

Unclassified

NEA/CNRA/R(98)3



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

OLIS : 10-Apr-1998

Dist. : 15-Apr-1998

PARIS

English text only

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

**NEA/CNRA/R(98)3
Unclassified**

Working Group on Inspection Practices (WGIP)

**PERFORMANCE INDICATORS AND COMBINING ASSESSMENTS TO
EVALUATE THE SAFETY PERFORMANCE OF LICENSEES**

64197

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ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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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 all OECD Member countries except New Zealand and Poland. The Commission of the European Communities takes part in the work of the Agency.

The primary objective of the NEA is to promote co-operation among the governments of its participating countries in furthering the development of nuclear power as a safe, environmentally acceptable and economic energy source.

This is achieved by:

- *encouraging harmonization of national regulatory policies and practices, with particular reference to the safety of nuclear installations, protection of man against ionising radiation and preservation of the environment, radioactive waste management, and nuclear third party liability and insurance;*
- *assessing the contribution of nuclear power to the overall energy supply by keeping under review the technical and economic aspects of nuclear power growth and forecasting demand and supply for the different phases of the nuclear fuel cycle;*
- *developing exchanges of scientific and technical information particularly through participation in common services;*
- *setting up international research and development programmes and joint undertakings.*

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

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COMMITTEE ON NUCLEAR REGULATORY ACTIVITIES

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

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

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

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

ABSTRACT

This report provides a compilation on how Member countries use the use of performance indicators and how assessments are combined in systematically evaluating a licensee's performance.

FOREWORD

The CNRA believes that safety inspections are a major element in the regulatory authority's efforts to ensure the safe operation of nuclear facilities. Considering the importance of these issues, the Committee has established a special Working Group on Inspection Practices (WGIP). The purpose of WGIP, is to facilitate the exchange of information and experience related to regulatory safety inspections between CNRA Member countries.

As a follow-up to the 1995 document on Compilation of Responses to a Questionnaire on the Evaluation of the Safety Performance of Licensees, WGIP members identified several issues where additional information would be useful in future meetings and discussions. The consensus of the Group was that performance indicators (PIs) and how assessments are combined were the two issues that should be addressed first. It was noted also that in addition to information in obtained through the questionnaire, results from the workshop in May 1996 may provide valuable input to the endeavour. This report summarises a review conducted of the PI-related information provided by the questionnaire, the workshop, and responses from WGIP members to a request for specific information not addressed previously.

The authors wish to thank all those members of WGIP and their associated colleagues for their contributions. The WGIP also wishes to extend their appreciation to Mr. Richard Aubrey of AECSB, Canada who headed up this task and provided overall co-ordination in editing and compiling the report and to Dr. J. J. Van Binnebeek and Mr. T. F. H. Warren for their assistance in reviewing the draft reports.

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1. BACKGROUND

At the seventh meeting of the WGIP, held in May 1994, it was decided that a report should be put together that provides general guidance to regulators on how to monitor the safety performance of licensees. The Group further noted that the report should highlight both positive and negative aspects of monitoring methods, based on the experience of regulatory bodies (RBs). At the Group's next meeting later that fall, it was confirmed that the title of the report would be "Methods to Evaluate the Safety Performance of Licensees", in which the focus would remain on inspection practices.

As a first step, the WGIP decided to conduct a survey by developing and issuing a questionnaire to all members. The rationale for this decision was that an understanding of different national practices is a fundamental requirement for the production of meaningful guidance on effective methods for regulators to use in the evaluation of safety performance. Reviewing the responses to this questionnaire at its meeting in May 1995, the Group identified several issues where additional information was necessary to produce this guidance. To this end, members elaborated on the answers given previously. A small sub-group analysed all answers to the questionnaire, and concluded in a report provided to the Group at its November 1995 meeting that an in-depth look into several issues was required still. This need was prompted not by the inadequacy of the answers, but by the disparity in some regulatory approaches to evaluating the safety performance of licensees. The questionnaire successfully fulfilled its function in gathering information on national practices.

To achieve its goal in providing general guidance, the WGIP decided at the same meeting to prioritise the issues requiring further study. The consensus of the Group was that performance indicators (PIs) and how assessments are combined were the two issues that should be addressed first. It was noted also that in addition to information in the questionnaire, results from the workshop in May 1996 may provide valuable input to the endeavour. This report summarises a review conducted of the PI-related information provided by the questionnaire, the workshop, and responses from WGIP members to a request for specific information not addressed previously.

