

REPORT OF THE WORKING GROUP ON INTERNATIONAL NUCLEAR SAFETY ARRANGEMENTS FOR CIVIL RESEARCH REACTORS

Introduction

1. A Working Group (WG) was convened by the Secretariat of the IAEA as a part of its response to operative paragraph 4 of GC (44)/14:

The General Conference (GC):

Requests the Secretariat, within its available resources, to continue work on exploring options to strengthen the international nuclear safety arrangements for civil research reactors, taking due account of input from INSAG and the views of other relevant bodies@

2. The WG consisted of experts from seven countries, chaired by Dr. John Loy of Australia, who met in the Agency headquarters in Vienna from 21-24 May 2001. A list of the names of the experts is included as Attachment A.

Background

INSAG Letters

3. INSAG wrote the Director General first in November 1998 on this topic. It noted that there were a significant number of research reactors in a state of shutdown without definite plans for the future; there were major issues related to the ageing of research reactors; that research reactors were not covered by the present safety conventions and that participation by member states in relevant Agency programs was rather low; many research reactors have large stocks of spent fuel, much of which contains HEU; there are issues of operating safety of new high flux reactors with some developing countries. It observed that regulatory supervision has been found to be inadequate or even non-existent in some member states. INSAG recommended that the Agency assess its projects within a structured approach in order to assign clear priorities commensurate with safety relevance. In particular, INSAG recommended that high priority be given to reviewing the condition of shutdown reactors.

4. In April 2000, INSAG (now appointed for its fifth term) wrote again to the Director General. It stated that **A**while fully endorsing the concerns expressed by the previous INSAG, it must regretfully recognise that in spite of a prompt reaction by the Secretariat **Y** the problem remains very serious.@The April 2000 letter rehearsed the

issues raised in the earlier correspondence and also referred to a low level of safety culture surrounding many research reactors. While noting the efforts of the Secretariat, it stated that **A**the Member States may as yet have realised neither the urgency of the issue nor the dimension of the problem.**@**INSAG suggested the development of a Protocol to the Convention on Nuclear Safety or some similar legal instrument as a way of establishing a better, international safety framework for these reactors. It recognised that this would take some time to develop and, in the meantime, recommended urgent action in two areas: a proper decommissioning of research reactors that are shutdown and not decommissioned; and a thorough review of the safety of the older research reactors not under the control of an independent national regulatory authority.

Current International Arrangements

5. The Agency currently has a number of mechanisms to influence the safety of research reactors. The Integrated Nuclear Safety Assessment of Research Reactors (INSARR) mission program performs an in-depth assessment of selected facilities which request such a review. The majority of these missions are done at facilities with which the Agency has Project and Supply Agreements. The Agency has developed a series of standards and safety guides which specifically address research reactor safety covering such areas as the design, operation, quality assurance, and ultimate decommissioning. The Technical Co-operation Programme is also being used to support safety related projects for research reactors at the request of Member States. An incident reporting system for research reactors has been set up and now facilitates the exchange of information among 29 currently participating countries. The Agency is also currently establishing a decommissioning advisory service for nuclear installations.

6. A small number of countries have voluntarily reported on research reactors in their national reports under the Convention on Nuclear Safety. The Joint Convention on the Safety Spent Fuel Management and the Safety of Radioactive Waste Management covers research reactor spent fuel and waste.

View of the Working Group

The Need to Strengthen Safety Arrangements for Research Reactors

7. In broad terms, the case made by INSAG speaks for itself. Of the 651 research reactors that have been constructed and included in the research reactor data base of the Agency, 284 are in operation and 109 have been decommissioned. The remaining 258 are shutdown but not decommissioned. More than half of the operating research reactors are over thirty years old. Some of the 284 facilities declared operational are in an extended shutdown condition and are not being adequately maintained.

8. Further, the WG was briefed by the Secretariat on outcomes from recent missions and ongoing Agency programmes. It is evident that the Agency is addressing some important concerns - while in the majority of cases there is constructive engagement between the Agency and the countries to address the safety issues, progress can be slow and continuing problems encountered. Significant safety problems were discussed for a number of research reactors in such areas as effects of ageing, absence of effective regulation, the need for upgrading to meet seismic parameters, and lack of management resources and political will.

9. While the Secretariat has information from missions and Agency programme activity regarding approximately 50 research reactors, there is no similar information for the majority of the research reactors in the world.

