection authority involved in reviewing of defined radiation protection measures for work with anticipated high dose commitments?
- What is the inspection authority's view of cost considerations or a monetary value of man-Sv?

9

Emergency preparedness

Important are the measures applied to cope with situations after incidents like the support of fire fighting or the clean-up of contaminated areas.

- How is radiation protection incorporated into nuclear safety emergency requirements?

10

Training

In all countries requirements of the necessary knowledge on radiation protection topics are in place.

Different requirements for RP specialists and for the rest of the personnel.

- How is the training on radiation protection inspected as part of the entire qualification, training and retraining programme?

11

Reporting and Reviewing of Radiation Protection results

Reporting of radiation protection data by the licensee is a common practice. Reports may be monthly or yearly or on special reportable events.

Reported items are for example:

- collective doses, job doses, outage dose
- distribution of individual doses
- radioactivity of effluents
- waste data
- events, lessons learned

12

Review of Reports

Results of the personnel radiation exposure

- individual and collective doses,
- job doses and associated measurements
- data on radioactive effluents

are considered valuable indicators to assess the safety performance of the nuclear power plant.

13

Outlook for the workshop

The workshop discussions on this topic can give valuable exchange of information on the different approaches countries take

- to incorporate radiation protection requirements and activities into the regulatory inspection on nuclear power plants.

The workshop participants are invited

- to draw conclusions
- to define commendable inspection practices.

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4.3 REGULATORY INSPECTION REQUIRED FOR LONG SHUTDOWNS AND SUBSEQUENT RESTARTS

CNRA

Committee on Nuclear Regulatory Activities

Regulatory Inspections Required For Long Shutdowns and Subsequent Restarts

1

Discussion Groups

Regulatory Inspections Required For Long Shutdowns and Subsequent Restarts - Group 1

- François Rinfret, Canada (Facilitator)
- Pavel Pittermann, Czech Republic (Recorder)

- Gustavo Caruso, Argentina
- Edward Leader, Canada
- Pauli Kopiloff, Finland
- Gilbert Sandon, France
- Joachim Müller, Germany
- Michael Lindström, Sweden
- Guennady Poltarakov, Russia

2

Discussion Groups

Regulatory Inspections Required For Long Shutdowns and Subsequent Restarts - Group 2

- Staffan Forsberg, Sweden (Facilitator)
- Hiroyoshi Koizumi, Japan (Recorder)

- Friedrich Kaufmann, Switzerland
- Maury Burton, Canada
- Albert Feser, Germany
- Miguel Calvin, Spain
- Thomas Davenport, United Kingdom
- John Thompson, United States

3

Background

For the purposes of this topic, the term “long” refers to unusual outages, as opposed to scheduled refuelling outages or annual maintenance outages.

A number of nuclear power plants around the world are shut down, for various abnormal reasons, such as after abnormal events, serious safety problems or economic reasons, for prolonged periods of time. Licensees expect to restart some of these plants eventually. Restarting these nuclear power plants after prolonged shutdowns may reveal hazards which are greater or different in nature than those initially anticipated for. Regulatory agencies must plan the right and timely regulatory inspections to gain reasonable assurance that the plants are maintained in a safe state during the shutdown and subsequent restart.

4

Background

Environment

State whether “long” shutdowns (or lay-ups) deserve a special regulatory status or attention in your country.

State under what circumstances or criteria (such as anticipated shutdown length, no firm commitment to restart) the regulatory authority suggests or requires that a normal shutdown becomes a “long” shutdown.

Requirements

Briefly describe the regulatory (legal and technical) requirements related to the status of “long” shutdown, if applicable.

Does the licensee submit shutdown and restart plans and does the regulatory authority approve the plans?

Does the regulatory authority expect commitments from the licensee during these periods?

Briefly describe the essential or important elements of such licensee plans, if applicable.

5

Background

Inspection programme

Briefly describe the regulatory inspection programme (type, objectives, frequency) and its essential elements, related to “long” shutdowns, taking into consideration such areas as:

-The licensee management organisation, and special configuration management features.

-Verification of licensee personnel abilities and training programme.

-Specific licensee training delivered, and its inspection by the regulatory authority.

Verification of safety related systems and components

Briefly describe the regulatory inspection programme (type, objectives, frequency) and its essential elements related to restarts after “long” shutdowns.

6

SUMMARY

List of Participants
Definition
Risks & Concerns
Minimal Actions from Licensee
- during Outage
- prior to Restarts

Requirements to licensees
Actions by Regulator
- for Long Outages
- for Restarts

7

SUMMARY

Commendable Practices by Licensees
- during long outages
- prior to Restarts

Commendable Practices by Regulatory Agencies
- during long outages

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4.4 USE OF OBJECTIVE INDICATORS BY THE REGULATORY AUTHORITY IN EVALUATING THE PERFORMANCE OF PLANTS

CNRA

Committee on Nuclear Regulatory Activities

Use of Objective Indicators by the Regulatory Authority in Evaluating the Performance of Plants

1

Overall Results

- Most countries (6 of 10) collect and use performance indicators
  - One country has recently developed and is testing the use of performance indicators
  - 2 countries do not use Performance indicators (provide rationale in explanation of this slide)
- Most of the Countries that use Performance Indicators -
  - use them as a source of information regarding the plant
  - don't use them to make formal decisions regarding plant performance or regulatory actions
  - use them to focus inspections

2

Performance Indicators Currently in Use

Typical Indicators

- Forced power reductions
- Forced outages
- Scrams while critical
- Events
- Safety system unavailability
- Safety system actuations
- Individual maximum dose
- Liquid effluent discharges

Others

- Corrective work orders (issued and pending)
- Rework
- Overdue preventive or predictive maintenance
- Increase in actual core melt frequency
- Failures discovered by testing
- Fraction of allowed outage time of TS used for interventions
- Backlog of unanswered requests of regulatory body

3

Uses in Which Performance Indicators May not be Effective

- Most Frequently suggested areas in which performance indicators may not be effective were
  - Management and organizational effectiveness
  - Problem identification and resolution (including quality assurance systems and employee willingness to raise safety concerns)
- Others included:
  - Human performance
  - Safety Culture
  - Areas that must be analysed in combination with others
  - Emergency arrangements or exercises
  - Operator health (fitness for duty)
  - Commercial pressures

4

Criteria for a Useful Indicator

The following were identified as important criteria for performance indicators by several respondents:

- Must relate to the regulatory objectives
- Must provide meaningful results
- Should be used to monitor aspects of performance that can be quantified (number of events, number of repairs)
- Should be objective
- Should have broad applicability to plants
- Must lead to an accurately measure plant performance
- Must not be subject to manipulation by the licensee

5

Areas of Focus During the Breakout Session

- Objectives of using performance indicators
- Benefits and limitations
- Criteria for a useful performance indicator
- Methods of combining performance indicators with other performance results

6

5. DISCUSSION GROUPS - SUMMARY OF RESULTS

5.1 RADIATION PROTECTION INSPECTIONS

5.1.1 Groups

GROUP 1	GROUP 2
H. Klonk, Germany *	S. Navert, Switzerland *
R. Pederson, United States *	E. Des Bouvrie, Netherlands *
G. Scheveneels, Belgium	J. Presley, Canada
I. Malatova, Czech Republic	V. Rihiluoma, Finland
L. Demol, France	D. Lelievre, France
L. Malmqvist, Sweden	I. Vegvari, Hungary
P. Burrows, United Kingdom	T. Labarta, Spain

* Facilitators/Recorders

5.1.2 Introduction

Both break-out groups were given the following list of topics as a starting point for the discussions:

1. Inspection Authorities - Interfaces and co-operation
2. Radiation Protection - Organisation of licensee: What to inspect?
3. ALARA-implementation - How to inspect?
4. Radiation Protection-Program of licensee - How to inspect effectiveness?
5. Reported data - Interpretation of results and lessons to be learned and implemented

5.1.3 Results

5.1.3.1 Radiation Protection Inspection Authorities

The organisation and competence of the national authority bodies involved in inspections and enforcement of Radiation Protection legislation is different in the countries. It can be found that often more than one authority is involved in inspections on Radiation Protection issues. Having separate authorities with focus on Radiation Protection may give an advantage to maintain the importance of Radiation Protection. Sometimes these authorities are independent from the authorities responsible for nuclear safety. For example, in one particular country three independent authorities carry out inspections on Radiation Protection issues, depending whether the issue under question relates to radioactive discharges, operational radiation protection or dosimetry. Furthermore it can be found that more than one organisation unit within

one authority is involved in Radiation Protection issues (for example, the effluents and emissions from a NPP and the operational radiation protection aspects are covered by different groups within the responsible authority).

The communication between the parties involved in Radiation Protection-inspections and their co-operation was identified as a key issue. The inspectors realised that an unhindered information transfer and the co-ordination of the inspection activities as well as a sharing of the inspection results among the involved parties is essential for a consistent and congruent enforcement policy with respect to Radiation Protection legislation. It is important to clearly define the respective responsibilities and to agree on the procedures as well as on the topics for inspections on Radiation Protection issues. This is especially important for the standards that will be applied during the inspections.

The discussed aspects of Radiation Protection inspection authorities are summarised in a set of Commendable Practices.

5.1.3.2 Radiation Protection Organisation of Licensee

The discussion focused on the overall organisation structure at NPPs. Some issues were identified concerning the level of Radiation Protection authority (e.g., position in the overall NPP organisation as well as the ability to stop work and co-ordinate the activities of other groups) as vital to Radiation Protection safety.

The discussion results are summarised in a set of commendable practices.

5.1.3.3 ALARA Implementation

In the respective countries, there are different levels on prescriptions with respect to ALARA-implementation. In some countries ALARA-implementation is laid down as a general rule in national legislation and the authorities verify that the licensees have taken their responsibility. In other countries furthermore the "How" of the ALARA-implementation is prescribed and the authority also checks if the licensees comply with these rules.

It is important that ALARA be integrated into the operational Radiation Protection (RP) programme. Differences noted in application between countries include the use of a minimising concept verses the reasonably achievable standard. Also, the level of the regulators involvement in the ALARA decision (optimisation) varies between countries.

