# URAM 2014

*Networking as a tool to improve education and training in environmental remediation of uranium production sites – the role of the ENVIRONET/CONNECT*

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# The Driving Principle to Guide Environmental Remediation

- IAEA Safety Glossary (IAEA, 2007):
  - **Remediation** is defined as any measures that may be carried out to **reduce the radiation exposure** from existing contamination of land areas through actions applied to the contamination itself (the source) or to the exposure pathways to humans. A very important element in the overall remediation concept, as defined by the IAEA, is that **complete removal of the contamination is not implied**

# The IAEA Objective

- MS's will eventually have in place a proper **infrastructure** and **technologies** for managing their radioactive legacies and resolve all related issues in a **timely**, **safe** and **cost-effective** manner

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# Background

- Contaminated sites continue to exist all over the world (generally remediation projects are very expensive and in many cases they are not moving forward).
- A wide variety of information sources on remediation techniques and strategies of varying quality are available
- Decision makers and project officers often do not have the technical know-how and insight in all aspects relevant to remediation projects

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# Environmental Remediation in Germany

- 1991 Start of the remediation programme following reunification of Germany in 1990
- Federal Ministry of Economics takes over all shares of SDAG Wismut and exempts Soviet Union from all future liabilities
- Wismut GmbH formed in 1991 ( Federal Republic of Germany is the sole owner)
- Corporate purpose: decommissioning and rehabilitation
- Closure schedule: 1991-2015
- Costs: government committed **6.2 billion €**

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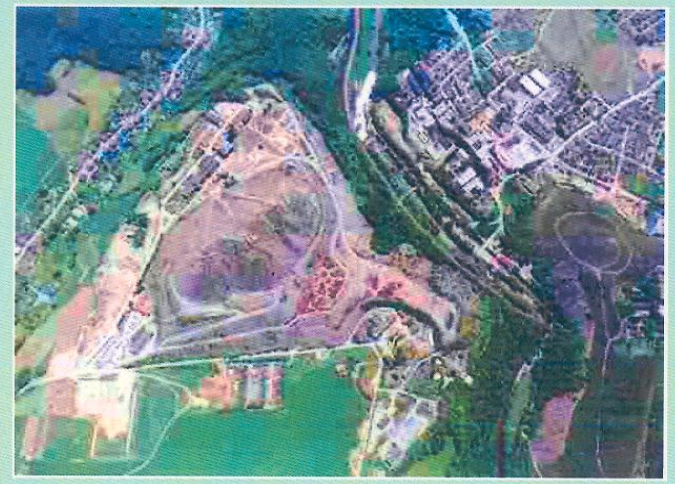
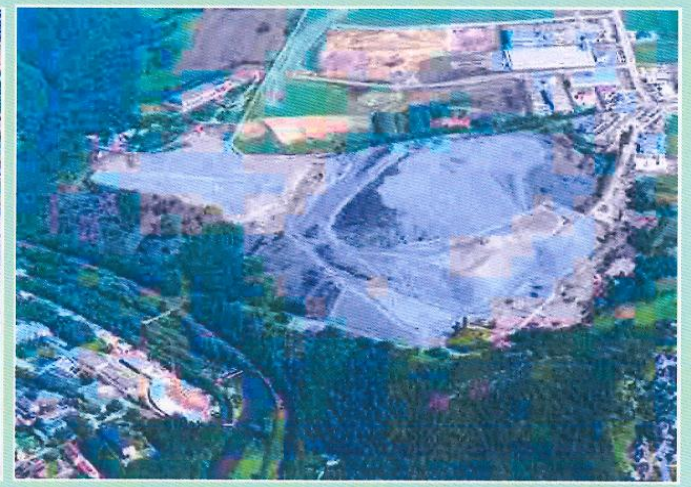
# Waste Rock remediation

