Technical Meeting on the Design Modification Process during the Lifetime of a Nuclear Power Plant: Challenges and Good Practices

Hosted by the
International Atomic Energy Agency

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Information Sheet

A. Background

Nuclear power plants (NPPs) must operate in a manner that meets their design intent over a period of many decades. Maintaining the safe and reliable operation expected of an NPP requires that the initial design, as well as any changes made thereto during its lifetime, is prepared, verified, validated, authorized, implemented and controlled via a meticulous and structured process that is effective and efficient.

When a plant is being considered, ordered, designed and built, its design is an integrated process among the vendors — ranging from the reactor supplier and the architect/engineer to the supplier or designers of components, and many others involved in construction and commissioning. Those entities, referred to as 'responsible designers', conform (or have been verified to conform by the owner/operating organization) to the appropriate quality assurance and service requirements to provide a safe and efficient design of the NPP.

The owner/operating organization is usually an 'intelligent customer' of those entities; but still bears the responsibility for the correctness and adequacy of the design of the facility, including during design customization. It must therefore have, as a minimum, the capability of understanding and

confirming the design or the design changes developed by (or requested from) the responsible designers. This capability is particularly important before the handover of the design in order to minimize unnecessary or adverse changes to the design, and thereby also minimize pre-operation costs and schedules.

Following the handover of the design to the operating organization, most design modification activities are initiated, performed, implemented and controlled by the operating organization. As the bearer of full responsibility for safety and the upholder of reliable and efficient performance of its NPP, the operating organization needs to have ownership of the 'design modification process' and to establish 'design control'.

The provision of effective design modification control is essential to maintain design and configuration so as to ensure the safe operation of NPPs and to maximize their availability and productivity. As stated in the International Atomic Energy Agency (IAEA) publication *Maintaining the Design Integrity of Nuclear Installations throughout their Operating Life* (INSAG Series No. 19, IAEA, Vienna, 2003), maintaining the NPP safety requires that initial design, and design changes thereafter, be implemented with a full understanding of all the design basis and information, such as "[…] the specifications for each system and component; of the engineering compromises and assumptions made by the designers about operation and lifetime; of why the plant was designed that way; and of the interactions with other systems and components […]."

Specifically, the concept of a design and its control — not only during the operation but also during the design, construction and commissioning stages — is essential in order to:

- Identify any design and specification issues during the design stage rather than during operation, since addressing these retrospectively would entail an additional cost and time burden;
- Make design changes with full knowledge of the design basis, design intent, design philosophy and all the details of implementation history of the design by validation;
- Ensure that the design and any changes thereto are tested and commissioned to demonstrate their compliance with requirements;
- Interface with the regulatory body, during the safety review of the design, in a controlled and informed manner;
- Manage the design responsibility borne by the contractors and have adequate contractor oversight;
- Transfer the detailed knowledge used in the design to the operating entities' technical support organizations; and
- Understand and update the track and records of design information to the conception of the design.

The experts involved in the assessment of, and search for, solutions to issues related to design and technical support should therefore be brought together periodically in an environment where they can exchange information on the implementation and effectiveness of efforts (including specific reasons and methods) related to the design process, the modification of design and the provision of scientific and technical support.

B. Purpose

The purpose of this meeting is to review and share international experience and exchange expert views related to best practices in the initiation, performance, review, approval and implementation of minor, major and temporary design modifications at NPPs throughout their lifetime (i.e. from initial design to decommissioning) for safe, reliable, economically efficient and administratively effective operation. The meeting also aims to collect feedback and input from Member States on challenges and needs in order to improve the focus of IAEA activities dealing with design modification decisions, design control and technical support processes and programmes in support of NPPs and programmes.

The particular goals of the meeting are as follows:

- To discuss case studies, good practices, problems identified and lessons learned in NPP design modification and associated technical support;
- To provide a forum in which participants can discuss common challenges, opportunities for cooperation, concerns and issues that their countries/organizations are facing or likely to face in the nuclear power programme;
- To allow participants to provide input and feedback on the efforts undertaken and guidance provided by the IAEA on good practices related to design decisions, design control and technical support processes and programmes; and
- To provide a forum for participants to improve their knowledge at the national or international level.

C. Expected Outcome

The primary outcome of this meeting will be an improved understanding — among Member States with established nuclear power programmes as well as those with expanding programmes and newcomer countries — of the design modification process. The expected output is a list of current and future good practices related to NPP design modification and associated processes, including technical support.

The secondary outcome will be the collection of information based on feedback and inputs from Member States on their challenges and needs in order to improve the focus of IAEA activities related to design decisions, design control and technical support processes and programmes.

D. Target Audience

The meeting is targeted at staff members of nuclear industry owner/operator organizations, responsible designers, technical support organizations and service and equipment suppliers involved in international/regional/national technical and facility design and technical support for NPPs, who have a leading support role in identifying, deciding on and implementing actions.

Representatives of countries with operating NPPs who have experience of the design modification/change concept, as well as established design engineering programmes, processes and procedures, are also encouraged to attend in order to maximize the exchange of information.

