The Challenge faced by Ukraine to Implement Projects ON REGULATORY SUPERVISION OF LEGACY SITES (RSLS) at the Nuclear and Uranium Production Legacy Sites

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Three main Nuclear and Uranium Production Legacy Sites

- Chernobyl Exclusion Zone
- Dnieprodzerzhynsk Former U Facility
- Zhouoti Wody Mining and Milling Facility

Legacy sites
- WWER – 440
- WWER – 1000
- RBMK – 1000
- Research reactors
- RW storage facilities
- Uranium mining and milling
Decommissioning and Environmental remediation were not planned as separate stages of nuclear fuel cycle operations in the past. These activities were considered as a last stage of operation. Therefore like many other (former SU) countries Ukraine has to spend a lot of financial resources and human expertises, establish appropriate regulatory framework to resolve existing serious problems.

Now we need to avoid the repetition of the mistakes made in the past and extensive and costly operation in the future.

The National Policy in Remediation should be substituted.

International cooperation may help Ukraine to optimise human efforts and financial resources.
Specific Interest of Ukraine

Because:

1. Great number of ongoing post-Chernobyl decommissioning and environment remediation projects

2. Some NPP Units and Radioactive waste facilities start preparations for their safe decommissioning
   To avoid future Legacy issues, financial assurances should be established for the facilities under operation that could have a significant environmental impact,

3. Existing serious Legacy problems at the Uranium Mining and Milling Industry.
   The Government of Ukraine have been implementing the State Program on Remediation of the contaminated lands and Uranium tailing sites in Dneprodzerzhinsk town since year of 2009

4. The Government of Ukraine considers new challenges for developing of nuclear fuel cycle facilities in combining of the own Uranium ore and Milling resources with modern technologies for its utilization and also for nuclear fuel productions at the own territory on a basis of cooperation with other countries
Chernobyl, the worst nuclear accident in history, created an unique laboratory to study the impacts of radiation and site for testing remediation technologies.

Almost 25 years later, the site still requires assistance in decommissioning and remediation projects.

Also Chernobyl site requires attention of the international expert’s society in such area as:

- New Safe Confinement (NSC) Project Development
- Radioactive Waste Management Strategy and Technology Development
- Chernobyl Cooling Pond Decommissioning and Remediation (Natural Attenuation or Clean-up)
- Future of Chernobyl Exclusion zone:
  - Possible Natural Reserves or Agricultural activities may be partly Restoration
Recommendations on Environmental Monitoring, Remediation and Research

During the years following the accident large resources were expended to provide a systematic analysis and an acceptable strategy for management of existing radioactive waste. However, to date a broadly accepted strategy for radioactive waste management at the Chernobyl power plant site and the Exclusion Zone, and especially for high level and long lived waste, has not yet been developed.

What is the future of the Chernobyl Exclusion Zone?

The future of the Exclusion Zone for the next hundred years and more is envisaged to be associated with the following activities:

— Construction and operation of the NSC and relevant engineering infrastructure;
— Defuelling, decommissioning and dismantling of Units 1, 2 and 3 of the nuclear power plant and the Shelter;
— Construction of facilities for processing and management of radioactive waste, in particular a deep geological repository for high-activity and long lived radioactive material;
— Development of natural reserves in the area that remains closed to human habitation; and
— Maintenance of environmental monitoring and research activities.

What has been changed?
In the past Ukraine was one of the leading countries in Uranium Mining and Milling. At the moment the Uranium Industry in Ukraine begins a way to the Renaissance and going to restore Mining and ISL (in-situ leaching) U-exploration. At the same time, legacy problems with Uranium production residues still exist that cause contaminated environments and social problems in the affected areas. The most serious problems are in Dnieprodzerzhinsk town (legacy) and Zhevtvy Wody town (responsibility of operating Vostochny Mining Enterprise).

Since 2009, State Remediation Program (Uranium Production Legacy Site Remediation and Reclamation of the site in Dnieprodzerzhinsk) has been implemented; however we can not estimate an achieved progress and program implementation results as efficient, because:

- Out-of-date regulatory provisions
- Lack of project management experience of such a scale
- Lack of knowledge in Risk communication and long term institutional control
Background and problem description

- After collapse of the USSR, one of the largest Uranium Milling facility “Pridneprovski Chemical Plant” in Dniprodzerzhinsk, which was in operation from 1948 till 1991 has been shut down.

- The plant is under the “sanation” since 1991 with the number of Uranium tailings located on its territory.