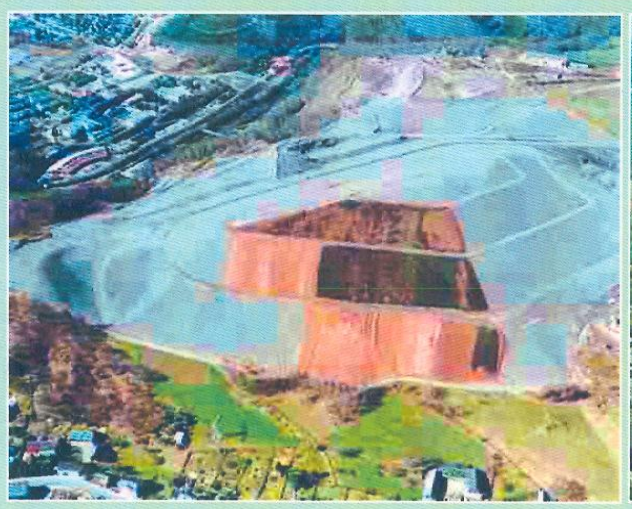
## Schlema site, Dump 366

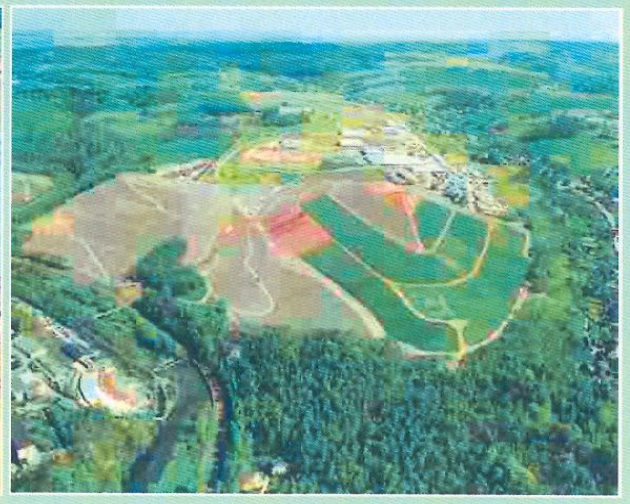
1994 1998

2000 2001 2007





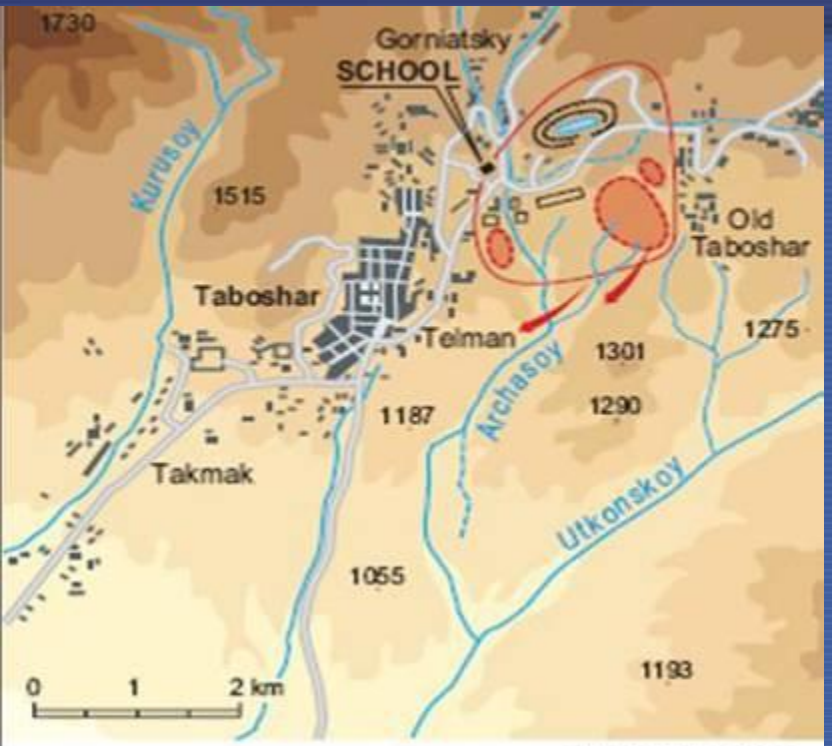


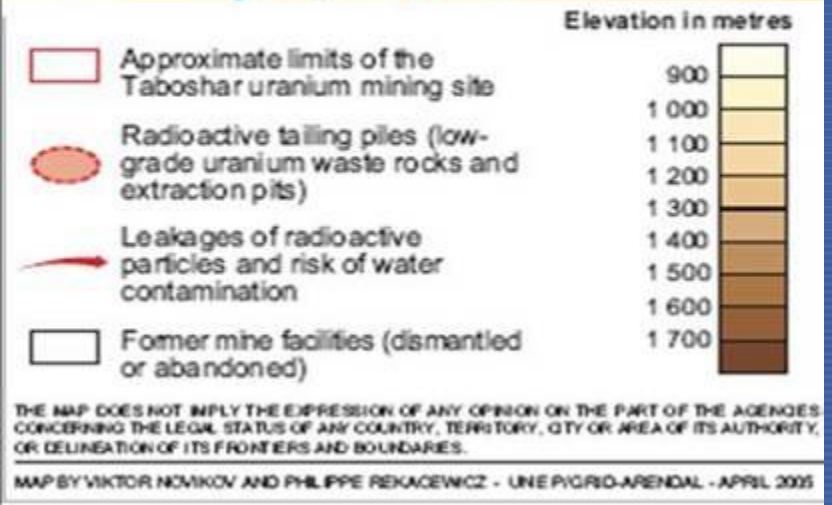




WISMUT

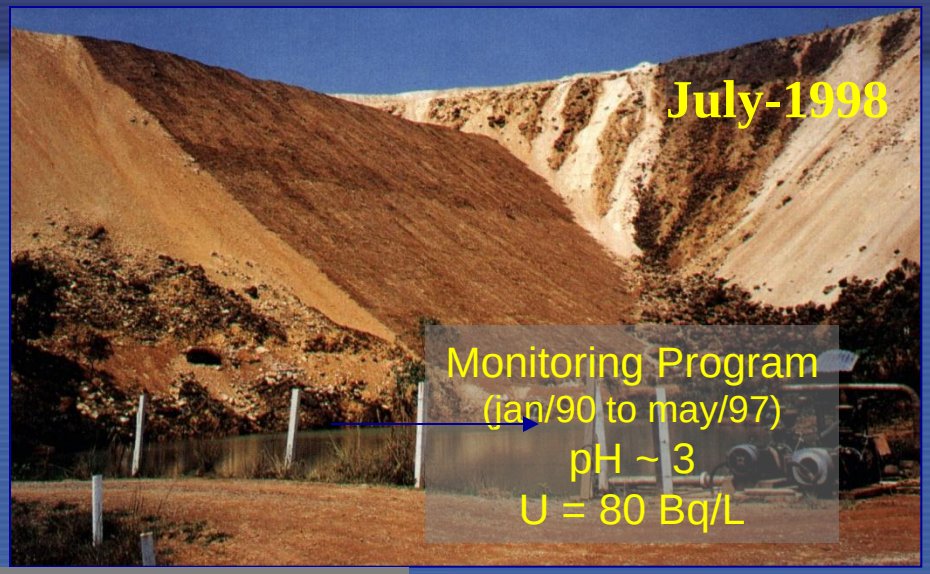
# Taboshar




- Large volume of material with low U content and high Ra content
- Acid drainage from tailings piles
- Inadequate covers on tailings piles
- Pit is filled with water with relatively high uranium concentration
- Site completely accessible to the public

# Pocos de Caldas Mining Site - Brazil




- **Reshaping;**
- **Drainage work;**
- **Clay layer;**
- **Re-vegetation**

