IAEA
International Atomic Energy Agency
Atoms for Peace and Development

Technical Meeting on the Modernization and Refurbishing of Instrumentation and Control Systems of Nuclear Fuel Cycle Facilities

IAEA Headquarters, Vienna, Austria
and virtual participation via Cisco Webex

3-5 July 2024

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Information Sheet

Introduction

Nuclear Fuel Cycle Facilities rely extensively on instrumentation and control (I&C) systems for protection, control, supervision and monitoring. I&C systems are installed throughout the facility and are vital parts of normal and off-normal operations. I&C systems have an important function in ensuring the safety of fuel cycle facilities. Although analogue I&C and measurement systems provided the above functions satisfactorily, during the past decades, fuel cycle facilities are facing challenges in several I&C areas due to ageing and obsolescence of components and equipment. With licence renewals, capacity and technology upgrades, the long-term operation and maintenance of obsolete I&C systems may not be a cost-effective and reliable option. The efforts needed to maintain or increase the reliability of existing analogue I&C systems may be greater in the long run than upgrading them to new digital or hybrid I&C systems.

The IAEA Safety Standards Series publication No. SSR-4, *Safety of Nuclear Fuel Cycle Facilities*, describes the requirements for I&C systems of nuclear fuel cycle facilities. There are numerous IAEA publications on I&C systems for Nuclear Power Plants (NPPs) and Research Reactors (RRs), such as:

- The IAEA Nuclear Energy Series No. NR-G-5.1, *Digital Instrumentation and Control System for New and Existing Research Reactors* (Vienna, 2021), which provides engineering guidance on the design and operational aspects of digital I&C systems for the refurbishment of existing and new RRs;
- The IAEA Safety Standards Series No. SSG-37, *Instrumentation and Control Systems and Software Important to Safety for Research Reactors* (Vienna, 2015);
- The IAEA Nuclear Energy Series No. NR-T-2.14, *Introduction to Systems Engineering for Instrumentation and Control of Nuclear Facilities* (Vienna, 2022); and
- The IAEA Nuclear Energy Series No. NR-T-3.34, *Management of Ageing and Obsolescence of Control and Instrumentation Systems and Equipment in Nuclear Power Plants and Related Facilities Through Modernization* (Vienna, 2022), which addresses the refurbishment and modernization of I&C systems for NPPs.

Obsolescence is a major consideration for control and instrumentation systems which can result from causes such as lack of spare parts, supplier support and functional capabilities needed to satisfy current and future needs and technological advancements. Ageing of the I&C systems is another consideration which leads to difficulties such as decreasing reliability and availability of operating fuel cycle facility, increasing costs to maintain acceptable performance, and the lack of experienced staff for maintenance and engineering. In addition, the need for better reliability and availability may require the capabilities of new technology that are not possible or practicable with the older technology.

Refurbishments and life extensions of nuclear fuel cycle facilities may also need to address the obsolescence issues. In addition, older technologies limit the possibilities for adding new beneficial capabilities to the facility systems and interfaces. New technologies (e.g., additive manufacturing or 3-D printing and artificial intelligence (AI)) are being incorporated in fuel manufacturing to improve quality and efficiency of nuclear fuel. They provide opportunities to improve plant performance, human-system interface functionality, and reliability; to enhance operator performance and reliability; and to address difficulties in finding young professionals who possess knowledge of, and experience with, the older analogue technology. In addition, there may be changes in regulatory requirements that could necessitate modernization activities.

Instrumentation and control upgrades at operating facilities require the use of digital I&C equipment. A digital I&C upgrade could also be an effective means to enhance the facilities' safety and I&C system functionality, manage obsolescence, and mitigate the increasing failure liability of ageing analogue systems. Many of the planning and implementation tasks of a digital I&C upgrade project are also relevant to the design and construction of new facilities since most equipment in new nuclear fuel cycle facilities will be digital.

There is, therefore, a need to develop a dedicated IAEA publication on I&C systems for nuclear fuel cycle facilities. The IAEA is working to systematically pool existing knowledge related to the use of digital I&C systems in nuclear fuel cycle facilities that can be shared within the community of operators and regulatory authorities. This event will address key areas of modernization projects for I&C systems in nuclear fuel cycle facilities. The IAEA is providing an organizational basis and a working environment for the participants representing various areas of I&C development, system design and testing, installation operation and licensing of I&C systems.

Objectives

The purpose of the event is to share experiences related to the life management of instrumentation and control systems at nuclear fuel cycle facilities for improving their long-term operation, in order to develop an IAEA Technical Document.

Target Audience

The event is intended for individuals from Member States with operating nuclear fuel cycle facilities or Member States that have initiated new nuclear fuel cycle facility projects. Participants should be individuals in charge of I&C systems at their respective nuclear fuel cycle facilities. Specialists from regulatory bodies who are in charge of the review and assessment of I&C systems for nuclear fuel cycle facilities can also participate.

Working Language

The working language of the event will be English.

Scope

Input from international experts is sought to cover all technical areas relevant to the complex process of I&C system modernization at existing nuclear fuel cycle facilities and in new facilities that are in the process of being designed or constructed. Presentations should focus on the following aspects of actual cases of modernization projects or projects for the design and construction of new nuclear fuel cycle facilities (NFCFs):

- Objectives and scope of the modernization project;
- Basis for modernization and I&C functions to be improved in the modernization project;
- Application of wireless technologies in I&C systems;
- Human factor engineering in I&C systems;
- Digital instrumentation and control systems for new and existing NFCFs;
- Impact of AI;
- Computer security aspects for I&C systems for NFCFs;
- Approaches for overall I&C Systems;
- I&C systems for advanced nuclear energy systems;
- Application of FPGA for I&C systems;
- Assessment of cable ageing in NFCFs;
- Seismic considerations of I & C systems;

- Integration of analog and digital I&C systems;
- Implementing digital instrumentation and control systems in the modernization of NFCFs;
- Online monitoring for improving the performance of NFCFs;
- Regulatory and safety assessment of instrumentation and control systems for NFCFs.