Finally, a supplementary list of questions was developed at the WGIP meeting in May 1997 that aimed at finding out national practices for combining information. The summary below therefore also presents a general view of members on how tools such as PIs are combined to assess systematically licensee performance.

2. ANALYSIS

The answers provided by members to the original questionnaire and to a series of follow-up questions are summarised in each of five areas:

- PI Role in the Evaluation Process;
- PI Source and Safety Relevance;
- Selection Criteria and Normalisation Practices;
- Functional Areas Covered;
- Reporting Requirements.

Because the primary objective of the original questionnaire was to provide guidance on the use of PIs, the advantages and disadvantages that members identified are described too. Information from the supplementary questions on combining information from tools such as PIs is presented under six general headings:

- Regularly Reported Data;
- Use of Data as an Evaluation Tool;
- Combination/Integration;
- Measures to Ensure Systematic Evaluations;
- Conclusion from the Integration Process;
- Transmission of Results.

Annex A presents the compilation of answers to the questionnaires.

The analysis compares the answers in each area and extracts common or different practices to make a summary statement. Depending on the degree of similarity, different conclusions can be drawn. In some cases, where all regulators follow the same practice, the conclusions are definitive. Other times, where practices vary, an indication is given of the relative use. Finally, and most importantly, all views on the positive and negative aspects of a PI programme are presented in a detailed rather than summary form. Each of the two means of presentation is intended to provide useful guidance of a different type. First, the summaries inform on the most common practices around the world, and second, the detailed views highlight positive and negative aspects gained through experience.

3. CONCLUSIONS

As a general conclusion, the answers show that while there is much commonality among licensees, there is significant variance in PI use by regulatory bodies. Most licensees use INPO or WANO type indicators that some regulatory bodies use in annual reports on operational performance. Other regulators have their own sets or are in the process of developing them. A few simply do not use them. Whereas there was varied practice on PI use, there was a lot of similarity on how assessment information is combined and integrated. Even though the processes may not exactly be the same, the general thrust or aims largely were very much alike.

Specific conclusions drawn for each of the five areas on PI use and the six relating to combining information from such assessment tools are outlined in the sections that follow. Views on advantages and disadvantages of PIs, the specific tool discussed in this report, are given last for any country to consider when deciding whether or not to implement a programme itself.

4. PERFORMANCE INDICATORS

PI Role in the Evaluation Process

There is no country where information from a Performance Indicator is used by itself to evaluate a licensee's performance. In all cases, PIs are recognised as one of many tools that a regulator may use. It is important that information gathered through other means such as weekly meetings, inspections, event analysis, and periodic safety reviews be considered too. In essence, PIs serve as a supplementary tool to others that are already in use.

PI Source and Safety Relevance

In some cases, licensees provide the data for the PIs that regulatory bodies generate. Other regulators use the licensees PIs directly, but typically only those relevant to safety.

Selection Criteria

Information on selection criteria to choose appropriate safety-related PIs was sparse. However, some criteria mentioned by one country include sensitivity to change, definability, discouragement of PI management, unmanipulability of data, and impact on safe operation.

Functional Areas Covered

The PIs used by regulatory bodies have many similarities. Most common are unavailability rates, significant events, scrams (trips), radiological emissions, and collective dose to workers. As to the functional areas covered by these PIs, worker safety and public safety were the two most obvious ones.

Reporting Requirements

Most responses indicated that either the data used for indicators or the PIs themselves were subject to a legal reporting requirement. In three cases, these reports have to be submitted annually while in another, monthly reports are necessary. Most countries did not mention any specific report frequencies.

5. COMBINING ASSESSMENTS

Regularly Reported Data

All licensees are required to provide data to the RBs that is related to safety performance. Some of the data may be used as a PI to trend performance, while other data is used for other purposes including direct input into the evaluation process. Generally, there are two types of report necessary. Licensees must report on their activities routinely according to a predetermined schedule, and they have to report on events/incidents/accidents at the time of occurrence.

Use of Data as an Evaluation Tool

There is mixed practice on how the data is put to use. Some use the data as direct input when assessing licensee performance in a particular area or in general. They are used too when planning audits or inspections. Databases capture certain types of information that may be consulted for this purpose. There are also RBs that expand use of the databases for trending performance as an indicator of a licensee's direction vis-à-vis safety. A couple of countries stated explicitly that some data is used to conduct inter-plant comparisons.

Combination/Integration

Formalised quantitative processes to combine/integrate data are not in common practice. Most countries collect information from the RB activities such as inspection, event analysis, data review and the study of licensee reports. Combination and integration of this information is done in a qualitative fashion through discussion amongst RB inspectors and technical experts. Results typically appear in an annual report on licensee performance.