## Overall Costs

- Water treatment → US$ 2.6 millions
- Clay layer → US$ 0.171 millions
- Other costs → US$ 0.576 million

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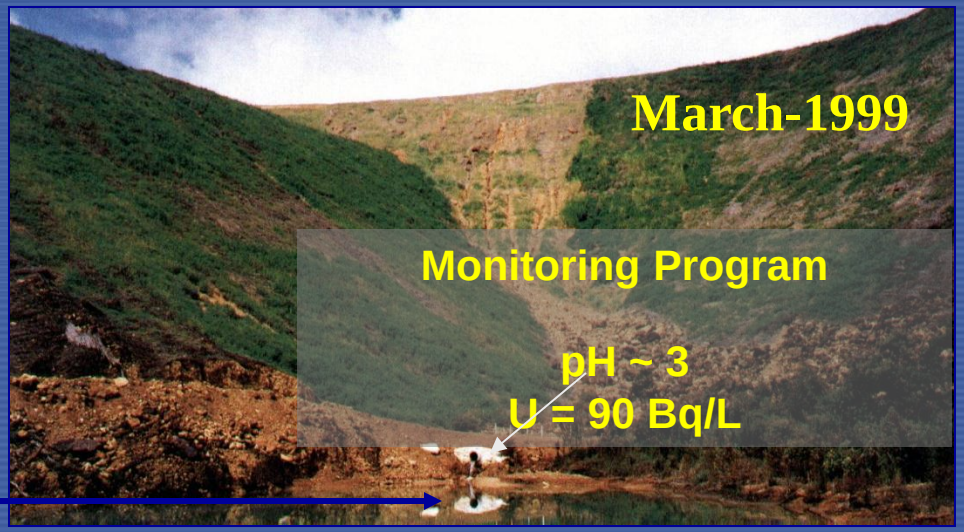
- Total US$ 3.347 millions

**Reduction of volume of pumped water:**
**28% wet season and 15% Dry season**

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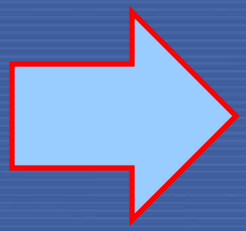
# Challenges – Existing Sites

- Good planning
- Resources
- Technical and Scientific Knowledge
- Capability of Assessing the Long-term performance of the Remediation Works
- Good communication with the relevant stakeholders (regulators, communities, shareholders, etc.)



