Stakeholder Involvement in Rehabilitation of Former Uranium Mining Sites – International Case Studies

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Common characteristics of pre-remedial conditions in former uranium producing countries in East Europe, in Central Asia and in Africa

(1) Uranium production was carried out in disregard for elementary rules of occupational health and safety and of environmental protection. As a consequence, an existing radiological situation was left behind which required the application of RP principles for intervention situations.

(2) Operations were terminated in an abrupt way. No preparations had been made for closure (no remediation concepts, no regulations, lack of qualified staff/know-how, lack of equipment necessary to conduct remediation).

(3) No financial provisions had been made for rehabilitation. Remediation had to be implemented under the conditions of constrained resources.

(4) The old culture of secrecy was still prevailing. Building bridges with the local population or even a culture of stakeholder involvement were hardly developed.

Problems which had to be solved also in East Germany (WISMUT) in 1990/1991
WISMUT, Germany:
- once one of the biggest uranium producer worldwide
- since 1990: Rehabilitation of the Wismut sites

As a consequence:
- Interests of the countries to use German (i.e. WISMUT) know how
- WISMUT/WISUTEC: From 1996 to 2011, engagement in more than 25 international projects (funded by EC, World Bank, Germany, IAEA), in 16 countries
- Stakeholder Involvement in many projects a central issue, often a key element to reach the project goals
Why is stakeholder involvement in rehabilitation of uranium mining legacies so important:

- Decisions in modern society in general cannot be left only to “experts” (media, politics, perceptions).
- Rehabilitation of former uranium mining sites is a very complex process and goes much beyond identification of technical solutions for the safety of the radioactive legacies.
- There is a pertinent need to arrive at a certain level of sustainability (Brundlandt Report “our common future, 1987) "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs”.
- The public perception of radioactivity (“Tschernobyl effect”) has to be recognized.
- Identification of optimized remedial measures requires a top-down approach (cost-benefit analysis, multi-attribute analysis).
Case studies:

(1) Remediation Concept Lermontov, Russia

(2) Tailings Pond Relocation in Kitwe, Zambia

(3) Building Bridges with the Public, WISMUT, Germany
Case study Lermontov

Stakeholder Involvement during Remediation of Uranium Mining Liabilities in a Mineral Water and Spa Region in Lermontov, Northern Caucasus, Russia
Lermontov

more than the name of a great Russian novelist?
(Michail Y. Lermontov, 1814 – 1841)
Stakeholder Involvement during remediation of U mining liabilities in a mineral water / spa region in Lermontov, Russia

- at the northern foothills of the Caucasus Mountains
- region of unique mineral water resources,
- home of internationally important health resorts, spas, tourist centres (Pjatigorsk, Kislowodsk, Essentucki, Mineralnye Vody, Shelesnogorsk)
- each year visited by more than one million patients and tourists
### Key elements of the Lermontov rehabilitation concept

EU TACIS Project, Wismut/WISUTEC in charge to develop a remediation concept

<table>
<thead>
<tr>
<th>Object</th>
<th>„Business as usual“ concept</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tailings management facility</td>
<td>• Establishment of a final „state of the art“ cover to guarantee long-term reduced percolation of water through tailings</td>
<td>Stakeholder issue 1</td>
</tr>
<tr>
<td>Industrial site</td>
<td>• Demolition of contaminated structures&lt;br&gt;• Site reclamation</td>
<td>OK</td>
</tr>
<tr>
<td>Waste rock dumps</td>
<td>• Repair of cover constructions&lt;br&gt;• Re-shaping of steep slopes</td>
<td>OK</td>
</tr>
<tr>
<td>Mines</td>
<td>• No complete sealing / flooding&lt;br&gt;• Closure of the adits and shafts&lt;br&gt;• At each mine one discharge point for mine water</td>
<td>Stakeholder issue 2</td>
</tr>
<tr>
<td>Surface water</td>
<td>• Removal of the existing precipitation ponds&lt;br&gt;• Treatment of the discharges mine water&lt;br&gt;• Restricted use of the treated water</td>
<td>Stakeholder issue 3</td>
</tr>
<tr>
<td>Access ways to the objects</td>
<td>• Repair / construction</td>
<td>OK</td>
</tr>
</tbody>
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Stakeholder issue 1:

Immediate establishment of a „state of the art“ cover would have consequently result in termination of the local fertilizer production (having a strong socio-economic impact since GMZ was the biggest employer at the Lermontov site)

Phosphorous gypsum (waste of fertilizer production) used as cover material

Decision: Postpone the relevant concept part, give GMZ time to develop a new waste management concept
Stakeholder issue 2:

Former mine Beshtau: radon containing water was provided to Pjatigorsk; Curing of diseases with radon containing water was essential for Pjatigorsk to retain the status of a top spa
Stakeholder issue 2

Owner ARMZ and the relevant Authorities in Moscow wanted to have complete mine closure, sealing of adits. Complete flooding.

Closure of all adits at mine Beshtau would have terminated the provision of high radon concentrations containing water from well #113.

Beshtau mine: Suggested Option

- reconstruction of radon water well #113
- remediation of adit #16, rehabilitation and further usage of radon pipeline
- closure of all other adits and connections with the mine workings
- passive mine water treatment

Radon water to Pjatigorsk

adit #16
Stakeholder issue 3:

“Traditional” Management of contaminated mine water (flooding, closure of discharges, reduced access, treatment, restrictions for the use of treated water) would result in no-longer availability of water for irrigation of the gardens/fields on the foothills of mountain Beshtau.

Need of compensation Measures!
Conclusions

1. For all objects technically feasible and economic solutions for remedial measures existed.
2. Building bridges with the public and stakeholder involvement was more challenging than development of technical solutions.

Stakeholder

Beneficiary KMV, town Lermontov, local public, former owner MINATOM, Atomredmetsoloto, VNIPI Promtechnolly, GMZ Lermontov, Stavropolski krai, town Pjatigorsk, KMV spa administration, church representatives, Russian government, environmental activists, EC, ….

Measures:

Presentations at the site and in Moscow by WISMUT, organisation of stakeholder meetings in Pjatigorsk and Lermontov, workshop in Chemnitz with participation of experts from other sites in Russia faced with rehabilitation of U mining liabilities [Pilot character of the project], site visits to Schlema and Jachimov

Key Element of the concept developed by WISMUT: use the great potential to integrate the Lermontov mining sites into the future development of the Caucasian Mineral Water and Spa District.
Case study Kitwe

Stakeholder Involvement during Clean-up of the AMCO Site in Kitwe, Zambia
Remediation of the AMCO site in Kitwe (Zambia)

**Situation:**

- 70,000 m³ uranium mill tailings from Uranium production in the 1950ies;
- Poor region; in the centre of the Zambian Copper belt where millions of tonnes of mining residues are managed (ongoing intensive mining in the region, existing infra-structure, Kitwe: 500’000 inhabit.)

**Local stakeholders:**
Zambian Rad. Protection Agency, Lusaka Environmental Council of Zambia, Lusaka Mopany Copper Mine in Kitwe/Ndola, Copper Belt University in Kitwe, Local Population, NGO’s, etc.
Remediation of the AMCO site in Kitwe (Zambia)

World bank TOR

- Development of a concept for relocation of one identified tailings dump (TD #13, 30 T m³ radioactive tailings)

During project implementation:

- Discovery of a second dump
- Confirmation through studies in the Mining Archive Ndola (TD#11) (simply forgotten; lack of institutional control)
- Detection of more contaminated areas (altogether 80 m³ radioactive material)
Identified exposure pathways of relevance site specific exposure pathways

People living very close to the sites / babies laid down on the ground

Harvesting on the tailings (food production); babies laid down on ground
Identified exposure pathways of relevance - site specific exposure pathways