Measures to Ensure Systematic Evaluations

Although quantitative means to combine/integrate information are not in place anywhere, most countries do have an administrative process to help achieve consistency. These include a formalised report guideline, policies, observations, internal audits, periodic meetings of inspectors, standard inspections, procedures, checklists, forums to discuss evaluation and integration, and organisational structure.

Conclusions from Integration Process

There is not much information available on how conclusions are drawn. Some said that no formal process was in place, indicating as well that consultation was the most practised means. Review panels, meetings, and annual reports were some of the primary vehicles used to generate conclusions. Technical knowledge and experience of the participants/contributors were noted as tools. Use of the conclusions generally include augmented inspections, determination of RB priorities, official interventions, reports, discussion with NPP management, and the inspection of special requirements.

Transmission of Results

All RBs except one transmit the results of their assessments to licensees. Meetings (discussions) and reports were the most common way. Others include letters, minutes and decrees.

6. CONSIDERATIONS FOR A PERFORMANCE INDICATOR PROGRAMME

Advantages

Several advantages are cited for a PI programme. In favour of a regulatory set of PIs is the aspect of data control, standardisation, and consistency of interpretation. Having a programme in place provides regulators with another means to assess, and to answer questions on performance comparison. PIs provide an additional view of operational performance, enhancing the regulatory body's ability to objectively recognise areas of poor or declining performance.

Disadvantages

Informal use of PIs can lead to wrong conclusions if thresholds are changed and not taken into account properly. Due to their ease of access, PIs are prone to use as a stand-alone means to evaluate and therefore can generate misinformation. They cannot be used for real safety assessment, evaluation, or as a direct tool to regulate due to their limited usefulness. PIs must be used with other tools that a regulator already has in place. Hints may be provided on weaknesses, but they do not give a uniquely clear indication of good or bad performance. The additional benefit of a formal PI programme may not be warranted if the RB already has vigorous supervisory and in-depth evaluation practices in place. In addition to these views, one country noted that no disadvantages exist if the PI programme is used in an appropriate way.

7. VERIFICATION

The summary record from the Chester workshop supports and supplements the conclusions above. According to the record, PIs generally are used to investigate trends and provide assistance in the assessment process, but are not used directly to assess management. An opinion expressed by some was that there should be more objectivity, and an auditable trail of information supporting the assessments made. Most countries periodically assess management of safety, but the assessments typically are qualitative in nature. It was stated also that most countries use some indicators as background information for the assessments. The assessments are based on a snapshot or sample, whereas PIs show trends and comparisons. Combining assessments is done formally, but in a qualitative fashion through administrative processes such as meetings and consultations.

ANNEX A

ORIGINAL Q's		
Question Objective		
	PI Role in the Evaluation Process	PI Source and Safety Relevance
Belgium	inspections and weekly meetings are adequate tools, although no programme exists. PIs may lead to further investigative work but will not initiate an investigation	licensee PIs are available, but not used explicitly
Canada	inspections (pro-active and reactive), investigations and event analysis are the primary tools; PIs will be used in conjunction with these tools to assess performance, advise the Board and public on trends, and initiate reactive inspections	data for PIs is supplied by licensees; the data chosen must be relevant to safety as opposed to production
Finland	regulatory control can be exercised if comparison shows significant deviation from general or international practices	both power companies use WANO performance indicators; some are salary related, and relate to production and safety; it has been noticed that there is a need to develop more precise performance/safety indicators; development work for indicators to measure the performance of organisational units is ongoing; some safety related aspects are being taken into account; there is also a Nordic co-operation project to define indicators
France	inspection results are synthesised currently; in future there may be periodic safety reviews using results from inspections, events, declared incidents, waiver requests, refuelling outage supervision, release and waste outputs; regulators prefer an approach where PIs could be used as tools only	licensees use 10 corporate PIs plus two specific ones; there are also 8 local ones in use
Germany	no formalised safety indicators are used to evaluate the safety performance of licenses	utilities are using WANO PIs for reporting to WANO and for internal purposes
Hungary	periodic safety reviews are used where consideration is given to PIs; in future PIs may be used for evaluation of occurrences	N/A

