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**NUCLEAR ENERGY AGENCY  
COMMITTEE ON THE SAFETY OF NUCLEAR INSTALLATIONS**

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## **ERRORS OF COMMISSION IN PROBABILISTIC SAFETY ASSESSMENT**

**Working Group on Risk Assessment (RISK)**

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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 27 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, 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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## COMMITTEE ON THE SAFETY OF NUCLEAR INSTALLATIONS

The Committee on the Safety of Nuclear Installations (CSNI) of the OECD Nuclear Energy Agency (NEA) is an international committee made up of senior scientists and engineers. It was set up in 1973 to develop, and co-ordinate the activities of the Nuclear Energy Agency concerning the technical aspects of the design, construction and operation of nuclear installations insofar as they affect the safety of such installations. The Committee's purpose is to foster international co-operation in nuclear safety among the OECD Member countries.

The CSNI constitutes a forum for the exchange of technical information and for collaboration between organisations, which can contribute, from their respective backgrounds in research, development, engineering or regulation, to these activities and to the definition of the programme of work. It also reviews the state of knowledge on selected topics on nuclear safety technology and safety assessment, including operating experience. It initiates and conducts programmes identified by these reviews and assessments in order to overcome discrepancies, develop improvements and reach international consensus on technical issues of common interest. It promotes the co-ordination of work in different Member countries including the establishment of co-operative research projects and assists in the feedback of the results to participating organisations. Full use is also made of traditional methods of co-operation, such as information exchanges, establishment of working groups, and organisation of conferences and specialist meetings.

The greater part of the CSNI's current programme is concerned with the technology of water reactors. The principal areas covered are operating experience and the human factor, reactor coolant system behaviour, various aspects of reactor component integrity, the phenomenology of radioactive releases in reactor accidents and their confinement, containment performance, risk assessment, and severe accidents. The Committee also studies the safety of the nuclear fuel cycle, conducts periodic surveys of the reactor safety research programmes and operates an international mechanism for exchanging reports on safety related nuclear power plant accidents.

In implementing its programme, the CSNI establishes co-operative mechanisms with NEA's Committee on Nuclear Regulatory Activities (CNRA), responsible for the activities of the Agency concerning the regulation, licensing and inspection of nuclear installations with regard to safety. It also co-operates with NEA's Committee on Radiation Protection and Public Health and NEA's Radioactive Waste Management Committee on matters of common interest.

\* \* \* \* \*

The opinions expressed and the arguments employed in this document are the responsibility of the authors and do not necessarily represent those of the OECD.

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## **ABSTRACT**

This report looks at descriptions of the methods used to analyse errors of commission, descriptions of the findings from the analysis of errors of commission and provides general insights or lessons learned about errors of commission.

## FOREWORD

The main mission of the Working Group on Risk Assessment (RISK) is to advance the understanding and utilisation of Probabilistic Safety Assessment (PSA) in ensuring continued safety of nuclear installations in Member countries. In pursuing this goal, the Working Group shall recognise the different methodologies for identifying contributors to risk and assessing their importance. While the Working Group shall continue to focus on the more mature PSA methodologies for Level 1, Level 2, internal, external, shutdown, etc. It shall also consider the applicability and maturity of PSA methods for considering evolving issues such as human reliability, software reliability, ageing issues, etc., as appropriate.

As a follow-up to CSNI report on Critical Operator Actions [NEA/CSNI/R(98)1] produced by the Working Group task group under Dr. Hirschberg, it was decided to initiate a further task addressing errors of commission. The task group through a series of meetings and discussions has carried out its objective in this report which describes various methods, provides findings from analysis and looks at general insights gained.

The principal characteristic of an error of commission in a PSA context is that its consequence is a state of unavailability of a component, system or function. This is in contrast to an error of omission, which is characterised by a lack of action, and therefore preserves the status quo of a system, component, or function. Thus an important error of commission is recognised by its consequence. In the PSA context, the most significant errors of commission are those that either, in addition to resulting in failure to perform some function, also fail, or made unavailable, other equipment or functions needed to mitigate the accident scenario, or otherwise exacerbate the situation.

This work represents the collective effort of the task group all of whom provided valuable time and considerable knowledge toward its production. In offering it thanks to these experts, the NEA Secretariat wishes to express to provide particular appreciation to Ms. Ann Ramey-Smith, U.S. Nuclear Regulatory Commission, who as task leader adeptly chaired the many meetings and provided overall co-ordination towards completing the report.

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