Within the groups there was general agreement that suitable performance indicators in this area are hard to identify. Collective dose does not provide a good indicator because there are too many factors that effect the result hidden in it. Therefore, there was a general agreement that ALARA is an important field inspection area at the site of the NPP. The role of the inspector is to dialogue with the licensee and promote a questioning atmosphere that identifies and evaluates alternatives to ensure that doses are ALARA.

ALARA integrates aspects of engineering, management and Radiation Protection as an overall approach in organising work. ALARA leads to optimised radiation exposures of the public and the workers during operation as well as during shutdowns with respect to cost, efficiency and duration. Inspections on ALARA-implementation do not cover only "classical" Radiation Protection issues, for example monitoring of an individuals radiation exposure and the follow up of jobdoses. These inspections will furthermore observe the interaction and interfacing of the licensees organisational units as well as the involvement of the contractors. The inspectors in this area need to have a broad knowledge on NPP operation and nuclear safety as well as on radiation protection.

A suggestion on a tentative inspection programme for ALARA-implementation was worked out by Group 2.

This group identified two general working fields for the regulatory authority inspecting ALARA-Implementation: *Paperwork* and *Field work*. The following table shows a list of inspection topics grouped according the working fields and also indicates, how the topic can be addressed. The main inspection techniques are:

- Review (of documents, either at office or at the NPP),
- Interviews with the staff and management at the NPP, and
- Observations (these must be done during the work on site).

The regulatory inspection programme on ALARA-Implementation is most effective, if it reflects the fact that not only radiation protection is involved but also the interaction between the involved organisational units of the licensee.

As the table could not be made complete, it may serve mainly as a guideline. The inspection topics intentionally are kept general, for application they should be made more detailed.

Topic (covering facts and documents)	**Review**	**Interview**	**Observations**
Policy statement	X	X	
Procedures	X		(X)
Personal Qualification	X		
Personal Training	X		X
Reports and Data	X		
ALARA-workplan	X		X
Manpower	X		X
RP-Equipment	X		X
Working attitudes of contractors	(X)		X

Topic (covering processes)	**Review**	**Interview**	**Observation**
Awareness and involvement of plant and contractors personnel to RP-issues		X	X
Work planning and ALARA Meetings	X		X
Work preparation and working environment		(X)	X
Work performance	(X)	(X)	X
RP-Service Performance		X	X
Lessons learned and knowledge transferred?	X	X	
Awareness of responsibility of Management	(X)	X	X
Interfaces of licensees involved parties	X	X	(X)

Three important statements were given by Group 1:

- We noted that what is reasonably achievable (or minimised) is a moving target because it is dependent on technology and other specific factors that can develop over time.
- ALARA implementation requires accurate dose/dose rate measurements (e.g., calibrated, appropriate instruments/dosimeters and qualified personnel) with timely feedback to employees to implement lessons learned.

- Zero discharges and zero risk are goals that are unachievable. Whilst it is important to minimise discharges and risk, it is also important that Radiation Protection is given sufficient weighting in decision making on such matters.

The discussed aspects of ALARA implementation are summarised in a set of Commendable Practices.

5.1.3.4 Inspections on effectiveness of licensee's Radiation Protection-programme and reporting of data

Effectiveness of the licensee's Radiation Protection-programme means that the licensee has control over the radiological situation onsite and offsite as well as of the personnel. This can be achieved by controlling corresponding measurements, regularly reviewing the results and reacting on changes. These parameters may be compiled into objective indicators. The discussions revealed that objective indicators, even if they are a valuable tool to measure and compare performance, provide only a limited insight into the effectiveness of Radiation Protection-programmes and that further information is required.

A comprehensive discussion focused on individual and collective dose data. There was general agreement that one needs to be careful about the source of the data and be aware of the underlying criteria (e.g., lower limit of detection). In most cases collective dose can not be used on their own to judge licensee performance. Collective dose can be useful for judging the performance if placed in proper context for:

- standard activities,
- other jobs only if additional information is provided,
- trending performance of one licensee, and
- questioning the performance of other licensees.

Regulatory inspections at the NPP-site (observations, document review and interview) provide the additionally required information to judge on effectiveness and will provide the confidence to the inspecting authority that the licensee has full control of the situation on the site.

A list of possible inspection points is given:

- The licensee's monitoring of onsite and offsite radiological parameters. These parameters are:
  - Surface and airborne contamination and their development over time,
  - Doserates and their development over time,
  - Radioactive discharges and their development over time.

- The licensees monitoring of persons:
  - Doses and contamination (internal, external),
  - General behaviour and compliance with rules,
  - Housekeeping at the workplace and on the site.

The first item could be addressed by review of documents, the second item is best observed by field inspections at the site. Furthermore housekeeping, general behaviour and compliance with rules are identified as a indicator for the safety awareness of the persons involved in maintenance and operation of the NPP, although it is difficult to measure this parameter objectively.

Some countries with a national dose registry (those with an open access) found it useful for both the licensee (to control doses) and the regulatory inspection Authority (to review performance).

The discussion results are summarised in a set of commendable practices.

5.1.4 Compilation of Commendable Practices related to Inspection on Radiation Protection

5.1.4.1 Commendable Practices related to Radiation Protection inspection authorities:

- The regulatory authorities (or their governing bodies) establish an organisational structure that has a separate unit that is devoted to Radiation Protection in order to maintain it importance.

- The regulatory authorities (or their governing bodies) take care that the co-ordination of regulatory activities on Radiation Protection and communication of inspection results among the different parties involved is functioning properly. Within these parties the unit responsible for nuclear safety takes part. Defining a leading party which has an overview of the Radiation Protection-inspection activities and which takes care for a good exchange of Radiation Protection-inspection results is encouraged.

- The Radiation Protection inspection authorities maintain their competence by carrying out inspections in a transparent manner. It enhances the transparency, if the inspecting authority has clear guidelines and procedures for the inspections carried out. The Radiation Protection-standards applied by the authorities must be clear to all involved parties.

5.1.4.2 Commendable Practices related to licensee's Radiation Protection organisation

- Appropriate staffing with qualified Radiation Protection personnel, adequate facilities and equipment, proper training of plant personnel, are the fundamental building bricks of an effective Radiation Protection organisation. The regulatory Inspection /authority assures these elements are provided by the licensee and function effectively.

- The regulatory inspection authority assures that the Radiation Protection organisation has sufficient authority within the overall licensee organisation (e.g., direct access to top management and the authority to stop work) to promote radiation safety.

5.1.4.3 Commendable Practices related to ALARA-Implementation:

- The regulatory inspection authority inspects the ALARA implementation as an integral part of the licensee's approach on management of safety and the Radiation Protection programme. This includes work management, planning and communication between the involved licensee's departments.

  When inspecting ALARA-implementation, the authority in charge not only concentrates on the Radiation Protection-department and it's activities, but also observes other departments and their activities as well as the interaction between these departments.

- Inspections on ALARA implementation cover both the review of documentation (reports, written procedures, data, etc.) and the witnessing the processes at the workplace by interviews and observations. Inspections are aimed at stimulating the licensee to reduce doses ALARA by questioning/dialogue.

5.1.4.4 Commendable Practices related to effectiveness of licensee's Radiation Protection programme

- The regulatory inspection authority inspects the effectiveness of the Radiation Protection-programme as an indicator for overall awareness of safety on the site. Beside the review of

documents the observation of access control, housekeeping, working environment, working methods and human behaviour gives the inspecting authority a deeper insight into the effectiveness of the Radiation Protection-programme.

- The regulatory Inspection Authority inspects dose data in conjunction with other relevant information, as a whole, to get insights into how doses are controlled by the licensee and to identify specific areas for more detailed inspection.

- Regulatory inspections on radiological parameters and measurements deal on one side with the results and the licensee's evaluation, on the other side with the instrumentation techniques, calibration and procedures applied for measurements.

5.2 REGULATORY INSPECTIONS REQUIRED FOR LONG SHUTDOWNS AND SUBSEQUENT RESTARTS

5.2.1 Groups

GROUP 1	GROUP 2
F. Rinfret, Canada *	S. Forsberg, Sweden *
P. Pittermann, Czech Republic *	H. Koizumi, Japan *
G. Caruso, Argentina	F. Kaufmann, Switzerland
E. Leader, Canada	M. Burton, Canada
P. Kopiloff, Finland	A. Fehser, Germany
G. Sandon, France	M. Calvin, Spain
J. Müller, Germany	T. Davenport, United Kingdom
M. Lindström, Sweden	J. Thompson, United States

* Facilitators/Recorders

5.2.2 Definition of a Long Shutdown

Where the duration of the shutdown raises potential concerns which may create undue risk regarding operation of the plant within its design basis and the licensee's commitment to safety.

5.2.3 Features of a Long Shutdown

A long shutdown lasts longer than a normal shutdown; a typical refuelling outage or planned annual maintenance outage are not long shutdowns. A long shutdown might have a duration for more than around six months.

A long shutdown might feature important design changes leading to basic safety envelope or technical parameters changes. A long shutdown might be called when activities related to the shutdown indicate that a new safety assessment report or re-evaluation safety assessment report is justified.

There may be unknown intentions with regards to restart, during long shutdowns.

5.2.4 Risks and Concerns

Listed below are the possible risks and concerns from long shutdowns identified by regulatory bodies. These risks and concerns elicit the necessary attention and focus to long shutdowns and subsequent restarts, from the regulatory bodies. Regulatory bodies indicated that one of their main concerns was related to uncertainty with regards to the decision to restart (political or economical reasons). This concern is reflected in several points below.

1. Possible maintenance suspension:
   Regulatory bodies stated that during long shutdowns, maintenance programs are affected.

2. Lack of training:
   Licensees suspend or reduce frequency of training activities during long shutdowns; this may affect safety.

3. Loss of competence - Net loss of knowledge:
   Regulatory bodies stated that for extended shutdowns, some key staff resign or transfer to other organisations.

4. Degradation in safety culture:
   Regulatory bodies stated that the uncertainty with regards to restart has non-negligible effects on the morale of staff and their attributes such as a sustained questioning attitude on safety related subjects. The fact that the reactor is shutdown may also give the impression that the risk is negligible.

