IAEA
International Atomic Energy Agency
Atoms for Peace and Development

Technical Meeting on Assessing and Quantifying Prognosticated and Speculative Uranium Resources

Hosted by the

Government of Brazil

through the

Industrias Nucleares do Brasil (INB)

Rio de Janeiro, Brazil

4 – 8 November 2024

Ref. No.: EVT2003780

Information Sheet

Introduction

As global population increases, and investment for locating and developing mineral resources to support growth becomes more difficult, the problem of resourcing future generations, especially for fuelling new or expending nuclear programmes, has become an important political and scientific challenge. New and innovative approaches are necessary to delineate known and undiscovered uranium (U) and thorium (Th) resources, characterize interactions among co-occurring resources, engage stakeholders' concerns and participation, and strike a balance among competing resource interests. Land managers, policymakers, and legislators are making greater use of U and Th resource assessments that identify and evaluate the compatibilities and conflicts associated with resource conservation and development opportunities.

The Joint OECD-NEA/IAEA Uranium Group is a collaborative effort between the Nuclear Energy Agency (NEA) of the Organisation for Economic Cooperation and Development (OECD) and the International Atomic Energy Agency (IAEA). It is a multilateral organization that provides information, analysis, and guidance on the uranium market and its role in the global nuclear fuel cycle, as well as being a forum for dialogue and cooperation among governments, industry, and other stakeholders on issues related to the uranium market and the front end of the nuclear fuel cycle. The Uranium Group is responsible for producing the "Red Book", a biennial global survey that collects statistical data and narrative information about the world's uranium exploration, resources, production and demand. The data and information are derived in large part from official government sources, and presented by country and summarized globally. Naturally occurring uranium resources reported in the Red Book are geologically classified and economically categorized according to various factors related to the certainty of their location, amount and concentration of uranium, and the cost of recovery (Figure 1). Uranium resources are geologically classified as "Reasonably Assured", "Inferred", "Prognosticated", and "Speculative", listed here in decreasing order of resource certainty, amount, and concentration. Reasonably Assured and Inferred resources, together, are considered "Identified" resources, whereas Prognosticated and Speculative resources, together, are considered "Undiscovered" resources. In decreasing order of economic attractiveness (i.e., lower to higher cost of recovery), uranium resources are categorized as <USD $40/kgU, <USD $80/kgU, <USD $130/kgU, and <USD $260/kgU.

For the coming decades, and especially after the declaration made at the COP28 by several countries to triple their nuclear energy capacities by 2050, it is crucial to recognize that the fuel supply chain, from raw materials to fuel fabrication, will face an increasing demand across all segments of the frontend of the nuclear fuel cycle. Following a recent rise in uranium market spot prices to a 17-year high, interest in uranium exploration and mining has been renewed. What were once considered to be sub-economic, low-grade or unconventional uranium deposits, are now economic (profitable to mine). In response, exploration for Prognosticated and Speculative uranium resources is increasing.

Red Book does not provide a well-defined, standardized, or structured approach to assessing Prognosticated and Speculative uranium resources. Over the past three decades, advancements have been made in geostatistical and geospatial methods for the assessment of undiscovered mineral resources, including various open-source software tools that combine these methods into user-friendly platforms. Such methodologies and tools help to refine the identification, delineation, and assessment of Prognosticated and Speculative resources in unconventional or undiscovered uranium deposits, which in turn will help secure uranium supply into the future.