- **Different Supporting Documents developed or being developed**
  - **Lessons Learned in Environmental Remediation**
  - **Stakeholder Engagement and Communication in Environmental Remediation**
  - **Policy and Strategy on Environmental Remediation**
  - **Life-cycle management of Environmental Remediation Projects**
  - **Cost Estimate of Environmental Remediation Projects**
  - **Financing Environmental Remediation Projects**
  - **Mathematical Modelling to Assess Long-Term performance of Remediation Works**

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# Challenges – On-going and future operations

- Avoid the need of future **extensive remediation** works
- Integrate Remediation in the overall **Life-Cycle Management** of the installation
- **Involve the public** on the definition of future conditions (end-state) of the site
- Avoid generation of **future legacy sites** (very important in projects to be developed in countries with lack of experience in uranium mining projects and lack of solid regulatory framework)

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# Programme Implementation Strategy should focus on:

- Providing timely and accurate **information** on available remediation strategies and technologies
- Fostering the concept of "**environmental sustainability**" by moving away from ***ex-post*** approaches to remediation towards a more integrated, **life-cycle management approach**.
- Enhancing **stakeholder participation** in the decision making process to guarantee the societal sustainability of remediation solutions.

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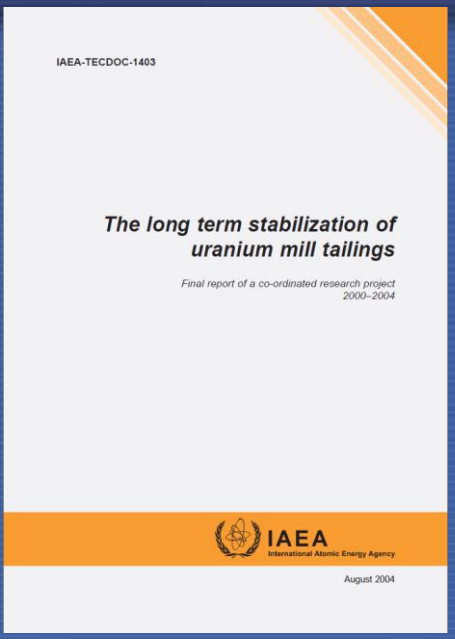
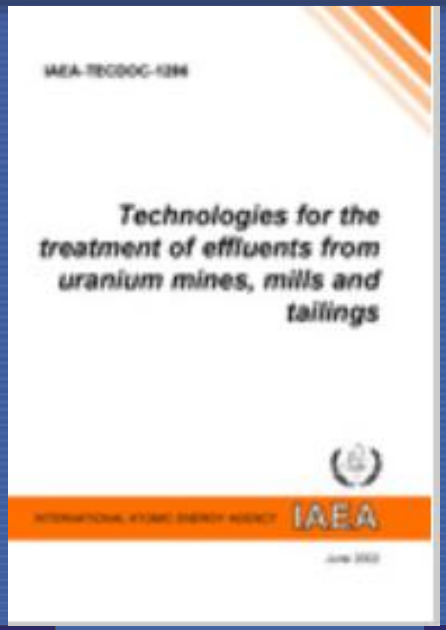
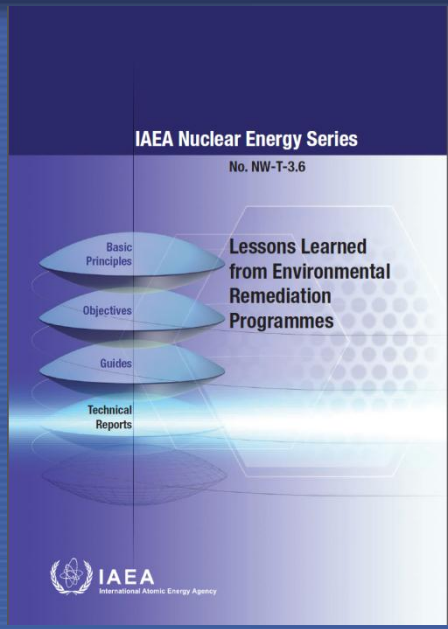
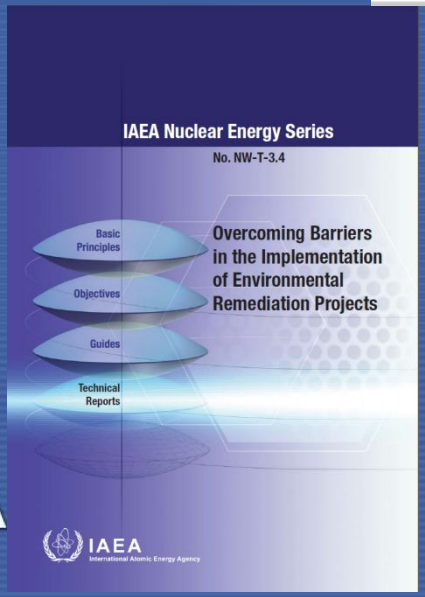
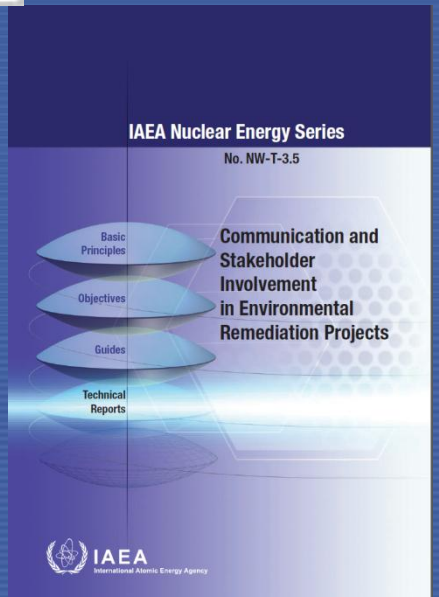
# Some NE-Dept. Publications on ER

