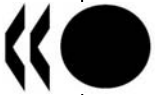


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NEA/CNRA/R(2006)2



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

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

**NEA/CNRA/R(2006)2
Unclassified**

OPERATING PLAN (2006 - 2009)

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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 28 OECD Member countries: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Luxembourg, Mexico, the Netherlands, Norway, Portugal, Republic of Korea, Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The Commission of the European Communities also takes part in the work of the Agency.

The mission of the NEA is:

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

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

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

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FOREWORD

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. In particular, the Committee reviews current practices and operating experience.

The Joint CSNI/CNRA Strategic Plan states in its last paragraph that:

“CNRA and CSNI each prepare an operating plan which describes in more detail their committee’s organisation, planned activities, priorities, and operating procedures to be used in fulfilling their mandates in accordance with this strategic plan. Specific attention will be given to ensure that cross-cutting issues are satisfactorily dealt with.”

This report represents such an operating plan. The intention is that it should fit onto a new third rung on the ladder representing the hierarchy of documents that govern the work of CNRA. At the top of this hierarchy is the Strategic Plan of the NEA¹; immediately below that is the Joint CSNI/CNRA Strategic Plan²; then comes the new operating plan (this document) and the operating guidelines (separate document). This plan sets the basis for establishing the current CNRA Programme of Work.

The plan was prepared by a sub-group of the CNRA Bureau, which included Lennart Carlsson (SKI - Sweden), Nobuo Tanaka (JNES - Japan), R. William Borchardt, Michael Weber and Michael Cullingford (NRC - United States) and Barry Kaufer (NEA - Secretariat). The group was chaired by Prof. Jukka Laaksonen (STUK - Finland).

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1. INTRODUCTION

1.1 Background

The Committee on Nuclear Regulatory Activities (CNRA) and the Committee on the Safety of Nuclear Installations (CSNI) are two of the Nuclear Energy Agency's (NEA's) standing technical committees. These Committees have the joint responsibility for the NEA sectorial arena, "Nuclear Safety and Regulation". The Strategic Plan of the NEA for 2005-2009¹ states that the role of each standing technical committee is to carry out efficiently the NEA Programme of Work in their strategic arenas, and to develop the basic strengths of the Agency as a key international instrument of co-operation. As a result, and in line with this plan, the CNRA, along with the CSNI, developed a Joint Strategic Plan², intended to:

- ensure appropriate alignment of the Committees' mission and objectives with the NEA Strategic Plan;
- identify the main challenges for nuclear safety in the next five years, and outline the focus areas to properly respond to those challenges;
- ensure appropriate consistency of the objectives, roles and responsibilities of the two committees so as to optimise the use of committee resources in achieving strategic goals;
- promote good communication and co-operation between the two committees; and
- establish guidelines and working methods that facilitate effective and efficient interaction between the committees, and with other external bodies.

In addition to the Joint Strategic Plan, the CNRA set up an independent Review Group to review its role, activities and working methods. The Review Group issued its report in April 2005. The CNRA, at its 2005 Summer Meeting (June 2005), unanimously endorsed the report³, including all its recommendations, among which were the following: (1) Selection criteria for selecting CNRA activities; (2) Member and Secretariat Resource requirements; (3) Interaction with the NEA Steering Committee concerning safety and regulation; and (4) to organisationally move WGOE from CSNI to CNRA.

¹ The Strategic Plan of the Nuclear Energy Agency, 2005-2009, OECD, ISBN 92-64-02081-0.

² Joint CSNI/CNRA Strategic Plan, Final draft, October 19, 2004.

³ Review of the Role, Activities and Working Methods of the CNRA, OECD 2005, NEA No. 6028, ISBN 92-64-01062-9

1.2 Purpose of this report

The Joint CSNI/CNRA Strategic Plan states in its last paragraph that:

“CNRA and CSNI each prepare an operating plan which describes in more detail their committee’s organisation, planned activities, priorities, and operating procedures to be used in fulfilling their mandates in accordance with this strategic plan. Specific attention will be given to ensure that cross-cutting issues are satisfactorily dealt with.”

This report represents such an operating plan. The intention is that it should fit onto a new third rung on the ladder representing the hierarchy of documents that govern the work of CNRA. At the top of this hierarchy is the Strategic Plan of the NEA¹; immediately below that is the Joint CSNI/CNRA Strategic Plan²; then comes the new operating plan (this document) and the operating guidelines (separate document). This plan sets the basis for establishing the current CNRA Programme of Work.

