

Nuclear Regulation

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# **Direct Indicators of Nuclear Regulatory Efficiency and Effectiveness**

## **Pilot Project Results**

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NUCLEAR ENERGY AGENCY  
ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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- 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.

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## FOREWORD

In 1998, the OECD/NEA Committee on Nuclear Regulatory Activities (CNRA) initiated an activity to advance the discussion on how to enhance and measure regulatory effectiveness in relation to nuclear installations. A task group reviewed the issue and drafted a report entitled *Improving Nuclear Regulatory Effectiveness*, published in 2001. The CNRA accepted the recommendations of the report and, in particular, decided that the task group should continue its activities with the aim of developing a set of direct performance indicators of regulatory efficiency and effectiveness.

To pursue this objective, the task group assembled a demonstration set of direct indicators and conducted a one-year pilot project. The present report describes the results of the pilot project, and makes some general observations about the usefulness of individual indicators as well as recommendations for future activities.

The report has been prepared on the basis of discussions and input from the Task Group on Regulatory Effectiveness (TGRE), with technical and secretarial assistance from Barry Kaufer, Dr. G.J. Kurt Asmis, Dr. S.A Harbison and Elisabeth Mauny.

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## TABLE OF CONTENTS

Foreword .....	3
Executive Summary .....	7
1. Introduction .....	9
2. Using Nuclear Regulatory Performance Indicators.....	11
3. Results of the Pilot Project .....	15
4. Observations and Conclusions .....	41
5. Recommendations .....	43
6. Reference Material .....	45



## EXECUTIVE SUMMARY

A pilot project, conducted by a CNRA task group of regulators from nine NEA member countries, has proven the usefulness of direct performance indicators in helping to assess and communicate regulatory efficiency and effectiveness. Direct indicators are those which measure a regulator's own performance, as distinct from indirect indicators which infer a regulator's effectiveness from its licensee's safety performance. It has also identified potential limits and cautions related to the use of performance indicators. The pilot project was prompted by Recommendation 6 of the previous NEA report on *Improving Nuclear Regulatory Effectiveness*. The task group developed a set of trial indicators based on the definition of regulatory effectiveness given in this report.

The direct indicators were developed to be able to:

- Verify that regulatory work is performed in accordance with the regulator's mission, strategy and plans.
- Verify that work is done according to internal quality procedures and policy.
- Measure performance of work.
- Determine the perception of various stakeholders and staff towards regulatory processes.
- Promote the use of detailed work plans for regulatory activities.

The fundamental value of performance indicators for a nuclear regulatory body is to focus on its safety mission. Maximum benefit can be derived from the use of performance indicators if they are part of an established quality management model. Performance indicators may also be used to communicate with stakeholders, to monitor internal processes and budgeting, and when necessary to assist strategic development and to manage change. Their use should be part of a continuous improvement process involving all stakeholders, including regulatory staff.

After initial discussions to identify the sorts of direct performance indicators that could be usefully tested, the group developed a common template for performing the pilot. The pilot was carried out over a period of one year. At its conclusion, an international forum “Measuring, Assessing and Communicating Regulatory Effectiveness, (MACRE 2003)” was held, which validated the work of the task group and provided helpful insights. This report describes the results of the pilot project, gives some observations about the usefulness of individual indicators and makes recommendations for future activities. The complete results are contained in a separate project document. Chapters 1 and 2 discuss the background and framework for the set indicators developed and tested by the task group. Chapter 3 lists the indicators and provides an assessment of their use and the lessons learned. Chapter 4 provides observations and general conclusions. The report concludes with recommendations in chapter 5. Chapter 6 provides the major references used by the task group.

It is recommended that regulatory bodies utilise direct performance indicators to the extent possible and remain active in the area to continue development of an integrated framework for regulatory efficiency and effectiveness.

The organisations from the nine countries that took part in the pilot project were:

- Canadian Nuclear Safety Commission (CNSC), Canada.
- STUK, Radiation and Nuclear Safety Authority, Finland.
- Direction générale de la sûreté nucléaire et de la radioprotection (DGSNR), France.
- Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), Germany.
- Nuclear and Industrial Safety Agency (NISA), Japan.
- Swedish Nuclear Power Inspectorate (SKI), Sweden.
- Swiss Federal Nuclear Safety Inspectorate (HSK), Switzerland.
- Health and Safety Executive Nuclear Installations Inspectorate, (HSE/NII), United Kingdom.
- Nuclear Regulatory Commission (NRC), United States.

## 1. INTRODUCTION

In 1998, the OECD/NEA Committee on Nuclear Regulatory Activities (CNRA) initiated an activity with the objective of advancing the discussion on how to enhance and measure regulatory effectiveness in relation to nuclear installations. One of the outcomes of this activity was to establish a task group to advance the understanding of regulatory effectiveness. The discussions and deliberations of the task group resulted in the publication of the report *Improving Nuclear Regulatory Effectiveness*. The CNRA accepted the recommendations of the report and, in particular relating to recommendation 6, decided that the task group should continue its activities with the aim of developing a set of direct performance indicators of regulatory efficiency and effectiveness.

