IAEA
International Atomic Energy Agency
Atoms for Peace and Development

Regional Training and Certification Course in Residence Time Distribution and Column Scanning Techniques

Hosted by

The International Atomic Energy Agency

4 to 15 December 2023

Ref. No.: TN-RER1023-2207745

Information Sheet

Purpose

The purpose of the event is to train and certify participants in Radioactive Tracer Method – Residence Time Distribution Technique (RTM/RTD) and Sealed Sources Methods – Column Scanning Technique (SSM/CST), as applied to industrial process units and columns.

Working Language

The working language of the event will be English.

Deadline for Nominations

Nominations received after **10 October 2023** will not be considered.

Project Background

Radioactive tracers and sealed sources technologies are important online non-invasive tools for the diagnosis of process flow anomalies which must be rectified to achieve process efficiency and optimization. These technologies have been developed and are well established in some Member States (MSs) where radioactive tracers are used routinely in local industries resulting in a steady increase in demand for the technologies among MSs with local capacity. Radioactive tracers and sealed sources technologies in comparison with conventional methods are advantageous in evaluating and troubleshooting industrial processes in a more economical way. Additionally, measurements using the technology can be carried out in-situ without a disruption of the process while obtaining results in a relatively short period of time. This provides the process and plant engineer access to critical information to make an informed decision regarding the operations even prior to further data treatment, interpretation and Residence Time Distribution (RTD) modelling which are important tasks in the application of radioactive tracer technology. In order to further increase the acceptance of the technology in industry in a sustainable fashion, there is the need to certify practitioners in accordance with accepted protocols by a certification body to boost confidence in the use of the techniques.

Scope and Nature

The training course will be for two (2) weeks: one week each for lectures and practical training respectively. At the end of the training, participants will be examined. Successful candidates will receive certificates of competences from the certification body, International Society for Tracer and Radiation Applications (ISTRA) for Level 1 or 2 in Radioactive Tracers Method, Residence Time Distribution Technique (RTM/RTD) and Sealed Sources Method, Column Scanning Technique (SSM/CST).

The lectures will include the following:

- An overview of industrial applications of radioactive tracer techniques including key theoretical concepts and principles underlying the techniques as well as case studies and common process flow anomalies (dead volume, channelling etc)
- Residence Time Distribution (RTD) modelling- Data acquisition and treatment, interpretation and RTD modelling of the experimental data
- Introduction to detectors and data acquisition systems for RTD measurements
- An overview of industrial and environmental applications of gamma scanning/nucleonic gauges including key theoretical concepts and principles underlying the techniques as well as case studies including sediment transport/dynamics investigations
- Scan profiles, data treatment, interpretation of the data from experiments in process column
- An overview of regulatory constraints (such as safety and security) and need for proper planning of radiotracers and sealed sources investigations.

The hands-on training will comprise sessions on:

- Performing radiotracer experiments on a water flow-rig (process flow simulator) including:
    1. Dirac Injection Practice with dye
    2. Injection of radiotracer (Tc-99m in the form of TcO_4^-)
    3. Set up of the data acquisition system, background counting, data acquisition, data treatment, analysis and interpretation.
- Performing a column scan on a physical model of a process column including:
    1. Set-up of data acquisition system (source and detector settings, etc)
    2. Column scanning, data acquisition, treatment, analysis and interpretation

Participation

The event is open to 18 participants from the participating Member States of RER1023.

Participants' Qualifications and Experience

The participants must be from nuclear institutions engaged in radiotracer and sealed source applications and have basic knowledge on radioisotope applications in industry. The participants should have a minimum qualification of a university degree in chemical engineering, petroleum engineering, nuclear engineering, mechanical engineering, physics, nuclear sciences, or applied mathematics. Applicants must provide evidence that they are covered by a radiological safety system and if possible, a certificate of training on radiological safety. As this training course will be conducted in English, participants must be proficient in English language.

Occupational Exposure to Radiation

This event may involve occupational exposure to radiation. Therefore, candidates are required to duly complete and return the occupational exposure History (OEH) form upon applying for the event. The IAEA will provide selected participants in due course with a dosimeter to monitor their occupational exposure during this event.

Application Procedure

Candidates wishing to apply for this event should follow the steps below:

1. Access the InTouch+ home page (https://intouchplus.iaea.org) using the candidate's existing Nucleus username and password. If the candidate is not a registered Nucleus user, she/he must create a Nucleus account (https://websso.iaea.org/IM/UserRegistrationPage.aspx) before proceeding with the event application process below.

2. On the InTouch + platform, the candidate must:
    a. Finalize or update her/his personal details, provide sufficient information to establish the required qualifications regarding education, language skills and work experience ('Profile' tab) and upload relevant supporting documents;
    b. Download and complete the Designation of Beneficiary and Emergency Contact Form, and upload to InTouch+ ('Profile' tab under the personal section) specifying the document name. If already provided, kindly discard this step; and
    c. Search for the relevant technical cooperation event (EVT2207745) under the 'My Eligible Events' tab, answer the mandatory questions and lastly submit the application to the required authority.

NOTE: Completed applications need to be approved by the relevant national authority, i.e. the National Liaison Office, and submitted to the IAEA through the established official channels by the provided designation deadline.

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

Should online application submission not be possible, candidates may download the nomination form for the training course from the IAEA website.

A medical certificate signed by a registered medical practitioner dated not more than four months prior to starting date of the event must be submitted by candidates when applying for a) events with a duration exceeding one month, and/or b) all candidates over the age of 65 regardless of the event duration.

Administrative and Financial Arrangements

Nominating authorities will be informed in due course of the names of the candidates who have been selected and will at that time be informed of the procedure to be followed with regard to administrative and financial matters.

Selected participants will receive an allowance from the IAEA sufficient to cover their costs of lodging, daily subsistence and miscellaneous expenses. They will also receive either a round-trip air ticket based on the most direct and economical route between the airport nearest their residence and the airport nearest the duty station through the IAEA's travel agency AX Travel Management, or a travel allowance, or they will be reimbursed travel by car/bus/train in accordance with IAEA rules for non-staff travel.

Disclaimer of Liability

The organizers of the event do not accept liability for the payment of any cost or compensation that may arise from damage to or loss of personal property, or from illness, injury, disability or death of a participant while he/she is travelling to and from or attending the course, and it is clearly understood that each Government, in approving his/her participation, undertakes responsibility for such coverage. Governments would be well advised to take out insurance against these risks.

Note for female participants

Any woman engaged by the IAEA for work or training should notify the IAEA on becoming aware that she is pregnant.

The Board of Governors of the IAEA approved new International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources. The Standards deal specifically with the occupational exposure conditions of female workers by requiring, inter alia, that a female worker should, on becoming aware that she is pregnant, notify her employer in order that her working conditions may be modified, if necessary. This notification shall not be considered a reason to exclude her from work; however, her working conditions, with respect to occupational exposure shall be adapted with a view to ensuring that her embryo or foetus be afforded the same broad level of protection as required for members of the public.

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