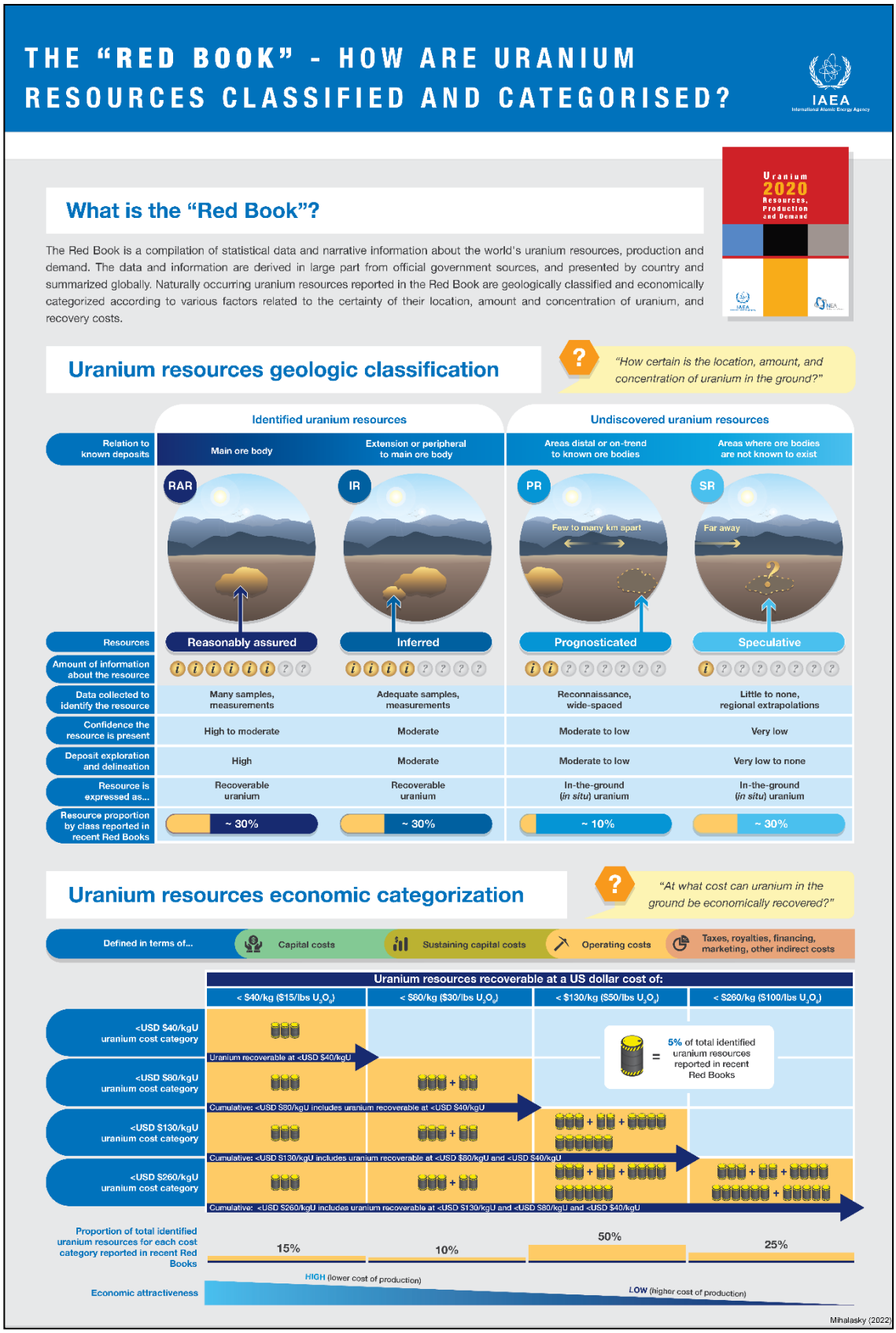

Figure 1. Uranium resources geologic classification and economic categorization used in the Joint OECD-NEA/IAEA publication titled Red Book.

Objectives

The objective of the event is to review and evaluate the usefulness and application of various existing and new methods and tools for systematically identifying, delineating, and assessing Prognosticated and Speculative resources in unconventional or undiscovered uranium deposits, specifically in relation to how they are estimated and reported in the Joint OECD-NEA/IAEA Uranium Group's survey on global uranium exploration, resources, production, and demand information compiled in the biennial Red Book publication.

Target Audience

This event is not an exploration training workshop. The target audience is highly technical and experienced geoscientists, including uranium exploration geologists, exploration managers, mineral resource assessment scientists, geospatial data analysts and modellers, and other specialists that have significant experience working with and reporting on uranium resources for the Red Book. Meeting participants are expected to engage and make salient contributions to group discussions, as well as optionally submit abstracts for oral presentations (the abstracts will be reviewed to select presentations that are particularly relevant to the stated objectives of the meeting).

Working Language

English

Expected Outputs

Expected outputs include review and selection of methods and tools that are useful for systematically identifying, delineating, and assessing Prognosticated and Speculative resources in unconventional or undiscovered uranium deposits, and development of a more standardized approach to assessing Prognosticated and Speculative resources in general.

Structure

The event will include four days of presentations given by experts, case study authors, and meeting participants, followed by discussions on the topics presented. A one-day field- or site-visit to a uranium mining operation or other nuclear facility operated or administered by Serviço Geológico do Brasil, Industrias Nucleares do Brasil, or other associated entity will be conducted.

This event will consist of four main technical sessions, and participants submitting an optional abstract for an oral presentation should select the technical session to which they want to contribute. The technical sessions are as follows:

Session 1: The Uranium Production Cycle, the Red Book, and the geologic classification of Reasonably Assured, Inferred, Prognosticated, and Speculative uranium resources (examples and currently-used methodologies). Uranium deposit type models and discrimination criteria (mappable and proxy) for the various deposit types as applicable to identifying, delineating, and assessing uranium resources.

Session 2: Existing and recently-developed geostatistical and geospatial methodologies for identifying, delineating, and assessing U and Th mineral resources, including case studies.

Session 3: Existing and recently-developed geostatistical and geospatial software tools for identifying, delineating, and assessing U and Th mineral resources, including demonstrations and examples of their applications.

Session 4: Group discussions and presentations centring on approaches to better and more comprehensively and systematically assess Prognosticated and Speculative uranium resources.

Topics

The presentation topics should align with the desired results of the meeting: Identification of methods and tools that are useful for systematically identifying, delineating, and assessing Prognosticated and Speculative resources in unconventional or undiscovered uranium deposits, including a standardized approach to assessing Prognosticated and Speculative resources in general.

