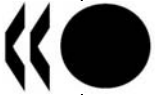


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Organisation de Coopération et de Développement Economiques
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**NUCLEAR ENERGY AGENCY
COMMITTEE ON NUCLEAR REGULATORY ACTIVITIES**

**NEA/CNRA/R(2005)3
Unclassified**

**SUMMARY AND CONCLUSIONS OF THE JOINT CNRA/CSNI WORKSHOP ON THE
REGULATORY USES OF SAFETY PERFORMANCE INDICATORS**

Held on 12-14 May 2004 in Granada, Spain

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NUCLEAR ENERGY AGENCY

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

The mission of the NEA is:

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

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

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

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COMMITTEE ON NUCLEAR REGULATORY ACTIVITIES

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

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

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

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

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SUMMARY AND CONCLUSIONS

INTRODUCTION

Regulators are monitoring closely the performance of their licensees' plants in terms of the most safety significant parameters, such as scrams or collective dose. They need, in addition to inspection results and other intelligence, indicators to evaluate the safety level of the installations. Regulators of many countries have in place country specific programmes on Safety Performance Indicators (SPIs). Harmonising methodologies and spreading information about good practices can help regulators in their task.

In some countries, there is a growing demand for information about NPP performance from the executives, public and media. Such a demand has to be responded to and the information provided need to be meaningful and understandable. Moreover, new regulatory practices such as moving towards risk informed regulation emphasise the role of quantitative information and indicators. Consequently, there may be a need for several levels of SPIs providing information for different stakeholders and decision situations.

The OECD/NEA Committees on Nuclear regulatory Activities (CNRA) and Safety of Nuclear Installations (CSNI) have addressed the issue by establishing a Joint Task Group on Safety Performance Indicators. This Group organised in cooperation with CSNI a workshop on "Regulatory Uses of Safety Performance Indicators", held in Granada on 12 - 14 May 2004.

The workshop was attended by 53 experts from the regulators, industry and technical support organizations in 18 countries (Appendix 1). Three international organisations were represented: IAEA, WANO and NEA.

The workshop programme consisted of plenary and technical sessions (Appendix 2). The plenary session topics were: international activities and indicators for regulatory effectiveness and efficiency. Technical sessions were organised around: regulatory policies related to the use of safety performance indicator systems; regulatory experience and lessons learnt about the use of safety performance indicators; indicators for safety management and safety culture; developments in risk informed safety performance indicators; and licensee safety performance indicator systems and their utilisation by the regulatory bodies. These sessions reflect the main themes set for the workshop by the organising committee (Appendix 3) in the call for papers. Together, 22 papers were presented and 5 panel discussions organised.

GENERAL OBSERVATIONS

The general observation based on the workshop presentations is that all participating regulatory bodies used safety performance indicators (SPIs) in one way or another in their regulatory oversight. Typically, the areas covered by SPIs are: reactor safety; radiation safety; emergency preparedness and human and organisational performance.

Generally, it is understood that SPIs are a tool to aid in decision making. It is also generally accepted that there are other, complementary, sources of information on licensees' safety performance. Therefore,

building indicator systems is not in itself an objective. Rather, the indicator system should be constructed so that indicators would provide decision makers with as much good quality information as possible for a variety of safety related decision making situations. Thus it is clear that the needs of each regulatory body will determine the scheme of SPIs it will use. As licensees have different motivations than regulators for using SPIs, their suites or schemes of SPIs may differ from those of their regulators.

Some regulatory bodies, like US NRC, have established a formal and public SPI system with thresholds launching regulatory actions. Most other countries have a system where indicators are used in combination with e.g. inspection results (complementary system) and regulatory actions are based on the synthesis of available data. The openness of the complementary system to the general public varies from country to country.

Ideas to build exclusive indicator systems and to manage safety entirely by using them with tools like PSA have led some countries to fear that such systems would only lead to tunnel vision in managing indicators, i.e. only attempting to minimise or maximise their values and forgetting other contributors to safety ("managing indicators and not safety"). Based on the discussions of the Granada workshop, that concern may have been justified in early development phases of SPI systems. However, it also seems that countries that have experience with indicators are learning to overcome this problem. One could say that this means "Regulating safety with the aid of indicators", of which one experience is described as "risk-informed decision making".