In the NEA report on *Improving Nuclear Regulatory Effectiveness* the role of indicators in a regulatory process is defined. In order to identify meaningful and measurable performance indicators it is necessary for a regulatory body to engage all of its stakeholders. Once a regulatory body has established a suite of performance indicators it can use them to evaluate and improve its level of regulatory efficiency and effectiveness.

As defined in the previous NEA report a regulatory body is effective when it:

- ensures that an acceptable level of safety is being maintained by the regulated operating organisations;
- develops and maintains an adequate level of competence;
- takes appropriate actions to prevent degradation of safety and to promote safety improvements;
- performs its regulatory functions in a timely and cost-effective manner as well as in a manner that ensures the confidence of the operating organisations, the general public, and the government; and
- strives for continuous improvements in its performance.

A task group of regulators from nine (9) NEA member countries was established to continue the development and evaluation of potential direct performance indicators of regulatory efficiency and effectiveness, based on this definition. A set of direct performance indicators was evaluated during the one-year pilot project. At the conclusion of the pilot a workshop, MACRE 2003, was held which validated the usefulness of this approach and provided helpful insights that enhanced the value of this work.

## 2. USING NUCLEAR REGULATORY PERFORMANCE INDICATORS

The desired outcome of regulatory activities is the safe operation of nuclear facilities in a manner that protects public health and safety, and the environment. The operator has prime responsibility for safe operation; however, the actions of the regulator contribute to this objective.

The regulator's direct contribution to nuclear safety is difficult to demonstrate, but it should at least be possible to develop indicators that provide insights into the regulator's performance in meeting its overall mission and objectives. It is important to recognise that a set of performance indicators is only one element in a matrix of evidence to assist management/stakeholders in evaluating the performance of a regulatory body. Other elements include qualitative assessments of regulatory activities and stakeholder feedback, which give an indication of the quality of regulatory performance. Performance indicators can be used by regulators to measure progress towards achieving regulatory outcomes and strategic objectives, addressing stakeholders' issues, and to provide timely indication of problems.

Performance indicators can be categorised in several ways. In the previous NEA report on *Improving Nuclear Regulatory Effectiveness*, they were considered under two headings: direct and indirect indicators:

- direct performance indicators attempt to measure the regulator's own activities and tend to use data generated within the regulatory body itself, while
- indirect performance indicators rely on the performance indicators of other stakeholders, principally the licensees, to deduce the performance of the regulatory body.

The focus of this pilot project was on direct indicators, recognising that other groups are dealing with indirect indicators.

The objectives of this project were to:

- obtain practical experience in gathering information and data related to regulatory efficiency and effectiveness;
- assess the relevance and usefulness of the selected performance indicators;
- assess the value of performance indicators in:
  - promoting internal quality;
  - providing information on regulatory efficiency and effectiveness;
  - providing input to a continuous improvement process;
  - helping to communicate with stakeholders; and
- disseminate lessons learned from the pilot.

The pilot project also identified a number of limitations and cautions related to the use of performance indicators.

### **Framework**

For a regulatory body to make effective use of performance indicators, it should have a formal business or management model in place. This provides a framework for sustainable use and integration of performance information to improve regulatory efficiency and effectiveness. Other benefits include improved communication with stakeholders including regulatory staff, integration of budget and resource allocations, accountability, and linkage of performance results to desired outcomes. Even without a formal business model, however, it is beneficial to establish a set of performance indicators to help the regulatory body assess and improve its performance.

This pilot project adopted the definition of regulatory effectiveness in the previous NEA report and developed and grouped a set of direct indicators to demonstrate the extent to which the regulatory body:

1. ensures that an acceptable level of safety is being maintained by the regulated operating organisations;
2. develops and maintains an adequate level of competence;
3. takes appropriate actions to prevent degradation of safety and to promote safety improvements;

4. performs its regulatory functions in a timely and cost-effective manner as well as in a manner that ensures the confidence of the operating organisations, the general public, and the government, and
5. strives for continuous improvements in its performance.

### **Desirable attributes of indicators**

Previous NEA documents have identified the following attributes of good performance indicators:

- Suitable for the purpose intended and measurable.
- Useful for communicating within the regulatory body and with its stakeholders.
- Capable of identifying undesirable trends to trigger actions by the regulator.
- Helping to focus and prioritise the regulator's activities.
- Providing a stimulus to the regulatory body to improve its performance.

The task group had these attributes in mind when it developed the list of performance indicators presented in this report (see the table in Chapter 3). Although the direct performance indicators chosen for this pilot satisfied the above attributes, it is also recognised that they provide a valuable though clearly incomplete assessment of regulatory performance. Within this framework, each regulatory body is naturally free to choose, modify, amend and supplement these indicators to suit its particular regulatory environment.

### **Limits and cautions when using performance indicators**

Notwithstanding the significant potential benefits of using performance indicators, stakeholders should be aware of certain limits and cautions:

- Performance indicators (particularly direct indicators) cannot give the complete picture of the performance of a regulatory body.

