WM’2012
Phoenix, 27 February – 2 March 2012

Advancing Environmental Remediation and Decommissioning in the IAEA Member States

Irena Mele
Waste Technology Section, IAEA
Barriers to Start ER and D&D Programs

- Lack of funding
- Lack of national policy
- Lack of technology, experience
- Lack of transportation and disposal systems
- Lack of regulatory and/or legislative framework
- Regional issues
- Lack of owner (or driver)
- Public resistance
- Conflicting interests
- Uncertainty, complexity or unknown risks
How to respond?

- ENVIRONET – Network on Environmental Management and Remediation
- E-learning curriculum
- Mobile Unit for Site Characterization
- DRCS – Directory of Radioactively Contaminated Sites
- TC Projects
- Central Asia Initiative
- RSLS
- Side Event to the GC 2011 → Working Group on Constraints in the Implementation of ER and D&D projects
An international network on Environmental Management Remediation to deal with existing radiologically contaminated sites and preventing the generation of new legacy sites
<table>
<thead>
<tr>
<th>Topic</th>
<th>Levels</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Mode</td>
<td></td>
<td>eLearning</td>
<td>Face-to-face</td>
<td>Face-to-face</td>
<td>eLearning and Face-to-face</td>
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<tr>
<td>Duration</td>
<td></td>
<td>6 hours</td>
<td>1 week</td>
<td>1 to 2 weeks per topic</td>
<td>Variable</td>
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<tr>
<td>Target Audience</td>
<td></td>
<td>Public or stakeholder groups</td>
<td>Regulators</td>
<td>Regulators</td>
<td>Senior specialists for targeted topics</td>
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<tr>
<td></td>
<td></td>
<td>Regulators</td>
<td>Graduates from Level 0</td>
<td>Senior level engineers and scientists</td>
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<tr>
<td></td>
<td></td>
<td>Educational institutions</td>
<td>Project managers</td>
<td>Project managers</td>
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<tr>
<td></td>
<td></td>
<td>Junior engineers and scientists</td>
<td>Mid-level engineers and scientists</td>
<td>Technical specialist</td>
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<tr>
<td></td>
<td></td>
<td>Prospective Level 1 candidates</td>
<td>Construction superintendents</td>
<td>Field engineer</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Executive management</td>
<td>Owner representative</td>
<td>Owner representative</td>
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<td></td>
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<td>Funding entities</td>
<td>Select stakeholder members</td>
<td></td>
<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>Technical specialists</td>
<td></td>
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</tbody>
</table>
Welcome to the

Directory of Radioactively Contaminated Sites

The Directory of Radioactively Contaminated Sites is a service that is provided by the International Atomic Energy Agency to its Member States. The DRCS contains information on contaminated sites and pertinent remediation activities.

The information is provided by the Member States and is compiled and stored by the Agency. The information can be viewed freely.

To view data click on 'Access Data'.

To participate in the DRCS programme, please contact the DRCS Programme Officer.

Note to the users:

The DRCS is a continually developing database on radioactively contaminated sites and on the efforts to remediate them.

Currently the initial data entering procedures undergo the initial testing procedure and, therefore, the database may not contain any accessible data.

Likewise, the help-function has not been enabled yet.
click on region/country to view site selection
<table>
<thead>
<tr>
<th>Category Code</th>
<th>Category Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Identification And Location Of The Site (Area)</td>
</tr>
<tr>
<td>200</td>
<td>Legal / Institutional Responsibilities</td>
</tr>
<tr>
<td>220</td>
<td>Ownership, Operation And Administration Responsibilities</td>
</tr>
<tr>
<td>230</td>
<td>Administrative Responsibilities For The Site's Environmental Remediation</td>
</tr>
<tr>
<td>240</td>
<td>Social &amp; Economic Aspects</td>
</tr>
<tr>
<td>300</td>
<td>Site History</td>
</tr>
<tr>
<td>410</td>
<td>Physical Geographical</td>
</tr>
<tr>
<td>430</td>
<td>Geological And Hydrological Characteristics</td>
</tr>
<tr>
<td>440</td>
<td>Climatological Characteristics</td>
</tr>
<tr>
<td>450</td>
<td>Demographic Data</td>
</tr>
<tr>
<td>460</td>
<td>Economic Data</td>
</tr>
<tr>
<td>500</td>
<td>Type, Levels And Extent Of Contamination</td>
</tr>
<tr>
<td>510</td>
<td>Radiological Contamination Level</td>
</tr>
<tr>
<td>520</td>
<td>Contaminated Environmental Media Characterization</td>
</tr>
<tr>
<td>540</td>
<td>Radioactive And Hazardous Waste Characterization</td>
</tr>
<tr>
<td>600</td>
<td>Potential And Actual Hazards Issuing From The Site And Emergency Measures</td>
</tr>
<tr>
<td>700</td>
<td>Restoration Strategies And Techniques</td>
</tr>
<tr>
<td>900</td>
<td>Published Information On The Site</td>
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</tbody>
</table>

**Site:** Kraton-E  
**Country:** Russian Federation

**Status:** Published  
**Status changed on:** 9/19/03 2:59:46 PM  
**Last Updated on:** 5/19/03 11:27:39 AM

- **click on data category to view details**
### PHYSICAL GEOGRAPHICAL CHARACTERISTICS

#### 412 Topographical map

http://drcs-dev/getfile.asp?fname=\{wef\}Site4\{030519_111329-3\}\TopographicMap.