5. Degradation of equipment; discovery of new degradation mechanisms:
   Regulatory bodies expressed the opinion that for long shutdowns, new degradation mechanisms or underestimated rate of degradation of equipment may appear, despite the fact that the plant do not produce power.

6. Higher staff turnover:
   Lack of challenge may result in a loss of interest by licensee staff.

7. Operation outside Technical Specifications:
   Regulatory bodies have expressed that the operation of components and systems has a higher probability of being operated outside the scope of technical specifications for that equipment.

8. Lack or regulatory follow-up:
   The reduction in the level of risk from a reactor in the shutdown mode results in the regulatory body reducing the pressures on the licensee, inspections and expectations. This may lead to a net reduction in safety.

9. Trace-ability (history of component, document trail):
   Regulatory body experienced that operating units neighbouring units in a long or indefinite shutdown borrow components from shutdown units, which become a spare parts supplier. Also, regulatory bodies stated that activities related to quality assurance by the smaller organisations are often the first ones to be stopped.

10. Configuration management problems:
    Regulatory bodies experienced that plants in a long shutdown suffer configuration management problems since many activities are held in parallel and managed by other than operating organisations.

11. Massive reduction in number of personnel:
    Regulatory bodies have experienced that licensees reduce their number of staff by as much as 50%.

12. Relaxation of prevention programs:
    Much related to the reduction of training is the reduction of some activities for the protection of health and security.

13. Operability of safety significant systems:
    Regulatory bodies have established doubts about the operability of systems which are not used or are in a dormant state.

14. Termination of continuous improvement processes and interest:
    Regulatory bodies have established that continuous improvements programs are dropped in the event of uncertainties or where the focus is shutdown work. This environment is not conducive to improvements of existing operating programs.

15. Lack of motivation:
    Regulatory bodies have reported a lack of motivation among organisations of units subjected to long shutdowns.

16. Unknown changes in properties:
    Regulatory bodies have reported their concern about components or systems operated in different configurations showing new failure modes.

17. Degradation of economic situation of utility:
    Regulatory bodies show concern towards organisations under financial stress, since this compromises safety.

18. General degradation in nuclear industry:
    Regulatory bodies stated that there was a general concern about the effect that plant closures had on the nuclear industry, since there might not be enough economic activity for suppliers to maintain their quality assurance programs.

19. Risk of criticality:
    Regulatory bodies indicated that the risk of criticality could not be underestimated in shutdown plants.

20. Loss of sense of ownership and responsibility:
    Much related to the lack of motivation is this loss of responsibility and ownership, regulatory bodies stated.

21. Overall risk different or larger than normal shutdown:
    Regulatory bodies indicated the concern that the contributors to risk had to be evaluated during lengthy shutdowns, to ensure that the overall risk is well understood and managed.

5.2.5 Requirements on Licensees During Long Shutdowns

- Licensees produce a shutdown plan.
- Licensees maintain and expand staff training.
- Licensees maintain staff qualification.
- Licensees maintain configuration control.
- Licensees perform safety analyses for design modifications and emergent work.
- Licensees maintain competence and assurance of plant safety.
- Licensees provide complete Manuals and procedures (operational, testing, maintenance, organisation);
- Licensees maintain adequate surveillance/maintenance programs.
- Licensees maintain spare parts inventory for specific systems necessary to preserve the unit in a safe state.
- Licensees pro-actively assess the state of core (with fuel left in-core or removed out of the core).
- During a long shutdown, licensees ensure that the plant remains within its design basis, and able to perform its intended safety function while maintaining an adequate organisation.
- Licensees demonstrate that the reactor remains within the design/licensing basis and this is reported for assessment prior to restart of the plant.
- Licensees set up specific requirements on safety significant systems as necessary.
- Licensees identify and review (update regularly) their intentions and plans, so as to enable regulatory bodies to set appropriate requirements and take appropriate actions.

5.2.6 Requirements on Licensees Prior to Restarts After Long Shutdowns

- Licensees develop a restart action plan.
- Licensees maintain quality control (key functions of the quality assurance program).
- Licensees provide specific safety assessment or probabilistic safety assessment (e.g. Specific or shutdown probabilistic safety assessment); licensees account for plant mods/changes and revise the probabilistic risk assessment (probabilistic safety assessment), as necessary.
- Licensees perform a pre-operational start-up test of required plant systems.
- Licensees demonstrate adequate human resources for restart.
- Licensees demonstrate that safety issues and their root causes have been corrected.
- Licensees demonstrate that safety-important program requirements have been met.
- Licensees establish either specific, partial or full recommissioning system tests as necessary.
- Licensees, being ultimately responsible for safety, take necessary steps as part of their self-assessment process to demonstrate that the reactor is safe for restart.
- Licensees present requests for relaxation of regulations requirements and commitments; to be corrected and verified prior to restart.

5.2.7 Requirements on Regulatory Bodies for Long Shutdowns

- Regulatory bodies maintain a basic level of inspection.
- Regulatory bodies review and approve shutdown plans.
- Regulatory bodies perform additional supplemental regulatory inspections, as deemed necessary.
- Regulatory bodies impose regulatory retrofit/upgrades if deemed necessary.
- For shutdowns involving some specific reactor types, and where licensees decide to leave fuel in the core, regulatory bodies verify the safe shutdown, the performance of cooling systems and other operational systems.
- For shutdowns involving reactor types or where licensees remove the fuel from the core, the risk is different; regulatory bodies audit licensee preservation plans, review recommissioning tests, continue on-site inspections and proceed with ongoing technical discussions with the licensees.

- For shutdowns involving major engineering modifications, regulatory bodies review and approve engineering modifications, complete field inspections of these modifications, and verify operational testing results, without loosing focus on other sources of risk at the plant.
- For shutdowns which show changes in management structure, organisation or membership, regulatory bodies inspect managed processes.

5.2.8 Requirements on the Regulatory Body for Restarts

- Regulatory bodies review and approve licensees start-up plan.
- Regulatory bodies perform operational team inspections to assess readiness of licensees to restart in areas such as corrective action program, training (operator/support staff), quality assurance/quality control inspections and audits, process/program assessment of maintenance activities during shutdown, and review pre-operational start-up tests.
- Regulatory bodies review and assess the corrective action plan for risk important issues.
- Regulatory bodies communicate with the public that licensees can safety restart the plant.
- Regulatory bodies maintain increased regulatory oversight for a period of time following plant restart.
- Regulatory bodies inspect to confirm that licensees have adequately justified that the reactor is suitable for a return to service.
- Where changes in management structure, organisation or membership took place, regulatory bodies inspect managed processes.
- Where licensees identified a clear intent to restart, regulatory bodies review and audit the preservation programme, audit staff qualification, review restart commitment plan, review particularly fire protection provisions, and review the unusual events reporting process.
- Where licensees identified their intent to decommission (and in the interim), regulatory bodies focus on verification of remnant organisation and personnel left in place, maintain inspection of fire protection provisions, review interim plans until decommissioning, and review financial guarantees by the licensees.

5.2.9 Commendable Practices by Licensees during Long Shutdowns

1. Licensees develop a shutdown probabilistic safety assessment and identify risk-significant activities.

2. Licensees take results from probabilistic safety assessment and risk-inform plant shutdown activities to reduce unnecessary plant risk.

3. Where a shutdown probabilistic safety assessment is not available, licensees consider other options to evaluate changes to risk.

4. Where available, licensees incorporate risk insights into shutdown and start-up plans.

5. Licensees perform a self-assessment of shutdown activities to assure that safety margins and licensing basis are maintained. This includes a review of safety assessment processes and programs.

5.2.10 Commendable Practices for Licensees prior to Restart

6. Licensees review the design basis of risk-significant plant systems.

7. Licensees assess the suitability of the management and organisation to return to power operations.

8. Licensees perform an independent assessment of the issues pertaining to restart.

9. Licensees inform the public.

10. Licensees establish a start-up program after a long shutdown (i.e., mode change assessment, hold points, etc.)

5.2.11 Commendable Actions for Regulatory Bodies for Long Shutdowns

11. Regulatory bodies develop a long shutdown inspection procedure.

12. Regulatory bodies identify appropriate regulatory improvements to be implemented during the long shutdown.

13. Regulatory bodies provide regulatory oversight of licensees' risk informed activities.

14. Regulatory bodies use probabilistic safety assessments to develop a systematic inspection programme.

15. Regulatory bodies identify additional requirements and communicate them to licensees as early as possible.

16. Regulatory bodies complete an early inspection/audit of managed processes during the various important states of the plant, and verify that the necessary organisation structures and processes are in place to comply with their shutdown quality assurance program.

5.3 USE OF OBJECTIVE INDICATORS BY THE REGULATORY AUTHORITY IN EVALUATING THE PERFORMANCE OF PLANTS

5.3.1 Groups

GROUP 1	GROUP 2
M. Johnson, United States *	J.-J. Van Binnebeek, Belgium *
G. Fichtinger, Hungary *	L. Gutierrez, Mexico *
J. L. Summers, United Kingdom *	S. Suksi, Finland *
K. Lenfreniere, Canada	M. Baudoin, France
W. Bergbauer, Germany	L. Schäffler, Germany
V. Gonzalez, Mexico	L. Zagade Hernandez, Mexico
M. Maroňo, Spain	G. Prohaska, Switzerland
P.-O. Sanden, Sweden	D. Hickman, United States
D. Coe, United States	W. Koch, Netherlands

* Facilitators/Recorders

5.3.2 Introduction

There is a spectrum of regulatory usage of Performance Indicators. Usage ranges from concentration on "outcomes" which tends to result in "high level" PIs; to concentration on "process", which can result in finely focused PIs. The former measures licensee's performance outcomes, leaving monitoring of processes to licensees. The latter allows regulators to monitor trends in licensee performance at a low level as a means to determine the effectiveness of the licensee's safety management system and licensees can use them in their improvement processes.

Usage by individual countries varies, and individual regulators use various approaches along the spectrum.

A fundamental principle is that, regardless of the way in which PIs are used, there must be a reasonable assurance, supported by evidence, that the PIs are valid for that purpose.