- There may be a tendency to focus on areas where it is easy to develop indicators and to forget the importance of qualitative aspects.
- Resources may be diverted in an attempt to meet performance indicator targets at the expense of the overall mission of the regulatory body.
- As verified during the pilot project, it is easier to develop performance indicators on efficiency rather than on effectiveness.
- There is a temptation to compare regulators without an in-depth understanding of the subtle differences between indicators used by different national regulatory bodies and the differences in culture, laws and the style of regulation.
- Comparing performance against the targets does not give the complete picture; there needs to be an analysis of trends as well.
- Caution must be exercised to avoid sacrificing quality to meet numerical targets.

In spite of these limits and cautions, and the cost of establishing and maintaining a performance management system, the task group feels quite strongly that performance indicators, correctly used, will have such great benefits that it is worthwhile making significant efforts to work within these limitations.

### **3. RESULTS OF THE PILOT PROJECT**

This Chapter provides the definition given for each indicator, a specific example on how it was used and a general assessment of the results obtained in the pilot project.

Each of the nine countries participating in the pilot reviewed each of the indicators and the defined measurable attributes and selected a candidate number of indicators to track. A country's candidate indicator selection was completely voluntary, nominally based on their national experience, the availability of information in the required category and most importantly their interest in being able to address specific concerns. The participants were given the flexibility to adjust the indicators for their use.

To establish uniformity in reporting, a standard template (see Figure on page 19) was developed. This template allowed the pilot country to identify and describe the specific indicator, establish specific targets and/or ranges, provide a discussion of how it was applied including benefits and limitations and explain the results obtained with supplemental information on related issues. The complete results of the pilot project are contained in a separate project document. Members of the pilot project will use this material for further analysis in the future.

A particular finding of note was that for each attribute addressed by the indicators the maturity of a regulator's processes has to be considered. This was more evident in indicator Section 5 on "Strives for continuous improvements in its performance", but the members of the study recognised that it applies throughout the pilot structure. And it explains, to some extent, a general finding that many of our indicators are of output rather than outcome.

Through the maturity process the indicators might become less subjective and more objective; less lagging and more leading; less output and more outcome.

For example, for the introduction of a regulatory management system the steps are: to develop a QM framework; then a strategy to implement it. The

measure is simply whether there is a framework – yes or no? The next stage is to identify elements of the QM system and commence their implementation – the measure might be has each stage been delivered as planned? Once there is a process in operation there will be *outputs* that can be measured – e.g. non-conformance resolution. Beyond that, as the process becomes self-improving, *outcomes* may be measured. At each stage the measures are different and the early stage indicators need to be abandoned once processes have been delivered. For each regulator, each attribute of the pilot structure will be in a different stage of the process – some may not even have started. The recognition that a particular aspect is missing should in itself be an important driver for improvement.

The remainder of this chapter is devoted to providing an assessment of the indicators used in the pilot project.

Table. **Pilot Project Indicators**

#	Indicator Title	Page
<b>1</b>	<b>Ensures that an acceptable level of safety is being maintained by the regulated operating organisations</b>	
1.1	Regulations and Guides are published, up-to-date, clear and comprehensive	20
1.2	Planned inspections are carried out	
1.3	Safety assessments are carried out	21
1.4	Licensee events are recorded and analysed	22
1.5	Emergency exercises are planned and carried out	23
1.6	Emerging issues are responded to	24
1.7	Integrated safety assessments of licensees facilities are carried out	
1.8	Safety deficiencies are recorded and corrected	25
<b>2</b>	<b>Develops and maintains an adequate level of competence</b>	
2.1	Appropriate resources, financial and human, for the regulatory control of nuclear safety are identified and updated according to plan	
2.2	The training and professional development of regulatory staff is carried out	26

#	Indicator Title	Page
2.3	Maintain requisite skills	27
2.4	The workload of regulatory staff members is appropriate for a learning organisation	
<b>3</b>	<b>Takes appropriate actions to prevent degradation of safety and to promote safety improvements</b>	28
3.1	Regulatory response to periodic safety reviews are carried out	
3.2	Experience is gained from abnormal situations, plant failures and their repairs and then this experience is incorporated into the regulatory programme	
3.3	An active programme of safety-related research is developed and implemented in accordance with an agreed/published plan	29
3.4	The safety management of regulated organisations is monitored	
<b>4</b>	<b>Performs its regulatory functions in a timely and cost-effective manner as well as in a manner that ensures the confidence of the operating organisations, the general public, and the government</b>	30
4.1	The regulatory outcome targets (e.g. mission and goals) are being adequately met	
4.2	Regulatory decision making is in accordance with criteria	31
4.3	Timeliness, clarity and openness of regulatory processes and procedures criteria and goals are met	
4.4	The regulatory document control systems meet the established quality standards	32
4.5	The initial regulatory response to any abnormal or accident situation on a licensed facility meets the agreed published plan	
4.6	Enforcement actions taken by the regulator are in accordance with policy	33
4.7	Regulatory obligations with regard to informing/communicating with other stakeholders (e.g. Government, general public, etc.) are in accordance with policy	