ORIGINAL Q's		
Question Objective		
	PI Role in the Evaluation Process	PI Source and Safety Relevance
Japan	pre-use inspections, periodic inspections, overall safety reviews, and periodic safety reviews are done; PIs do not change inspection frequency or content as regulatory policy requires uniform application of the best inspection practices	NPP licensees use WANO performance indicators; a small subset is supplied to the RB
Netherlands	the RB does not have a PI to evaluate safety performance of the NPP; to evaluate performance of the licensee, the RB uses licensee-generated PIs together with other input	the NPP does use a set of PIs; they report in their monthly report the PIs of WANO; these deal with safety aspects such as unavailability of cooling capacity, unavailability of electricity and personnel accidents; they also use about 25 other indicators to evaluate their performance; some of them are reported in the monthly report
Spain	the PIs are used as a tool to follow the most significant performance parameters; the Annual Inspection Plan of the RB takes into account the results only if data appear abnormal; an incident review panel in the RB follows in monthly meetings the results for consistency; an annual report is produced on programme results; PIs are used as a supplementary tool to the conventional evaluation processes	the main source is the event reports and monthly reports of performance data by licensees; in special cases, additional information is required by letter or special inspections; licensees follow the WANO PI programme but the RB does not get this information; the RB and licensees have independent programmes
Sweden	N/A	N/A
Switzerland	N/A	the RB is developing its own PIs; WANO indicators relevant to safety are used presently
United Kingdom	pro-active and reactive inspections and annual dose statistics are the principal evaluation tools; PIs are used to determine inspection plans only if data appear abnormal	N/A
United States	besides PIs, routine and special inspections, and the SALP programme are other tools in the evaluation process; the senior management meeting process and plant specific analyses of safety performance, including diagnostic evaluation team evaluations, use PIs	the licensee event report is the primary source

ORIGINAL Q's		
Question Objective		
	Selection Criteria & Normalisation Practices	Functional Areas Covered
Belgium	there is no performance comparison	safety system unavailability rates and the amount of anomalies or incidents are two PIs of interest
Canada	mandatory criteria include sensitivity to change, definability, discouragement of PI management, unmanipulatability of data, and impact on safe operation; normalisation practices will be developed for comparisons, where appropriate	PIs under development cover operations, maintenance, work safety, public safety, and compliance
Finland	N/A	NPPs provide the RD with PIs for load factor, nuclear share of electricity produced, power diagrams, trips, INES scale events, events/observations, collective doses, dose distributions, external releases, environmental monitoring results, spent fuel and waste, safety related projects
France	N/A	the number of events significant to safety; events affecting employee safety, and parameters related to radiological environmental impact and radiological protection of workers
Germany	N/A	N/A
Hungary	N/A	N/A

ORIGINAL Q's		
Question Objective		
	Selection Criteria & Normalisation Practices	Functional Areas Covered
Japan	N/A	indicators reported to the RB include capacity factor, unplanned shutdowns, radiological emissions to the environment, worker dose and others related to worker safety
Netherlands	N/A	N/A
Spain	there are only 9 NPPs so that, due to statistical considerations, the RB decided in 1994 to follow the US NRC's PI programme; comparisons can be made between NPPs in the two countries, including checks for consistency	the PI programme has seven indicators - automatic scrams, safety system actuations, safety system failures, forced outage rate, equipment forced outages per 1000 critical hours, collective radiation exposure, and events
Sweden	N/A	N/A
Switzerland	N/A	trends of some indicators are shown for each plant, such as reportable events, scrams, plant availability, fuel defects, collective and individual doses
United Kingdom	N/A	unplanned automatic trips/7000 hrs; accident frequency rate/100000 person-hrs; rolling annual events at level 1 and above
United States	N/A	automatic scrams, safety system actuations, significant events, safety system failures, forced outage rate, equipment forced outages per 100 critical hours, and collective radiation exposure are the seven PIs the RB monitors

ORIGINAL Q's			
Question Objective			
	Reporting Requirements	Advantages	Disadvantages
Belgium	licensees are not required to report	N/A	informal use has lead to wrong conclusions due to a changing reporting threshold
Canada	data for the PIs are reported to the RB under licence condition	control, standardisation, and consistency of interpretation result from a regulatory programme; PIs provide an additional tool to assess; they provide a basis to answer questions on industry comparison	misuse as a sole assessment tool
France	N/A	useful for a licensee to adjust policies and organisation	cannot be used for real safety assessment or evaluation
Germany	N/A	N/A	PIs may give hints on weaknesses, but do not give clear indications on good or bad performance; PIs are only the starting point for more in-depth investigations; the additional benefit of a PI programme is questionable given the supervision practice and in-depth evaluations of the RB and its expert organisations
Hungary	PIs are reported annually by licensees	N/A	N/A
Japan	licensees report data that is published monthly	N/A	there is no intention to use indicators containing limited information by itself as a direct tool to regulate
Netherlands	the RB requires that the licensee develops and applies PIs for their own activities	N/A	N/A