1.3 Structure of the Report

This report provides a set of regulatory issues that the CNRA together with its Working Groups plan to address in relation to the main objectives and challenges identified in the NEA and Joint CSNI/CNRA Strategic Plans^{1 2}, and those set out in the CNRA Review Report.³ The chapters of the report include the following:

Chapter 2: Strategic Factors. A brief overview of the CNRA structure, the criteria used in determining regulatory issues for the CNRA programme of work and the tools available to the CNRA for addressing those issues.

Chapters 3 to 7: Main Challenges. These chapters discuss the regulatory issues to be addressed by the CNRA during the strategic planning period and identify the respective tools to be used. The issues have been derived from CNRA discussions.

The intention is that this operating plan can be revised over time as needed, and it acts along with the operating guidelines as a repository of knowledge on how the Committee should function.

2. STRATEGIC FACTORS

2.1 Mission and Mandate

The remit for the Committee on Nuclear Regulatory Activities (CNRA) stems from the mission statement, general objectives and goals of the Nuclear Energy Agency (NEA). In the Strategic Plan of the NEA¹, “nuclear safety and regulation” is the first of six “strategic arenas” identified by NEA, the goal in this arena being:

“To assist member countries in ensuring high standards of safety in the use of nuclear energy, by supporting the development of effective and efficient regulation and oversight of nuclear installations, and by helping to maintain and advance the scientific and technological knowledge base.”

As stated in the Joint CSNI/CNRA Strategic Plan, given their common interest in nuclear safety, the following mission statement applies to both CNRA and CSNI:

“The mission of CNRA and CSNI is to assist Member Countries in maintaining and further developing the knowledge, competence, and infrastructure to support the safe operation through the lifecycle and efficient and effective regulation of NPPs and fuel cycle facilities based upon sound technical information, shared experience and up-to-date methods.”

Further to this, the plan states: The fundamental interest of both CNRA and CSNI is nuclear safety. This includes safety related to nuclear power plant and fuel cycle facility design, construction and operation throughout their life cycle (i.e., initial start-up, full power, shutdown, refuelling and decommissioning). Safety of the public and facility operating staff are both of concern. The CNRA and CSNI assist the member state safety regulators by conducting non-promotional activities that strive to ensure high standards of safety in the use of nuclear energy.

Within the nuclear safety arena, the focus of CNRA activities is related to the effective and efficient regulation of NPPs and fuel cycle facilities. The focus of CSNI activities is to provide the technical basis to support nuclear safety developments and regulatory activities by identification of safety issues and by addressing them with research programmes if deemed necessary.

2.2 Structure of the CNRA

The CNRA consists of the main Committee comprised of senior representatives of the national nuclear regulatory authorities of the NEA Member countries and observers from non-member countries (as per the direction of the NEA Steering Committee) and from relevant international organisations. The CNRA organisation consists of a mix of Working Groups (Inspection Practices, Operating Experience and Public Communication) and Task Groups to prepare reports, presentations and discussions at committee meetings and workshops.

2.3 Criteria

As recommended by the CNRA Review Group and endorsed by the Committee, the following general selection criteria are applied as a first step in determining the programme of work:

- the issue is of relevance to many member countries;
- international co-operation is essential, or at least useful, to address, and possibly resolve, the issue;
- the expected output will provide significant added-value to nuclear safety; and
- the NEA is the best place for international co-operation on this specific issue.

2.4 Tools for Addressing Issues

The following is a list of the main (not inclusive) tools used by CNRA in carrying out its programme of work:

- ***In-depth discussion*** based on invited presentations in the CNRA meetings or jointly with the CSNI, which should conclude with a decision on additional work (if needed) or a joint position/recommendation.
- ***Request to the CSNI***, usually after an introductory presentation and discussion in the CNRA meeting. Subsequently discussion on the respective CSNI answer and drawing CNRA conclusions with possible recommendations to members.
- ***WGIP, WGPC, or WGOE Tasks***, usually after an introductory presentation and discussion in the CNRA meeting. Subsequently discussion on the respective working group report and taking a position on the report.
- Establishing a ***Senior Level Task Group*** (with a consultant) to write a green booklet.
- Organising a ***Special Issues Meeting*** in connection with the CNRA summer meeting. Publishing a report on conclusions.
- Organising a ***NEA/CNRA Forum*** in connection with the CNRA summer meeting. Publishing a report on conclusions.
- Sponsoring a ***Topical Workshop*** that is open also for experts from industries and non-NEA countries. Publishing a workshop report with recommendations.
- Other processes include co-ordination and exchanges with other NEA Committees including requests to and from for specific products.

3. SHRINKING NUCLEAR INFRASTRUCTURE

3.1 Description

In many countries both regulators and industry are facing an ongoing gradual loss of experienced and competent personnel in nuclear technology and the resulting weakening of nuclear field organisations. A trend that may have a negative impact on the hardware quality and reliability of NPPs is the shortage of equipment orders, which has led to loss of interest among equipment manufacturers to provide products for nuclear facilities. Consequently, many factories or their technical support sections have been closed.

