

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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Horst Monken-Fernandes, Zhiwen Fan, Andressa dos Santos Junger

Waste Technology Section/NEFW & Waste and Environmental Safety Section /NSRW



IAEA

International Atomic Energy Agency

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

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

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 €**



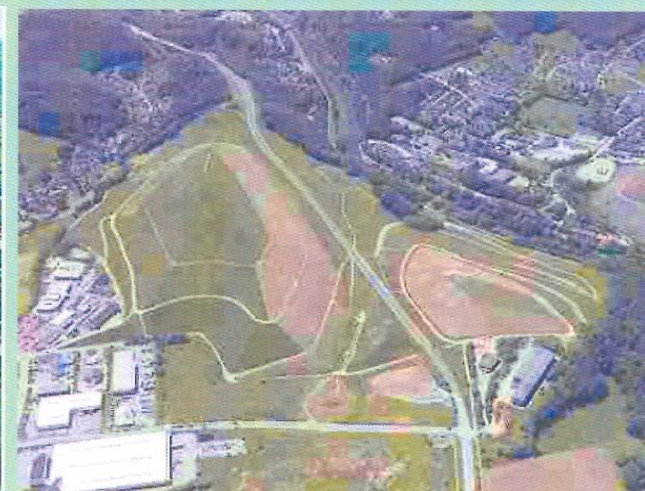
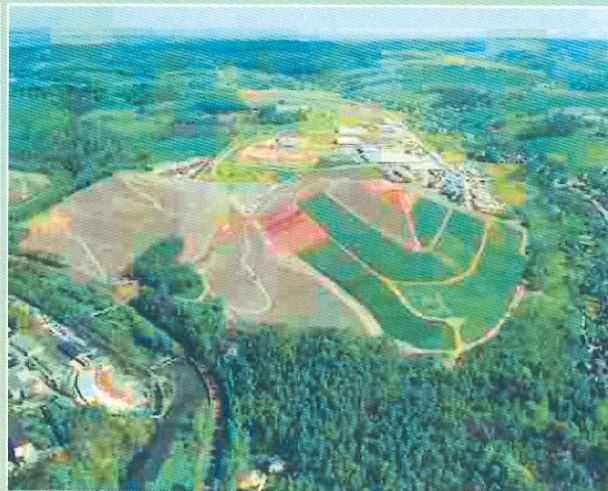
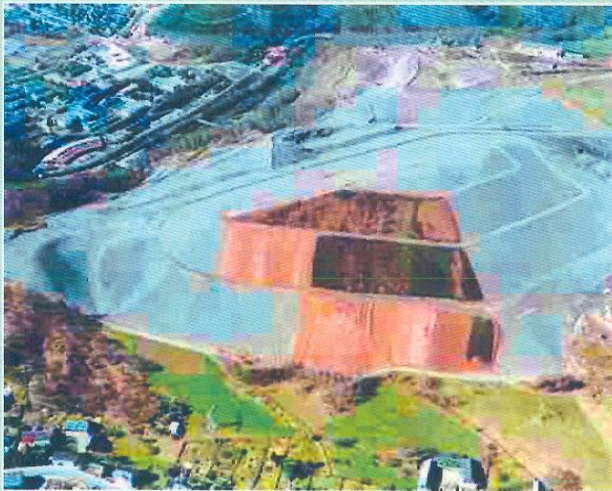
IAEA