- There has been no regular surveillance of the uranium residue and other toxic waste and releases from the tailing sites.

- New monitoring programme launched in 2005 and founded by Ministry of Fuel and Energy of Ukraine
9 tailings dumps were created containing about 42 million Uranium Production Residues (Total activity is uncertain)

Residues are located within the territory of the Industrial zone of town (around 400 000 citizens),

Others tailing are located about 14 km to the South-east.

Tailing dumps situating at the large town
No adequate Risk Assessment and Clear Strategy for the future management of the tailing materials.

The Public opinion is to remove tailings from the town

Strategy on conservation of the tailings is not supported by the Public due to lack of Knowledge and Risk Communication
There are 20 enterprises under operation on the territory of the Legacy Site, which are not related to the former Uranium Production.

Radiological status of workers at these enterprises is not set clearly.

Population has overestimated Risk perception.

The extended regular monitoring program has been established just recently (2005-2009).
Tailing “Zapadnoe” Restored cover (2007)

Tailing dump “Dneprovskoe, posphogypsum cover

Containers filled by contaminated pipes (2008)

“Yugo-Vostochnoe tailing” New cover establishing (2009)
Remediation Planning according to the State Program Concept (2008)

- **Phase 0 (2009).** Tailing dumps Inventory and characterisation. Safety Assessment. Monitoring and Surveillance networks development. Legal framework and Regulation development.


- **Phase 2 (2011-2015).** Implementation of the main set of engineering measures as a first priority to be implemented on the territory of PChP (preparation and decontamination of the most contaminated buildings).

- **Phase 3 (2016-2020).** Preliminary actions on possible removal of the tailing materials from the industrial site to the tailing “D”. Justification and partial relocation of the tailing materials to the surface of tailing “D”.

- **Phase 4. (2021-2025).** Long-term management program implementation. Handover of the re-profiled facilities to the basic enterprises and neighbouring areas of the town.
Evaluation of current preparedness for the State Program implementation

- There is still substantial diversity in international and national radiological criteria and safety standards applicable to remediation of areas contaminated by radionuclides.

- The experience gained in Ukraine during implementation of the initial stage (0-phase) of the State Program on Uranium Legacy Site Remediation had demonstrated that regulatory provisions were out-of-date and readiness for its implementation was not sufficient.

- It was assumed that main stakeholder (Ministry of Fuel and Energy) is still has no sufficient level of preparedness for efficient implementation of the State Remediation Program.

- We have realize the following
Regulatory provisions and Administration

The Regulator should significantly develop a number of requirements for remediation according to international standards.

The Responsible Agency for Program implementation (Ministry of Fuel and Energy) is still has no clear understanding what should be the endpoint of remediation and which strategies on remediation should be selected.

The roles and duties of key players involved in the implementation of the State Remediation Program are not clearly set and understood by the partners: --- regulator / operator (responsible for remediation and long term care monitor, public and local authorities)
Remediation Plans are not well elaborated in details

A number of particular engineering actions have not been designed.

However, there is still **no Conceptual Strategic Action Plan** which should consolidate all particular remediation strategies and prioritize the following options:

- clearing up the territory of the legacy Site,
- restoration of the tailings covers or removal of the tailing dumps,
- decontamination and demolishing of the former contaminated facilities,
- reprocessing of the residues and re-use of phosphohypsum covers,
- security,
- monitoring networks development,
- institutional control and long-term care programs established.
Legal provisions should be improved supporting sustainable implementation of the Remedial Projects

Funding of the State Remediation Program is not sustainable and fragmentary:

- Bid (tender) rules are not matured enough
- In 2010 the economical recession in Ukraine halted financial support of the State program and jeopardized implementation of the remediation programs
- No legislation to ensure long-term financial provisions for a long-term post closure surveillance program for each project as long as hazards will exist.
What kind of support is expected?

- Consulting in developing and improving of regulations based on ICRP (101,103) and draft of new BSS and best international practice

- **Knowledge Transfer** in Remediation projects planning and project management

- Use IAEA TC project mechanisms and ENVIRONET networking for specific education and fellowships of the Ukrainian experts on Safety Assessment and Safe management of the Nuclear facility decommissioning procedures and on Environmental remediation planning and project implementation

- **Involvement of IAEA experts in independent expertise of the remediation strategies and projects for their implementation**

- Staff training and technical capacity enhancing to improve Site specific Radiation Monitoring and Surveillance Programs
Thank you for cooperation and assistance!

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