ORIGINAL Q's			
Question Objective			
	Reporting Requirements	Advantages	Disadvantages
Spain	data used are subject to a legal reporting requirement through technical specifications included in the licence conditions; the PIs themselves are not subject to a legal reporting requirement	the PI programme provides an additional view of operational performance to find licensees' performance weaknesses; it provides a consistent way to report and assess operational performance	there are no disadvantages if the PI programme is used in an appropriate way
Sweden	the RB receives PI data annually from NPP licensees	N/A	N/A
Switzerland	the RB requires that licensees present the WANO indicators in their annual reports	N/A	N/A
United Kingdom	N/A	N/A	N/A
United States	N/A	provides an additional view of operational performance, enhances the RB's ability to recognise areas of poor or declining performance	PIs must be used in conjunction with other tools

SUPPLEMENTARY Q's		
Question Objective		
	Regularly Reported Data	Use of Data as an Evaluation Tool
Belgium	reactor trips and turbine trips, safety system actuations, significant events, collective dose and statistical data on individual doses, results of dose optimisation, radioactive releases, and radioactive waste production are reported; other reported data include information such as duration of unavailability for safety related equipment are gathered by the licensees and can be made available to the RB	trending is the most common use; these data are considered to be tools that can be used to focus the inspection activities on specific areas of interest; they are more often used to investigate some licensees' activities and to track some recurrent problems than really to evaluate "performances" in matters of safety; no comparison with standards is usually performed due to unavailability
Canada	reporting requirements are set out in a regulatory document referenced in the operating licence; this document requires several types of reports, including event reports, quarterly reports, safety reports, radiological environmental monitoring reports, research and development progress reports, periodic inspection programme reports, reliability reports, and fissionable and fertile substances reports	data from event reports is input into a database that is used by RB inspectors to plan for audits, and during other inspections to verify system performance; some of the information is trended, but because of the unavailability of standards, interpretation is inconsistent and sometimes difficult; the RB currently is developing its own PI programme, incorporating standard terminology and calculational methods
France	the RB receives telexes and reports on significant incidents, summary reports on work carried out during refuelling outages, facts and figures on waste, a file on events important to safety, and an annual report from each plant on the state of the reactors, regulatory documents, results on barrier monitoring, safety functions and availability, analysis of significant incident and surveillance test results, details on radioactive waste and radiation protection	data are examined by engineers from local safety authority offices according to a common reading form; the engineers formula additional requests to have a clear idea of the plant's state which is well substantiated and, if necessary, to compare with other plants and to better assess the effectiveness of the safety authority's action; overall analyses of significant incidents and waivers are presented in the RB's activity report in terms of variations with previous years
Germany	regular information comprises on-line remote plant monitoring, daily, monthly and annual reports, post-refuelling outage reports, annual reports of the licensee to the reactor safety commission (RSK), formal reports on reportable events and detailed reports, reports by licensee and expert organisations on assessments, summary report on evaluations of plant internal HF reporting system, insights and knowledge gained during surveillance testing	information is systematically evaluated and includes trend analysis of operational data, component and system behaviour, assessment of collective/individual doses, evaluation of national event reports and applicable foreign operating experience for lessons to be drawn, in-depth technical evaluation of national event reports and foreign operating experience

SUPPLEMENTARY Q's		
Question Objective		
	Regularly Reported Data	Use of Data as an Evaluation Tool
Hungary	regular reports include general annual refuelling report, campaign report, operator's manual, annual report on radiation protection, quarterly report on corrective measures taken in response to events, licences of the NPP authority and hundreds of data that can be analysed for trends; special reports are submitted on performance new equipment or systems that serve a safety function; service reports cover operating experience and error occurrences	information is used for supervision and compliance; reports are used for various purposes, such as information and follow-up, verifications, comparison of operational tests with core characteristics to determine licensability, approval of corrective measures completeness and deadlines, checks for compliance with event reporting requirements; future uses will include investigations of abnormal events and unit supervision for Technical Specification compliance
Japan	annual reports include the number of NPPs and electrical outputs, monthly reports show max output, electricity generation, max electricity generation averaged over any 3 days in a month, load factor, availability factor, etc.; installation and operation also requires a report on average/max radioactive density indicated by off-gas monitors every quarter, employee dose every year, average/max operating hours and thermal output every month	the RB sums up and evaluates data to grasp the tendency of total NPPs performance (not individually); information on the operation/trouble condition of NPPs are summarised and published in annual reports of NPPs' operating status; availability factor is also released every month; uniform periodic inspection shall be performed every year based on laws regardless of PI status
Netherlands	reports produced by the RB on performed activities include cumulative doses of plant personnel and those for contractors, the amount of radioactive effluent (gas and liquids), the availability of NPP (power to the grid) and an evaluation of the incidents (INES level 0 included)	the RB checks the PIs as part of its inspection activities