REGULATORY SPI SYSTEMS

Apart from differences in methods of decision making and openness to public scrutiny, regulatory indicator systems also differ with regard to their objectives. Almost all countries seem to use the indicators to steer inspections, but only about 50 % use their systems in order to provide policy makers with information. This latter use means making at least part of the SPI system public. Different stakeholders and their needs partly explain national differences in using indicators, and this is one reason impeding universal indicator systems. Experience from using indicators as a communication tool with e.g. Ministries and Parliament is still relatively sparse but in countries that have done so there is mostly very positive feedback.

The workshop participants reported many examples of misunderstandings with how indicators should be calculated or measured. This leads to the conclusion that, irrespective of whether the regulatory SPI system is formal or not, the definitions and the aims of SPIs need to be documented carefully. This definition needs to be communicated to the data collection chain and it is particularly important that stakeholders understand the definitions, to avoid misunderstanding and misinterpretation.

Trending is in used as a tool to observe indicator changes in all countries. In addition to this, countries with formal systems use thresholds to launch actions, but also mixed uses of both trending and thresholds were reported.

Colour coding was discussed on many occasions during the workshop. Colours used typically vary from green/blue for good performance through to red/orange for unsatisfactory performance or non-compliance. No clear opinion about pros and cons was formed collectively, but many countries either use or consider using colour coding at least for some of their indicators. One has to pay attention not to give a wrong message to the public with using colours. In some cases the regulators and licensees use same indicators and in such cases usually the utilities take actions on SPI at levels which may be below regulators' action levels. This was regarded as good examples both of efficient and effective licensee safety management and efficient and effective regulatory oversight as the utility seeks improved performance in advance of the regulator's intervention. Nevertheless, the workshop participants were concerned that the use of colours in

such a case might confuse non-specialists especially if the same colours were being used. In such cases, it might be better only to present numerical values and trends as compared to required limits.

One further trait of both regulatory and utility indicator systems is that they all begin to be hierarchical. This property is basically ideal: there are strategic and lower level parameters and decisions to be made. Regulators and their stakeholders may require different information. However, a hierarchical system sometimes leads to combining lower level SPI values by arithmetic means to form upper level aggregated indicators. In such cases, caution has to be exercised in order not to lose functionality. An example of this is where conflicting trends of sub-indicators (e.g. one decreases rapidly and the other increases rapidly) lead to a constant or almost-constant upper level aggregated value.

WANO indicators play an important role in regulatory SPI-systems, since licensees use them widely. Consequently, the WANO indicators form a common tool for discussion. But there are boundaries to the usefulness because comparisons between plants are limited to similar plant types in similar circumstances and cultures. Their greatest importance is to encourage emulation of the best industry performance and motivate the identification and exchange of good practices. Also, only a few of the WANO indicators are safety related. For these reasons the usefulness to operators is greater than to regulators. Some problems were reported with regard to e.g. measuring the fuel reliability index (FRI) and safety system performance (SP 1,2,5). Finally, it is clear that plants tend to target the (limited number of) indicators and this, together with genuine all-round improvements in performance, is leading to them developing plateaux (i.e. saturation).

SPECIAL ISSUES WITH REGULATORY INDICATOR SYSTEMS

A theme, which was repeated by many participants, was that an indicator system needs a regular review. This is because the indicators may lose their information and safety management value over time. For example, the indicators may lose their effectiveness (saturation) due to targeting or safety management activities, or they may fail to show optimal performance from the very beginning (indicator not well chosen). In such cases, one has to look for other SPIs so that the indicator system would again support the licensee's safety management.

A discussion arose during the workshop about the meaning and value of lagging and leading indicators. So-called lagging indicators show the trends of historical data and leading indicators are intended to forecast future performance through developing a view of the quality of licensees' processes. Related to this, the view was presented that there are only lagging indicators since indicators have to be based on some historical facts.

The workshop seemed to form a consensus that lagging indicators (like safety system unavailability, number of safety significant events, etc.) have to be used in order to confirm that the leading ones really may lead to direct and adverse safety consequences (i.e. they validate the leading indicators). Very often the leading indicators are more indirect in their effect as they relate to the efficiency of safety management and organisational processes. Also, trending of the lagging SPIs and PSA figures of merit could, for instance, be used as leading indicators as, for example, such deterioration of performance is likely to continue without action to remedy the safety management system.