Under Session 1, the following broad topics are suggested, but not limited to:

- Uranium Production Cycle: Overview or focussed topics on prospecting and exploration.
- Uranium deposit type models: Overview or focussed topics on individual or groups of similar type deposits.

Under Session 2, the following broad topics are suggested, but not limited to:

- Mineral potential mapping / prospectivity mapping methodologies and case studies (data-driven, knowledge-driven, AI and ML, etc.), with a focus on U and Th deposits.
- Remote-sensing / image processing techniques in exploration targeting and mineral resource assessment/evaluation, with a focus on U and Th deposits.
- Quantitative mineral resource assessment methodologies and case studies, with a focus on U and Th deposits.

Under Session 3, the following broad topics are suggested, but not limited to:

- Geostatistical and geospatial software tools and their operation and applications.

Under Session 4, the following broad topics are suggested, but not limited to:

- Defining, delineating and assessing Prognosticated and Speculative uranium resources: Requirements and concepts, and methodological ideas and proposals, including case studies.

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 **6 September 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 **6 September 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

The IAEA encourages participants to give presentations on the work of their respective institutions and agencies that falls under the topics listed above.

Participants who wish to give presentations are requested to submit a short abstract of their work. The abstract will be reviewed as part of the selection process for presentations. The abstract should be in A4 page format, should extend to no more than one or two pages (including figures and tables) and should not exceed approximately 500 words. It should be sent electronically to Mr Mark Mihalasky, the IAEA Scientific Secretary of the event (see contact details below), not later than **6 September 2024**. Authors will be notified of the acceptance of their proposed presentations in due course.

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 **6 September 2024**.

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 **6 September 2024.**

Visas

Participants who require a visa to enter Brazil should submit the necessary application as soon as possible to the nearest diplomatic or consular representative of Brazil.

Organization

Scientific Secretary

Mr Mark Mihalasky
Division of Nuclear Fuel Cycle and Waste Technology
Department of Nuclear Energy
International Atomic Energy Agency
Vienna International Centre
PO Box 100
1400 VIENNA
AUSTRIA

Tel.: +43 1 2600 22757
Fax: +43 1 26007
Email: M.Mihalasky@iaea.org

Administrative Secretary

Ms Zsuzsanna Zohori
Division of Nuclear Fuel Cycle and Waste Technology
Department of Nuclear Energy
International Atomic Energy Agency
Vienna International Centre
PO Box 100
1400 VIENNA
AUSTRIA

Tel.: +43 1 2600 22765
Fax: +43 1 26007
Email: Z.Zohori@iaea.org

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.

Event Web Page

Please visit the following IAEA web page regularly for new information regarding this event:

https://www.iaea.org/events/EVT2003780

Enclosures:

- Form for Submission of a Paper (Form B)

IAEA
International Atomic Energy Agency
Atoms for Peace and Development

Form B
EVT2003780

Form for Submission of a Paper

Technical Meeting on Assessing and Quantifying Prognosticated and Speculative Uranium Resources

Rio de Janeiro, Brazil

4 to 8 November 2024

To be completed by the participant and sent to the competent national authority (e.g. Ministry of Foreign Affairs, Permanent Mission to the IAEA, or National Atomic Energy Authority) of his/her country for subsequent transmission to the International Atomic Energy Agency (IAEA) either by email to: Official.Mail@iaea.org or by fax to: +43 1 26007 (no hard copies needed). Please also send a copy by email to the Scientific Secretary (M.Mihalasky@iaea.org) and to the Administrative Secretary (Z.Zohori@iaea.org).

Participants who are members of an invited organization can submit this form to their organization for subsequent transmission to the IAEA.

Deadline for receipt by IAEA through official channels as per Conference Announcement.

Title of the paper:		
If applicable: Abstract ID in IAEA-INDICO:		
Family name(s) and first name(s) of all author(s): e.g. Smith, John	Scientific establishment(s) in which the work has been carried out	City/Country
1.		
2.		
3.		
Family name and first name(s) of author presenting the paper: e.g. Smith, John	Mr/Ms:	
Mailing address:		
Tel. (Fax):		
Email:		

I hereby agree to assign to the International Atomic Energy Agency (IAEA):

the copyright; or

the non-exclusive, worldwide, free-of-charge licence (this option is only for those authors whose parent institution does not allow them to transfer the copyright for work carried out in that institution) granting the IAEA world rights for the use of the aforementioned material in this and any future editions of the publication, in all languages, and in all formats available now, or to be developed in the future (digital formats, hard copy etc.).

Please note: If granting the licence mentioned above, please supply any copyright acknowledgement text required.

Furthermore, I herewith declare:

that the material submitted to the IAEA is original, except for such excerpts from copyrighted works as may be included with the permission of the copyright holders thereof, has been written by the stated authors, has not been published before, and is not under consideration for publication by another entity;

that any permissions and rights to publish required for third-party content, including but not limited to figures and tables, have been obtained, that all published material is correctly referenced; and

that the material submitted to the IAEA does not contain any libellous or other unlawful statements and does not contain any materials that violate any personal or proprietary rights of any person or entity.

Date: **Signature of main author:**