Waste Rock remediation

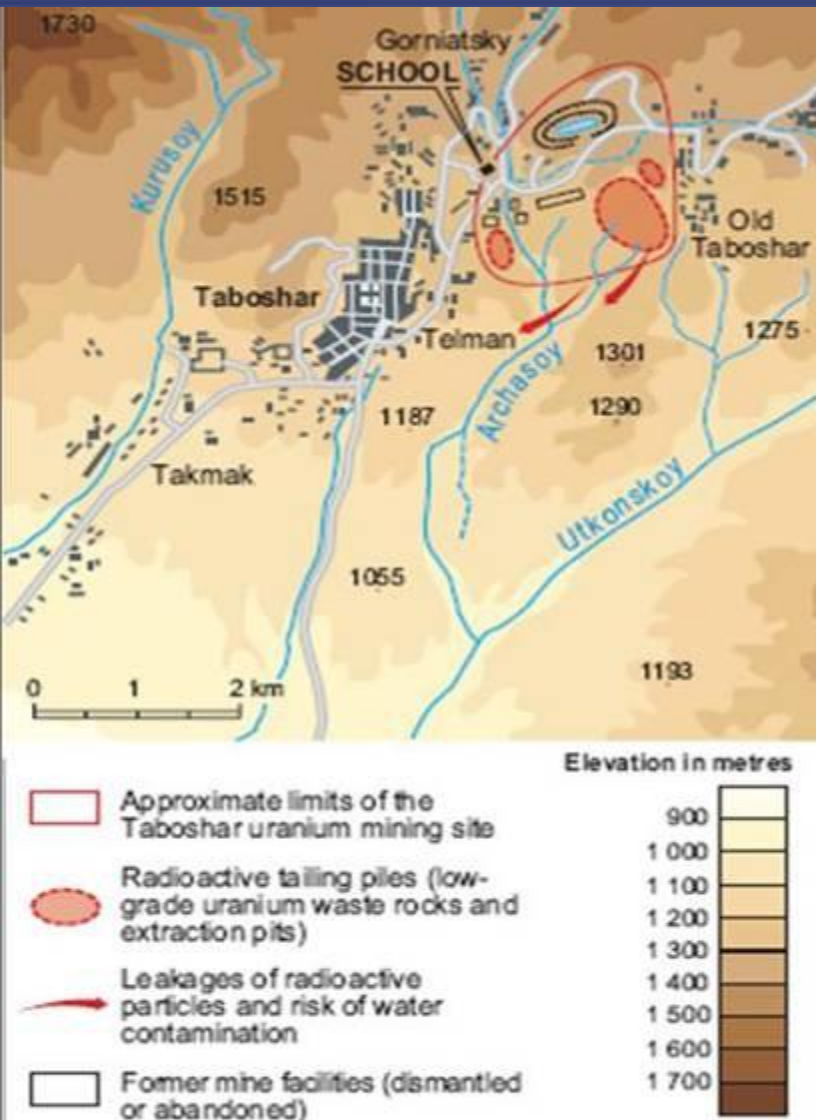
Schlema site, Dump 366

1994 1998

2000 2001 2007



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

THE MAP DOES NOT IMPLY THE EXPRESSION OF ANY OPINION ON THE PART OF THE AGENCIES CONCERNING THE LEGAL STATUS OF ANY COUNTRY, TERRITORY, CITY OR AREA OF ITS AUTHORITY, OR DELINEATION OF ITS FRONTIERS AND BOUNDARIES.

MAP BY VIKTOR NOVKOV AND PHILIPPE RENACEWICZ - UNEP/GRIQ-ARENAL - APRIL 2005

Pocos de Caldas Mining Site - Brazil

July-1998

Monitoring Program
(jan/90 to may/97)
pH ~ 3
U = 80 Bq/L

- 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
-
- Total US\$ 3.347 millions

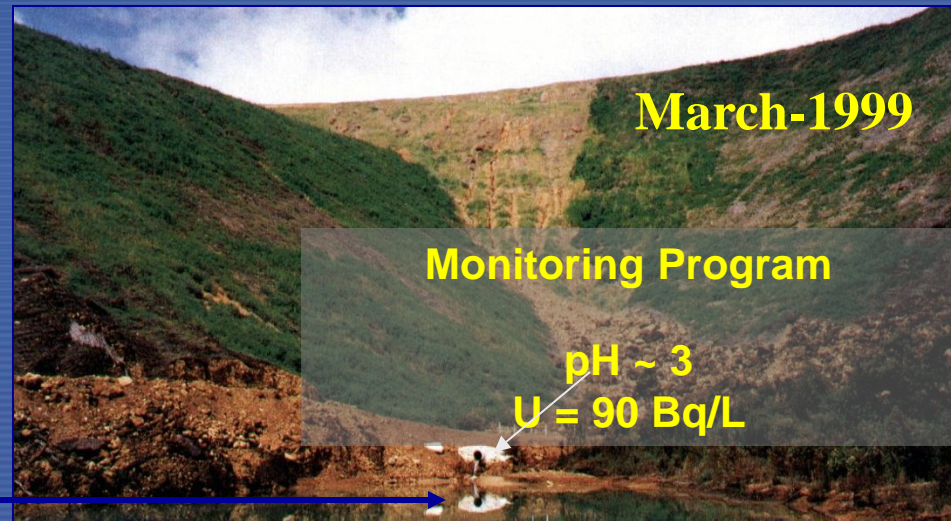
Reduction of volume of pumped water:
28% wet season and 15% Dry season



March-1999

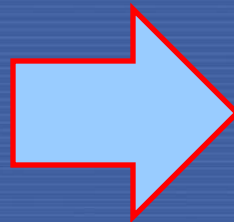
Monitoring Program

pH ~ 3
U = 90 Bq/L



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**

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)



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.