The coverage of the indicators and needs for an optimal SPI set were also discussed. There seems to be slight suspicion that all the operating modes (e.g. shutdown operation) are not yet well-covered. There is also concern that a suite of SPIs, if incomplete, may lead to targeting attention and diverting it from where it is needed. Other types of data collection are also required as SPIs alone can never give the complete safety picture. A SPI set should also have a risk-informed element, i.e. it should include indicators including information about PSA initiating event frequencies; systems reliability and unavailability and

core damage frequencies. In order to be informative, such indicators require an up-to-date living PSA model, as was observed during the discussions of the workshop.

Data collection for SPIs was, perhaps slightly surprisingly, not generally reported as a major problem - neither the direct regulatory body access to raw data, nor the use of inspectors, contractors or utility reporting to arrive in indicator values. This conclusion was confirmed by a joint discussion – the regulatory bodies were normally pleased with access to indicator data. However, care is obviously required in order to verify that all the links in the data collection chain share the same understanding of the specification of the data needed and its uses in order to be sure that there is consistency in the data obtained, and regulators need to be aware of the resource burden of carrying out their own data collection and analysis.

Also, searching for a perfect SPI set was seen as not necessarily relevant – some saw it as more important to have a system which, even if imprecise, provides efficient aid for decision making in each country. Consequently, there was no agreement of a need for a “universal comparative SPI set”. Generally, experience shows that extreme caution is required when SPIs are compared – even in case of WANO indicators as discussed before. This especially applies to comparisons between different designs and at an international level, where no access to basic data may be available. A numerical comparison would require an add-on qualitative study to explain the similarities or differences, as one delegated noted, "SPIs do not tell you the truth, they only tell you where to ask questions". SPIs are better used for national assessments and decision making rather than for benchmarking purposes.

INDICATORS FOR ORGANISATIONAL EFFECTIVENESS, EFFICIENCY, SAFETY MANAGEMENT AND CULTURE

An item that is often raised in discussions is the need for indicators for safety management and safety culture. The workshop participants did not find any clear agreement about what the indicators of safety management and especially safety culture are or could be. A view was expressed that developing safety culture indicators is of first priority, but that view was contrasted by some scepticism, too. It is generally difficult to handle human and organisational performance aspects in formalised indicator systems. The view was challenged by some that safety management and culture indicators could not be produced because they relied on non-quantified judgements and surrogate measures: although it is desirable, measures do not always have to be quantitative, and nearly all SPI systems have some qualitative elements. A “black-box” alternative for regulatory bodies is to use the existing SPIs as indirect indicators of safety management effectiveness, which actually is widely taking place nowadays. Nevertheless, this does not give much chance to actively observe utility safety management.

On the other hand, there was a view amongst some delegates, particularly from utilities, that indicators of safety management and culture may be seen as belonging to the domain of utility organisation, and consequently the regulatory bodies may not wish to go too far to that domain except by oversight and inspections. However, it is agreed generally that looking for indicators for human and organisational performance and safety management effectiveness is indispensable. It has a clear coupling to self-assessment and continuous development of both utility and regulatory organisations.

The workshop briefly discussed the effectiveness and efficiency of regulatory bodies and indicators for their measurement. The conclusion was that it is not yet clear how to achieve the best regulatory effectiveness and how that would be measurable with indicators. Despite that observation, progress has been made. The CNRA Task Group on Indicators for Regulatory Effectiveness has been active in the area and some countries e.g. Finland have taken its work further. Finally, it was noticed that the SPIs used by regulatory bodies steer to some extent utilities and the regulatory functions themselves. This highlights the need for continuous reviewing of the SPI systems so that they really help in bringing information about

safety instead of just steering safety work to one direction. It also suggests that regulatory bodies need to be aware of the influence their actions have on utilities and take care that influence is positive and not inadvertently negative.

FUTURE DIRECTIONS

With the observation that SPIs are a low cost tool when compared to benefits that can be obtained from it in improving licensees' safety management and regulators' resource deployment, the joint CSNI/CNRA task group will continue its work to prepare a report on good practices with regard to the regulatory uses of SPIs. The workshop discussions indicate clearly that besides good practices, pitfalls also need to be discussed and the differences across various countries kept in mind.