Participation and Registration

All persons wishing to participate in the event have to be designated by an IAEA Member State or should be members of organizations that have been invited to attend.

In order to be designated by an IAEA Member State or invited organization, participants are requested to submit their application via the InTouch+ platform (https://intouchplus.iaea.org) to the competent national authority (Ministry of Foreign Affairs, Permanent Mission to the IAEA or National Atomic Energy Authority) or organization for onward transmission to the IAEA by **3 May 2024**, following the registration procedure in InTouch+:

1. Access the InTouch+ platform (https://intouchplus.iaea.org):
   - Persons with an existing NUCLEUS account can sign in to the platform with their username and password;
   - Persons without an existing NUCLEUS account can register here.

2. Once signed in, prospective participants can use the InTouch+ platform to:
   - Complete or update their personal details under 'Complete Profile' and upload the relevant supporting documents;
   - Search for the relevant event under the 'My Eligible Events' tab;
   - Select the Member State or invited organization they want to represent from the drop-down menu entitled 'Designating Authority' (if an invited organization is not listed, please contact InTouchPlus.Contact-Point@iaea.org);
   - If applicable, indicate whether financial support is requested and complete the relevant information (this is not applicable to participants from invited organizations);
   - Based on the data input, the InTouch+ platform will automatically generate the Participation Form (Form A) and/or the Grant Application Form (Form C);
   - Submit their application.

Once submitted through the InTouch+ platform, the application, together with the auto-generated form(s), will be transmitted automatically to the required authority for approval. If approved, the application, together with the applicable form(s), will automatically be sent to the IAEA through the online platform.

NOTE: The application for financial support should be made, together with the submission of the application, by **3 May 2024**.

For additional information on how to apply for an event, please refer to the InTouch+ Help page. Any other issues or queries related to InTouch+ can be sent to InTouchPlus.Contact-Point@iaea.org.

Selected participants will be informed in due course on the procedures to be followed with regard to administrative and financial matters.

Participants are hereby informed that the personal data they submit will be processed in line with the Agency's Personal Data and Privacy Policy and is collected solely for the purpose(s) of reviewing and assessing the application and to complete logistical arrangements where required. The IAEA may also use the contact details of Applicants to inform them of the IAEA's scientific and technical publications, or the latest employment opportunities and current open vacancies at the IAEA. These secondary purposes are consistent with the IAEA's mandate. Further information can be found in the Data Processing Notice concerning IAEA InTouch+ platform.

Papers and Presentations Each participant is encouraged to give a presentation on the topics outlined in Section "Scope" above.

Participants who wish to give presentations are requested to submit an abstract of their work. The abstract will be reviewed as part of the selection process for presentations. It should be sent electronically to the Scientific Secretaries of the event (see contact details below), not later than **3 May 2024**.. Authors will be notified of the acceptance of their proposed presentations by **Acceptance Deadline.** Presentations should be submitted to the IAEA not later than **24 June 2024**.

In addition to the registration already submitted through the InTouch+ platform, participants have to submit the abstract, together with the Form for Submission of a Paper (Form B), to the competent national authority (e.g. Ministry of Foreign Affairs, Permanent Mission to the IAEA or National Atomic Energy Authority) or organization for onward transmission to the IAEA not later than **3 May 2024**.

Abstracts will be used to organise the presentations for the event and to establish the final programme The time for each presentation will be limited to 25 minutes (subject to change, depending on the number of presenters) in order to have sufficient time for discussion. Computer-based projection facilities will be provided.

Expenditures and Grants

No registration fee is charged to participants.

The IAEA is generally not in a position to bear the travel and other costs of participants in the event. The IAEA has, however, limited funds at its disposal to help meet the cost of attendance of certain participants. Upon specific request, such assistance may be offered to normally one participant per country, provided that, in the IAEA's view, the participant will make an important contribution to his or her State's I&C systems for research reactors.

The application for financial support should be made, together with the submission of the application, by **3 May 2024**.

Venue

The event will be held at the Vienna International Centre (VIC), where the IAEA's Headquarters are located. Participants must make their own travel and accommodation arrangements.

General information on the VIC and other practical details, such as a list of hotels offering a reduced rate for IAEA participants, are listed on the following IAEA web page:
https://www.iaea.org/events.

Participants are advised to arrive at Checkpoint 1/Gate 1 of the VIC one hour before the start of the event on the first day in order to allow for timely registration. Participants will need to present an official photo identification document in order to be admitted to the VIC premises.

In addition, the event will allow for virtual participation via Cisco Webex.

Visas

Participants who require a visa to enter Austria should submit the necessary application to the nearest diplomatic or consular representative of Austria at least four weeks before they travel to Austria. Since Austria is a Schengen State, persons requiring a visa will have to apply for a Schengen visa. In States where Austria has no diplomatic mission, visas can be obtained from the consular authority of a Schengen Partner State representing Austria in the country in question.

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Subsequent correspondence on scientific matters should be sent to the Scientific Secretaries and correspondence on other matters related to the event to the Administrative Secretary.