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# Technical Cooperation Projects

- **INT9175 - Promoting safe and efficient clean-up of radioactively contaminated facilities and sites**
- **RER7006 Building Capacity for Developing and Implementing Integrated Programmes for Remediation of the Areas Affected by Uranium Mining**
- **NER9011 - Strengthening National Capacity for Remediation of Uranium Mining Sites to Ensure Long-Term Safety and Public Health at the End of Operations**
- **UKR9032 - Developing Decontamination, Recultivation and Reconstruction Infrastructure for Existing Uranium Mines and Former Uranium Production Facilities**
- **ZAM9010 Assessing Radioactive Contamination of Surface, Groundwater and other Resources in Mining Areas**

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# The ENVIRONET

Network on Environmental Management and Remediation

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# ENVIRONET …

- “ An international network on Environmental Management Remediation to deal with existing radiologically contaminated sites and preventing the generation of new legacy sites”
- Other RWM – Networks
  - URF
  - IDN
  - DISPONET
  - LABONET

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# Rationale for the ENVIRONET

- Networking facilitates the exchange and dissemination of information and identification of common needs. These can be object of further discussion in the form of workshops or training courses.
- Synergies can be found, results can be maximized and time spent to solve a specific problem minimized
- All these combined will lead to a more efficient implementation and cost reduction in the scope of ER - Projects development

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# ENVIRONET : objectives

- **Coordinate support** to organizations or Member States with less advanced programmes from Member States with experience in environmental remediation;
- Organise an expanded range of **training and demonstration events** disseminating proven methodologies, good practices and state-of-the art technologies;
- Facilitate **information exchange and experience sharing** amongst organizations with advanced programmes;
- **Create a forum** in which expert's advice and technical guidance may be provided.

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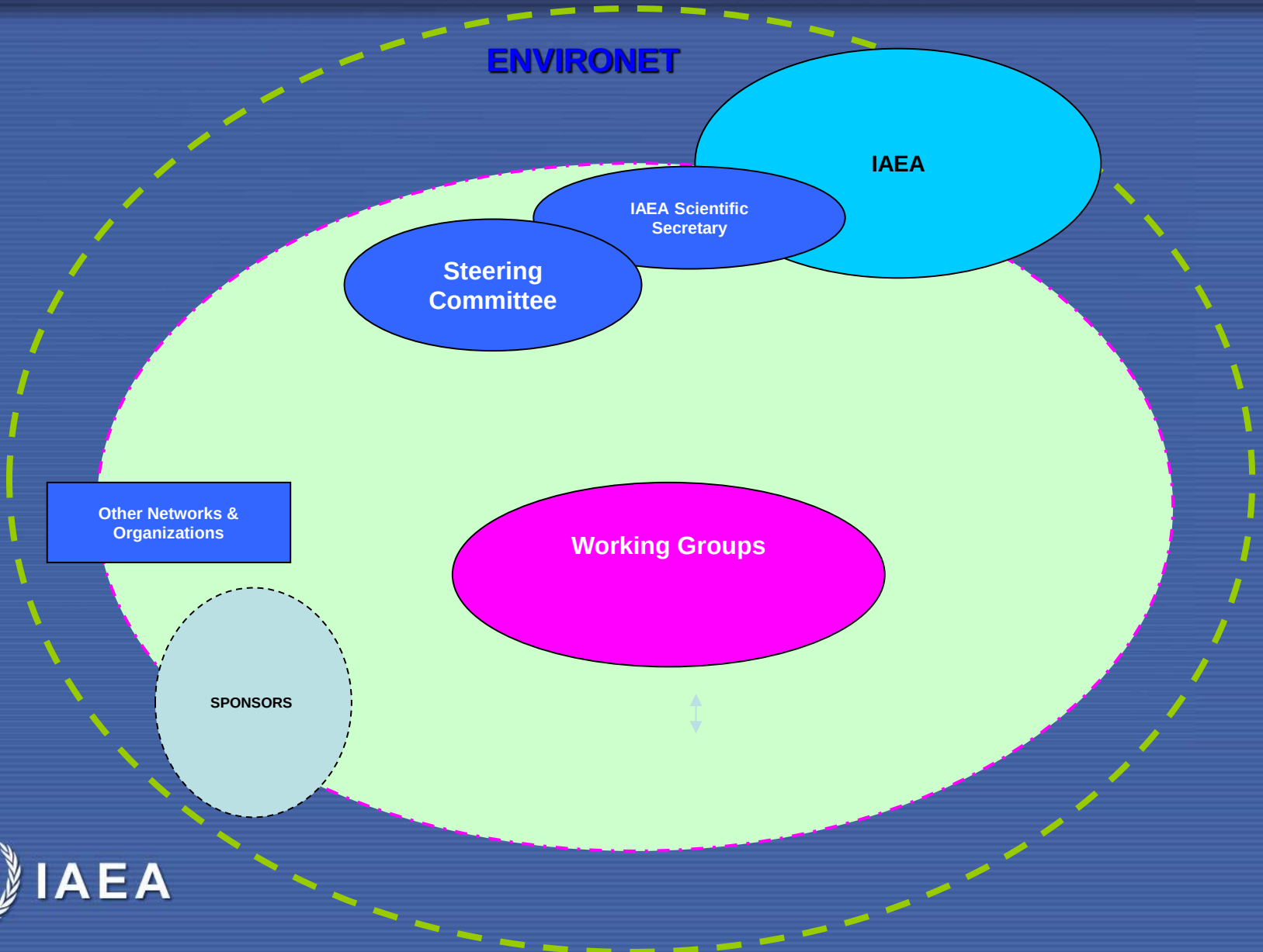
# The Structure



