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MEASURES TO STRENGTHEN INTERNATIONAL CO-OPERATION IN MATTERS RELATING TO NUCLEAR SAFETY AND RADIOLOGICAL PROTECTION

(a) Implementation of resolution GC(XXXVI)/RES/582

(iii) Safety principles for future nuclear power plants

In resolution GC(XXXVI)/RES/582, the General Conference last September urged a continuation of the process of developing safety principles for future reactors. The attached report, which describes activities in this area since the 1992 regular session of the General Conference, was considered on 21 September 1993 by the Board of Governors, which authorized the Director General to transmit it to the General Conference.

SAFETY PRINCIPLES FOR FUTURE NUCLEAR POWER PLANTS

Introduction

1. In September 1991, the General Conference, having noted with appreciation the results of the International Conference on the Safety of Nuclear Power - Strategy for the Future", held in Vienna from 2 to 6 September 1991, invited the Director General "to set up a small group of experts to develop safety principles for the design of future reactors, using a step-by-step approach based - inter alia - on the work of INSAG and taking into account the characteristics of various reactor types".¹
2. In September 1992, the General Conference had before it, in Annex 3 to document GC(XXXVI)/1021, a report on steps taken in response to that invitation. At the end of the report it was stated that the next step was expected to be the preparation of a technical document (IAEA-TECDOC) on safety principles for the design of future nuclear power plants (NPPs).
3. In resolution GC(XXXVI)/RES/582, the General Conference last September urged a continuation of the process of developing safety principles for future reactors.

Work on IAEA-TECDOC

4. In December 1992, a group of consultants compiled material for the IAEA-TECDOC referred to in paragraph 2 above.
5. The group considered that most of the comprehensive set of safety objectives and safety principles spelled out in the INSAG document "Basic Safety Principles for Nuclear Power Plants" (INSAG-3) were applicable to future NPPs, but that the IAEA-TECDOC should provide a basis for updating those objectives and principles in order: (a) to reflect the current emphasis on safety, and in particular on the prevention and mitigation of severe accidents (including the limitation of the consequences of most severe accidents to the point where there was no significant radiological impact); (b) to ensure that emerging issues such as safety problems encountered under low-power and shutdown conditions were addressed and; (c) to ensure consistency and completeness with respect to all relevant documents in the Agency's Safety Series.

1 See preambular paragraph (b) and operative paragraph 9 of General Conference resolution GC(XXXV)/RES/553.

6. In April 1993, a Technical Committee reviewed the aforementioned material and prepared a draft IAEA-TECDOC entitled "Development of safety principles for the design of future nuclear power plants", which will undergo review in due course. The Technical Committee recommended that, after the review, the draft IAEA-TECDOC be submitted, before being issued, to the Safety Series Review Committee with a view to ensuring consistency and completeness with respect to all relevant Safety Series documents as envisaged in paragraph 5 above. The intention is that the IAEA-TECDOC should be a stand-alone document. The Technical Committee also recommended that the Secretariat provide guidance on the future use of the IAEA-TECDOC.

7. The Technical Committee considered that relatively minor modifications to some of the main safety objectives and safety principles in document INSAG-3 could, with the addition of a small number of further principles, result in a comprehensive set of safety objectives and safety principles for the design of future NPPs which could serve as a bridge between a Safety Fundamentals document and more detailed safety-related documents and also as a framework for the development by Member States of comprehensive criteria and guidance.

8. The key to these relatively minor modifications was the incorporation into the draft IAEA-TECDOC of a modified version of the technical safety objective set forth in paragraph 19 of document INSAG-3 and its supporting paragraphs - including the introduction of the concepts "realistically conceivable severe accident" and "no significant radiological impact".

9. The concept "realistically conceivable severe accident" means that certain severe accidents should be allowed for in the design and that the selection of those to be allowed for is a matter of engineering judgement in the light of such factors as physical processes and likelihood; it does not mean that every conceivable accident scenario and/or phenomenon should be allowed for. National authorities would be the final judges of which severe accident scenarios and/or phenomena must be considered, and in what fashion, in order to ensure adequate protection of the public.

10. The concept "no significant radiological impact" means that, even under certain severe accident conditions (in a "realistically conceivable severe accident"), there should be no significant offsite disruption. Of course, national authorities would have to determine the offsite consequence thresholds which correspond to a significant disruption.

11. The technical safety objective was modified in order to enable severe accidents to be considered at the design stage and is included as the overall design objective in the draft IAEA-TECDOC on safety principles on the design of future NPPs, which is expected to be finalized and issued in 1994.

12. Since many factors are involved in the prevention and mitigation of severe accidents, the Technical Committee considered that there were other parts of document INSAG-3 where modifications or additions to existing principles would be appropriate in order to help achieve the overall design objective.

13. The Technical Committee reconfirmed recommendations made by an Advisory Group in July 1992 regarding:

- the international exchange of information on criteria and methodologies associated with offsite radiological consequences;
- the deferral of any decision on the development of specific safety criteria for future NPPs until after the present R & D work on future reactors has progressed sufficiently; and
- the international exchange of information on criteria and methodologies used in the selection of realistically conceivable severe accidents (this topic will be taken up in November 1993 by a Technical Committee, which will start work on the preparation of a further IAEA-TECDOC).

14. The Board discussed the question of safety principles for future nuclear power plants at its June session. It noted that various firm opinions had been expressed concerning the need for and usefulness of further consideration of the question on the basis - inter alia - of advice formulated by INSAG.

15. In the light of the discussion in the Board during its June session, the Secretariat placed the question of safety principles for nuclear power plants before INSAG, which decided to review a revised version of the draft IAEA-TECDOC referred to in paragraph 6 above at its forthcoming regular meeting, in November, when it will formulate its views on future activities relating to this question.

