IAEA
International Atomic Energy Agency
Atoms for Peace and Development

Technical Meeting on the Management of Spent Fuel (Pebbles and Compacts) from High Temperature Reactors

IAEA Headquarters, Vienna, Austria

7-11 July 2025

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Information Sheet

Introduction

The interest in small modular reactors (SMRs) is steadily increasing, and significant industrial efforts are ongoing to facilitate their development and early deployment. According to the IAEA's Advanced Reactors Information System (ARIS) database, there are currently about 70 SMR designs at different active stages of development and deployment worldwide. Among these designs, High Temperature Reactors (HTRs) are receiving attention because they can provide high temperature energy for the generation of electricity and for industrial heat applications.

HTRs use inherently safe fuel and feature pebble-bed or prismatic core designs using Tri structural isotropic (TRISO) coated particle fuel, which is made of fuel particles covered by three layers of carbon and ceramic based materials designed to prevent the release of radioactive fission products. There is very limited experience worldwide to develop and implement HTR fuel cycle options, especially backend solutions for managing spent HTR fuels, considering that about 92 % of the spent fuel is graphite.

Feedback from IAEA activities in this area showed the need and interest from Member States for fostering the exchange of operational experiences in managing these spent fuels, for discussing potential fuel cycle options, and for the identification of potential gaps and needs. Therefore, the IAEA proposes to organize a Technical Meeting on the Management of Spent Fuel (Pebbles and Compacts) from High Temperature Reactors at IAEA Head Quarters, Vienna, Austria from 7-11 July 2025.

Objectives

The purpose of the event is to collect global information on experiences in managing spent fuels from high temperature reactors (HTRs) in order to anticipate the challenges of managing spent fuels from future HTR-small modular reactors, and to conduct a gap analysis of R&D and innovation needs in order to identify collaborative research and development opportunities that might be supported by the IAEA.

Target Audience

The meeting is aimed at practitioners (e.g., operators, regulators, researchers, etc.) in Member States who are responsible for, or actively involved in, the management of spent HTR fuels.

Working Language(s)

The working language of this event is English with no interpretation provided. All communications and papers must be submitted in this language.

Expected Outputs

The expected outputs from the Technical Meeting are the sharing of information, operational experience and lessons learned on managing spent HTR fuels and the publication of an IAEA Technical Document on the subject, gathering technical information, discussions, conclusions and recommendations for potential future activities.

Topics

The scope of this meeting is focused on the following types of spent fuel:

- TRISO particles embedded in *graphite matrix*[1] used in conventional gas cooled reactors (HTGRs) as well as in reactors using other coolants (e.g. molten salt, liquid metal).
- TRISO particles embedded in SiC matrix.

Irradiated graphite that comprises moderator, reflector, and any other structural component without fuel embedded is out of scope for this Technical Meeting.

[1] The term **graphite matrix** refers to all graphite with fuel particles embedded in it, either pebbles or compacts.

Participants are invited to propose a presentation with an accompanying paper, (10 pages maximum) to be published in the Technical Meeting Proceedings, on the Topics under the scope of the Technical Meeting listed below.

List of Topics to be included in the Technical Meeting

- Characteristics of HTR spent fuel (pebbles and compacts) that may impact the different management steps (e.g., storage, transportation, recycling, conditioning, disposal)
    - Impact of manufacturing process on SNF characteristics (e.g., graphite impurities, pebble binders, etc.)
    - History and range of irradiation conditions
    - Discharge inventories & heat load, calculations and their validation (benchmark)
    - Initial and residual enrichments
    - Physical conditions (e.g., swelling, cracking, broken pebbles, dust …)
    - Cross contamination
    - Volumes of spent fuel and generated wastes

- Graphite matrix
    - Graphite grades and purity
    - Activation products and contamination
    - Separation and treatment technologies (e.g., controlled oxidation)

- Understanding non-conforming spent fuel
    - Definition of failed spent fuel
    - Definition of damaged spent fuel
    - Detection
    - Management strategies

- Conducting gap analyses for the back end of the fuel cycle (sufficiency for licensing and design) e.g.,
    - Degradation phenomena
    - Criticality benchmark
    - Technical readiness level of HTR spent fuel recycling
    - Durability (pebbles and compacts)
    - Long-term leachability
    - Local chemistry for spent fuel dissolution in disposal conditions

- Disposal strategies
    - Disposal options and maturity
    - Durability of waste forms

- Opportunities to adapt technologies used for managing LWR SNF for the management of spent HTR fuels, taking into account differences in for example, higher enrichments, larger waste volumes, lower heat loads, licensed infrastructures, code validations, in the stages of:
    - Storage
    - Transport
    - Recycling
    - Conditioning

    - Disposal
- Decision making factors for HTRs' SFM options
    - Size and type of reactor fleet
    - Economics
    - At reactor operation, including impact of SNF storage container design (e.g., size) on the next steps of the backend of the fuel cycle
    - Impact of secondary wastes
    - Applicability and synergies of existing LWR's SNF data
    - Key dependencies
    - Enablers for transitioning from one stage to the other in the back end of the fuel cycle

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 **17 April 2025**, 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 **17 April 2025**.

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

In addition to the registration already submitted through the InTouch+ platform, participants should submit an 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 **17 April 2025**.

Additionally, for the selection process, this abstract must be submitted through the INDICO page https://conferences.iaea.org/event/414/ no later than **17 April 2025.** Authors will be notified of the acceptance of their proposed work by **28 April 2025.**

The IAEA encourages those participants submitting an abstract to deliver a presentation on the work of their respective institutions that falls under the topics listed in above Topics Section and to submit the corresponding full paper through INDICO platform by **23 June 2025** the latest. The paper should be in A4 page format, should extend to no more than 10 pages (including figures and tables) and should be in the IAEA template available in INDICO platform.

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 the event.

The application for financial support should be made, together with the submission of the application, by **17 April 2025**.

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:

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.

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 Secretary/Secretaries and correspondence on other matters related to the event to the Administrative Secretary.