If a map/document is available on Internet and can be accessed through HTTP or FTP connection, type its address in the field. To upload a map from your computer click on upload button and follow the instructions.

#### 420 Land Cover

<table>
<thead>
<tr>
<th>421 Sealed/built-up area (sq.km)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>422 Prevailing land cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest/Plantation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>423 Land-cover map</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>


If a map/document is available on Internet and can be accessed through HTTP or FTP connection, type its address in the field. To upload a map from your computer click on upload button and follow the instructions.
### URANIUM PRODUCTION LEGACY SITE REMEDIATION

<table>
<thead>
<tr>
<th>Project design requirements</th>
<th>REFERENCES</th>
<th>BEST TECHNOLOGY</th>
<th>TOOLS</th>
<th>CASE STUDIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulatory and legal framework</td>
<td>IAEA DOCUMENTS</td>
<td>Geotechnical control</td>
<td>Transport Model</td>
<td>USA (UMTRCA)</td>
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<tr>
<td>History and Site Characterization</td>
<td>CRP EU CRP EU EU EU EU</td>
<td>Dams and Barriers</td>
<td>Dose Calculation</td>
<td>Canada</td>
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<tr>
<td>Radiation Safety criteria</td>
<td>National Regulatory documents</td>
<td>Covers ( tailing, piles et sal.)</td>
<td>Waste Management</td>
<td>Germany (WISMUT)</td>
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<tr>
<td>Environmental Quality Criteria</td>
<td>REPORTS</td>
<td>Water treatment</td>
<td>Risk Assessment</td>
<td>CA ( KAZ, TAD, UZ, KIG)</td>
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<tr>
<td>Safety Assessment &amp;EIA procedures</td>
<td>Training source materials</td>
<td>Erosion control</td>
<td>Data Management</td>
<td>Russia</td>
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<tr>
<td>Remediation Planning procedures</td>
<td>Conferences and Meetings</td>
<td>Groundwater flux control</td>
<td>Technology support</td>
<td>Ukraine</td>
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<tr>
<td>End point, clearance criteria</td>
<td>Publications</td>
<td>Site decontamination</td>
<td>Decision Making Tools</td>
<td>Brasil</td>
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<tr>
<td>Prioritization &amp; optimization procedure</td>
<td>Other</td>
<td>Metal decontamination</td>
<td>Cost-Benefit Analyses</td>
<td>DIAMO</td>
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<tr>
<td>Monitoring and Surveillance Programs</td>
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<td>Construction removal</td>
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<td>Romuina</td>
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<tr>
<td>Project implementation</td>
<td></td>
<td>Phyto-stabilization</td>
<td></td>
<td>France</td>
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<tr>
<td>LTSM (Long-term Site Management)</td>
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<td>Reworking materials</td>
<td></td>
<td>Extra informational resources</td>
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<tr>
<td>Post closure &amp; Institutional control</td>
<td></td>
<td>Drilling facilities</td>
<td></td>
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<tr>
<td>Management for mixed rad&amp;tox waste</td>
<td></td>
<td>Machineries and transportation</td>
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<tr>
<td>Best practice in Site licensing</td>
<td></td>
<td>Tailing management</td>
<td></td>
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<td>Data &amp; Information management</td>
<td></td>
<td>Pile management</td>
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<td>ILS site remediation</td>
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<td></td>
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<td>Mine closure</td>
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### Extra informational resources

- U-Dose Calculator
- SATURN
- ECOLEGO
- AMBER
- RESRAD
- SAFRAN
- MANY OTHER
On-going TC Projects

- Interregional (New): Promoting safe and efficient clean-up of radioactively contaminated facilities and sites
- Regional Asia & the Pacific: Developing Safe NORM Waste Disposal Technology and Long Term Repository Designs (ARASIA)
- Regional Europe:
  - Supporting Preparation for Remediation of Uranium Production Legacy Sites
  - Safe Management of Residues from Former Mining and Milling Activities in Central Asia
  - Supporting Environmental Remediation Programmes
  - Supporting Safe Management of Uranium Production Legacy Sites
  - Supporting the Return to Normal Radiological Environmental Conditions for the Territories Affected by the Chernobyl Accident
- Iraq: Decommissioning and Remediation of the Former Nuclear Facilities and Sites in Iraq
- Kazakhstan (New): Supporting the Transfer of Lands of the Former Semipalatinsk Nuclear Test Site for Economic Use
- Kyrgyzstan: Enhancing Radioecological Monitoring
- Kuwait: Monitoring and Assessing Naturally Occurring Radioactive Materials from the Oil Industry (Phase II)
- Libya: Managing Naturally Occurring Radioactive Materials in the Oil and Gas Industry
- Qatar (New): Monitoring and Assessing Naturally Occurring Radioactive Materials (NORM) from the Oil and Gas Industry
- Ukraine: Chernobyl NPP Units Decommissioning and Radioactive Waste Management at the Site Including Shelter
- Ukraine: Rendering Assistance in ChNPP Decommissioning and Safe Radioactive Waste Management
- Zambia: Assessing Radioactive Contamination of Surface, Groundwater and Other Resources in Mining Areas of the Southern, Copper belt and North Western Provinces
Central Asian Coordination Group (CACG)