#	Indicator Title	Page
4.8	The regulator's international obligations are carried out in accordance with the agreed plan	34
4.9	The management of contracts is carried out in accordance with the agreed/published policy	35
4.10	Leadership is responsive and supports vision, mission and values of the organisation	
<b>5</b>	<b>Strives for continuous improvements in its performance</b>	36
5.1	Feedback from all stakeholders and licensees in the regulatory process is obtained, analysed and utilised as appropriate on a regular basis	
5.2	The efficacy of any action programme in response to licensee and stakeholder feedback is determined by reference to the criteria	
5.3	The results of regulatory processes are regularly reviewed and evaluated, against agreed/published criteria, and used to modify the strategic direction for the following year	37
5.4	Regulatory activities are assessed against the overall Mission to ascertain the extent to which outcome targets have been met	38
5.5	The regulatory plan and its associated performance indicators are evaluated regularly in order to verify that outputs correspond to expected outcomes and that resources are being used efficiently and effectively	
5.6	Has a formal business and or quality management system	39

Figure. **Reporting Template**

Performance Indicator	Title as it relates to Chapter 3 and any changes that may be required.
Description	Description to amplify the title as modified. May touch on frequency that the indicator area is sampled.
Target or Range	Target or range the indicator is supposed to be in (if not available then a note about how that target will be established).
Discussion	<p>Discussion on whether or not this will be a leading/lagging indicator, what might be the challenges in collecting the data, what might be the challenges in transforming the data to meaningful information for decision makers. Focus comments on:</p> <ul style="list-style-type: none"> <li>• what was learned,</li> <li>• limitations,</li> <li>• improvements generated,</li> <li>• initiatives or “investments” that are being tracked through Performance Indicators,</li> <li>• anticipated benefits.</li> </ul>
Results (optional)	The results already achieved (this applies to existing indicators and if no past history, perhaps a past history of like minded indicators in other industries or jurisdictions, or failing that similarity, a discussion on results that are hoped to be achieved).
Supplemental Information	Supplemental Information which might include related studies, how this indicator fits into say the hierarchy of indicators – some more detailed, others more global or indirect, etc.

**1. Ensures that an acceptable level of safety is being maintained by the regulated operating organisations**

**1.1 *Regulations and Guides are published, up-to-date, clear and comprehensive***

The proportion completed relative to the plan.

*Specific example*

Maintenance of regulations – Regulatory guides are updated according to annual plan.

*Assessment*

- All users were able to use the established indicator, but predetermined targets (e.g. predefined period for reviewing and updating) and results depended on differences in how the participating countries defined regulations and guides. (e.g. legally binding documents, non-binding guides, etc.).
- The qualitative aspects (relevance, comprehensiveness, proportionality, clearness, applicability, etc.) may not have been explicitly included in this indicator.
- This indicator can be extended to include other regulatory documents.

**1.2 *Planned inspections are carried out***

- The proportion of planned inspections made in a given year.
- The proportion of inspections leading to significant enforcement actions.

*Specific example*

The proportion completed relative to plan.

### *Assessment*

- This indicator was found to be useful. Some of the benefits noted were: improved management and promotes holistic view; prompted the regulator to consider improvements to inspection planning and reporting system; showed obligation to perform certain inspections met; was useful for tracking a fundamental regulatory activity and that routine inspections are carried out according to plan; use of indicator led to programme improvements; and the use to focus inspection on high risk licensees and to lower effort on low risk licensed operations.
- The main limitation of this indicator is that by itself it does not reflect quality and added value of inspections carried out.
- Several new sub-indicators were identified such as the percent of reactors for which “baseline” inspections are completed per year.

### **1.3 Safety assessments are carried out**

- The proportion completed and on time relative to the plan.
- The proportion utilising risk informed technology.

### *Specific example*

The proportion of safety assessments completed and on time relative to the plan.

### *Assessment*

- This indicator was generally found to be useful in tracking the assessment work both internally within the regulator and with their Technical Support Organisations (TSOs). The second sub-indicator was found useful by those users that had already established a risk-informed approach for optimising resource allocation for their operations and for communicating safety issues with licensing management and stakeholders.

- Difficulties encountered were:
  - Challenges in compiling information due to lack of resources/staff shortages; challenges in establishing processing times for safety assessments.
  - Factoring in the delays that occur when licensees submit safety submissions are received that require questions to be asked and a dialogue to be undertaken.
- Some of the benefits quoted were: used in reactor oversight program; used to track performance on different categories of safety assessments carried out by the regulator; used to track completion of safety assessments by Technical Support Organisations (TSOs).
- The indicator by itself it does not reflect quality and added value of safety assessments carried out.
- Implementation of an electronic documentation system was offered as one solution to getting the information more easily.

#### ***1.4 Licensee events are recorded and analysed***

- Time to completion of analysis based on plan.
- Time for regulatory response to emerging issues.

##### *Specific example*

Time to issue communications to industry regarding follow-up to licensee events.

##### *Assessment*

- This indicator was found useful because it highlights the intensity of resources used and the adequacy of resources assigned to this type of activity. Additionally the first sub-indicator was found useful to disseminate results of analysis within the regulatory authority and nuclear safety community.
- In order to better utilise the indicator, in addition to the time factor, completeness, screening, determination of safety

significance, generic implications, immediate corrective action and release of generic communication should be addressed.

- Several new sub-indicators were identified. For example, the number of and proportion of licensee events categorised as significant, very significant or extremely significant and the number of incidents per risk level or type of response.