Building material from the TD 13 foreland

In general: No awareness of the problem

Peanuts from TD 11
Remediation Options

Option 1: Natural attenuation
Option 2: Containment on site
Option 3: Engineered Facility
**Option 4: Disposal at Existing Tailings Dam**
Option 5: Open Pit Disposal
Option 6: Disposal to an underground mine

Multi-Attribute Analysis, stakeholder involvement, feasibility analysis;

Decision: Disposal of the uranium tailings at an existing and still operated tailings pond
owner: Mopani Copper Mine
TP15a, >100 Mio. m³ sludge's from Cu production
Relocation of TP11/13 to TP 15a (copper mining tailings, Mopani Copper Mining Company)
Capacity building – the Zambian RP Agency

- RP Agency staff: 2 experts, two assistants
- RP Ordinance, not qualified for NORM
- no regulations guiding RP in connection with rehabilitation of U mining and milling legacies

Measurements
- presentation of the EIA /RIA approach
- joint definition of remediation criteria
- presentation of the results of the EIA
- licensing by RP Agency
- involvement of the Agency and local staff (ZCCM, CBU) in environmental monitoring during relocation of TP11/13 to TP15a
- Involvement of the Agency in supervision activities
Wismut: Remediation Work Challenges in Building Bridges with the Public
The WISMUT inheritance

- a military run company; operated under strict conditions of secrecy
- „state inside the state“ (former GDR (East Germany) was structured in 14 regional districts plus WISMUT as an independent organisation on a par with the districts)
- operation with insufficient provisions for working safety;
- violation of the fundamental rules of radiation protection (high rates of lung cancer incidences due to extremely bad working conditions during the „wild WISMUT years“)
- overexploitation of natural resources;
- insufficient protection of the environment; ecological devastation of whole areas
The WISMUT inheritance
The WISMUT inheritance

Situation after fall of the iron curtain in Germany:
- mistrust, even hate
- yellow press: „Second Tschernobyl in the Centre of Europe?“

Question in 1990 after termination of 40 years of uranium production in East Germany:

- How can the new-built state-run company WISMUT GmbH restore public confidence?
- How to built bridges with the local public?
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Policy for implementation of the WISMUT Environmental Remediation Project

• implementation of the project with the staff of the former mining company SDAG WISMUT, involvement of local experts and companies

• „Opening of the books“; openness, frankness, - in particular disclose of data on environmental pollution

• Involvement of the local public in decision making; stakeholder involvement in general

• active public relation policy

• preservation of mining traditions

• returning the WISMUT legacy to productive use
• involvement of local engineering companies, collaboration with scientific institutes/universities
• more than 100 apprentices each year
• the WISMUT Remediation Project as an important social and economic factor in the affected regions
„Opening of the books“

• local public has access to the environmental data
  (is in line with the German „Umweltinformationsgesetz“ – law on
  information about environmental data)
  - internet presentation
  - requests of the local public are answered
  - annually an environmental report is published
  - compilation of all site-specific environmental data in a so-called
    „Environmental Atlas“ for each site (Umweltatlas); the atlas is handed
    over to communities and other interested parties

• environmental monitoring is carried out by WISMUT (self control);
  the authorities check the monitoring by simultaneous measure-
  ments at ca. 10 % of the points of measurements; strong QA
  requirements

• monthly data transfer to the authorities; data bank structure at the
  side of the authorities is exactly the same as at WISMUT
Stakeholder Involvement

• development of remediation concepts for each site whereby the interests of the local public for further development of the community were taken into account

• plans for regional development as an essential base for the concepts; the future use of the reclaimed areas/objects should be specified prior to reclamation

• contribution to the regional revitalization and development must be given (sometimes even decisive) consideration

• presentation of the concepts to the public and discussion; the same applies to remedial measures for individual objects as far as concerns of the public are touched
Stakeholder Involvement

Proc.