Vendors and suppliers would also benefit from this meeting, as it would help them to improve and establish NPP customer interfaces and to better understand the needs and challenges faced by

countries launching nuclear power programmes. As such, the meeting targets nuclear project, utility, designer and vendor staff who are involved (or will be involved) with NPP design, including its review, approval and modification processes.

Participants should be knowledgeable in, or familiar with, industry-wide practices, regulations, standards and applications relating to the design process and provision of technical support. They should also be capable of describing and discussing in depth their knowledge and experience, as well as the needs and challenges faced by their countries.

Participants will be asked to give a presentation on a specific topic. Topics may include, but are not limited to, standards, methods, expectations, implementation and practices for improving the effectiveness of design modification responsibilities to assist NPP owner/operating organizations with informed design decision-making.

Although the decision-making processes by the regulatory body and owner/operating organization of an NPP on design modifications are independent of one another, the practice of transparency and informative interface between them is essential in the activities towards decision-making. Therefore, this meeting could also be beneficial for participants from the regulatory bodies for the nuclear safety aspects of design modifications.

E. Topics

The topics to be covered during the meeting will consist of specific information on the benefits, risks, difficulties and challenges associated with design processes and programmes, as well as the relevant scientific and technical support. The topics will include the following:

- Definitions and graded approaches used in the design modification process;
- Standardization of design and design modification processes;
- Configuration management as related to design modification;
- Risk informed design modification processes and programmes;
- Functions, characteristics and management of the players, relations and interfaces among designers and decision makers on the modifications to design;
- Essential elements and best practices in initial design and design modifications thereafter, regarding:
    - Design basis, safety analysis, design and operational margin verification/validation;
    - Plant system classification and qualification verification;
    - System and component reliability assessments;
    - Non-conformance identification and correction;
    - Review and approval of design and design changes;
    - Vendor selection and management for design and major design modifications;
    - Preparation and implementation of modification processes and procedures; and
- Areas of improvements on design and design modification practices; technical and administrative solutions to issues in the design changes of NPPs, including during the design customization and construction phases, such as:

- Project management in terms of timeliness (request, confirmation, final product); qualifications, roles and responsibilities of individuals; interfaces and oversight (majors/disciplines, relevant internal organizations, etc.); and relationships (vendor–owner–regulator–contractor);
- Classification (significance, impact, value, risk) and prioritization (design deficiencies/improvements) of change proposals;
- Tools/methods in implementation.

F. Working Language

The meeting will be conducted in English. No interpretation will be provided.

G. Administrative and Financial Arrangements

No registration fee is charged to participants. The costs of the meeting facilities and logistic support will be borne by the IAEA. Travel and subsistence expenses of participants may be borne by the IAEA utilizing the limited funds that are available to help cover the cost of certain participants. Such assistance can be offered upon specific request to one or two participants per country, provided that, in the IAEA's view, the participant(s) will make an important contribution to the meeting and that, where assistance is requested for two participants, they represent different national organizations. **The application for financial support should be made at the time of designating the participant(s)**.

It should be noted that compensation is not payable by the IAEA for any damage to or loss of personal property. The IAEA also does not provide health insurance coverage for participants in meetings, workshops or training courses or for consultants. Arrangements for private insurance coverage on an individual basis should therefore be made. The IAEA will, however, provide insurance coverage for accidents and illnesses that clearly result from any work performed for the IAEA.

H. Application Procedure

Designations should be submitted using the attached Participation Form (Form A).

Completed forms should be endorsed by the competent national authority (e.g. Ministry of Foreign Affairs, Permanent Mission to the IAEA, or National Atomic Energy Authority) and returned through the established official channels.

The applications must be received by the IAEA not later than **31 August 2018**. Designations received after that date or applications sent directly by individuals or by private institutions will not be considered. Designating Governments will be informed in due course of the names of the selected candidates and at that time full details will be given on the procedures to be followed with regard to administrative and financial matters.

For Member States receiving financial assistance through technical cooperation funds, applications for financial support should be made at the time of designating the participant(s).

I. Visas

Designated participants should submit the necessary visa application to the nearest diplomatic or consular representative of Austria, as soon as possible. Visa arrangements, including transit visas, are the sole responsibility of the participants, who should initiate the necessary action for obtaining a visa prior to departure.

J. Local Arrangements

The meeting will be held at the IAEA's Headquarters, i.e. at the Vienna International Centre (VIC), Wagramerstraße 5, Vienna. The meeting will take place in **Room M4, M Building** of the **VIC**. It will start at 09:30 on Tuesday, 30 October 2018 and end at 15:30 on Thursday, 1 November 2018.

Participants are kindly requested to arrive at Gate 1 of the VIC at least an hour before the meeting in order to allow adequate time for security checks and registration. They will be asked to present some form of photo identification, such as a national passport.

K. Secretariat

Scientific Secretary

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Enquiries about the meeting should be sent by email to the IAEA Scientific Secretary, **Mr Arif Nesimi Kilic**, with a copy to the Administrative Secretary, **Mr Roy Georg**e.