# The scope of the ENVIRONET includes

- Life-Cycle Management of active and future operations, including:
  - Facilities of the Nuclear Fuel Cycle
  - **Active U mines and processing facilities**
  - **Active NORM facilities**
  - Radiological facilities
- Legacy Sites, including:
  - **Closed U mining and processing sites**
  - Closed NORM sites
  - Former nuclear industry sites and former military sites
  - Land contaminated by nuclear and radiological accidents/incidents
  - Orphan radiological sites

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# Target Audience of the ENVIRONET

- Problem holders
- Regulators
- Scientific research institutions
- Contractors
- NGOs
- General public
- Academics
- Students
- Trainers
- IAEA

# ENVIRONET Topics (1/2)

- Life-cycle planning of both facility operations and environmental remediation
- Project design, planning, implementation, and management
- Stakeholder involvement and communication
- Regulation and policy development
- Risk communication
- Stewardship or institutional control
- Funding

# ENVIRONET Topics (2/2)

- Data management, integration, and communication
- Site characterization
- Risk assessment
- Remediation approaches and technologies
- Monitoring
- Modelling
    - Fate and transport
    - Engineering design
    - Economic

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# *ENVIRONET* activities

- Hosting of training courses, fellowships or scientific visits
- Provision of suitably qualified and experienced individuals to support participants;
- Providing qualified peers amongst the participants to support the IAEA's efforts on peer reviews and technical support;
- Provision of expertise in the IAEA's programme areas;
- Use of fellowships, exchanges, coaching and mentoring, both on an individual and potentially on an organizational level