The Joint CSNI/CNRA Strategic Plan included the following elements in this area:

- fewer suppliers of nuclear facilities and nuclear specific equipment and services;
- fewer experts with high-level experience and knowledge in nuclear safety;
- less education in nuclear field;
- less financing for nuclear safety research.

3.2 Regulatory Concerns

The current environment can lead to potential declining performance by nuclear operators due to reduced availability of experts who have adequate knowledge and experience on NPP operations and maintenance. Less financing to nuclear research organizations means that there are fewer opportunities for training high quality experts who have the capability to resolve new safety issues or to address ageing phenomena. Additionally there may be reduced human capital resources for regulators to use to accomplish their safety mission

Industry's limited capability to produce spare parts and replacement equipment qualified to special nuclear standards, compensated at least to some extent by the general improvement of the quality awareness and quality management in the manufacturing industry, puts the regulators in front of a new situation. New regulatory positions are needed on quality assurance for safety classified equipment, to find an optimum between special nuclear quality versus high quality available from a standard production line.

3.3 Plan for the CNRA programme

3.3.1 Succession Planning and Development of New Regulatory Staff

Under this issue the CNRA needs to consider both the means for ensuring adequate training of nuclear experts within a country and the staff development practices within the regulatory body.

Provision of a common pool of experts is a necessary pre-requisite for recruitment of high-quality new staff to the regulatory body, operating organizations, technical support organizations, and industry. It is

therefore important that the regulators promote development of such pool. Among the key topics in national training are the methods for financing nuclear education and nuclear safety research.

Within the regulatory body, the staff development is one of the most important tasks to be incorporated into the management system.

Programme of Work Elements:

- a) ***In-depth discussion*** (CNRA) - Presentations by several countries on how they are addressing regulatory staff development including recruiting and training issues in December 2006.
- b) ***In-depth discussion*** (CNRA) - Presentations by several countries on how they are addressing the development of national expert resources in December 2007. This should include updates from the 2005 workshop in Stockholm.

Based on the insights and results of the discussions, the Committee will consider setting a task group for writing a CNRA report (green booklet).

- c) ***CNRA Workshop*** (CNRA/CSNI) – Organise a joint workshop with the CSNI on the Role of Research in a Regulatory Context in December 2007 or spring 2008. This is a follow-up activity from the NEA Forum in June 2001.

3.3.2 Qualification of High Safety Class Components and their Manufacturers

Currently there are manufacturers that have formal accreditations and are qualified to produce high quality equipment for various purposes. Their entire production line can thus provide consistent high quality, irrespective of the technical field where the products are used. Requiring additional steps in quality assurance, intended to produce special nuclear quality, may not be beneficial especially if the nuclear equipment are only a small part of the production. A deviation from the standard manufacturing practice could even result in reduced quality and reliability of the products. Under this issue the Committee should aim for a common understanding on conditions that are necessary and adequate for approving use of equipment in high nuclear safety class.

Another topic that the Committee needs to address is an acceptable qualification procedure and conditions for mutual international approval of manufacturers of high safety class equipment (i.e., how national regulators handle manufacturers from abroad).

Programme of Work Elements:

- a) ***In-depth discussion*** (WGIP) Hold a discussion in the fall 2006 or spring 2007 (with the help of expert support from the national regulatory organizations) on current practices and how they compare (benchmarking exercise). WGIP will make follow-up presentation and/or proposal to CNRA in winter 2006 or summer 2007. This work should be performed with support from WGOE.

4. INCREASED PUBLIC EXPECTATION ON SAFETY IN USE OF NUCLEAR ENERGY

4.1 Description

The fundamental objective of all nuclear safety regulatory bodies is to ensure that nuclear utilities operate their plants at all times in an acceptably safe manner. In meeting this objective, the regulatory body should strive to ensure that its regulatory decisions are technically sound, consistent from case to case, and timely. In addition, the regulator must be aware that its decisions and the circumstances surrounding those decisions can affect how its stakeholders, such as government policy makers, the industry it regulates, and the public, view it as an effective and credible regulator. In order to maintain the confidence of those stakeholders, the regulator should make sure that its decisions are transparent, have a clear basis in law and regulations, and are seen by impartial observers to be fair to all parties. Efficiency in decision-making by governmental authorities is increasingly dependent upon public trust. Public communication is one of the keys to the future of nuclear power.

The regulators 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. 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. 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. The Joint CSNI/CNRA Strategic Plan included the following elements in this area:

- desire for more effective and efficient regulations;
- need for transparency and public communication;
- need to increase efforts on security and emergency preparedness.