Some NE-Dept. Publications on ER

IAEA-TECDOC-1403

The long term stabilization of uranium mill tailings

Final report of a co-ordinated research project
2000-2004



August 2004

IAEA-TECDOC-1386

Technologies for the treatment of effluents from uranium mines, mills and tailings



INTERNATIONAL ATOMIC ENERGY AGENCY IAEA

June 2003

IAEA Nuclear Energy Series

No. NW-T-3.6

Lessons Learned from Environmental Remediation Programmes

Basic Principles

Objectives

Guides

Technical Reports



IAEA Nuclear Energy Series

No. NW-T-3.4

Overcoming Barriers in the Implementation of Environmental Remediation Projects

Basic Principles

Objectives

Guides

Technical Reports



IAEA Nuclear Energy Series

No. NW-T-3.5

Communication and Stakeholder Involvement in Environmental Remediation Projects

Basic Principles

Objectives

Guides

Technical Reports



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

The ENVIRONET

Network on Environmental Management and
Remediation



IAEA

International Atomic Energy Agency

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

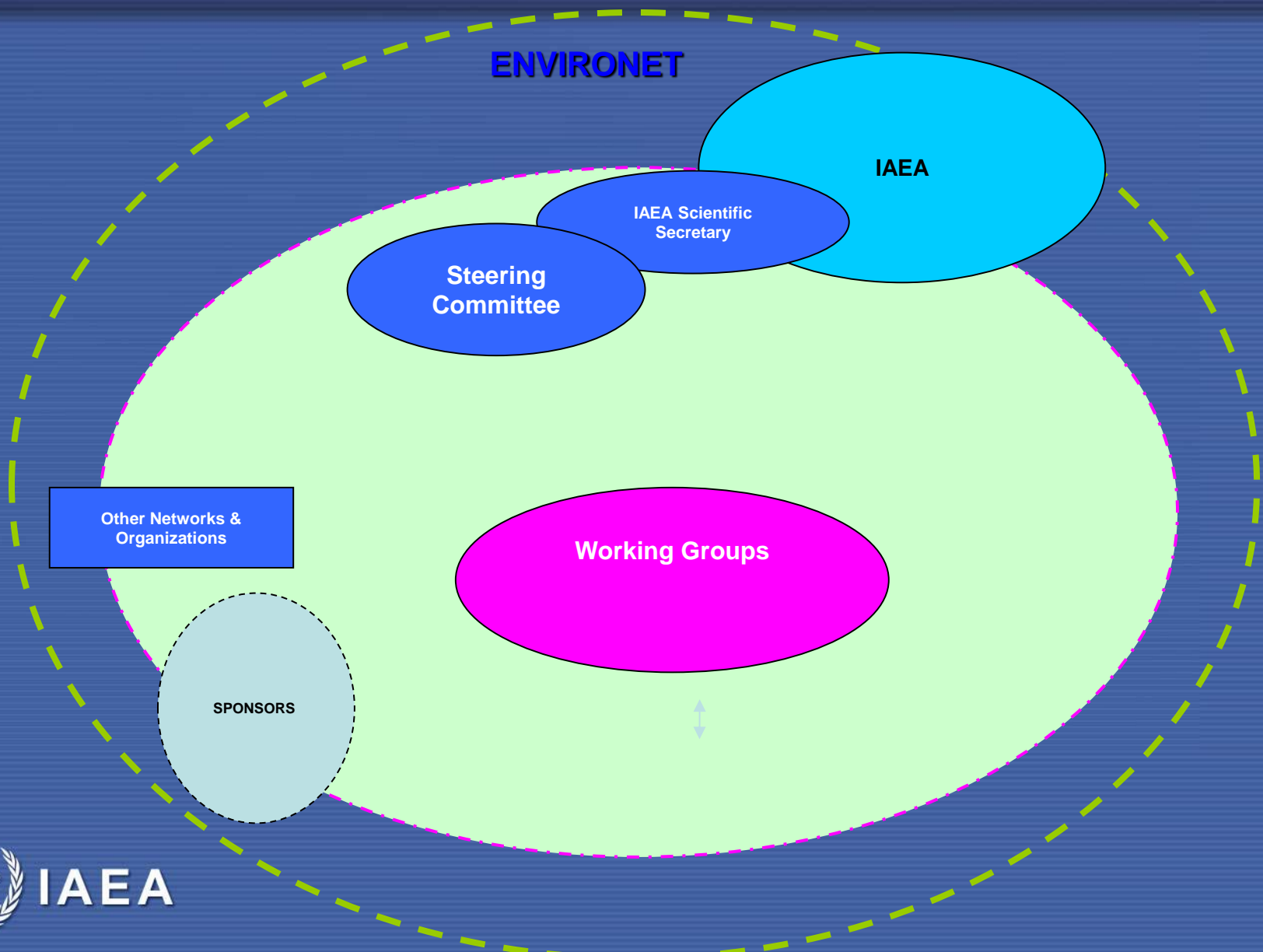
Rationale for the ENVIRONET

- 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

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.

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

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

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**

Discussion Forum in Linked-In

The screenshot shows the LinkedIn interface for the group "ENVIRONET - Network on Environmental Management and Remediation". At the top, there is a navigation bar with the LinkedIn logo, a search bar for groups, and icons for notifications (130), a flag, a plus sign, and a profile picture. Below the navigation bar, there are tabs for Home, Profile, Connections, Jobs, Interests, Business Services, and Upgrade. A banner for "Institute of Physics" is visible. The group's profile picture is a landscape with a lake and trees. The group name is "ENVIRONET - Network on Environmental Management and Remediation" with a lock icon, and it has 1,351 members. Below the name are tabs for Discussions, Promotions, Jobs, Members, Search, and Manage (with a red notification badge for 12). The main content area features a large hero image of a white geometric structure with a text overlay: "Click here to edit your hero image". To the right, there is a section for "Members of this Group" showing four profile pictures and the name "Nicolas JEANNEE" with his title "Chief Technology Officer at GEOVARIANCES" and an "Unfollow Nicolas" link. Below this is a "Your group contribution level" section with a progress bar and the text "Getting close! Reach the next level and you could get featured on the group homepage." At the bottom left, there is a "Your Activity" section with a small profile picture and a text input field: "Start a discussion or share something with the group...". At the bottom right, there are tabs for "Popular" and "Recent".