### ***1.5 Emergency exercises are planned and carried out***

The proportion completed relative to the plan.

#### *Specific example*

The proportion of emergency exercises relative to the plan in a given year.

#### *Assessment*

- In using this indicator, it was agreed that the definition should be interpreted such that it refers to the regulator's activities (e.g.; the regulator's involvement in emergency exercises relative to the plan). The indicator was found useful, however there may be a need to define sub-indicators in order to reflect country specific situations.
- Use of this indicator provides strong evidence to authorities concerning the need to put more emphasis on emergency exercises.
- This indicator has a limitation of not being informative on the quality or adequacy of plans. Poor performance in terms of this, or any other indicator, should trigger an analysis of root causes, an identification of the trade-offs made, and whether these were justified in terms of risk.
- Consideration should be given to developing indicators or tools to evaluate the effectiveness of emergency exercises.

**1.6 *Emerging issues are responded to***

- Staff is provided with and aware of guidance and instructions.
- Number and proportion of emerging issues responded to.
- Stability of instructions as measured against changes to instructions following new issues.

*Specific example*

None

*Assessment*

This indicator was not evaluated in the pilot. However we recommend that it be retained for future evaluations. Some reasons that it may not have been used are: difficulty to identify an issue as an emerging issue and difficulty to determine at what time it emerged.

**1.7 *Integrated safety assessments of licensees' facilities are carried out***

- Comparative assessment of licensees' performance indicators – results achieved vs. planned performance.
- Proportion of planned activities reviewed relative to plan.

*Specific example*

Comparative assessment of licensees' performance in safety areas – results achieved.

*Assessment*

- This indicator is useful for monitoring regulatory performance.
- This indicator can be tied to the corporate strategic objective of ensuring that the regulatory regime is effective and efficient.
- This indicator focused on a process that can include an analysis of licensees performance indicators thereby allowing the integration of indirect indicators.

### **1.8 Safety deficiencies are recorded and corrected**

Proportion and number of safety deficiencies still outstanding at end of year.

#### *Specific example*

Safety deficiencies or non-compliances are recorded and corrected within the stipulated time.

#### *Assessment*

- The indicator was found useful for tracking the resolution of issues, deficiencies or items of non-compliance raised in inspection and safety assessment reports and to reflect the ability of staff action to encourage licensees to address deficiencies or items of non-compliance.
- Difficulties or problems of data collection and tracking were encountered.
- To be useful and relevant this indicator should include “importance attributes”. Care needs to be taken with this indicator to avoid taking away the licensees' responsibilities.

## **2. Develops and maintains an adequate level of competence**

### **2.1 *Appropriate resources, financial and human, for the regulatory control of nuclear safety are identified and updated according to plan***

- Proportion of staff with particular core competencies (such as structural mechanics), compared with planned number.
- Competence analysis updated according to plan.
- Corporate memory is maintained according to plan.

#### *Specific example*

Proportion of staff with particular core competencies (such as structural mechanics), compared with planned number.

### *Assessment*

- Participants used the first sub-indicator and found this one useful.
- This indicator is able to track strategic measures to ensure sustainability and availability of competencies of staff.
- The indicator could be used for human resource planning and to gauge how well the strategies for attracting and retaining excellent staff are working.
- Extension to the full intent of the indicator may be useful in the future.

### **2.2 *The training and professional development of regulatory staff is carried out***

Proportion of staff completing training/development activities, compared with planned number.

#### *Specific example*

Proportion of resources expended on training/development versus the budgeted number.

### *Assessment*

- The exercise showed that this is an appropriate indicator.
- The Performance Indicator gives one point of view on training effort but it should be completed with figures concerning staff turnover and information on level of competencies at hiring time.
- An integrated information system to track training should make this indicator easier to use.
- Other sub-indicators were provided for example: training and professional development and time tracking.

### **2.3** *Maintain requisite skills*

- Staff turnover measured by rate or other appropriate techniques.
- Corporate memory is maintained according to plan.

#### *Specific example*

Total and average years of experience of the technical staff.

#### *Assessment*

- The indicator was found to be useful but targets were difficult to fix.
- This can be used to track trends and analyse the impact on regulatory objectives.
- The Performance Indicator does not take into account competencies at hiring time.
- Personal development programs could be included as well as indicators to keep a proper balance in terms of experience, knowledge, and diversity of viewpoints.

### **2.4** *The workload of regulatory staff members is appropriate for a learning organisation*

Number of staff whose workload fell outside defined boundaries.

#### *Specific example*

Overtime greater than 15 hours per month (in per cent of nominal working hours).

#### *Assessment*

- Not enough exposure in this pilot to give a meaningful judgement on benefits or on limitations.
- This performance indicator needs to be developed further to include proper work mix, which takes into account: age,

experience, background, new-emerging technologies, new ways of licensing, etc.

**3. Takes appropriate actions to prevent degradation of safety and to promote safety improvements**

**3.1 *Regulatory responses to periodic safety reviews are carried out***

Proportion of safety assessments/periodic safety reviews performed to time, according to plan.

*Specific example*

Average age of the last safety review.