5.3.3 Commendable Objectives

PIs should be used:

- As part of a structured, formal process for communication within and between the RB and licensees.
- To identify off-normal conditions to trigger regulatory actions.
- In combination with other information processes, to improve the focus of the regulator's activities.
- To provide information to stakeholders (the degree of information & the stakeholders informed depend on the country's practice).
- To provide a measure of effectiveness of other regulatory tools.
- To facilitate efforts of licensees to improve their safety performance (e.g., through appropriate benchmarking).

5.3.4 Benefits and Limitations

5.3.4.1 Comparison

Potential benefits	**Potential limitations**
Are objective, auditable, and not disputable	Can not be used alone
When used as a set, provide insights regarding what is important for safety	Difficult to define without ambiguity
A structured set of PIs provide can provide information that is understandable to all stakeholders	May be misconstrued as providing a measurement of safety level rather than an indication of a particular aspect of performance
Provide additional bases for investigation by the regulatory body	May be subject to misuse or manipulation
Are relatively low cost (i.e., easy to report) and easy to evaluate	Data collected by the utility must be verified to ensure its accuracy
Encourage licensees to monitor performance at a lower level	May not provide timely indication of trends in safety performance
Enable comparisons or benchmarking	Are not effective unless used as part of a full set of PIs that provide information regarding a spectrum of activities or attributes

Potential benefits	Potential limitations
Can promote licensees own improvement processes	Difficult to develop and collect PIs for non quantifiable issues (e.g. program effectiveness, management effectiveness)
	May be of limited value in comparing plants where differences between plant types are great
	Regulators may lack legal powers to require licensees to collect PIs
	Cannot replace qualitative judgements

5.3.4.2 Cautions when developing and using PIs

- PIs are most effective when they provide information that is sufficiently timely to allow the regulator to identify adverse trends in safety performance before a significant degradation has occurred.
- It is important to have as complete a set of PIs as possible
- PIs Should not be used alone. Rather, they should be used along with other performance insights.

5.3.5 Commendable Criteria for Good PIs

A good PI is one that meets the following criteria:

- It is resistive to manipulation, misuse, and misunderstanding.
- Definition of PI is clear, concise, and precise to make sure different observers given the same input are able to produce the same results.
- There exists a clearly defined, logical relationship to the safety regulator's objectives.
- In combination with other information, it enables timely indication of safety degradations.
- It is measurable and quantifiable to the extent possible.
- It is relatively easy to define, report, and evaluate.
- It does not result in licensees taking action contrary to safety.

5.3.6 Combining PIs and other Insights: Commendable Approaches

PIs should always be combined with other objective and subjective inputs (such as inspections, investigations into events and risk informed data), and be evaluated on a collegial manner.

The way in which such insights are combined depends on the purpose of each particular use.

When information (including PIs) is combined for a particular use it should be incorporated into the normal, systematic, process of preparing for regulatory action or decision taking.

6. CLOSING PLENARY SESSION

6.1 NRC PRESENTATION/POSTER SESSION

Participants were offered the opportunity to attend a special session organised by US NRC at which presentations and discussions took place. In parallel the facilitators met to review the work of the discussion groups and to prepare their presentations to the final workshop session.

6.2 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. [*reference Section 5]*

6.3 CLOSING REMARKS

Mr. Y. Balloffet remarked on the apparent 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:

- Radiation Protection
- Long Shutdowns
- Objective Indicators

In closing the Workshop Mr. Balloffet thanked the United States Nuclear Regulatory Commission and Mr. Collins in particular, the US delegate to CNRA, who although unable to attend was instrumental in selection of this location. He also thanked Chairman Richard Meserve of the NRC for providing valuable input on current issues related to the NRC. Mr. Balloffet also thanked Mr. Jon Johnson, Mr. Michael Johnson and Mr. Douglas Coe, as well as Ms. Sharon Bell and the staff of NRC for arranging the detailed organisation.

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.

7. EVALUATION

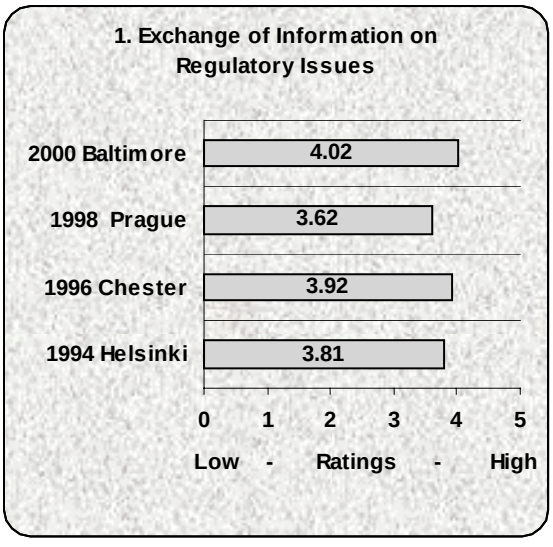
7.1 EVALUATION FORM

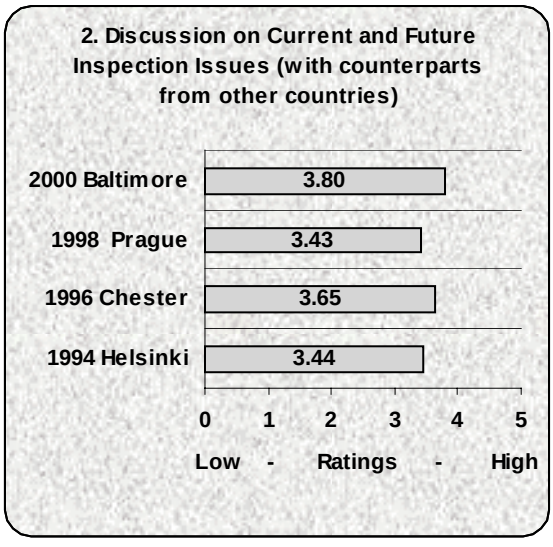
All participants at the workshop were requested to complete an evaluation form. The results of this questionnaire summarised below, are utilised by WGIP in setting up future workshops and to look at key issues for in the programme of work over the next few years. Of the 52 total participants 49 responses were received.

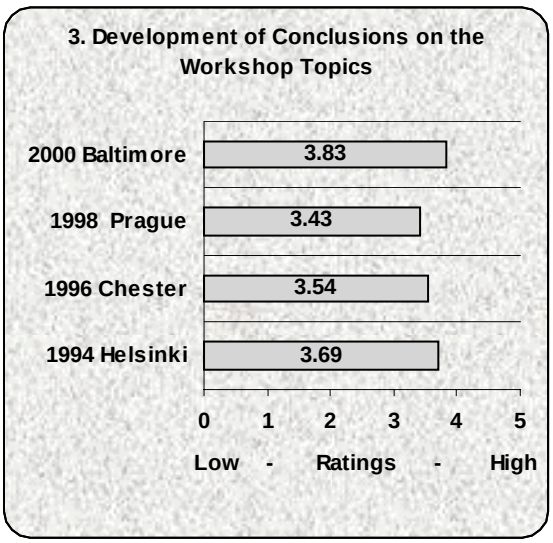
The evaluation form, which was similar to ones issued at previous workshops, asked questions in 4 areas: workshop objectives, workshop format, workshop topics and future workshops. An additional question was added to determine to what extent the information gained from the workshop is used within the 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 and tables (which also reflect scores from the previous workshops - for comparison purposes) along with a brief written summary.

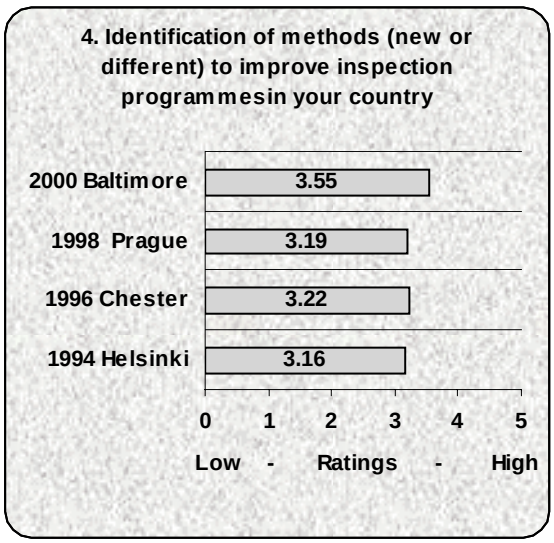
7.2 GENERAL

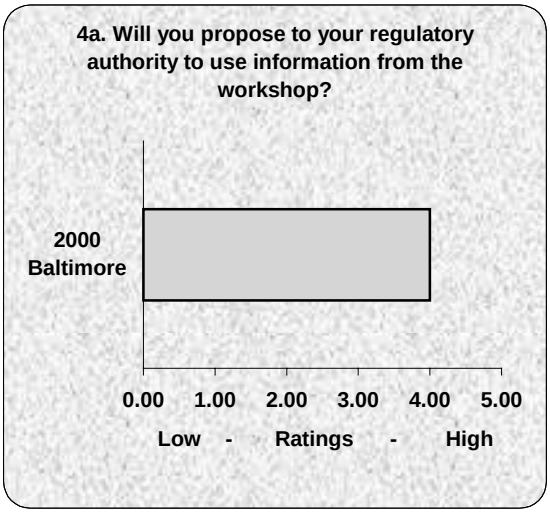
Each chart or table shows a specific objective in relation to the generally worded lead question on how well were the following objectives meet.