With regard to the question of whether the CSNI/CNRA task group should generate a common set of indicators: the stand of the participants was mostly clearly negative. In fact, this same opinion has already, previously, been expressed by CNRA. IAEA has been active in developing a model set of SPIs for utilities, and has given the caveat that the model is but a guide, for individual utilities to adapt to their individual needs. IAEA has also considered the use of SPIs by regulatory bodies and put a lot of effort into the detailed methodologies of definition, collection, manipulation, and aggregation of indicators and the defining of thresholds. This work will be given consideration by the joint CNSI/CNRA group which will continue its work and will finish its end report during 2005.

Although a common set is not desirable as a part of the CSNI/CNRA work, examples, experience and overview of usage may be given as a part of the end report of the joint task group. Also, general agreement on objectives, characteristics and strategic areas of SPI systems are achievable internationally.

Indicators of regulators' organisational performance and effectiveness continue to be a challenging area. Developments in the field are desirable, although different views and practices exist about how much the regulators intervene in the utility safety management itself. The joint CSNI/CNRA task group will be in contact with the follow-up activities of the CNRA regulatory effectiveness work.

There is a long term trend of increased use of PSA in safety management. Therefore, risk-informed SPI development needs to continue as a part of any developments in the SPI systems.

Further consideration is also needed on how to deal with hierarchies of indicators and their use for different purposes and to inform different stakeholders. In particular, work is required on the identification and prevention of unintended consequences of indicator usage.

REPORTS ON PERFORMANCE INDICATORS AND RELATED EFFORTS BY OTHER ORGANISATIONS

In the past, the following CNRA and CSNI reports have been issued discussing various activities relating to safety performance indicators and/or organisational effectiveness:

NEA/CNRA/R(98)3 - Performance Indicators And Combining Assessments To Evaluate The Safety Performance Of Licensees.

NEA/CNRA/R(2001)3 - Improving Regulatory Effectiveness

NEA/CNRA/R(2001)4 & 5 - Regulatory Inspection Activities Related To Radiation Protection, Long Shutdowns And Subsequent Restarts, And The Use Of Objective Indicators In Evaluating The Performance Of Plants, Workshop Proceedings, Baltimore, United States, 15-17 May 2000.

NEA/CSNI/R(2001)11 - Summary Report on the Use of Plant Safety Performance Indicators.

NEA/CSNI/R(2002)2 - Specialist Meeting on Safety Performance Indicators, Proceedings, Madrid, Spain, October 17-19 2000.

NEA Publication 04728, Nuclear Regulatory Review of Licensee Self-assessment (LSA). ISBN: 92-64-02132-9. June 2003. 52 pages

NEA Publication 03669, Direct Indicators of Nuclear Regulatory Efficiency and Effectiveness - Pilot Project Results. ISBN: 92-64-02061-6. April 2004. 48 pages

The World Association of Nuclear Operators (WANO) has its own set of Performance Indicators (PI) that its members calculate in order to know how each one performs in respect to the WANO goals. Moreover, the International Atomic Energy Agency (IAEA) has issued, in 2000, the document IAEA-TECDOC-1141 "Operational Safety Performance Indicators For Nuclear Power Plants". This document presents a hierarchical development starting from general attributes, directly associated with plant safety performance, down to plant-specific safety performance indicators that are closely related to individual plant programmes. The specific SPIs proposed in the IAEA-TECDOC-1141 are just guide examples and include those more broadly used, e.g. WANO indicators. Otherwise, the IAEA SPI system is more comprehensive than that of WANO. WANO and IAEA have been participating in the CNRA/CSNI task group.

In the non-nuclear field, OECD has produced an interim "Guidance on Safety Performance Indicators" as part of its work on guiding principles for chemical accident prevention, preparedness and response which provides some useful discussion (OECD Environment, Health and Safety Publications – Series on Chemical Accidents No.11).