4.2 Regulatory Concerns

The public is interested to see improved performance in nuclear safety, security and emergency preparedness; and more transparent communications on these developments. Loss of public and news media confidence in the regulator's capability to carry out its mission would result in general deterioration of means needed for effective and efficient regulation. Accordingly, it is important to define what the role of the regulator is in public communication.

4.3 Plan for the CNRA programme

4.3.1 *Measures for Building and Maintaining Confidence on the Regulatory Body in all Sectors of Society*

CNRA has in the past sponsored two most useful workshops (Paris in 2000, Ottawa in 2004) where the main topic was public confidence on nuclear regulator. These workshops have provided consistent views on the importance of public confidence for successful nuclear regulation, and general guidance on how to achieve this. Although the practical means of communication were found to depend on cultural background of each country, there are several common features in communication approach that were identified as important for gaining and maintaining public trust. Insights from the two workshops were quite similar, and it was concluded that one more workshop on the same topic would be worthwhile on the Asian territory.

Another topic of general interest is the public communication in abnormal situations, including emergencies. Although the experience from communications in most serious events is fortunately limited, public communication is often part of emergency exercise. Sharing the experience from actual situations and exercises among the regulators is worthwhile.

A special group with interest in nuclear regulation is the local community living around a nuclear facility, including the local authorities and decision makers. Practices for communication with this group have been developed in many countries, and experiences from these would be worth sharing.

Programme of Work Elements:

- a) **Topical Workshop** (WGPC) Arrange a workshop in Japan in spring 2007 on regulators means and approaches for gaining public confidence. The main conclusions and recommendations of this and earlier workshops will be developed into a CNRA report (green booklet) to be produced by the end of 2007.
- b) **Working Group Task** (WGPC) Annually present to the CNRA (summer meetings) examples of cases where public communication has succeeded in advancing public confidence on the regulators, or where a failure in communications has resulted in loss of confidence. Additionally, WGPC to present case studies on successful approaches in informing local communities around nuclear facilities.

4.3.2 *Measuring, Assessing and Communicating Regulatory Effectiveness*

Value added by regulator to the safe use of nuclear energy can not be directly measured, and there is no objective way to define the optimum amount of regulatory work needed to get adequate assurance of nuclear safety. It is also difficult to prove the effectiveness of various regulatory actions, or to conclude whether the regulators are working efficiently. However, indirect measuring means have been applied in the NEA member states, and it is of mutual benefit to exchange information on these.

Safety performance indicators collected from the nuclear power stations tell primarily about the quality of management of the operating organizations, but it is evident that also the regulatory requirements and regulatory oversight have some influence on the results. It is also evident that the public forms its view on effectiveness of nuclear regulation, and more generally its confidence on regulator, on the bases of safety performance of NPPs. A joint task force of the CNRA and the CSNI has exchanged information on the practices of collecting safety performance indicators and on the use of indicators as part of the integrated safety assessment. The area is still evolving, and it is useful to keep benchmarking of the work on safety performance indicators.

A more direct measure of quality of regulatory management system, and of the efficiency of the regulatory work, is a set of regulatory performance indicators. These measure the output of the regulatory work against management targets. A task group of the CNRA has worked on this topic, and it is well founded to continue similar benchmarking also in the future.

Means for measuring and assessing of public trust on regulators, and more generally the appreciation of the regulatory body among its main stakeholders, have been developed in the member states. Comparison and benchmarking of national practices falls naturally in the area of the WGPC.

The Nuclear Development Committee of the NEA has started an interesting project which could provide relevant insights for the regulators – Impact of Licensing Processes on Nuclear Energy Competitiveness. For the success of this project support by the CNRA is inevitable.

Programme of Work Elements:

- a) **Senior Level Task Group** – Provide update on Regulatory Efficiency and Effectiveness direct indicators to CNRA in December 2006 or June 2007 including advances made since the end of the pilot project (2003). CNRA will determine the need to produce a new report following this discussion.
- b) **Joint CSNI/CNRA Task Group** - Provide update on the Regulatory Use of Safety Performance Indicators (indirect indicators) to review the progress/advances in summer 2008. CNRA will determine the need to produce a new report following this discussion.
- c) **Working Group Task (WGPC)** – Prepare a proposal for June 2007 to make a comparison and benchmark methods used in member states for measuring the trust on the regulatory body, and for measuring the appreciation of the regulatory body among the stakeholders. The results will be presented and discussed by the CNRA in June 2008.
- d) **Working Group Task (WGIP)** – Complete task on Inspection Effort (benchmarking exercise on amount of inspections performed by regulatory authorities in member countries) and provide results to CNRA in June 2006.
- e) **NEA Co-ordination** - CNRA will provide support to the Nuclear Development Committee in their activity to assessing impact of licensing on nuclear energy competitiveness (Licensing Processes and Nuclear Energy in the Competitive Electricity Market). The CNRA will discuss this topic annually based on presentations made to the CNRA meeting by the NDC as it develops the report.