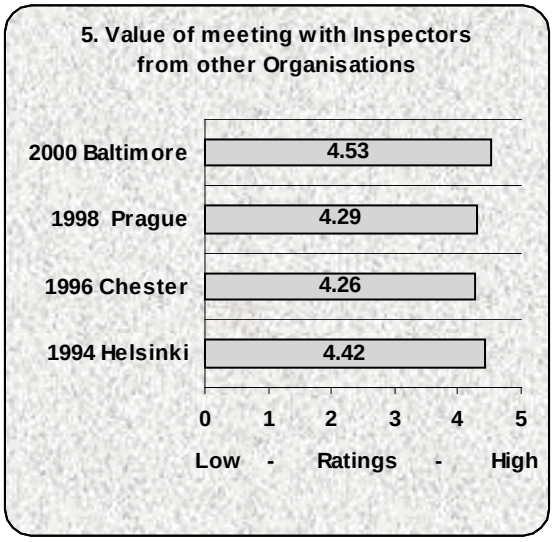










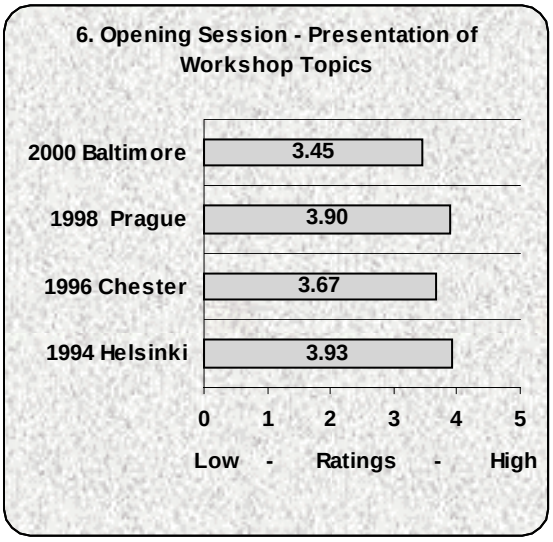


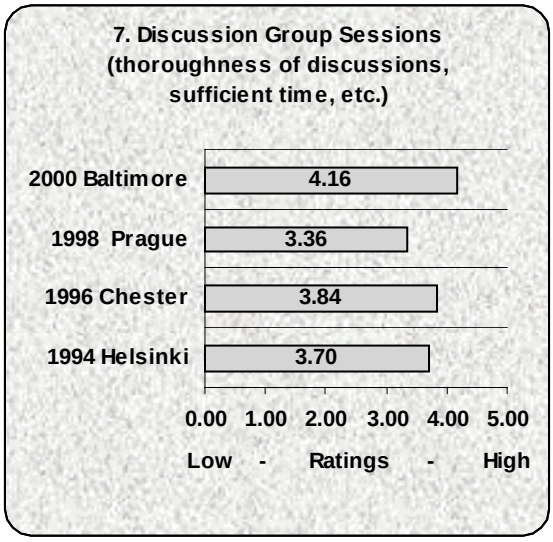
Results showed a marked increase from the last workshop in all of the questions. The increases are larger than in almost any of the other workshop survey differentials. This reflects not only a better exchange of information during the workshop but the increased focus by WGIP on better preparation prior to the workshop. As seen in the results to question 5, participants regard the value obtained from meeting with inspectors from other organisations to be one of the most beneficial parts of these workshops. The high rating on the additional question 4a shows that the information exchanges is not only valuable to the participants but helps improve national inspection programmes.

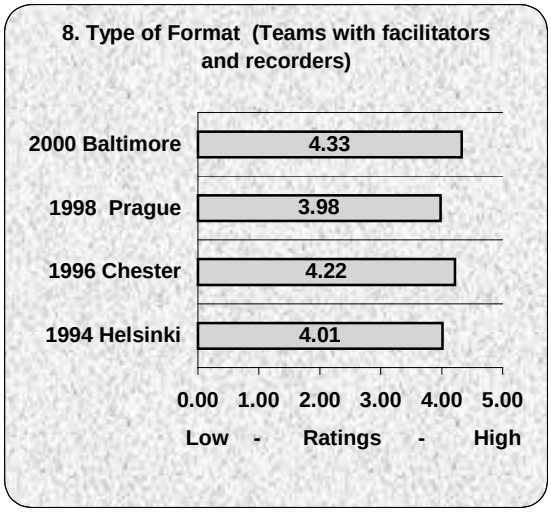
The results also reflect that participants in exchanging information are provided a unique opportunity to "calibrate" their own inspection methods against those from other countries. While exchanging inspection practices and learning new ideas are part of the main objectives, this opportunity to recognise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

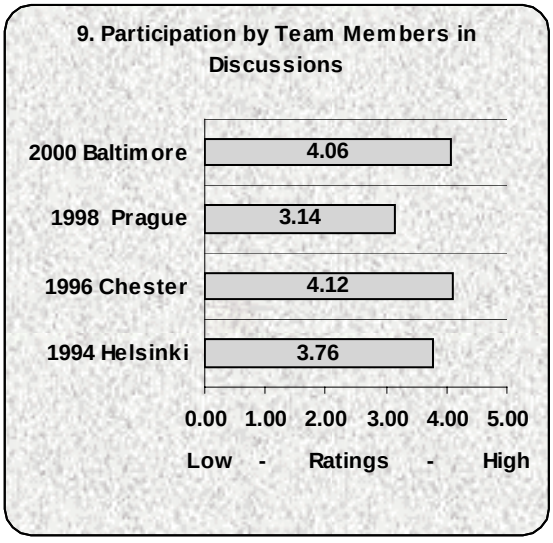
7.3 WORKSHOP FORMAT

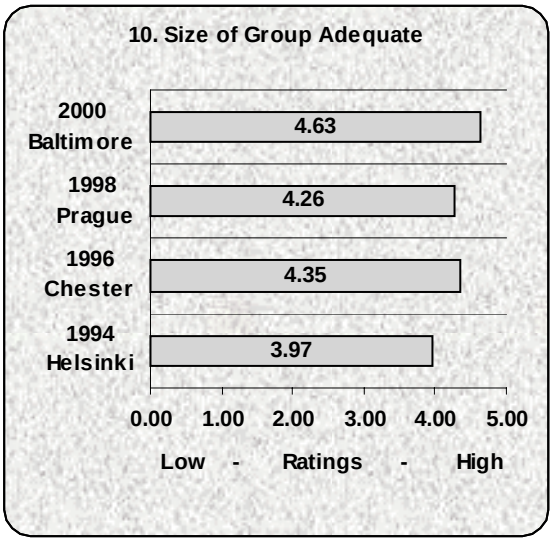
This part of the questionnaire looked at how effective each of the sessions were. The main objective of this question focuses on the way sessions are conducted. The responses provide key information to WGIP in their preparation and planning for future workshops.

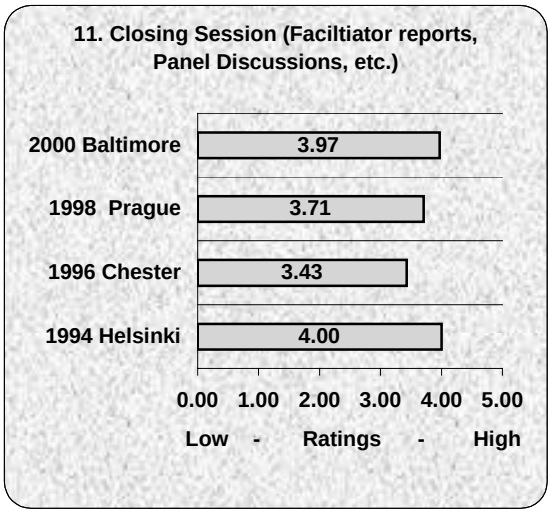












The workshop format was basically the same as used in previous workshop. Ratings in comparison to the last workshop again showed a marked increase in all areas but one, the opening session.

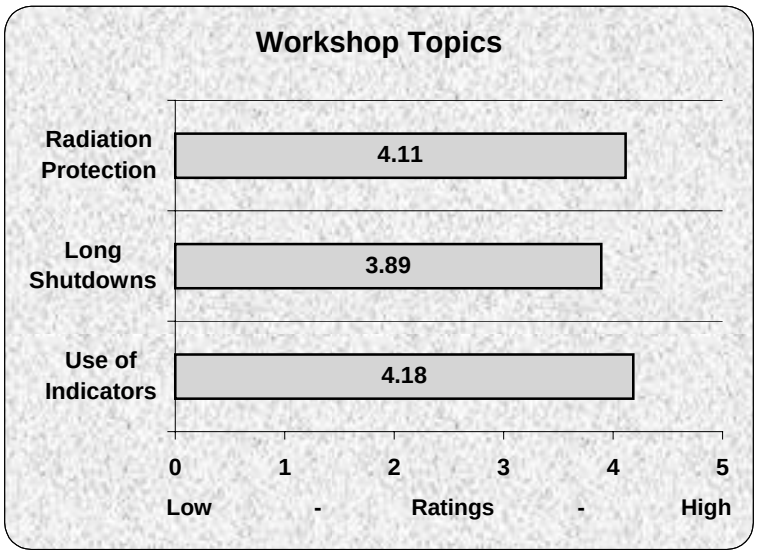
Similar to the general responses, the increases showed that preparatory work by WGIP allowed for better discussions within the breakout sessions. Facilitators and recorders were better prepared to discuss specific issues related to the topics and participants were better informed on the focus and objectives to be achieved. The issuance of questionnaires on each topic provided the ability to focus on key elements and participants where able to discuss and make valuable conclusions. Therefore, the topics were presented with a better focus on the work to be performed by the discussion groups. The decrease in the opening session was most likely the result of time taken to make all the presentations. It is noteworthy that the decrease in the opening session did not limit or decrease the outcome of the workshop.

The improved performance of the discussion groups appear to reflect not only better preparation but better balance and size in team membership. 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. Cultural and language differences are most often cited as the major problems in communicating in these types of international workshops. WGIP will be continue to focus on this item when planning future workshops.

The change made at the last to allow open discussion after each topic presentation led to a much better closing session. Participants were able to maintain a much better focus on each subject in this way. An increase in the active participation by participants, a goal set in the last workshop was seen during the closing session as well. Again the addition of a poster session on the third morning was noted in many of the comments made by the participants, as a very welcome and informative item. The added opportunity to meet and discuss informally in such a setting was rated very high.