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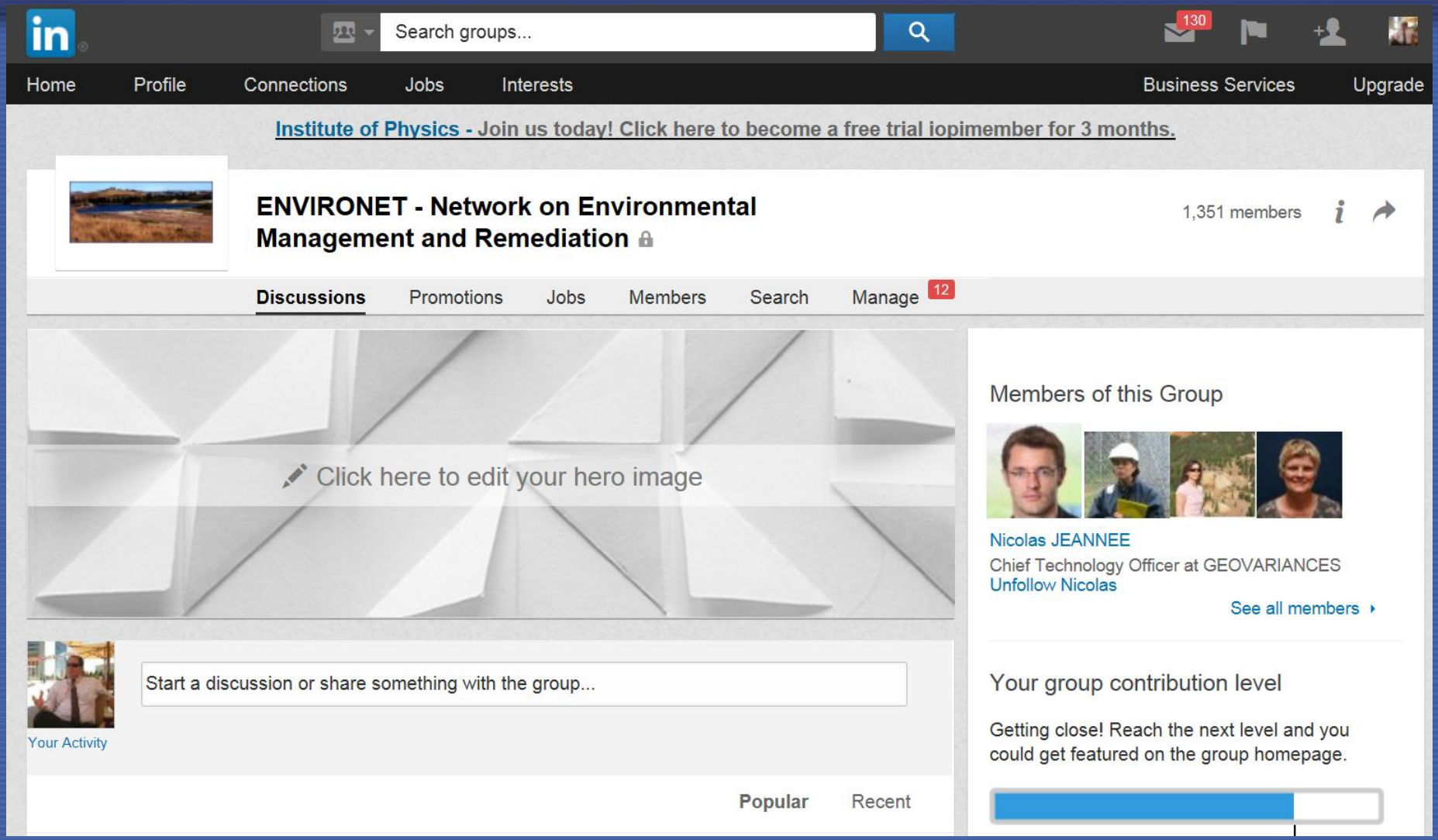
# Discussion Forum in Linked-In

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# ENVIRONET Workshops


- The TM gave guidance on how to manage the residues arising from different NORM industries and the pertinent residue management strategies and technologies.
- Help Member States gaining perspectives on the management of NORM residues regarding the industrial processes that may lead to NORM generation.
- Cooperation between IAEA/Environet (WTS /WES) + TC and NRG-The Netherlands under the

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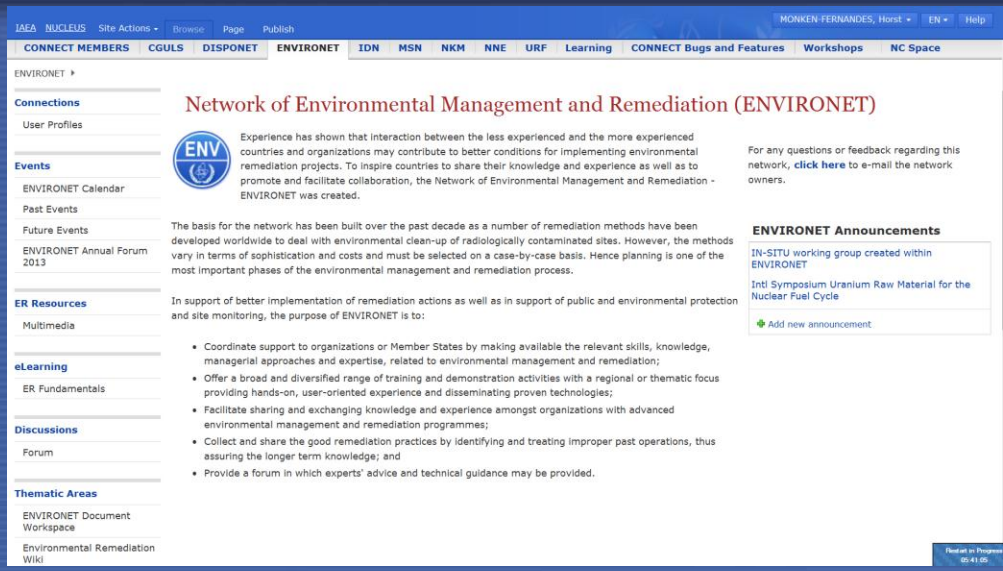
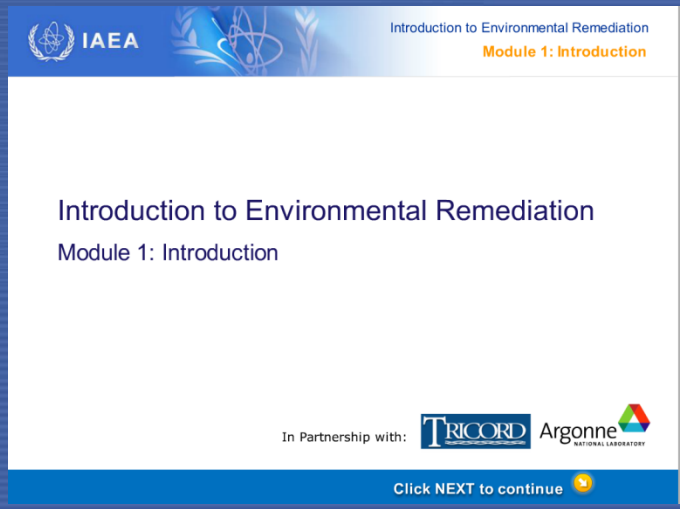
# “ENVIRONET in CONNECT”