*Assessment*

- This indicator was useful for tracking the completion of specific safety reviews, rather proactive or reactive. It enables timely resource allocation in order to accomplish the highest priority activities.
- This indicator doesn't address qualitative aspects of safety reviews regarding scope and depth of reviews.

**3.2 *Experience is gained from abnormal situations, plant failures and their repairs and then this experience is incorporated into the regulatory programme***

- Number of recommendation issued by experience feedback group.
- Proportion of recommendations issued actually implemented.

*Specific example*

Precursor reports are issued in timely fashion.

*Assessment*

- Targets are difficult to set for this indicator because of the emerging issue aspect. Value is derived from monitoring and analysing the trend of abnormal situations and following up on the resulting recommendations for improvement.

- There is a danger that putting too much importance on an absolute numerical target could influence the licensee and regulatory body (e.g. licensee not looking for or not declaring abnormal situations and regulatory body issuing recommendations regardless of their benefit or applicability) behaviours. The indicator does not track qualitative aspects of recommendations (significance of abnormal situations and added value of recommendations).

**3.3 *An active programme of safety-related research is developed and implemented in accordance with an agreed/published plan***

Proportion of projects completed to plan.

*Specific examples*

- Proportion of research projects progressing according to plan.
- Proportion of projects completed to plan.

*Assessment*

- This indicator has benefits in monitoring the progress and completion of research activities against an established plan. In the case of joint research programs, the monitoring of the indicator can avoid undue duplication of efforts and help optimising resource allocation.
- However, the indicator does not evaluate the adequacy of the plan or the results of the research.

**3.4 *The safety management of regulated organisations is monitored***

- Proportion of regulated organisations evaluated for core competency staffing levels, to established standards.
- Proportion of regulated organisations planned changes (e.g. technologies, management systems, and organisational structures) evaluated, to established standards.

*Specific example*

Proportion of regulated organisations planned changes evaluated, to established standards.

### *Assessment*

- This indicator simply monitors the review activities of the regulator, on a topic that is important but difficult to assess.
- This area does not have well-established standards for evaluation such as what to evaluate, how to evaluate it and who evaluates it.

#### **4. Performs its regulatory functions in a timely and cost-effective manner as well as in a manner that ensures the confidence of the operating organizations and all other stakeholders**

##### ***4.1 The regulatory outcome targets (e.g. mission and goals) are being adequately met***

- Proportion of outcome targets met.
- Proportion of licensing requirements that have been met by the operating organisations.
- Number of safety deficiencies identified by regulator that were not identified by operator.

### *Specific example*

Proportion of planned compliance promotion activities carried out at the end of the year.

### *Assessment*

- This indicator was found to be useful. It can be used to track and provide clear evidence on the extent to which the goals and mission of the regulatory body have been met.
- Generally, this indicator and the others in group 4 are designed to build stakeholder confidence and trust.
- The indicators in group 4 give insights on activities, outputs, and global outcomes.

#### **4.2 *Regulatory decision making is in accordance with criteria***

Proportion of regulatory decisions meeting the criteria (e.g. number of safety cases cleared within 3 months of submission).

##### *Specific example*

Timely decision making – decisions should be distributed in two months. Indicator is number (and proportions) of decisions distribution: less than 1 month / 1-3 months / more than 3 months.

##### *Assessment*

- The indicator was found to be useful. It allows the regulatory body to structure its work and allocate its resources.
- A limitation is that this indicator by itself does not reflect quality and added value of regulatory decisions.

#### **4.3 *Timeliness, clarity and openness of regulatory processes and procedures criteria and goals are met***

The compliance policy in terms of graded enforcement has been fairly administered.

##### *Specific example*

Ratio of number of jobs for which the time schedule is met to total number (without counting those occasions where schedule changes are beyond the regulator's control).

##### *Assessment*

- This indicator was found to be useful, but more specific sub-indicators were felt to be needed.
- There may be added value to the regulator in establishing more consistent outputs, evaluations that have some uniformity in terms of risk, penalties awarded, and sanctions towards the licensees.

**4.4** *The regulatory document control systems meet the established quality standards*

- Proportion of documents completed to quality and timeliness standards.
- Number of incidents of unavailability of information required to support regulatory activities.

*Specific example*

Ratio of number of times inspection reports are completed on schedule to total number.

*Assessment*

There is not enough information at this point to assess the usefulness of this indicator. However, we recommend that this indicator be retained and put to trial use as it can be used for root cause analysis.

**4.5** *The initial regulatory response to any abnormal or accident situation on a licensed facility meets the agreed published plan*

- Proportion of situations responded to within specified criteria.
- Proportion of investigations responded to within specified criteria.
- Tools, guidance and training provided to responding staff meet expectations.

*Specific example*

None

*Assessment*

There is no information at this point to assess the usefulness of this indicator. However, we recommend that this indicator be retained and put to trial use as it can be used for root cause analysis and incident reporting.

**4.6** *Enforcement actions taken by the regulator are in accordance with policy*

Proportion of enforcement activities that meet criteria in plan.

*Specific examples*

- Proportion of enforcement activities that meet criteria in plan.
- The percent of enforcement activities that meet timeliness criteria.