ENVIRONET Workshops



IAEA Training/Meeting Workshop on NORM in The Netherlands; Technical Program

Hosted by:

Nuclear Research & consultancy Group

Leo van Velzen

7th till 11th of October 2013
The Netherlands

- 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

“ENVIRONET in CONNECT”



Wiki
database

e-learning

IAEA NUCLEUS Site Actions Browse Page Publish MONKEN FERNANDES, Horst EN Help

CONNECT MEMBERS CGULS DISPONET ENVIRONET IDN MSN NKM NNE URF Learning CONNECT Bugs and Features Workshops NC Space

ENVIRONET

Network of Environmental Management and Remediation (ENVIRONET)

Experience has shown that interaction between the less experienced and the more experienced countries and organizations may contribute to better conditions for implementing environmental remediation projects. To inspire countries to share their knowledge and experience as well as to promote and facilitate collaboration, the Network of Environmental Management and Remediation - ENVIRONET was created.

The basis for the network has been built over the past decade as a number of remediation methods have been developed worldwide to deal with environmental clean-up of radiologically contaminated sites. However, the methods vary in terms of sophistication and costs and must be selected on a case-by-case basis. Hence planning is one of the most important phases of the environmental management and remediation process.

In support of better implementation of remediation actions as well as in support of public and environmental protection and site monitoring, the purpose of ENVIRONET is to:

- Coordinate support to organizations or Member States by making available the relevant skills, knowledge, managerial approaches and expertise, related to environmental management and remediation;
- Offer a broad and diversified range of training and demonstration activities with a regional or thematic focus providing hands-on, user-oriented experience and disseminating proven technologies;
- Facilitate sharing and exchanging knowledge and experience amongst organizations with advanced environmental management and remediation programmes;
- Collect and share the good remediation practices by identifying and treating improper past operations, thus assuring the longer term knowledge; and
- Provide a forum in which experts' advice and technical guidance may be provided.