7.4 WORKSHOP TOPICS

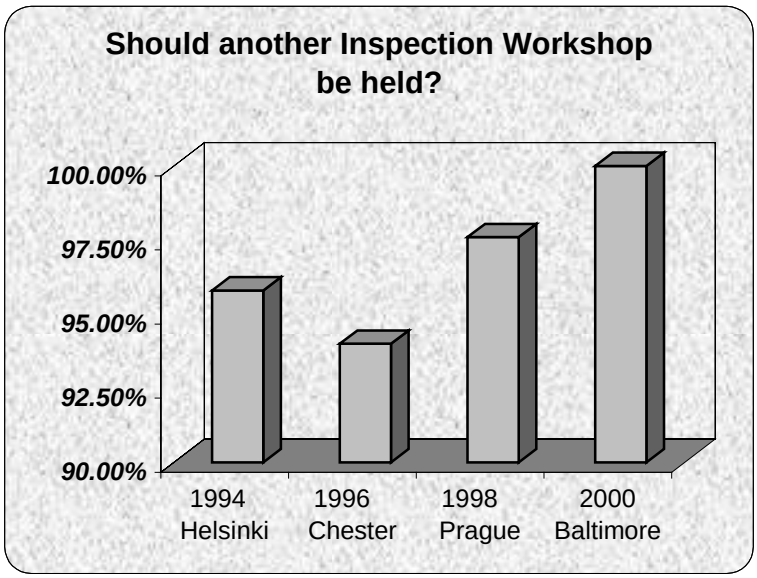
In order to assess how well the topics have been addressed, participants are asked to give a rating on whether they perceived the topics were covered adequately.

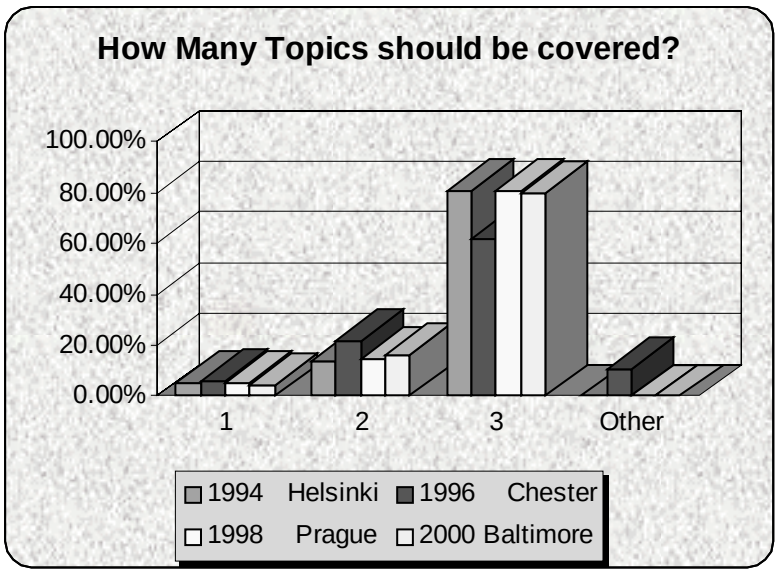


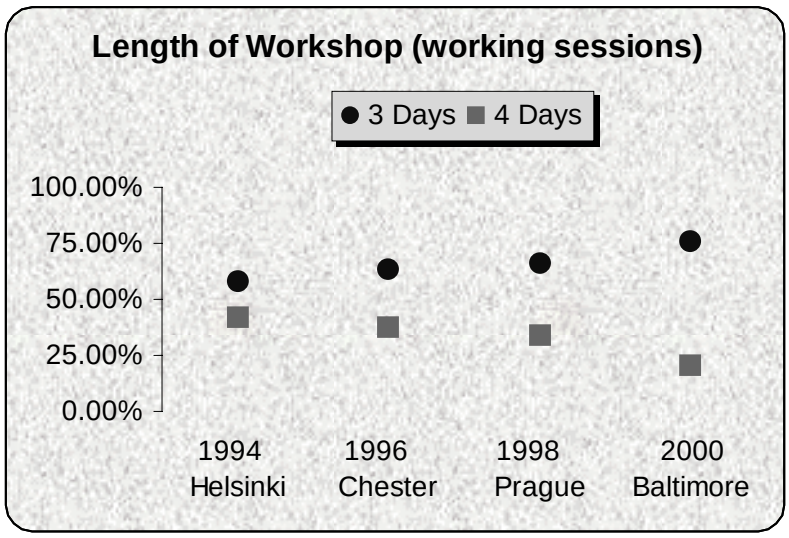
Participants were satisfied with how the topics were addressed during the workshop. These scores were higher in comparison with topics from previous workshops, A major reason for this appears to be the high interest in these issues. While many factors are involved in selecting topics, the input received from participants is extremely important. Each of the topics selected were highly rated as future issues by previous workshop participants. In addition, issues such as indicators and radiation protection were seen by both WGIP and CNRA as important.

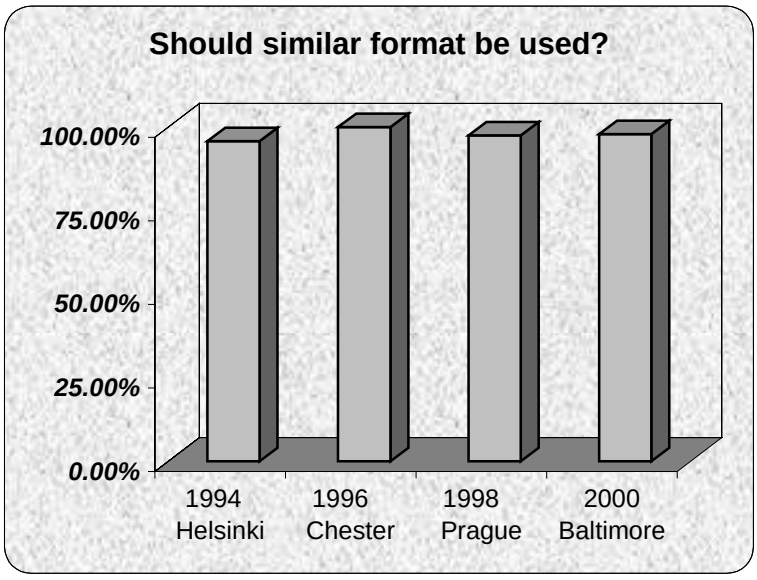
7.5 FUTURE WORKSHOPS

While section 7.3 looks at the way workshop sessions are conducted, this section provides a perspective of the type of format, on the overall value of having workshops and how they can be bettered.





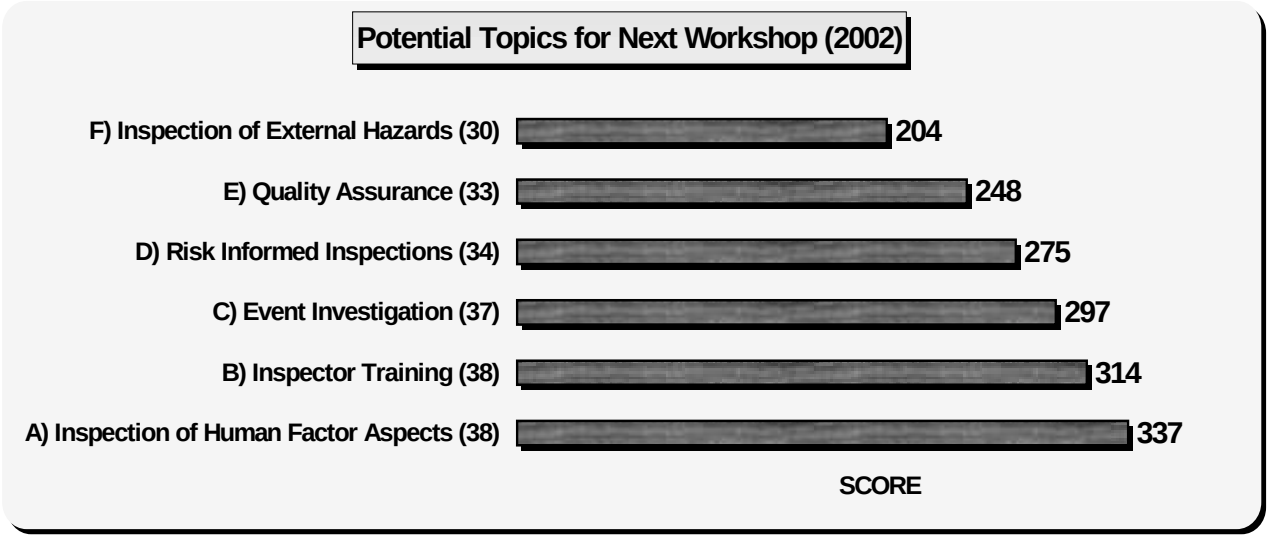




Participants were asked whether additional workshops of this type should be held in the future. The responses show that 98% answered yes. When asked about the number of topics, type of format, and length workshop, participants supported the same format presently used: e.g., 3 discussion topics, 3 day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

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 pt). The highest possible score is 490 pts (highest rating of 10 times 49 possible responses). The results were as follows:



Note:

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 (in order of decreasing ranking):

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

7.7 WORKSHOP PARTICIPANTS' COMMENTS

Below are listed some of the general comments made by some of the participants at the workshop:

7.7.1 General

- In relation to the survey questions on identification of new or different methods and the use of workshop information to improve national programmes. This was especially good and will be used to improve public relations changing from reactive to proactive information.

- Most important impact is contact with colleagues I never would have this opportunity otherwise

- Good balance in differing views – with most participants trying not to impose their own viewpoints but to share and exchange ideas.

7.7.2 Workshop Format

- The afternoon sessions seemed to end abruptly. Perhaps the schedule should include informal gatherings after dinner.

- The panel discussions could possibly be improved by presenting more than one viewpoint. The format for the discussion groups was adequate.

- Opening session could be shorter and the time used in the break-out sessions. Some of the opening addresses could be added to the first luncheon.

7.7.3 Topics

- Could have linked all 3 topics (i.e., PIs for radiation protection and long shutdowns at the end of the workshop.

- The topic I participated in was addressed very well, but it is difficult to evaluate the other topics based on the shortness of the presentations that were given

- The workshop tends to describe what kind of plans should be implemented to serve the regulatory body. What is missing is the way on "how to inspect" the plans (i.e., instead of stating it is good to inspect human performance, it would be better to state, Human Performance can be inspected by doing ...).