5. INDUSTRY INITIATIVES TO IMPROVE ECONOMICS AND SAFETY PERFORMANCE IN PRODUCTION OF NUCLEAR POWER

5.1 Description

Organisational matters and related safety management issues brought about by the restructuring of the utilities, by changing ownership patterns and by increased pressure on costs as a consequence of the liberalisation of electricity markets, form a topical area that seems to require specific regulatory measures at least in some of the member countries. Experience to date is that changes in utility ownership may transfer nuclear assets into the hands of those whose previous experience lies in non-nuclear fields. Some countries have reported significant problems as a result of the commercial pressures, while in others the changes have been to a positive direction due to generally increased attention to good management. The CNRA members need to be alert to the consequences of diluting and/or undervaluing nuclear experience at the top and senior levels in these new utility holding groups. This is an area where there is a need for those countries that are in the forefront of these developments to use the opportunity of the regular CNRA meetings to keep other member countries informed, so that they can avoid some of the pitfalls that perhaps await.

In addition to the direct impact on operating environment of the nuclear power plants, the changes in power markets have lightened the requirements on reserve capacity available for supporting the power transmission grid, and consequently reduced the reliability of offsite power supply to the nuclear power plants.

The Joint CSNI/CNRA Strategic Plan included the following elements in this area:

- reduction of safety margins (power uprate, increase of fuel burn-up)
- new management strategies (staff reduction, use of contractors)
- risk informed approaches
- new approaches to safety management (including safety culture)

5.2 Regulatory Concerns

In the competitive environment the operators can be expected to concentrate their attention on maximising generation of electricity. If it leads to continuous strive to increase equipment reliability and to improve planning and management, it can have a positive impact on safety. On the other hand, attempts to maximize generation could also sometimes result in extended operation in degraded conditions or in state of uncertainty, even if within operating limits and conditions (technical specifications). This would gradually erode the safety culture. Another possible effect of the new climate of competition could be strive for cost cutting by reducing permanent staff or material resources. In the case of deteriorating safety culture, the regulators' requests for safety information from operators may take longer to be answered or may sometimes be ignored.

At many plants, safety margins have been reduced in separate projects without making an integrated assessment of the combined impact to safety. Among the changes made to improve fuel economics or to increase the rated power are a high fuel burn-up and flattening of the core power distribution. In many countries there are no formal regulatory limits for these changes although it is evident that they would increase the potential amount of fuel failures in connection with major design bases accidents.

5.3 Plan for the CNRA programme

5.3.1 Safety Margins in Relation to Fuel / Core Optimisation and Power Up-rate

More experimental and theoretical research is needed to understand the actual significance of changes that have brought the fuel properties and the core power distribution outside the boundary studied in the original licensing safety case. The results have to be taken into account in new integrated plant specific safety analysis.

Programme of Work Elements:

- a) ***CSNI Request*** - CSNI/SEGFSM to provide annual reports on current data and analysis from new research related to fuel safety margins.
- b) ***In-depth discussion*** - CNRA to schedule agenda item in 2007 and 2009 to discuss the results of integrated safety analysis made in connection with power up-rate(s) and other modifications, including the respective positions taken by regulators. The main conclusions including any commendable practices will be compiled into a short regulatory note.

5.3.2 Assessment and Regulation of Licensee Safety Culture

Every regulatory body needs to be continuously alert to the possibility of deteriorating safety culture, especially the need to assess the influence of changes in plant management. Among the topics requiring regulatory attention and oversight are the annual investments intended to maintain or upgrade plant material conditions, possible increase of foreign ownership, use of contractors in tasks vital for safety, and the amount of operator sponsored research and other expert services that may be needed to support safe operations in the long term.

Programme of Work Elements:

- a) ***Working Group Task (WGIP)*** - Use the results of the Toronto Workshop (2006) and prepare a report comparing regulatory oversight practices and targets for keeping abreast of the safety culture at nuclear power plants. This work should be performed with support from WGOE and the CSNI/SEGHOF. The results and final report to be presented to and discussed at the CNRA in June 2008.

5.3.3 Regulation and Inspection of Risk-Informed Safety Management

Currently many operating organisations in different countries are in the process of increasing risk-informed safety management. This new approach is applied in areas such as maintenance, in-service-inspections, fire safety, and operating limits and conditions (technical specifications). In some countries the use of risk-informed management is even required in the regulations.