*Assessment*

- This indicator was found to be useful, particularly for monitoring the effectiveness of a graded enforcement approach.
- The effectiveness of an enforcement policy can be checked using this performance indicator.
- The pilot project showed that a number of sub-indicators can be defined in this area.

**4.7** *Regulatory obligations with regard to informing/communicating with other stakeholders (e.g. Government, general public, etc.) are in accordance with policy*

- Number of surveys of stakeholder views.
- Stakeholder views fall within target bands.
- Number of questions responded to within criteria.

*Specific examples*

- Regulatory obligations with regard to informing/communicating with other stakeholders (e.g. Government, general public, etc.) are in accordance with policy.
- Number of surveys of stakeholder views.

*Assessment*

- The indicator was found to be useful.

- To get a complete picture of stakeholder views, the regulatory body has to consult a spectrum of stakeholders.
- To use this indicator, a regulatory body needs a clear policy on communication with its stakeholders.
- This indicator may require extensive resources to implement.
- Regulatory bodies should consider sub-indicators that measure accessibility of the regulator, particularly using technologies such as the Internet.

**4.8 *The regulator's international obligations are carried out in accordance with the agreed plan***

- Proportion of staff participating in meetings, working groups, peer review activities relative to plan.
- Standards changed and improved, regulations up-graded due to international involvement.

*Specific examples*

- Volume of international activities.
- Volume of exchange of personnel.

*Assessment*

- This indicator was found to be useful, but more work needs to be done to develop additional sub-indicators. For instance, sub-indicators that show that the regulator's participation in international activities has been effective would be useful. Also, sub-indicators that show how the aspects of a learning organisation can be addressed by participating in international activities would be useful.
- There is a danger in focusing on the volume of activity without looking at the quality of the international activity.
- There is value to extend this indicator to garner viewpoints from international and other sources of data and information.

**4.9** *The management of contracts is carried out in accordance with the agreed/published policy*

- Proportion of planned contracts issued on time.
- Proportion of results that met pre-established success criteria.

*Specific example*

Ratio of non-chargeable to total resources.

*Assessment*

- There is not enough information at this point to assess the usefulness of this indicator. However, we recommend that this indicator be retained and put to trial use as it can be used for checking if the contractor has provided quality work and value for the money.
- This indicator could provide management with a means of verifying that the right contractor has been awarded the right work.

**4.10** *Leadership is responsive and supports vision, mission and values of the organisation*

Proportion of acceptance of staff proposals.

*Specific example*

Ratio of suggestions related to process improvement to total number submitted.

*Assessment*

- There is not enough information at this point to assess the usefulness of this indicator. However, we recommend that this indicator be retained and put to trial use as it can be useful for making improvements based on feedback from staff.
- A programme is needed for responding to staff proposals to effectively use this indicator.

- There is a need for more sub-indicators in this area (e.g., internal surveys to assess the quality of leadership).

## **5. Strives for continuous improvement in its performance**

### **5.1 *Feedback from all stakeholders and licensees in the regulatory process is obtained, analysed and utilised as appropriate on a regular basis***

- Proportion of meetings with licensees and stakeholders, compared with plan.
- Proportion of licensee and stakeholder views that indicate satisfaction with regulator.
- Number of analyses carried out and improvements instigated due to licensee and stakeholder feedback process .

#### *Specific example*

Number of analyses carried out and improvements instigated due to licensee and stakeholder feedback process.

#### *Assessment*

- This is a useful indicator to evaluate stakeholders feedback and could be used within the framework of a quality management system. It is also useful to align or to adjust your strategic goals and thereby can provide improvements.
- Use of this indicator requires not only solicitation of stakeholders by the regulator but also an active participation of the external stakeholders
- The appropriateness and adequacy of input for further analysis has to be carefully judged taking into account the various view-points of various stakeholders.

### **5.2 *The efficacy of any action programme in response to licensee and stakeholder feedback is determined by reference to the criteria***

Proportion of changes to strategic and corporate internal programmes that can be attributed to licensee and stakeholder feedback.

*Specific example*

None

*Assessment*

- This performance indicator was not evaluated during the pilot project as it is necessary to have a mature stakeholder engagement process in place before it can be used.
- Distinguishing which category of stakeholders provides specific input could enrich the indicator.

**5.3 *The results of regulatory processes are regularly reviewed and evaluated, against agreed/published criteria, and used to modify the strategic direction for the following year***

- Proportion of regulatory processes reviewed relative to plan.
- Timeliness of such reviews in relation to plans.
- Proportion of changes attributed to process reviews.
- Strategic plan for the year produced.
- Annual report produced.
- Values of the organisation discussed .

*Specific example*

Strategic plans for the year produced.

*Assessment*

- These performance indicators were easy to use and happened to be useful to review and monitor the functionality of regulatory processes and can thereby help initiate necessary improvements.
- These performance indicators do not track qualitative aspects of these products (effectiveness of the processes, pertinence of the plans or interest of the report).

**5.4 *Regulatory activities are assessed against the overall Mission to ascertain the extent to which outcome targets have been met***

- Proportion of assessments of regulatory activities carried out compared with plan.
- Performance Indicators reviewed.
- Results of external peer reviews.