SUPPLEMENTARY Q's		
Question Objective		
	Regularly Reported Data	Use of Data as an Evaluation Tool
Spain	the RB receives from licensees, according to Technical Specifications, the unusual event reports in 1 or 24 hours by fax in an appropriate format; the RB also receives a monthly report including various information on all aspects of performance - operation, radiation protection, waste disposal, events, etc.	the RB's PI programme is the same as that of the USNRC, including the software programme to run the application; the RB then makes comparisons and does trending for plants in the two countries; an annual report is produced about the programme itself, and an evaluation report with RB conclusions and recommendations for RB members
Sweden	the RB requires licensees to report the status annually in structural components in NPPs, competence and training of control room operators and maintenance staff in leading positions, operation and maintenance, and the loading of fuel; other regular reports include licence event reports, reactor trip reports, a report every 24 hours on production and safety, outage review reports, a special As-Operated Safety Analysis Report, and a report on reliability data of components	information is used to confirm licensees have a good internal control system, to compare against RB requirements to plan inspections or safety reviews, to review safety analyses, to determine inspection activities or investigations, to follow-up on man-technology-organisation events, to discuss weekly inspections and NPP safety status, to review and compare with results of inspections, analyses or investigations, and to ensure licensees have reliable failure data
Switzerland	licensee event reports; monthly reports, giving a survey of operation, plant safety and radiation protection; reports on fuelling outages concerning technical items and radiological data; annual reports as a summary of the monthly reports containing WANO PIs and their trends through several years; applications for safety related plant modifications based on specific analyses; special reports on operational performance and experience	several databases are set up on which trend analysis is done: regulatory action are sometimes taken; data is taken into account for granting a new operation cycle after refuelling; radiation protection data is trended internationally; trending is also done under special circumstances; if low availability is observed for certain systems, special analysis is required from the licensee
United Kingdom	prescribed dangerous occurrences, radiation over-exposures, environmental releases above statutory limits, uncontrolled spreads or release of contamination, unsafe operation or condition of the plant found by examination, inspection, surveillance, maintenance or test, reactor trips etc. are reported to the RB; all potential INES reports are similarly reported	data are used according to significance at the time received; trends on dose statistics have been used successfully in discussions with licensees as a means of reducing worker radiation dose
United States	licensee event reports and monthly operating reports provide data routinely used as input to the evaluation processes	techniques include computation of plant self-trend/deviation from median value of peer plants, including statistical significance, separate consideration of outage and power operation, study of changes in calculated trend/deviation, combination of PIs into an overall score; work underway includes development of single trends using combined PIs, a template to measure management/organisational effectiveness, and a PI for economic stress

SUPPLEMENTARY Q's		
Question Objective		
	Combination/Integration	Measures to Ensure Systematic Evaluations
Belgium	no formal process is presently available to integrate or combine this information; the data are generally used in discussions during inspections to support specific concerns and to encourage or to prompt the licensee to investigate some problems more deeply or to take corrective actions	no formal systematic process exists to ensure the consistency of evaluations; these are discussed on a permanent basis with the head of the inspection team that is responsible for this aspect of the evaluations
Canada	at the present time, there is no specific RB organisational unit responsible for combination and integration of results; resident offices co-ordinate the production of an annual report on licensee performance; this report combines information from event analysis, inspections, and licensee reports to make an assessment in each of about 14 safety-related areas; a selected number of licensee-generated PIs may be used for the assessment; the report makes an overall conclusion vis-a-vis safety	the RB has established a guideline for the production of annual reports on NPP performance; senior inspectors meet monthly to discuss regulatory activities like inspections, events, and technical issues of common interest; there is a standardised set of inspections, common procedures and, to the maximum extent possible, checklists; a procedure on event analysis also exists and a tool make these analyses more systematic and consistent is under development
France	all information regarding plant safety are recorded on paper (inspection meetings of refuelling outages, analysis of waivers, event analysis, etc.); the resulting summary is not a statistical indicator, but rather a reasoned judgement by the safety authority on the plant's ability to detect discrepancies and to analyse and deal with them	the reading form is revised periodically
Germany	the information on the state level is complemented by the information from the federal level; exchange of information is assured by written communication, RSK recommendations and regular information exchange meetings; it is the responsibility of the state regulator to combine/integrate this information	the state RB ensures that evaluations are done systematically; consistency between states is ensured by the federal government; provisions for consistency include requests to state regulators to provide information on specific issue activities, discussion of practices in different states and agreement on common approach in joint commission of states and federal government for nuclear safety, discussion and recommendations in RSK, and federal government orders
Hungary	as stated above, all reported information is used for official supervision; the inspector who made the prescription on the periodic report is obliged to evaluate it; in daily practice, it is not more than an intuitive and comprehensive read-through evaluation; the comparison is done against the Technical Specifications	the system analyser or probabilistic assessment expert gathers the reports, the corresponding in-house inspector reports, and investigation reports to derive reliability data on performance or service; this reliability data is introduced into the next version of the probabilistic model for the unit