7.7.4 Other Comments

- Impressed by the friendliness and facilitation by all parties.

- Well done and valuable .conference. Presentations could have been shorter.

8. CONCLUSIONS

8.1 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 fifth 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 regulatory 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 and the need for regulatory inspections.

8.2 Commendable Practices

The group discussions identified the commendable practices and commendable approaches. They are included in Section 5. As for all commendable practices identified by WGIP in it's working group reports, these commendable practices are not international standards nor guidelines. Inspection practices should be determined by each country, considering its regulatory environment and practices as well as its social and cultural backgrounds. Commendable practices can be useful reference when each country improves its inspection practices.

The identified commendable practices are based on those regulatory practices that are already in use in order to give advice for further enhancement of the safety of plants and their regulatory control.

8.3 Radiation Protection Inspections

In many countries radiation protection inspections and enforcement is distributed among different authorities. The communication between the parties involved and their co-operation was identified as a key issue. Sharing the inspection results is essential for a consistent and congruent enforcement policy.

As ALARA is a general principle, it is important that ALARA be integrated into the operational radiation protection programme of the licensee. Suitable performance indicators in this area are hard to identify. As a consequence, the role of the inspector is to dialogue with the licensee and to promote a questioning

atmosphere that identifies and evaluates alternatives to ensure that radiation doses as well as radioactive releases are ALARA. The inspectors furthermore observe the interaction and interfacing of the licensee's organisational units with respect to ALARA. This in turn requires the inspector to have a broad knowledge not only on radiation protection but on NPP operation and nuclear safety as well.

The regulatory inspection authority assures that the necessary elements for an effective radiation protection organisation, i.e., qualified personnel, adequate facilities and equipment and proper training are provided by the licensee and function effectively. The licensee's radiation protection organisation should have the authority to stop work and to promote radiation safety.

The inspection on effectiveness of a licensee's inspection programme is done by review of documents, interview with staff and general observations. Collective dose results can be useful for judging the performance if placed in the proper context for standard activities, for other jobs if additional information is available, for trending performance of one licensee and for questioning performance of other licensees.

The overall approach for regulatory inspection in the field of radiation protection is a combination of general observances, inspection of equipment and facilities, review of documents and procedures and interviews with staff in a questioning atmosphere promoting ALARA attitudes. This will provide the confidence to the inspection authority that the licensee has full control of the radiological situation on the site.

8.4 Regulatory Inspections Required for Long Shutdowns and Subsequent Restarts

Long shutdowns can elicit possible risks and concerns which need to be identified and reviewed by the regulatory body. The groups looked at and developed a list of issues relating to restarting a plant that has been shut down for a long period. They also provided a catalogue of requirements on both licensees and regulatory bodies relating to long shutdowns and for restarts.

Numerous risks and concerns elicit the necessary attention and focus to long shutdowns and subsequent restarts, from the regulatory bodies. These included: Possible maintenance suspension, Lack of training, Loss of competence, Degradation in safety culture, Degradation of equipment; discovery of new degradation mechanisms, Higher staff turnover, Operation outside Technical Specifications, Lack or regulatory follow-up, Trace-ability (history of component, document trail), Configuration management problems, Massive reduction in number of personnel, Relaxation of prevention programs, Operability of safety significant systems, Termination of continuous improvement processes and interest, Lack of motivation, Unknown changes in properties, Degradation of economic situation of utility, General degradation in nuclear industry, Risk of criticality, Loss of sense of ownership and responsibility, and Overall risk different or larger than normal shutdown.

Included as commendable practices for licensees during long shutdowns were the development and use of shutdown PSAs, identification of risk-significant activities performed during shutdown and performance of self-assessment of shutdown activities to assure that safety margins are maintained. For restart it was suggested that licensees review design basis of risk-significant systems, assess suitability of management and organisation factors, perform independent assessment of restart issues and take steps to properly inform the public.

Commendable actions for regulatory inspectors included identification of appropriate regulatory improvements and development of long shutdown inspection procedures. Also regulators can use PSA to develop systematic inspections and inspectors can provide oversight of licensees risk-informed activities. Timely completion of inspection and or audit of managed processes and verification of necessary

organisational structures and processes are in compliance were recommended as well as timely identification and communication of additional requirements to licensees.

8.5 Use Of Objective Indicators by the Regulatory Authority in Evaluating the Performance of Plants

The use of objective indicators varies from country to country. Different types and approaches are used from those used to monitor trends to those for measuring ‘outcomes. The discussion groups focused on 4 areas: objectives, benefits and limitations, criteria and combining indicators with other results. Consensus was reached in several areas including criteria for good performance indicators and cautions to use in developing and using performance indicators.

It was seen that performance indicators can be used as a structured formal process for communication within and between the regulatory body and the licensee. They can also be suited to identify off-normal conditions to trigger regulatory actions and to optimise the allocation of regulatory resources.

Good criteria for developing performance indicators includes a clear concise and precise definition such that different users, given the same input will produce the same results. Performance indicators should be simple and have a logical relationship to the performance being measured. They should also be measurable and quantifiable to the extent possible. It is also recommendable that some performance indicators be able to provide timely detection of safety degradation.

Performance indicators should always be combined with other objective data and subjective inputs, and be evaluated in a mutually respectful manner. In developing and using performance indicators it is important to recognise they may not be predictive, there may be lag time between declining safety performance and changes in the indicators and it is important to have as complete a set of indicators as possible. Additionally, it should also be understood that setting performance indicator goals may leads the licensee towards unsafe behaviour

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International Organisation

OECD Nuclear Energy Agency

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APPENDIX B - OPENING PRESENTATION

CNRA

Committee on Nuclear Regulatory Activities

International Workshop on Regulatory Inspection Activities related to

Radiation Protection Inspections,
Regulatory Inspections Required For Long Shutdowns and Subsequent Restarts and
Use of Objective Indicators by the Regulatory Authority in Evaluating the Performance of Plants

Hosted by the United States Nuclear Regulatory Commission

Best Western Hotel and Conference Centre, Baltimore, Maryland
15th - 17th of May 2000.

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Opening Session

- Welcome
  - Jon Johnson, Associate Director for Inspections and Programs, NRR
  - Barry Kaufer
  - Michael Johnson
- What is WGIP - Yves Balloffet, Chairman, Working Group on Inspection Practices
- The Baltimore Workshop - Yves Balloffet, Chairman, Working Group on Inspection Practices
- Workshop Topics
  - Radiation Protection Inspections- Hartmut Klonk
  - Long Shutdowns and Subsequent Restarts - François Rinfret
  - Use of Objective Indicators - Michael Johnson

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What is WGIP

Yves Balloffet, Chairman, Working Group on Inspection Practices

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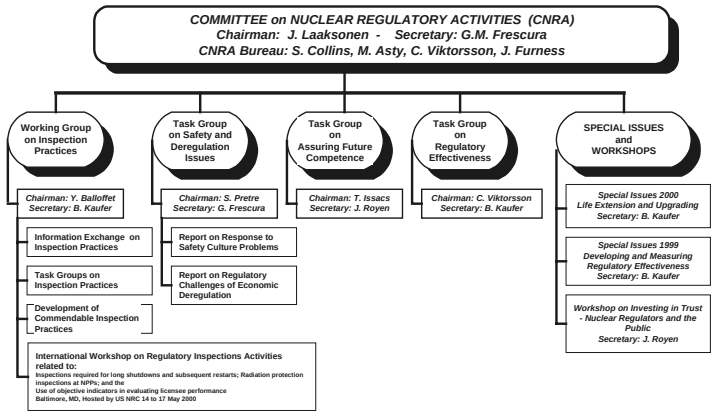
CNRA

Committee on Nuclear Regulatory Activities



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WGIP

Chairman → **Yves Balloffet**
DRIRE Rhône-Alpes - France

Vice-Chairmen → **Hartmut Klonk, BfS, Germany**
→ **Hiroyoshi Koizumi, JAPEIC, Japan**

Secretariat → **Barry Kaufer, OECD/NEA, France**

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WGIP

- **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.**
- **Mandate:** **Revised June 1998**
- **Members:** **All Member countries of the NEA**
- **Observers** **IAEA**

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WGIP Members

BELGIUM	**VAN BINNEBEEK, Jean-Jacques**	**AVN**
CANADA	**RINFRET, François**	**AECB**
CZECH REPUBLIC	**PITTERMANN, Pavel**	**SONS**
FINLAND	**SUKSI, Seija**	**STUK**
FRANCE	**BALLOFFET, Yves**	**DSIN/DRIRE**
GERMANY	**KLONK, Hartmut**	**BfS**
HUNGARY	**FICHTINGER, Gyula**	**HAEA**
ITALY	**ROSELLI, Filippo**	**ANPA**
JAPAN	**KASUKAWA, Hironobu,**	**NSTC**
	KOIZUMI, Hiroyoshi	**JAPEIC**
MEXICO	**GUTIERREZ RUIZ, Luis Miguel**	**CNSNS**
THE NETHERLANDS	**DES BOUVRIE, Evert**	**KFD**
SPAIN	**GIL, Jesus**	**CSN**
SWEDEN	**FORSBERG, Staffan**	**SKI**
SWITZERLAND	**KAUFMANN, Friedrick**	**HSK**
UNITED KINGDOM	**SUMMERS, John Lyndon**	**NII**
UNITED STATES OF AMERICA	**JOHNSON, Michael**	**NRC**
INTERNATIONAL ORGANISATIONS	**LACEY, Derek**	**IAEA**
	KAUFER, Barry	**NEA**