A change to risk-informed management requires respective knowledge and skills from the regulatory staff, and the availability of a full-scope plant specific PSA (i.e., internal initiating events, fires, floods, extreme

weather conditions, seismic phenomena, and other external hazards, all assessed in full-power and shutdown conditions) that is reviewed and approved by the regulatory body.

Programme of Work Elements:

- a) **Working Group Task (WGIP)** - Prepare a report comparing the various areas of application of risk-informed safety management in member countries, and to benchmark the regulatory oversight practices between those countries. This work should be performed with support from WGOE and the CSNI/WGRisk and CSNI/SEGHOE. The results and final report to be presented to and discussed at the CNRA in June 2009

5.3.4 Power Grid Stability and related Regulatory Requirements

Power transmission grid collapse events and extensive power cuts have been reported in the recent years from many countries. A question can be raised whether these events are of such likelihood that strengthening of the current on-site power supply systems needs to be considered.

Programme of Work Elements:

- a) **Working Group Task (WGOE)** - Study the trend of the loss of offsite-power events, and the potential remedial actions taken in the member countries and report their observations at the December 2008 CNRA meeting. Discuss the WGOE report and conclude on commendable regulatory actions in member states. Results to be shared with WGIP to incorporate inspection practices.

6. NECESSITY TO ENSURE SAFETY OVER PLANT LIFE CYCLE

6.1 Description

The physical and mechanical properties of most materials and components change with age and these changes are often exacerbated by environmental factors such as heat, stress, humidity and radiation. Methods have been developed for identifying, testing and modelling the ageing mechanisms that affect materials and components important to the safety of nuclear power plants. The rate of deterioration of NPP systems and components due to ageing is kept under continuous review by the operators and is a major part of the routine inspection programmes of the regulatory authorities.

The experience shows that events take place at nuclear power plants indicating safety shortcomings that have not received adequate attention during plant design and operation. Some of the events have kept repeating, which is a sign of not learning from the experience. There is thus a global need to improve operating experience feedback.

The Joint CSNI/CNRA Strategic Plan included the following elements in this area:

- ageing of equipment, technologies, documentation
- learning from experience and knowledge transfer
- low power and shutdown risks
- decommissioning

6.2 Regulatory Concerns

The management of plant ageing, life extension and licence renewal are of direct interest to all Member countries. Feedback of worldwide operating experience has been inadequate and needs to be improved to avoid events reoccurring for similar reasons. Addressing these issues is crucial for reducing the potential for major incidents.

The CNRA needs to keep these issues high on its agenda, keeping closely in touch with the work going on within the IAEA in order to ensure that the CNRA views are reflected into documents currently under development.

6.3 Plan for the CNRA programme

6.3.1 *Developing Appropriate Guidance on Monitoring and Management of Physical Ageing of Plant Equipment*

It is a common requirement for NPP operators in all countries to develop and implement a programme for ageing management. There is thus a lot of experience from respective methods and means, and evidently the national regulators have identified the ageing issues that receive their most attention. For sharing the experience from ageing management, it would be worthwhile to compile information on ageing phenomena that are found most important from risk point of view, and are being addressed in systematic programmes in member states.

Programme of Work Elements:

- a) **Senior Level Task Group** – Prepare green booklet on The Regulatory Goal of Assuring Nuclear Safety. *NEA Forum* to be held (based on development of report) in June 2007. Report to be completed end of 2007.
- b) **Working Group Task (WGIP)** - Compile information on ageing issues that receive the most regulatory inspection attention in the member countries, and to prepare a report for CNRA by June 2008 highlighting the key areas that are important to safety. This work should be performed with support from WGOE. This work should be performed with support from WGOE and relevant CSNI Groups and NEA Projects.
- c) **Working Group Task (WGIP)** - Prepare a report benchmarking the regulatory oversight practices in the area of equipment physical ageing and present the results to CNRA in December 2008. This work should be performed with support from WGOE. This work should be performed with support from WGOE and relevant CSNI Groups and NEA Projects.

6.3.2 *Addressing Ageing Issues that Emerge from NPP Operating Experiences*

Experience has shown that there are ageing phenomena and environmental conditions that may result in equipment deterioration faster than predicted. Sometimes this deterioration has not been observed in early stage, due to inadequate understanding of the situation and respective failure of the maintenance and inspection programmes to provide proper monitoring. It is necessary to compile and share international experience from less understood deterioration mechanisms.

Programme of Work Elements:

- a) **Working Group Task (WGOE)** - Screen the information available from operating experience reports, with the aim to highlight ageing phenomena or conditions that have led to unexpected equipment deterioration. Furthermore, WGOE to summarize the corrective actions taken to avoid further deterioration for similar reasons and also to identify potential research needs for better understanding of respective ageing situations. Results including observations and/or recommendations will be presented at CNRA annual meetings.