Finally, EU financed a concerted action "Approaches and Recommendations for the Application of Safety Performance Indicators for Nuclear Power Plants" dealing e.g. with risk informed indicators



**Joint CNRA/CSNI workshop on the
regulatory uses
of safety performance indicators
Granada, Spain, May 12 – 14, 2004**

SUMMARY AND CONCLUSIONS

**Lennart Carlsson, SKI
Pekka Pyy, OECD NEA**



General

- Together 53 participants, 18 countries + 3 international organisations present
- 22 papers, 5 panels
- Most RBs have now SPI systems in operation - development of systems is still ongoing
- Indicators are a tool to aid in decision making
- Growing understanding of merits and pitfalls - "Managing safety with the aid of indicators"
- The results of the Granada WS are in line with the conclusions of the IAEA TM in November 2003



Regulatory Frameworks

- Different stakeholders -> different strategies of using indicators (feedback from policy makers beginning to arrive)
- Definition and aim of SPIs needs to be documented
- Formal (US) and complementary SPI systems exist
- Formal system: caution with numbers in SPI definitions
- Trending generally used / thresholds in the formal system (also mixed uses reported)
- Classes / colour codes for RB and utility actions may differ
- WANO indicators play a role in RB SPI-systems despite some problems were reported WANO indicators (e.g. FRI, SP 1,2,5)
- Aggregation of SPIs - caution has to be exercised in order not to lose transparency (e.g. masking of conflicting trends of sub-indicators)



Issues With Indicators 1

- Indicator system needs a regular review since indicators may lose their information value over time (saturation, excellent performance)
- Difficult to handle human / organisational performance aspects (especially in a formal system)
- What are lagging and leading indicators, and may one genuinely have only leading ones?
- "Lagging" indicators have to be used in order to confirm that the leading ones really may lead to adverse effects on safety (validation)
- Trending of "lagging SPIs" and PSA could, for instance, be used as leading indicators



Issues With Indicators 2

- Data collection not generally experienced as a big problem (either direct RB access to raw data, use of inspectors, contractors or utility reporting)
- Are all the operating modes and situations covered by SPIs (e.g. outages)?
- Is there an optimum number of indicators for a RB set (...42...)? -> Need for an “good enough” RB decision aid
- Numerical indicators lead to follow-up questions
- Caution required in SPI comparisons (even when WANO indicators are used)
- No agreement of a need for an “universal comparative set”



Safety Management & Culture Indicators

- No clear agreement about what SM and especially what SC indicators are
- Relation to self-assessment and continuous development
- Four different views were expressed:
 - Need to develop SC/SM indicators
 - Use existing “indirect SPIs” as SC/SM indicators
 - “SM indicators are the domain of utility and RBs should not go too far except by follow-up of processes of an utility”
 - Scepticism towards existence of “SC indicators”



Reg. Body Effectiveness

- RB effectiveness discussed briefly during the workshop
- SPIs used by regulatory bodies have steer to some extent utilities and the RB functions itself
- It is not yet clear how to achieve the best regulatory effectiveness and how it would be measurable with indicators
- Some countries have taken the work further from the CNRA task outcome (Finland)



Future Directions

- Task group continues to prepare its report
- RI-SPIs (aggregated PSA figures of merit) - long term trend of increased use of PSA?
- Should the task force develop a set of high level indicators for RBs -> No, but examples, experience and overview of usage may be given
- Pitfalls besides good practices need to be reported
- Indicators of organisational performance and effectiveness are a challenging area
- Follow-up and co-ordination with the regulatory effectiveness task group

CLOSING SESSION

Joint CNRA/CSNI Workshop REGULATORY USES OF S.P.I.s

Brief Summary

J. Palomo

It has been worthwhile for me, as Quality Department Manager of IBERDROLA Nuclear Generation, to participate in this Workshop. We have shared experiences, ideas and issues regarding SPIs development and possible uses.

Nowadays, we have to face important demanding challenges and a “Continuous Improvement” environment is needed for all of us. High Quality Management with good Safety & Quality Management Systems ought to be pursued.

Management Models and Assessment Tools are key for evaluating and measuring (qualitatively and quantitatively) equipment, activities, processes and human performance. These tangible and intangible cornerstones are manifested through visible results which can be assessed.

On the other hand, according to the statement made for the first chairman of WANO, you cannot manage what you cannot measure, therefore, a coherent and comprehensive set of SPIs here takes place. SPIs should cover the important aspects of safety performance and jointly with other tools such as inspections, safety assessments, quality and operating experience feedback programmes and periodic safety reviews could illustrate or infer the NPPs safety performance level.