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WGIP Meetings

No.	Year	Date	Country	City	Site Visit
1	1991	04-05 June	France	Paris	NONE
2	1991	24-25 October	Belgium	Brussels	NONE
3	1992	26-28 May	United States	Chattanooga	NONE
4	1992	30 August -04 September	United States	**Chattanooga**	Sequoyah/Bellefonte NRC Regional Office-Atlanta
5	1993	21 April	France	Lyon	Bugey
6	1993	07-08 October	United Kingdom	Colchester	Cliff Quay Training Centre Sizewell B
7	1994	22-27 May	Finland	**Helsinki**	Loviisa
8	1994	13-14 October	Spain	Madrid	Zorita
9	1995	23-25 May	Canada	Ottawa	Darlington/Pickering
10	1995	07-09 November	Sweden	Stockholm	Oskarshamn/CLAB
11	1996	19-24 May	United Kingdom	**Chester**	Wylfa
12	1996	30 September -02 October	Germany	Munich	KFÜ/Gundremmingen
13	1997	20-23 May	Japan	Tokyo	Kashiwazaki Kariwa
14	1997	06-09 October	Switzerland	Würenlingen	ZWILAG/Leibstadt/Grimsel
15	1998	07-12 June	Czech Republic	**Prague**	Temelin
16	1998	19-22 October	Hungary	Budapest	Paks
17	1999	03-06 May	Netherlands	Den Haag	Borssele
18	1999	04-07 October	France	Lyon	Bugey
19	2000	15-17 May	United States	**Baltimore/Washington**	NONE
20	2000	16 -17 October	Spain	Madrid	

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WGIP
Mandate

- **The Working Group on Inspection Practices shall report to the Committee on Nuclear Regulatory Activities (CNRA) and assist that committee with its work concerning the inspection of nuclear installations, with regard to safety.**
- **The Working Group shall constitute a forum for the exchange of information and experience among regulatory organisations. In particular it shall review the effectiveness of inspection practices, disseminate lessons learned, and identify commendable inspection practices.**
- **The Working Group shall focus on inspection practices by regulatory organisations and associated regulatory frameworks primarily on existing power reactors. It shall also examine other matters referred to it by CNRA.**
- **The Working Group shall agree its programme of work with CNRA. It shall also, with the agreement of CNRA, sponsor specialist meetings and workshops to further its objectives.**
- **The Working Group, with the prior agreement of CNRA, shall collaborate with, and assist as appropriate, other NEA Committees or other international organisations for co-operation among regulators.**

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WGIP
Programme of Work

- Recent Reports
  - NEA/CNRA/R(99)4 - Regulatory Practices for Decommissioning of Nuclear Facilities with Special Regard of Regulatory Inspection Practices - Unclassified
  - NEA/CNRA/R(2000)2 - Commendable Practices for Regulatory Inspection Activities - For Official Use (Restricted)
- WGIP Tasks
  - Inspections of Maintenance during Operation
  - Status Report on Regulatory Inspection Philosophy, Inspection Organisation and Inspection Practices, 3rd update
- WGIP Surveys and Group Discussions
  - Inspections of Contracted Work
  - Effectiveness of Regulatory Inspections
  - Inspection of Management
- Possible Future Topics (Tasks, Surveys, Group Discussions, etc.)
  - Inspection of Contracted Work
  - Inspection of Research Reactors
  - Inspection of other Nuclear Facilities (i.e., Fuel manufacturing plants, fuel reprocessing plants, etc.)
  - Resident/non-Resident Inspectors

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WGIP
Decommissioning Report

This report summarises the answers of fourteen countries to a questionnaire describing the licensing requirements and the programmes on regulatory inspection during decommissioning. As background material, some short information on ongoing decommissioning projects is given. Also, brief information on the national status of projects for final repositories for radioactive waste has been included in the answers.

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WGIP
Commendable Inspection Practices

STATEMENT ON COMMENDABLE PRACTICES

These commendable practices are extracts from the topics, which were discussed by WGIP 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.

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WGIP
Commendable Inspection Practices

What are commendable inspection practices?

- They are **NOT RECOMMENDATIONS** (I.e., any country is free to use or not use them, when re-assessing their inspection methodology
- They go beyond identified "common practices
- "WGIP began identifying commendable inspection practices 2 years ago at the last international workshop in Prague

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The Baltimore Workshop

Yves Balloffet, Chairman, Working Group on Inspection Practices

Radiation Protection Inspections,
Regulatory Inspections Required For Long Shutdowns and Subsequent Restarts
and
Use of Objective Indicators by the Regulatory Authority in Evaluating the Performance of Plants

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Objectives

- In general, enhance international exchange of information between regulatory inspectors
- Conduct group discussions on 3 specific inspection topics
- Identify associated “commendable inspection practices” to be proposed at the end of the workshop

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Workshop Topics

- **Radiation Protection Inspections**
- **Regulatory Inspections Required For Long Shutdowns and Subsequent Restarts**
- **Use of Objective Indicators by the Regulatory Authority in Evaluating the Performance of Plants**

1. **They all deal with inspection activities**
2. **They have been selected by the Working Group on Inspection Practices (WGIP) and approved by the Committee on Nuclear Regulatory Activities (CNRA)**

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Workshop Agenda

- **Opening Session**
  - Monday morning
- **Group Discussions**
  - Monday afternoon
  - Tuesday morning
  - Tuesday afternoon
- **Poster Session and Panel Presentations**
  - Wednesday morning
- **Closing Session**
  - Wednesday afternoon

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Registration

Sunday, 14 May

17:00 Registration (Mezzanine)

17:30 Reception and Dinner (Chesapeake 2 Room)

Welcoming Address:
Mr. Jon R. Johnson, Associate Director
Office of Inspection and Programs
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission

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Monday, 15 May

Morning

07:30 Continental Breakfast (Harbor)
09:00 Opening Session (Harbor)
12:00 Luncheon (Chesapeake 2)

Afternoon

13:30 Group Discussions (Mount Vernon, Severn, Key A and B, Fort A and B)
Facilitators Meeting following group discussions (Bayview)

Evening

18:45 Workshop Dinner (Chesapeake2)

Dinner Speaker
Chairman Richard A. Meserve
U.S. Nuclear Regulatory Commission

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Tuesday, 16 May

Morning

07:30 Continental Breakfast (Harbor)
08:30 Group Discussions (Mount Vernon, Severn, Key A and B, Fort A and B)
12:00 Luncheon (Chesapeake 2)

Afternoon

13:30 Group Discussions (Mount Vernon, Severn, Key A and B, Fort A and B)
Facilitators Meeting following group discussions (Bayview)

Evening

Free Time (Sight Seeing)

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Wednesday, 17 May

Morning

07:30 Continental Breakfast (Harbor)

08:30 Poster Session and Panel Presentations (Fells Point 1 and 2, Bayview)

12:00 Luncheon (Chesapeake 2)

Afternoon

13:30 Closing Session (Harbor Room)

16:30 Closure of Workshop

Evening

18:00 Dinner Cruise (Baltimore Inner Harbor)

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Workshop Organisation

- Preparation:
  - Lead facilitators for each topic will provide summary of the responses received to the questionnaire which will be used **AS STARTING POINT FOR THE GROUP DISCUSSIONS**
- Group Discussions:
  - Six discussions groups / 2 groups per topic
  - Each group has one facilitator and one recorder
- Conclusions of Group Discussions:
  - Each group to develop conclusions and suggested or proposed commendable inspection practices on their topic
  - One lead facilitator for each topic will present the conclusions and recommendations developed followed by a question and answer period.
  - Final open panel session on the workshop
- Final Report
  - NEA/CNRA report will be prepared and issued to all participants.

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Discussion Groups

Radiation Protection Inspections - Group 1

- Hartmut Klonk, Germany (Facilitator)
- Roger Pederson, United States (Recorder)

  - Guy Scheveneels, Belgium
  - Irena Malatova, Czech Republic
  - Ludovic Demol, France
  - Lars Malmqvist, Sweden
  - Peter Burrows, United Kingdom

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Discussion Groups

Radiation Protection Inspections - Group 2

- Stephan Navert, Switzerland (Facilitator)
- Evert Des Bouvrie, Netherlands (Recorder)

  - Jim Presley, Canada
  - Veli Rihiluoma, Finland
  - Didier Lelievre, France
  - Istvan Vegvari, Hungary
  - Teresa Labarta, Spain

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Discussion Groups

Regulatory Inspections Required For Long Shutdowns and Subsequent Restarts - Group 1

- François Rinfret, Canada (Facilitator)
- Pavel Pittermann, Czech Republic (Recorder)

  - Gustavo Caruso, Argentina
  - Edward Leader, Canada
  - Pauli Kopiloff, Finland
  - Gilbert Sandon, France
  - Joachim Müller, Germany
  - Michael Lindström, Sweden
  - Guennady Poltarakov, Russia

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Discussion Groups

Regulatory Inspections Required For Long Shutdowns and Subsequent Restarts - Group 2

- Staffan Forsberg, Sweden (Facilitator)
- Hiroyoshi Koizumi, Japan (Recorder)

  - Friedrich Kaufmann, Switzerland
  - Mary Burton, Canada
  - Albert Feser, Germany
  - Miguel Calvin, Spain
  - Thomas Davenport, United Kingdom
  - John Thompson, United States

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Discussion Groups

Use of Objective Indicators by the Regulatory Authority in Evaluating the Performance of Plants - Group 1

- Michael Johnson, United States (Facilitator)
- Gyula Fichtinger, Hungary (Recorder)
- J. Lyndon Summers, United Kingdom (Recorder)

  - Ken Lafreniere, Canada
  - Walter Bergbauer, Germany
  - Victor Gonzalez Mercado, Mexico
  - Marta Maroño, Spain
  - Per-Olaf Sanden, Sweden
  - Douglas Coe, United States

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Discussion Groups

Use of Objective Indicators by the Regulatory Authority in Evaluating the Performance of Plants - Group 2

- Jean-Jacques Van Binnebeek, Belgium (Facilitator)
- Luis Miguel Gutierrez, Mexico (Recorder)
- Seija Suksi, Finland (Recorder)

  - Martine Baudoin, France
  - Ludwig Schäffler, Germany
  - Luis Angel Zagade Hernandez, Mexico
  - Günter Prohaska, Switzerland
  - Donald Hickman, United States

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Suggestions

Identifying Commendable Inspection Practices

- use the “lead facilitator” opening presentation as a starting point.
- identify common practices
- identify commendable practices which can be beneficial to most countries (some may already implement them)
- be “open-minded” and “sensitive” to the culture and regulation differences between countries
- be pragmatic
- write few statements, but enough to be clear

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