Based on results CNRA will consider the need to write CNRA green booklet.

6.3.3 *Regulatory Inspections to Address Low Power and Shutdown Risks*

There is increasing evidence from operation experience and from the PRA studies that the risks in low power and shutdown conditions represent a significant fraction of the total radiation exposure risk that a NPP causes to the workers and to the people living in its neighbourhood. It is therefore useful to share information on the most significant low power and shutdown risks that have been identified at NPPs of different type and with different approaches to outage management. Information is also needed on regulatory inspections addressing those risks.

Programme of Work Elements:

- a) ***In-depth Discussion*** or ***Special Issues Meeting*** (CNRA) WGIP and WGOE to compile information on regulatory practices in inspecting issues relevant for low power and shutdown risks and report results to CNRA in June 2008. The report should compare practices with the aim to giving recommendations on commendable practices to all regulators. CNRA will consider the benefit of issuing a CNRA report on means to address low power and shutdown risks. This work should be performed with support from WGRisk.

6.3.4 *Regulatory Inspections to Address Fire Risks*

According to the statistics on fires at NPPs, it is not uncommon that small fires are ignited at nuclear power plants with intervals of 1-2 years. Furthermore, the fire PSAs have indicated that especially at plants having not been designed with strict physical separation of redundant plant sections, the fires may represent a significant part of total risk of severe core damage. Sharing the experience on regulatory inspections of fire risks would be helpful in reducing these risks in all member states.

Programme of Work Elements:

- a) ***Working Group Tasks*** (WGIP and WGOE) to complete report (Proposal WGIP(2006)1) on regulatory inspection of Fire Protection Programmes by December 2007. WGOE to prepare a report on typical causes of fires and on measures taken in member countries to reduce the fire risks, using among others the information that is now available in the NEA and national data base on fires at nuclear facilities by December 2007. CNRA to hold an in-depth discussion (or Special Issues Meeting) and consider the benefit of issuing a CNRA green booklet. This work should be performed with support from WGRisk and other relevant CSNI Groups and NEA Projects.

6.3.5 *Regulatory Lessons Learnt from Sump Pump Clogging Issue*

The 1992 incident at Barsebäck (stem line safety relief valve inadvertently opening) spurred immediate actions by regulators and utilities and several research and development efforts, which resulted in some cases in substantial backfits being made. An international working group was set-up in the mid 90's to establish a knowledge base for assessing ECC water recirculation systems. Numerous workshops have been held in the past years to update this knowledge base with the most recent taking place in 2004. Because of the safety significance many regulators have taken actions in this area and it is important to assess the regulatory lessons learnt from this experience.

CNRA Workshop (CNRA/CSNI) – Organise a joint workshop with the CSNI on the Regulatory Lessons Learnt from Sump Pump Clogging Issues in 2007 or 2008.

6.3.5 Regulatory Aspects of Decommissioning

CNRA has published in 2003 a green booklet “The Regulatory Challenges of Decommissioning Nuclear Reactors”, and has co-sponsored international workshops on decommissioning. In several member states there are nuclear power plants in decommissioning stage, or have been decommissioned. There is thus practical experience accumulating that is worthwhile to share among the committee members.

Programme of Work Elements:

- a) **Annual reports** - CNRA members with new relevant experience on regulation of decommissioning and dismantling to make presentations in the CNRA meetings, as appropriate. RWMC to present summaries at CNRA Annual meetings on decommissioning situation and experiences, as they have new information accumulated for presentation.

7. NEW REACTORS AND NEW TECHNOLOGY

7.1 Description

Design and construction of advanced nuclear power plants is underway or being considered in a number of countries. In addition there are a number of ongoing or planned modernization projects of operating facilities.

Manufacturing of the equipment for nuclear facilities is globally spread in a large number of countries, which is a new challenge for quality assurance and for regulatory approval of the manufacturers and components.

In a longer term perspective than covered by the present Strategic Plan, new reactor concepts, such as those studied by the Generation IV International Forum, may enter the licensing phase. So, for the coming years it is sufficient for the CNRA to limit itself to periodic updates on emerging new designs and related regulatory issues, at the same time ensuring that the CSNI will be well prepared to brief the CNRA on the technical safety aspects of any new designs, if and when they approach the licensing stage.

The Joint CSNI/CNRA Strategic Plan included the following elements in this area:

- licensing of new facilities and major plant modifications
- identification of safety issues specific to new designs and new technologies
- new regulatory standards
- new analysis methods/tools.

7.2 Regulatory Concerns

A general goal among the regulators is that a design found suitable in one country does not have to be substantially modified to meet licensing requirements elsewhere. This can be achieved if the requirements that must be satisfied in one country are consistent with, or at least not significantly different from, those that must be satisfied in another. Striving for harmonised regulations is relevant for both new reactors and modernisation of operating ones.