I have learned during the workshop that SPIs should:

- Be better used for assessment and decision making rather than for benchmarking purposes.
- At least cover indirect indicators in the NPPs strategic areas of : Reactor Safety; Radiation Safety; Emergency Preparedness and Human Performance; and direct indicators in the Regulators strategic areas of : Safety; Competence; Processes and Stakeholders. Additionally, both NPPs and Regulators should be involved in a Continuous Improvement Programme.
- Be Risk Informed taking in account : Initiating Event Frequencies; Important to Risk Systems Reliability and Unavailability and Core Damage Probabilities. It should be monitored by using living PSA and Risk Monitors and it should be understood that they are directly related to technology side not to human factor performance.
- Be hierarchical structured: Attributes; Overall- Areas; Strategic- Cornerstones; and Specific SPIs.
- Contain both “lagging-reactive” and “leading-proactive” indicators looking towards the assessment of safety management processes and programmes. However, we cannot forget that to support a leading indicator a lagging one is always needed.
- Look up human factors in spite of this SPIs are still at a development stage. M & O and Safety Culture predictive SPIs could be defined based on: a deep Root-Cause Analysis of LERs; the application of

ASCOT & INPO Guidelines, and the third attribute of TECDOC-1141. This is a clear responsibility of the Operators that Regulators could oversight it.

- Have an overall structure at different levels for different purposes. It should be developed country by country, regulator by regulator and plant by plant specifically. Notwithstanding that a common guideline could be internationally established for the upper part of this structure.
- Not transmit wrong messages to the public. SPIs is only one tool for inferring safety performance as stated earlier. No calibration to quantify NPPs safety level is needed.
- Be used for a grading response matrix taking into account inspections findings and licensees' assessment and self-assessment results.
- Be periodically reviewed. Some SPIs lose their effectiveness over time, however, old SPIs could be useful for trends monitoring. It should be a dynamic system for NPPs management but not for public information since that it is believed that, for this use, should remain stable.
- Have a different approach for criteria on thresholds when used by Regulators vs. Operators. Operators have to have more challenging goals to react first and, on the other hand, only a fraction of NPPs-SPIs is expected to be used by Regulators.
- Not likely be harmonized at international level as the WANO -PIs. Nevertheless, general agreements on objectives, characteristics and strategic areas is achievable.
- Focus to NPP management of key processes since this is the more important part of the overall plant safety performance. Lower level SPIs should be assessed by Operators and Regulators will oversight and inspect it if necessary.

Furthermore, SPIs is a low cost tool when compared to benefits that can be obtained from it.

Regarding data validation, an independent verification system should be implemented such as that one in place for Cofrentes NPP made by "owners" and "coordinators" of each SPI.

Moreover, applying colour coding to SPIs may give a wrong message when communicating with the public. It would be better to present indicators results-numerical values and trends as compared to required limits. However, colour coding is being used effectively, jointly with aggregation and weighting factors, for NPPs management/ SPIs assessment.

Finally, we can correlate SPIs benefits with: i) the ability to self-assess performance on a continuous basis; ii) identifying areas of concerns and corrective actions effectiveness; iii) detecting early symptoms of deterioration and complacency; and iv) focusing resources on important problems resolution.

Thanks a lot for allowing us to organize this workshop here in Granada, it has been a pleasure being with all of you and also thanks for your attention.

JOINT WORKSHOP NEA-CNRA/CSNI**“REGULATORY USES OF SAFETY PERFORMANCE INDICATORS”****CLOSING SESSION****Speech by Mr. Diego Molina
Director Nuclear Generation
IBERDROLA**

I am very pleased to be here today, as Director of Nuclear Generation of IBERDROLA, to participate in the Closing Session of this Joint CNRA/CSNI Workshop having the opportunity to address to you a few words about safety management and performance indicators.

I think that we all agree that both regulators and licensees have learned much about operational safety and we have improved the efficiency in our plants operation as well as the interfaces and interactions among us through better regulatory regimes and policies, so as to obtain a safer and more reliable NPPs operation. As a matter of fact, it is recognized that utilities have demonstrated a sustained high level of performance by improving their safety management systems during past years. Basic safety management frameworks had been carefully analyzed and had included key elements such as:

- safety requirements compliance and experience feedback;
- organization structure and safety culture;
- processes analysis and quality in operation manuals and procedures;
- planning, self-assessment and implementation of safety significant activities;
- control by audits, inspections, periodic safety reviews and finally by deploying safety performance indicators to oversight the whole process.