SUPPLEMENTARY Q's		
Question Objective		
	Combination/Integration	Measures to Ensure Systematic Evaluations
Japan	combination/integration of PIs with other tools such as inspections and event analysis has not been done so far because the objectives of summarising PIs mainly is to publish reports and because it is the RB's policy that every NPP be subject to annual inspection of a uniform scope the RB stipulates	it is the RB's policy that every NPP be subject to annual inspection of a uniform scope the RB stipulates; uniform inspections shall be performed every year based on laws regardless of PI status
Netherlands	the RB corrects its standard annual inspection plan by specific inspections and audits	the RB starts every year with a standard inspection plan; besides this direct performance measurement, the NPP must set up every two years an evaluation of technical, organisational, personnel, and administrative resources in relation to the current licence regarding nuclear safety and radiation protection; the RB reviews the evaluation; every 10 years, an unconstrained evaluation takes place; independent audit-like inspections take place every 2-3 years
Spain	the RB has an incident review panel with several technical people providing a number of different perspectives (project managers, engineering, nuclear technology, operational experience, etc.); the panel has a monthly meeting studying all the events and following operational information; it can also make recommendations to management to carry out inspections to clarify some aspects of the events or perform other actions	the RB's PI programme began in 1994 as a pilot: two reports have been produced for 1995 and 1996, with one also to be produced for 1997; experience to date has not been full consistency, but progress has been made in comparing with US programmes
Sweden	an annual meeting is held at which experts and inspectors summarise safety status from their point of view, and evaluate strengths and weaknesses; the meeting summarises the safety status of the NPP; results from this integrated evaluation are used for RB planning of inspections, reviews and discussions with the NPPs about improvement strategies	areas like structural components in nuclear installations, competence and training of control-room staff and maintenance staff in leading positions, and quality assurance have regulations; screening of LERs assures that licensees have a high standard event analysis, documenting the events and experience feedback; participants are from all reactor safety departments; a so-called R-forum focuses on safety and the evaluation and integration of safety data

SUPPLEMENTARY Q's		
Question Objective		
	Combination/Integration	Measures to Ensure Systematic Evaluations
Switzerland	information from databases, inspections, required reports and other regulatory activities are combined and evaluated in the RB's annual report; integration also takes place within the periodic safety assessment reports or other licensing assessments; countermeasures are discussed with licensees and systems watched more closely if an adverse trend is observed; modifications may be required; data is also used in the living PSAs	granting the restart after plant outages and the RB's annual report are two key actions to ensure evaluations are done in a systematically consistent fashion; the RB is organised in such a way that a co-ordinator is responsible for each plant; co-ordinators belong to one section that ensures the conduct of systematic evaluations
United Kingdom	no systematic use is made of data; relevant data are reviewed before biannual site meetings with NPP licensees	planned inspections are made to ensure that safety significant areas, systems and legal requirements are examined at least every 2 years; inspection findings are reviewed by line management and discussed with inspectors as appropriate: joint visits and team inspections also help to ensure that consistent standards are being applied by inspectors
United States	PI information is used with inspection results, enforcement actions, licensee self-assessments, etc. to develop an overall perspective of performance; during performance reviews, all information for the last 6 months is reviewed to identify trends; inspection activities are adjusted accordingly; the information is used also in the SALP process and during the Senior Management Meeting	policies and procedures are set by the headquarters program office; assessment processes review similar types of information for each plant; headquarters conducts routine observations of selected assessment meetings and audits of overall process implementation and consistency; regional SALP board chairmen are periodically required to observe a SALP board in another region