In view of the globally spread manufacturing, it is not meaningful that all national regulators audit all manufacturers of the high safety class components. There is a need to find solutions that provide proper sharing of the work load and confidence on the work done by other regulators.

7.3 Plan for the CNRA programme

7.3.1 *Harmonising Nuclear Safety Requirements for Selected Design Features of New NPP Types that are Considered for Construction in Near Term*

The IAEA is in the process of revising its Safety Standards, and it can be expected that the new design requirements and related guides will have several modifications compared with the current ones, still very much based on design principles used in the 1970's. The CNRA provides a wide discussion forum for exchanging views on topics that will be addressed in new requirements. Among these topics are the design basis events for systems and structures, criteria for fuel design, ensuring containment integrity after core meltdown, digital I&C systems design, and protection against malevolent acts and other external hazards. Input from the CNRA would be most timely for the revision process, or at least the insights from discussions in the CNRA would facilitate forming national positions on the IAEA requirements.

In addition to making an input to the IAEA's Safety Standards programme, the CNRA provides an extended basis for reflecting the work done under the MDAP, Multinational Design Approval Programme.

Programme of Work Elements:

- a) ***In-depth discussions*** - Select appropriate design topics focusing only on a one or small number of topics in each meeting. Ask the vendors of different designs to explain how they have approached the safety issue being discussed. Ask the countries being active or having done review of the new plants to present their views on the respective requirements. Discuss the basis of the requirements and possibly ask input from the CSNI, trying to find a consensus view among the members or at least to clarify the arguments supporting various positions.

Based on the outcome of the CNRA discussions, consider arranging topical workshops or setting task groups among the experts.

- b) ***Working Group Task (WGIP)*** – Develop a report on inspection practices for digital I&C systems. Previous work by the CNRA/CSNI Ad Hoc Group, results of CNRA workshops should be referenced. This work should be performed with support from WGOE, COMPSIS and other relevant CSNI Groups as necessary.

7.3.2 *Safety Requirements for Modernization of Safety Systems at Operating NPPs*

As part of the European nuclear safety harmonization process driven by WENRA, the European regulators have committed to meet the agreed safety reference levels by the end of 2010. If properly done, it means modernization of many reactors currently operating in Europe. Among the required measures is provision of systems that are designed to ensure the reactor containment integrity after a potential core meltdown accident. There is thus a need to exchange information on systems that have been designed and installed for this purpose in some countries.

Another major modernization activity is the replacement of original analogue I&C systems with new digital I&C. Evidently this has to be done sooner or later at all NPPs that are intended to operate for more than about twenty more years. There is already a lot of experience from installations of new digital I&C systems in the member states, but consistent regulatory requirements have not yet been defined.

Programme of Work Elements:

- a) **Request to the CSNI** - Assess and report to the CNRA the means that are available for providing increased assurance about the integrity of reactor containment after a potential core meltdown accident at the June 2007 meeting. The assessment should address all physical phenomena that threaten the containment integrity, such as high-pressure core meltdown, gradual pressure increase inside the containment due to decay heat or accumulation of non-condensable gas, melt-through penetration, or hydrogen burn/explosion. Use the information received from the CSNI as input to national regulatory considerations.
- b) **In-depth discussions** - On other key topics in this area and consider the need for related topical workshops (2008 and 2009).

7.3.3 **Progress in Safety Analysis Tools and related Impact on Regulatory Requirements for Safety Analysis**

The fast development of computer technology has provided opportunities for progress in developing and applying advanced analysis tools for safety analysis. Consequently, the dynamic 3-D calculations combining reactor physics, thermal hydraulics, and materials behaviour have given improved insights of the possible phenomena during major plant transients and accidents. Regular briefing of the CNRA on the current development, and discussion on the impact to regulatory requirements and safety assessment would be valuable.

Programme of Work Elements:

- a) **Request to the CSNI** - To brief CNRA regularly on the development in the safety analysis tools.

7.3.4 **Inspections and Audits related to Design of NPP Systems and to Equipment Manufacturing and Qualification**

Regulatory inspections and audits have been conducted by the national regulators in the design organizations of the NPP vendors and facilities of the equipment manufacturers. Also the processes for equipment qualification have been audited. Sharing the conclusions of these inspections and audits would be useful to avoid multiple repeating of similar regulatory measures.

Programme of Work Elements:

- a) **Annual reports** - Ask regulators having conducted inspections and audits to foreign vendors to report about their approaches and conclusions. Discuss the possibility to use this information by other national regulators, in order to restrict redundant regulatory work where possible.