- environmental impact assessment EIA for all environmentally relevant remedial measures (Umweltverträglichkeitsprüfung); presentation of the EIA results to the stakeholders

- implementation of the remedial measures as an iterative process rather than linear succession of tasks;

- progressive licensing approach; („licensing conferences“ under participation of involved parties)
Active public relation policy

- publication of all relevant data
- workshops
- every year at the sites a „day of the open door“ is organized
- WISMUT exhibition opened in 2007 at the Ronneburg site
- presentation of WISMUT in the internet (www.wismut.de)
- presentation of WISMUT during the World Exhibition in Hannover in 2000
Active public relation policy - International Workshop on Remediation of Mining Sites, Gera 2007

Excursion to the Seelingstädt tailings ponds

200 experts from 16 different nations

- since 1991: six international workshops
- since 1991: almost 200 scientific visits from abroad (via IAEA, EU projects, Worldbank projects, etc.)
Active public relation policy

Ronneburg site annual „day of the open door“

2012: 10 000 visitors
Active public relation policy: Wismut exhibition, Ronneburg site

Opening during the German Horticultural Exhibition BUGA 2007
Active public relation policy: Wismut exhibition, Ronneburg site

Since opening 2007: 650,000 visitors
Preservation of mining traditions

Wismut participates actively in the application of the Saxonian Ore Mountain Region to become an UNESCO World Culture Heritage (unique ensemble of technical monuments, old mines, relicts of mining, etc. from the 14th century up to the present)
Returning the WISMUT legacy to productive use

Remediated waste rock dumps and tailings ponds are areas of restricted reuse!
Most common utilizations of reclaimed areas are forestation or establishment of green fields.
Advantage: low maintenance, sustainable in the long run

But:

• Why not to have more „creative“ types of re-utilization?
• Why not to use remediated areas as a leisure or game park?
• Why not to install a solar panel farm for use of sun energy on a covered tailings pond?
• Why not to integrate mining legacies as technical monuments in developing regions as touristic attractive sites?

To top it:
• Why not to build a golf course on covered waste rock piles?
Example: Rebirth of the health spa in Schlema

Bad Schlema:
Conversion of a devastated uranium mining site back to a radon health spa
Example: Rebirth of the health spa in Schlema

Gulf course built on a covered waste rock dump
Example:
The Horticultural Exhibition BUGA 2007 in Gera/Ronneburg

Open pit Lichtenberg 1990

BUGA impression 2007
Example: Solar panels on a remediated waste rock dump footprint, Ronneburg site

To date, appr. 800 hectares of reclaimed areas have been sold by WISMUT
WISMUT experience regarding productive reuse of reclaimed sites

• The effect of environmental reclamation goes well beyond containment of the health and environmental risks and can greatly contribute to regional revitalization and development.

• Value added results can be achieved at no additional (or at reimbursable) costs, if reclamation is done with a well-defined utilization goal in mind. The goal is best developed in cooperation with the future user, regulatory authorities and should be specified already prior to reclamation.

• If a consensus can be achieved with all stakeholders, “reclamation by objectives” becomes practicable, i.e. the objectives for the individual remedial steps can be already set consistent with the ultimate utilization goal, which is cost efficient and time saving.

• After the responsibility for long term monitoring has been reliably established, the sustainability of the remediation results is best achieved by turning over the reclaimed areas/remediated objects to productive use.
WISMUT: Is an export of ideas possible?

Of course, the experiences of WISMUT cannot be transferred „one by one“ to countries in Central Asia, Russia or South America.

However, the key elements of the WISMUT policy, i. e.

- development of a culture of involvement of stakeholders
- openness,
- progressive public relation activities, and in particular
- returning the affected sites to productive use,

should these elements not become part of a strategy to combine also at other places modern mining with environmental protection? and

should these elements not become part of a strategy to open perspectives for the revitalization and further development of the regions after termination of the mining activities?
General Conclusions

- Stakeholder issues are site- and/or country-specific
- There is a big variety of ways and options to practise stakeholder involvement.
- A stakeholder involvement culture is essential.
- Often, stakeholder involvement is a key element to reach project goals.
Many thanks for your attention