10. The WG endorses the general views expressed by INSAG on the importance and urgency of the problem. Given that the problems are, to a large degree, associated with ageing, the loss of expertise and control, and the lack of operating and regulatory infrastructure, they will only get worse with time without action. The WG believes that there needs to be action to address the issues.

11. Further exploration of approaches that might make the role of the Agency more effective in these issues should continue with clearer priorities for existing relevant Agency programmes and projects. In broad terms, the WG sees the need for steps to raise the awareness of countries to the issues and to establish clearly the fundamental, internationally accepted safety regime for research reactors. Countries should also provide information on the state of their facilities to guide further development of international activity in this area.

Options for a Legal Instrument

12. The WG reviewed and discussed a paper prepared by the Secretariat entitled **Possible Options for an international arrangement on the safety research reactors.** (Attachment B) The options discussed in this paper were:

Binding Arrangements

- _ A new Convention on the Safety of Research Reactors
- _ An amendment to the Convention on Nuclear Safety
- _ A Protocol to the Convention on Nuclear Safety
- _ Unilateral declarations by States

Non Binding Arrangements

- _ A Code of Conduct
- _ General Conference resolutions.

13. A legal subgroup of the WG examined the options. Taking into account the restricted composition of the group and the fact that the meeting was of a preliminary nature, the subgroup did not want to discard any type of legal arrangement that might appear necessary in the longer term to address the issue of the safety of research reactors. The subgroup did, however take the view that, at least in the short term, they could not see the benefit of having a strict binding agreement to address the specifics of safety of research reactors. Their general feeling was that a binding instrument with reporting obligations would put an excessive burden on countries, without necessarily achieving results for the safety of research reactors. It was also expressed that, with very limited transboundary effects, the case of research reactors was different to NPPs. From this point of view, consideration of a binding instrument for research reactors was not as appropriate as it had been for NPPs.

14. The legal sub-group suggested that two approaches be further explored:

- _ An adaptation of the modalities to strengthen the monitoring system drawing upon experience in other fields e.g. adaptation of the modalities to the **oversight service** used in the ICAO to review the performance of national airline safety regulation. The approach would require the support of countries through a GC resolution and then the negotiation of bilateral agreements between countries and the Agency that would permit the Agency to review the state of research reactor facilities in the agreement country.

- The development of a non-binding Code of Conduct for research reactors. Such a document would establish clearly international best practice in relation to such issues as construction, operation, ageing, maintenance and control during extended shutdown, and decommissioning planning and execution. The development of the Code of Conduct would also be an important tool for raising awareness on the issues affecting research reactors and for building co-operation.

A Proposal for Country Assessment Surveys of Research Reactors

15. After lengthy discussion, the WG reached the view that, whilst the broad definition of the overall problem was clear (as set out above) and there is more specific information available to the Secretariat about certain research reactors, there is a need for more detailed knowledge on a country by country and facility by facility basis.

16. The Agency's Research Reactor Data Base (RRDB) provides basic factual information about research reactors. It cannot provide an assessment of the state of each research reactor in terms of the operating and regulatory arrangements or the future planning for utilisation, shutting down or decommissioning of the research reactor. There is some such information available to the Agency as a result of INSARR missions and other activities, and while it by no means covers the population of research reactors, it could serve as a basis and a verification of a wider survey.

17. The WG believes that it would be valuable to gain such information through an assessment survey with wide participation by countries. The objectives of the survey are:

- Better characterising the status of safety at specific research reactor
- Heightening member state awareness and attention to potential research reactor safety issues
- Identifying opportunities to apply existing, modified or new Agency services and programs to research reactor safety concerns.

The survey should also seek generic information about regulatory oversight applied to research reactors in the country. The information solicited should strike a balance between providing enough detail to meet the objectives above and not being overly onerous on member states to complete (particularly for member countries with large numbers of research reactors).

18. An outline of the scope of the assessment survey is at Attachment C. This outline is intended to be illustrative of the level and scope of the questions to be asked and is based upon a short amount of discussion by the WG. There would need to be a wider and more extended discussion of the assessment survey before it could be expected to receive wide support and participation. An important incentive for participation in the assessment survey should be the opportunity for countries to describe their planning for tackling research reactor issues, such as decommissioning or refurbishment, and the resources needed to achieve these plans.

19. The assessment survey, provided sufficient countries participated, would be valuable in itself as a means of obtaining more detailed information to support the current Agency programs in regard to research reactors and to develop more effective, innovative approaches. It would also be a means for raising awareness of the issues, including at political level.