In fact, following the main idea of concentrating our objectives in achieving a good integration of safety management and business management, we have recently developed a Spanish industrial guideline: “Integrated Management System”(IMS) handling important subjects such as:

- Organization
- Planning
- Processes Management
- Assessment
- Corrective Actions Management
- Investment
- Overall Assessment, and of course,
- Performance Indicators Programme

I want to end with some comments on SPIs. First of all, I fully support the conclusions and identification of open issues drawn in this workshop, emphasizing that I believe that the set of SPIs finally chosen by each utility should be a dynamic and plant specific system. It has to be a practical tool available for plant self-assessment. Second, I think that the set of S.P.I.s for regulatory body uses should be country specific taking into consideration the already applied systems in other countries. Let me finally say that workshop like this one contributes to get a good forum for information exchange, so as to identify good practices

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through the experience feedback from already implemented S.P.I.s systems, and for the presentation of results of undergoing research projects in this field. I congratulate the NEA and the CNRA/CSNI for this event which is going for sure to be used in the future as a reference for a very good job.

Thanks to the Organizers for giving me the opportunity to participate in this closing session and thank you very much for your attention.

Appendix 1

ORGANIZING COMMITTEE MEMBERS

The members of the Committee contributed text to the conclusions and to the session summaries.

Mr. Lennart Carlsson, SKI (S)

Mr. Patrick X. Baranowsky, NRC (US)

Mr. Yves van den Berghe, AVN (B)

Mrs. Seija Suksi, STUK (FIN)

Mr. M. Tominaga / Mr. K. Kawaguchi, JNES (J)

Mr. Ken Lafrenière, CNSC (CAN)

José Palomo, IBERDROLA (S)

Mr. Manuel Ibañez, UNESA (S)

Mrs. Elena Verduras-Ruiz, CSN (S)

Dr. Pekka Pyy, NEA

Dr. Javier Yllera, IAEA

Appendix 2

OECD Nuclear Energy Agency (NEA)



Committee on the Safety of Nuclear Installations (CSNI)
Committee on the Nuclear regulatory Activities (CNRA)
CSNI Working Group on Operating Experience (WGOE)

Joint CNRA/CSNI Workshop

**“REGULATORY USES OF SAFETY PERFORMANCE
INDICATORS**

—
NEEDS, USES AND DEVELOPMENTS”

**Organised by
CONSEJO DE SEGURIDAD NUCLEAR**

In cooperation with UNESA

Granada, Spain 11-14 May 2004

PROGRAMME

TUESDAY, 11 MAY, 2004

18h30 Pre-registration at hotel Saray, Granada (until 19h30)

WEDNESDAY, 12 MAY, 2004

8h30 Registration (cont'd) - hotel Saray, Granada

9h00 **Welcome and Opening Addresses**

CHAIRPERSONS: Mr. Carlsson, Mr. Palomo

- Opening Address: *Commissioner Barceló, CSN (E)*
- Workshop objectives: *Dr. P. Pyy, OECD NEA*
- Introductory lecture: Work of CSNI/CNRA task group on safety performance indicators, *Mr. L. Carlsson, SKI (S)*, Workshop General Chairman

10h00 Logistics and Local Information: *Mrs. Verduras, Mr. Palomo.*

Plenary Session 1: International Stocktaking

10h15 **Plenary Session 1 begins**

CHAIRPERSONS: Mr. Ibañez/Mr. Izquierda, Dr. Pyy

- IAEA Programme in the area of Operational SPIs, *Dr. J. Yllera, IAEA*
- Results of the EU concerted action on risk based SPIs, *Mr. K.Köberlein, GRS (D)*
- WANO Indicators System Development, *Mr. Schlegel, WANO*

11h15 Coffee Break

Technical Session 1: Regulatory Safety Performance Indicator Systems – Policy, systems in place and their use

11h45 **Technical Session 1 begins**

CHAIRPERSONS: Mr. Lafrenière, Mr. Van den Berghe

- Performance Indicators in the Reactor Oversight Process: A Status Report, *Mr. D. Hickman, NRC (US)*
- Regulatory needs and practical application of SPIs in Slovakia, *Mr. Tkac*
- Spanish Regulatory SPI system, *Mr. Melendez, CSN (S)*
- Use of Safety Performance Indicators at STUK, *Mrs. Suksi (FIN)*