For any questions or feedback regarding this network, [click here](#) to e-mail the network owners.

ENVIRONET Announcements

IN-SITU working group created within ENVIRONET

Int'l Symposium Uranium Raw Material for the Nuclear Fuel Cycle

[Add new announcement](#)

Feedback in Progress 05:41:09



Introduction to Environmental Remediation

Module 1: Introduction

Introduction to Environmental Remediation
Module 1: Introduction



In Partnership with:



Click NEXT to continue

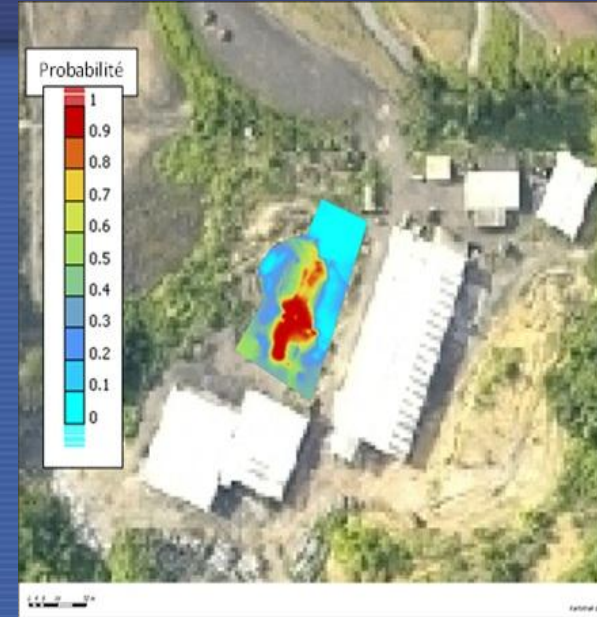
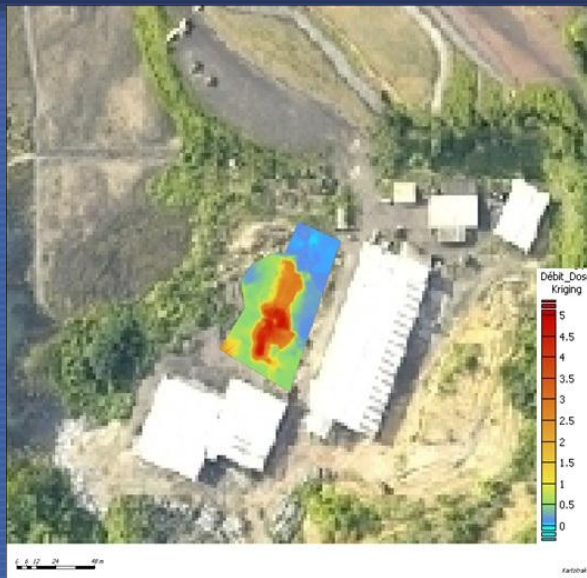
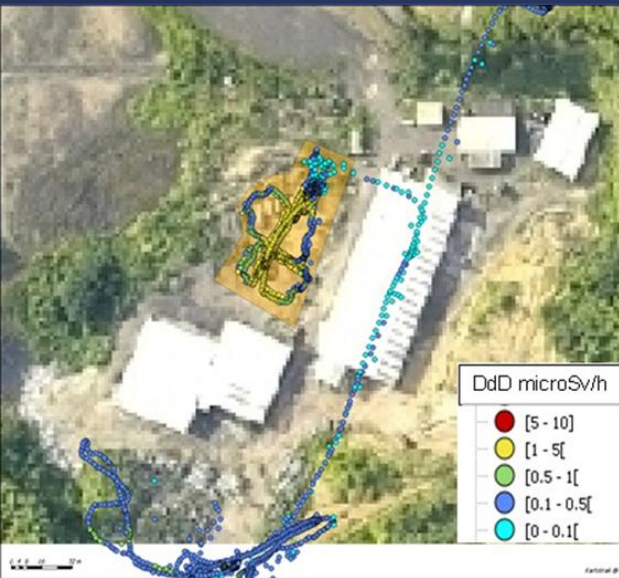
Mobile Unit for Site Characterization

- 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



Mobile Unit for Site Characterization



All measured points

Estimated dose by
Kriging interpolation

Probability of the
dose to exceed 1
 $\mu\text{Sv/h}$

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.

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

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.



Thank you for your attention

Join The Environet

“For a cleaner and Safer
Environment”