20. The Agency should stand ready - and the Division of Nuclear Installation Safety be appropriately resourced (including, if appropriate, through an extra budgetary program) to assist countries to complete their assessment surveys. The Agency should focus on those countries likely to be facing resourcing difficulties.

21. Following completion of the assessment survey, the Agency should be tasked with analysing the outcomes and bringing forward plans to address the issues identified.

Recommendations: A Way Ahead to an International Action Plan for Research Reactors

22. The WG notes that the DG is to report to the 45th regular session of the General Conference on the implementation of GC(44)/RES/14. The report will need to cover the Agency's efforts to assist member states to implement the relevant Safety Standards

and its monitoring those research reactors subject to agreements and assisting those member states.

23. The WG recommends in this context, that the Agency consider establishing an international action plan for research reactors. The elements of the plan to be considered by Member States should include:

- _ The early development of an assessment survey as described in paragraphs 15 to 21.
- _ The preparation of a Code of Conduct that would clearly establish the desirable attributes for management of research reactor safety.
- _ Further exploration of the modalities to strengthen the monitoring system drawing upon the experience in other fields, e.g. ICAO.

As the action plan develops and further information is accumulated, Agency programmes affecting research reactor safety, including Technical Co-operation Projects, should be reviewed to ensure that priorities are commensurate with safety relevance.

24. The WG recognises that for this international plan of action to succeed that there needs to be additional resources devoted to these matters within the Agency and political will in the member states.

Attachment A

List of Working Group Members

Loy, J (Chairman)	Australia
Arcuri, J	Argentina
Arkhangelsky, N	Russian Federation
Blaha, J	United States of America
Burrows, R	United States of America
Degueuse, D	France
Funayama, Y	Japan
Gauvain, J	France
Jigen, L	China
Kalygine, V	Russian Fedration
Mulkey, J	United States of America
Pinel, C	France
Sajaroff, P	Argentina
Takaya, H	Japan
Tappert, J	United States of America

Attachment B

**Working Group Meeting
International Nuclear Safety Arrangements for
Civil Research Reactors
IAEA - Vienna
21 - 25 May 2001**

**Possible options for an international arrangement on the safety of research
reactors**

Discussion paper by the Secretariat

1. One of the tasks of the aforementioned Working Group Meeting is to advise the Secretariat regarding research reactor safety in response to General Conference Resolution GC (44)/RES/14. In that Resolution, the Secretariat was, *inter alia*, requested to within its available resources, to continue work on exploring options to strengthen the international nuclear safety arrangements for civil research reactors, taking due account of input from [the International Nuclear Safety Advisory Group] INSAG and the views of other relevant bodies;@ INSAG, in a letter to the Director General of the IAEA of 2000-04-24, expressed a view that adding a Protocol to the Convention on Nuclear Safety to cover research reactors would be a major contribution towards a better international framework for these reactors.@It further suggested that the Secretariat should begin developing an international Protocol or some similar legal instrument without delay.@The purpose of this draft discussion paper is to present various options for strengthening the international nuclear safety arrangements for research reactors, as mentioned in General Conference Resolution GC (44)/RES/14.

2. Strengthening the international nuclear safety arrangements for research reactors from a legal point of view can be achieved in a number of ways. At one end of the spectrum, States may wish to adopt a binding international legal instrument on the subject, for example in the form of a Convention. At the other end of the spectrum there are non-binding international instruments such as codes of conduct or resolutions to cover the subject matter. The Working Group is invited to discuss the advantages

and disadvantages of each of the options set out below as well as to explore other possibilities.

3. **Convention on the Safety of Research Reactors:** As a free-standing document it would be a **traditional** form of a binding international agreement concluded between States. It would be binding between Contracting Parties only. It could provide for its own peer review mechanism or any other form of monitoring compliance with the provisions of the treaty. A free-standing Convention may follow preambular paragraph (x) of the Convention on Nuclear Safety which **recogniz[es]** the usefulness of further technical work in connection with the safety of other parts of the nuclear fuel cycle, and that this work may, in time, facilitate the development of current or future international instruments.