*Specific example*

Proportion of internal audits carried out compared to plan.

*Assessment*

- Use of this Performance Indicator fosters an effective self-assessment program and continuous improvement philosophy. It incorporates all contributing elements to the regulatory body's missions.
- It is not possible to use all sub-indicators if a regulator does not have a quality management system.

**5.5 *The regulatory Plan and its associated performance indicators are evaluated regularly in order to verify that outputs correspond to expected outcomes and that resources are being used efficiently and effectively***

- Number of evaluations of Performance Indicators carried out relative to plan.
- Number of Performance Indicators reworked and redesigned (measures stability of suite of Performance Indicators).
- Number of new Performance Indicators required to properly assign resources and confirm achievement of mission and goals.

*Specific example*

This performance indicator was not evaluated during the pilot project.

### *Assessment*

Since this indicator evaluates the entire performance indicator system, there must be several years of experience before a thorough assessment can be performed.

#### **5.6 *Has a formal business and or quality management system***

- Uses a recognised methodology (such as ISO 9000 or EFQM).
- Includes a policy for its business management.
- Applies to the whole of the regulator's activities and at all levels.
- Regular reviews are planned, carried out and improvements and findings are implemented.
- External and internal audits and benchmarking is planned and carried out to plan (remark: ISO-definitions).

### *Specific example*

Scores of internal/external assessments of the business excellence model of the European Foundation for Quality Management (EFQM).

### *Assessment*

This indicator requires redefinition and further elaboration to change the current wording of this Yes/No indicator with indicators that measure progress towards a formal business and or quality management system.



#### **4. OBSERVATIONS AND CONCLUSIONS**

Throughout the pilot project, participants provided feedback regarding their experiences in implementing the direct performance indicators, using a template designed for that purpose. The significant feedback is summarised below. The task group recognises that, during the course of one year, it is impossible to capture all of the positive and negative aspects of the use of performance indicators.

Use of direct performance indicators:

- Provided a better holistic picture of the work situation and allowed line management to get a better picture of the work situation of every individual.
- Allowed an increased focus on long term matters and provided a basis for adjusting priorities within the work plan and planning system.
- Allowed the identification of poor performance and triggered corrective actions.
- Allowed a more informed allocation of resources with appropriate adjustments in accordance with the mission.
- Demonstrated the difficulty of defining indicators that are not influenced by other indicators.
- Allowed more effective communication with internal and external stakeholders.
- Fostered an improved understanding of expectations by internal and external stakeholders.
- Promoted a better focus on regulatory outcomes.

- Should be part of a long term commitment to self-improvement.
- Can lead to staff frustration if the performance indicators are regarded as too many, unhelpful, or unfocused on the main mission of the regulatory body.
- Must be preceded by clear definitions, and followed by appropriate analysis, to avoid misinterpretation.
- Should be viewed in the context of a balanced quality management system.
- Needs to be supplemented with qualitative aspects, indirect indicators and other information in order to get a complete assessment of regulatory performance.
- Requires caution in order to avoid sacrificing quality to meet numerical targets.
- Tends to focus on efficiency rather than effectiveness performance indicators.

## 5. RECOMMENDATIONS

Based upon the experience gained during the course of this pilot project, the following recommendations are made:

- It is recommended that member countries utilise direct performance indicators, including those presented in this report, to the extent possible to assess and improve their regulatory efficiency and effectiveness. Maximum benefit can be derived from the use of performance indicators if they are part of an established quality management system.
- It is recommended that the CNRA remains active in this area and convene an annual status review to exchange lessons learned. A task group should be convened in 2006 to produce a progress report by 2007, taking into consideration other international activities in this area.
- The CNRA should examine methods of integrating all the various efforts and initiatives in the general area of regulatory efficiency and effectiveness.
- It is recommended that the NEA communicate the results of this pilot project to other interested stakeholders (e.g. member and non-member countries).
- It is recommended that the CNRA develop an integrated framework for regulatory efficiency and effectiveness, paying particular attention to qualitative aspects of regulatory performance and the value added by the regulatory body to nuclear safety.



## 6. REFERENCE MATERIAL

Numerous documents were used in the preparation of this report and several are directly referenced in this report. They are considered as both reference material and additional reading for those who plan to begin work on direct indicators. These documents include:

### Direct references

- NEA (2001), *Improving Nuclear Regulatory Effectiveness*, CNRA Report 2001 (Note: This is sometimes referred to as the previous NEA report), OECD, Paris.
- Proceedings from the NEA International Forum on Measuring, Assessing and Communicating Regulatory Effectiveness (MACRE 2003), NEA/CNRA/R(2004)x, not yet published.
- CNRA Pilot Project on Direct Indicators for Nuclear Regulatory Efficiency and Effectiveness – Complete Results (for official use only), NEA/CNRA/R(2004)x, not yet published.
- TGRE Notebook – Compilation of information compiled by the TGRE Task Group, (for official use only), internal CNRA document.

### Other useful references

- NEA (2002), *Improving versus Maintaining Nuclear Safety*, CNRA Report, OECD, Paris.
- Assessment of Regulatory Effectiveness, IAEA PDRP-4, 1999.