SUPPLEMENTARY Q's		
Question Objective		
	Conclusions from Integration Process	Transmission of Results
Belgium	no systematic or formal process is available; the conclusions drawn from the informal integration are rather included in the inspection activities and generally result in augmented inspection activities or inspections devoted to specific areas	the results are transmitted either during discussions related to inspection activities or during specific meetings with licensee management
Canada	the RB has in place an internal guide on lead and support responsibilities for each technical area; to arrive at a conclusion, the lead unit considers all information sources and obtains input from the support units; judgement of performance adequacy in any or all areas has not been proceduralised; in some areas, such as maintenance, there are few if any standards to measure against; technical knowledge, experience, and personal ability to integrate are the primary tools in use	facts from audits are presented to the licensee orally following the audit; about 90 days later, a written report is submitted to the licensee that specifies findings and corrective actions; findings from routine inspections by resident inspectors are communicated orally, if there is urgency, and followed-up in writing; an annual report on all evaluations is issued that also is provided to the licensee; annual review meetings take place with NPP management
France	the conclusions drawn are used to specify the priorities of the safety authority (inspection programmes, analyses, etc.)	the conclusions from the assessments are not sent to the operating organisations
Germany	conclusions are drawn by state regulators and their expert organisations, and by the federal government supported by its expert organisations and advisory committees	results are transmitted through regular contacts, discussions and information exchange on relevant subjects between state regulators, expert organisations and licensees, direct distribution of information regarding operating experience feedback to the licensees on a regular basis, distribution of findings of the evaluation process with safety significant lessons to the licensees via statements and recommendations of the RSK and information notices
Hungary	results of evaluations are used for various official interventions on the basis of obligations to report which are prescribed only in certain cases; for TS violations, or when unexpected numbers of errors are reported, the RB embarks on an investigation; if there is a previously undiscovered design or quality deficiency, the operational licence for the equipment or system is revoked; in less serious cases, notification is made to management that specifies corrective actions	results of evaluations are used for various official interventions, as noted above; in future, precursor information will be used in the inspection of abnormal situations and for the initiation of improvements; another future use involves risk monitoring for licensing activities and Technical Specifications

SUPPLEMENTARY Q's		
Question Objective		
	Conclusions from Integration Process	Transmission of Results
Japan	the objectives of summarising PIs mainly is to publish reports and because it is the RB's policy that every NPP be subject to annual inspection of a uniform scope the RB stipulates	the RB has a meeting of its inspectors of head office and regional offices several times a year, and exchange information on individual NPPs; if there was a remarkable event, the RB may direct the licensee to improve management; an advisory committee to the Minister of MITI discusses and examines the results of inspections/events from various viewpoints, after which the RB may inform the licensee of comments on improvements in performance
Netherlands	findings from the inspections and audits are evaluated; the evaluation is discussed with the NPP management and reported in the yearly report; findings are also discussed with NPP management	the yearly report of the performed activities of the RB and the yearly report of planned activities are sent to the nuclear facilities
Spain	the integration process with regulatory actions is through the incident review panel, because its recommendations are usually assumed by management	the draft annual report on the performance indicator programme is sent to licensees for comment; the final report is issued to all licensees; the report is not issued to the public, but is not confidential
Sweden	N/A	N/A
Switzerland	conclusions are drawn in the RB's safety assessment reports and in its annual reports; special requirements may be imposed on the licensee to improve system performance, or to modify the plant	results of the evaluation are transmitted fully to the licensee by means of reports, minutes, letters, and decrees (if necessary); in addition to these documents, regulatory meetings are carried out such as monthly discussions of the co-ordinator with appropriate NPP partners, meetings on operation experience with NPP management every four month, and meetings twice a year on a managerial level
United Kingdom	there is no formal or systematic integration process; any ad-hoc integration can lead to team or special inspections, etc.	the RB has a policy of openness subject to constraints such as security and commercial confidences; the policy is discharged by relevant discussions and communications with licensees and workpeople
United States	procedures are in place that govern implementation of the assessment processes including organisational responsibilities, assignment of assessment category ratings, and process outputs and subsequent regulatory actions: these actions may include adjustments to the inspection schedule, management meeting with the licensee, issuance of a letter notifying of significant concerns, etc.	inspection results are presented in exit meetings, and documented in a report issued to the licensee and made public; following plant performance review, a revised inspection plan is issued to each licensee; results of completed SALP reports are provided to licensees and are discussed with the licensee in a public meeting; results of the Senior Management Meeting are made publicly available; plants that warrant RB-wide attention are notified in writing