4. **Amendment to the Convention on Nuclear Safety:** This option of a legally binding instrument has been discussed in the past. Amendments to Articles 2 and 3 (Definitions and Scope) of the Convention on Nuclear Safety would be required. Article 32 of the Convention prescribes the relevant amendment procedures. Paragraph 1 of Article 32 provides that **any** Contracting Party may propose an amendment to this Convention. Proposed amendments shall be considered at a review meeting or an extraordinary meeting [under the Convention]. **By** way of an amendment to Articles 2 and 3 of the Convention on Nuclear Safety the provision of that Convention would be expanded to cover the safety of research reactors.

5. **Protocol to the Convention on Nuclear Safety:** This option was specifically mentioned by INSAG. In legal force, a Protocol, however, does not differ from a free-standing Convention or an amendment to a Convention. Rather there is a difference in form in that negotiating Parties link one legally binding international instrument to another thereby expressing the close relationship between these two instruments. Protocols can either foresee that they are only open for ratification by Contracting Parties of the main instrument (the Convention) or they may be open for ratification by all States, i.e. also by States that are not Contracting Parties to the main instrument. In the latter case the difference with a free-standing Convention would exist only in terms of terminology used. (**Protocol** versus **Convention**). In the particular case of a Protocol to the Convention on Nuclear Safety the question of whether, and, if so, in which form there should be a reporting mechanism to Review Meetings of Contracting Parties arises. The Protocol may use the reporting mechanism of the main instrument or provide for one of its own.

6. **Unilateral Declarations:** This is also a form of a legally binding international undertaking. States would, for example, subscribe to apply the safety principles embodied in the Convention on Nuclear Safety to research reactors and to report thereon to Review Meetings of Contracting Parties. Such unilateral declarations could be submitted to the Depositary for the main instruments (the Convention on Nuclear Safety), i.e. the Director General of the IAEA. In respect of the reporting mechanism it should be noted, however, that States which have not submitted such a unilateral declaration to the Depositary may object that time at Review Meetings of Contracting Parties under the Convention on Nuclear Safety is spent on a subject to which they have not subscribed. Different from a Protocol, an amendment to the Convention or a free-standing Convention, unilateral declarations could be made binding not only vis-à-vis Contracting Parties but in respect to all States, depending on the terms of the commitment.

7. **Code of Conduct:** This is a form of a non-binding international instrument. Often Codes of Conduct are drafted as a first step in the development of subsequent legally binding international instruments on the subject. (see for example the Code of Practice on the International Transboundary Movement of Radioactive Waste which is now by and large embodied in Article 27 of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management)

8. **Resolutions:** This is another form of a non-binding undertaking on the safety of research reactors. Resolutions may embody, in a non-binding context, the same principles as any binding international legal instrument; they may thus also provide for a voluntary peer review mechanism or for example for the establishment of a forum of States to discuss certain subject matters. Resolutions may be combined with other legally binding undertakings such as unilateral declarations. For example, States may undertake in a unilateral declaration to apply the safety principles embodied in the Convention on Nuclear Safety and to report thereon to a forum created by a General Conference Resolution

Attachment C

Possible Survey Questions

(These questions are intended to be illustrative of the scope and level of questions to be asked in the survey.)

Please update the provided IAEA information about research reactor facilities in your country as necessary

Regulatory/Operating Program

- _ Are laws, regulations and procedures in place which are comparable with international practices? Who has responsibility for independent oversight?
- _ Have all research reactors been licensed and subject to periodic inspection by the regulatory authority?
- _ Identify the operating organisation(s) involved.

Decommissioning Research Reactors

- _ Is fuel still on site
- _ Has the facility been decommissioned and decontaminated in accordance with international standards or appropriate national standards?

Shutdown Research Reactor

- _ Has a decision been made to restart or permanently shut down the research reactor?
If not, when will such a decision be made?
- _ If a decision has been made to permanently shut down the research reactor, is a decommissioning plan in place?
- _ Are safety systems being maintained?
- _ Is fuel in the reactor?

Operating Research Reactor

- _ Are adequate numbers of qualified specialists and managers available?

- _ Is there a Safety Analysis Report and does it address the current facility configuration?
- _ Is a formal QA program in place?
- _ Describe the financial resources available?
- _ When was the last inspection by the regulatory body?

Research Reactors Planned or Under Construction

- _ Are new research reactors planned or under construction?
- _ If yes, are they under regulatory review and oversight?

Opportunity for Assistance

- _ Would your country be interested in a safety service mission by the Agency to assist in assessing the safety of the research reactor?
- _ Would your country be interested in technical assistance or other financial support?