13h15 Lunch Break

14h30 **Panel discussion with Technical Session 1 Speakers**
(panellists: *Mr. Hickman, Mr. Tkac, Mr. Melendez, Mrs. Suksi*)

15h45 End of Technical Session 1 and Day One

THURSDAY, 13 MAY, 2004

Plenary Session 2: Indicators for Regulatory Effectiveness

9h00 **Plenary Session 2 begins**

CHAIRPERSONS: Mr. Tominaga, Dr. Pyy

- Opening of the Day: The results of the CNRA pilot project about regulatory effectiveness indicators: *Dr. S. Chakraborty, HSK (CH)*

9h30 **Technical Session 2 begins**

CHAIRPERSONS: Mrs. Suksi, Dr. Chakraborty

- Safety Performance Indicators for Nuclear Power Plants, Development and Applications with Specific Focus on MTO, *Mr. P. Balfantz, TUV (D)*
- An Integrative Evaluation for Organizational Safety Culture, *Mr. A. Takeharu, JNES (J)*
- Two cornerstones in SKI's Safety Indicator System – MTO-Indicators and Unavailability of Safety Systems, *Mr. J.P. Bento, JPB & Mr. L. Carlsson, SKI (S)*

10h30 Coffee Break

11h00 **Panel discussion with Technical Session 2 Speakers**
(panellists: session speakers and *Dr. Järvinen, STUK*)

Technical Session 3: Regulatory Safety Performance Indicator Systems – Lessons Learnt and New Developments

12h00 **Technical Session 3 begins**

CHAIRPERSONS: Mrs. Verduras Ruiz, Mr. Baranowsky

- Uses of the Safety Performance and regulatory Effectiveness Indicators System for the Mexican Nuclear Regulatory Body, *Mr. A. Merino (M)*
- Czech Regulatory Body Experience by using the Safety Performance Indicators, *Mr. Rehacek (CZ)*
- Some Insights From SKI Safety Indicator System Development, *Mr. Lennart Carlsson SKI & Yngve Flodin SwedPower*
- Development of Safety Performance Indicators in Korea, *Koo et al.*

13h15 Lunch Break

14h30 **Panel discussion with Technical Session 3 Speakers**
(panellists: *Mr. Merino, Mr. Rehacek, Mr. Koo, N.N*)

15h45 Coffee Break

<p><i>Technical Session 4: Developments in Risk Informed Safety Performance Indicators</i></p>

16h15 **Technical Session 4 begins**

CHAIRPERSONS: Mr. Yllera, Mr. Ibañez

- Proposed Improvements to Mitigating Systems Performance Indicators for the USNRC's Reactor Oversight Program, *Mr. P.W. Baranowsky, Mr. D.A. Dube*
- The Development of Risk Based Indicators in Czech Republic, *Mr. Sedlak (CZ)*
- Maintenance Rule Safety Performance Indicators at Cofrentes NPP, *Mr. Suarez (S)*

17h15 **Panel discussion with Technical Session 4 Speakers**
(panellists: *Mr. Baranowski, Mr. Sedlak, Mr. Suarez, N.N.*)

18h15 End of Day 2

FRIDAY, 14 MAY, 2004

Technical Session 5: Licensee Indicators and their Regulatory Uses

9h00 **Technical Session 5 begins**

CHAIRPERSONS: Mr.Hickman, Dr. Feige

- **Opening** of the Day: Evolution in the development of the Cofrentes NPP indicators to monitor operational safety performance, *Mr. Palomo, Iberdrola (S)*
- INDI - Indicator Display System, *Mr. Mandula (CZ)*
- Safety indicators, regulator's vs. operator's perspective, *Mr. B.Tomic and Mr. C.K.Chen, ENCONET (A)*

10h00 **Panel discussion with Technical Session 5 speakers**
(panellists: *Mr. Tomic, Mr. Mandula, Mr. Palomo*)

10h45 Coffee Break

Closing Session : WORKSHOP FINAL DISCUSSION AND CONCLUSIONS

11h15 **Final Discussion/Conclusions**

Moderated by Workshop General and Co-Chairmen

- Summary of the sessions and panels (session chairs)
- Open Discussion, recommendations for issue resolution and perspectives for future CSNI/CNRA actions
- Closing remarks

12h45 End of the Workshop

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