**Wiki database**


**e-learning**

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# Mobile Unit for Site Characterization

- Team members bring a variety of radiation measurement instruments, associated with GPS and data collection systems with the capability of geo-referencing radiation measurements for subsequent display in (GIS map products
- This “mobile laboratory” concept provides an interactive capability to perform rapid and effective site characterization, with immediate real-time identification of areas of high interest.
- Mobile Units can be an asset to IAEA Member States that do not have an adequate analytical laboratory infrastructure to support site characterization

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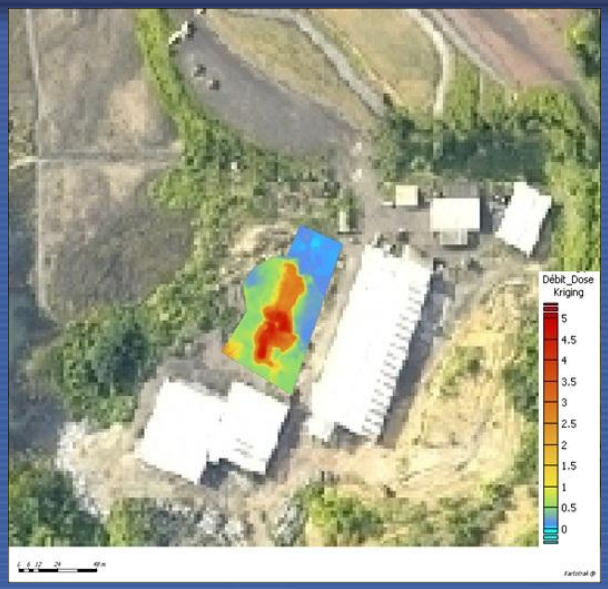
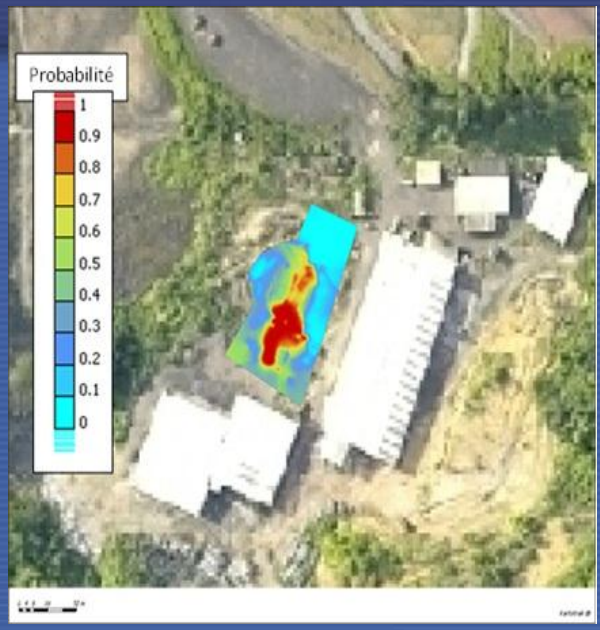
# Mobile Unit for Site Characterization


All measured points




Estimated dose by Kriging interpolation




Probability of the dose to exceed 1 µSv/h

**Activities performed in the vicinity of Mounana in Gabon. Uranium mining, processing, and tailings disposal activities were conducted from 1956 until in 1999. 24,500 tons of uranium recovered during this operational period.**

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# The CIDER Project (1/2)

- **Raise awareness and promote greater cooperation** amongst IAEA MS dealing with the decommissioning and remediation of disused nuclear facilities and sites, and with national and international organizations involved in the development of aspects pertaining to their management, decommissioning and remediation and regulatory oversight;
- Develop a **baseline report** for use by policy makers and other involved parties that provides an overview of national and global liabilities for decommissioning and remediation; **discusses specific constraints** impeding implementation of decommissioning and remediation of different categories on radioactively-contaminated installations and sites; and **provides recommendations** on how these constraints might be overcome; and

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# The CIDER Project (2/2)

- Establishing a **plan of action** that proposes specific actions and associated timeframes to address constraints to progress. This will include actions that are relevant at international, regional or national levels; it will also include performance indicators that may be used to measure progress towards achievement of the proposed actions.

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