• Support the Central Asian member states to develop a portfolio of projects that will provide solutions for remediation of their legacy uranium production sites and give confidence to potential donors to invest in the region

• Through the CG, the IAEA Secretariat will provide a forum for the Central Asian member states and international partners doing work in the region

• The CG will avoid duplication of project work in Central Asia and assure that priorities are properly addressed and made known to the interested parties

• Technical advisory committee (TAC) will provide technical advice on the projects and function as a support committee for the CG
Structure for Coordination Group

- Coordination Group (chair – IAEA)
- Technical Advisory Group
  - IAEA
- International Donors
- Central Asian Member States
- International Assistance Orgs

Remediation Projects Funded by International Donors
To promote high standards of regulatory supervision for the management of legacy sites, in line with the IAEA Safety Standards and good international practices.

To be achieved through:

• collection and collation of information on nuclear legacy sites and experience of legacy supervision;

• exchange of information on nuclear legacy site restoration plans, and the role of regulatory supervision in planning activities;

• the generation of mutual understanding of how regulatory supervision can be made effective and efficient.
The scope of RSLS activities includes all types of nuclear legacy sites.

Provide support in development of effective and efficient regulatory processes, such as:

- regulatory requirements and guidance development, licensing and authorisation,
- inspection and compliance monitoring, and enforcement.
Constraints to implementing D&D and ER

• General Conference Side event to discuss constraints to implementing D&D and ER
• Aim: to understand why progress with D&D and ER in many countries is slow or negligible
• Main participants: UKTI (co-host); US; Russia; Japan; Kazakhstan; EBRD and European Commission
• Fundamental requirements for D&D and ER projects:
  • Legal and regulatory framework
  • Funding
  • Access to specialist resources (human and technological)
Constraints to implementing D&D and ER

- Important considerations:
  - Institutional arrangements for liability and project management – need to ensure efficient use of scarce national resources
  - Waste disposal routes – need for integrated approaches to waste management
  - Technical expertise is concentrated in a small number of countries – need to create an environment that more easily allows technology and expertise to be transferred between countries
Observations

• Additional efforts are needed to increase global rate of decommissioning and remediation (MSs, IAEA and other stakeholders)
• Considerable experience and data on decommissioning and remediation projects and future activities exists
• Increased sharing of MS experiences may facilitate greater implementation of decommissioning and remediation programs, with a focus on resolution of barriers
• These efforts would support implementation of Nuclear Safety Action Plan
Constraints to Implementation of D&D and ER

• A need recognized to analyse and report on international good practices in implementation of decommissioning and remediation

• Recommended to follow a coordinated, multi-step approach:
  • Analyse global experience and needs
  • Plan and conduct a Technical Meeting (TM)
  • Work with MS to analyse TM results
  • Recommend specific opportunities and projects to advance specific decommissioning and remediation programs in MS
Objectives of Future Effort

- Provide platform for coordination and assistance to MS to implement projects and resolve barriers
- Find shared problems between MSs to increase collaboration
- Find solutions that allow progress in decommissioning and remediation despite constraints or barriers (for example: lack of disposal solutions)
- Organize and leverage MSs expertise and experience
- Provide “practical” and “specific” assistance to MS
- Support Nuclear Safety Action Plan
Resources and Timing

- Data mining of available IAEA resources – February/March
- Consultancy to plan survey - April
- Implementation of survey – May
- Announcement of effort at JC Review Meeting - May
- Receive survey results – July
- General Conference Side Event – September
  - Presentation on preliminary survey results and announcement on planned Technical Meeting
- Consultancy to plan Technical Meeting – September/October
  - IDN/Environet Annual Forum – November
- Technical Meeting – January/February 2013
Conclusions

- Key requirement for ER and D&D: an appropriate legal and institutional framework including funding systems
- Arrangements for capturing and sharing experience from ongoing decommissioning projects are of crucial importance – important role of IDN and Environet
- Need to create an environment where technology and expertise developed in advanced programmes may more easily be applied in others
- May be beneficial to establish mechanisms to study good practice and to facilitate enhanced collaboration and sharing of expertise between programmes