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IAEA Technical Cooperation Projects on Management of Non-standard and Historical Radioactive Waste from the A1 NPP Decommissioning

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Session #: 064 A

Content

- A1 NPP Decommissioning Project
- RAW treatment facilities at Bohunice nuclear site
- Objectives of TCP SLR/3/002(3) Management of Historical RAW from the A1 NPP Decommissioning
- TCP SLR/3/002 activities
- TCP SLR/3/003 activities
- Conclusions

National Background : A1 NPP Decommissioning Project (1)

Main goals:

- to bring the A1 NPP into the radiation safe conditions (Stage I, 1996 - 2009);
- D&D of the A1 NPP auxiliary buildings (Stage II, 2009 - 2016);
- to create conditions for complete dismantling of the A1 NPP (Stages III-V).



National Background : A1 NPP Decommissioning Project (2)

Project tasks of Stage I:

- Management of damaged spent fuel assemblies (1996 – 1999);
- D&D activities in the main building and in auxiliary buildings;
- Protection of environment;
- RAW treatment and conditioning;
- Technical support.

National Background : A1 NPP Decommissioning Project (3)

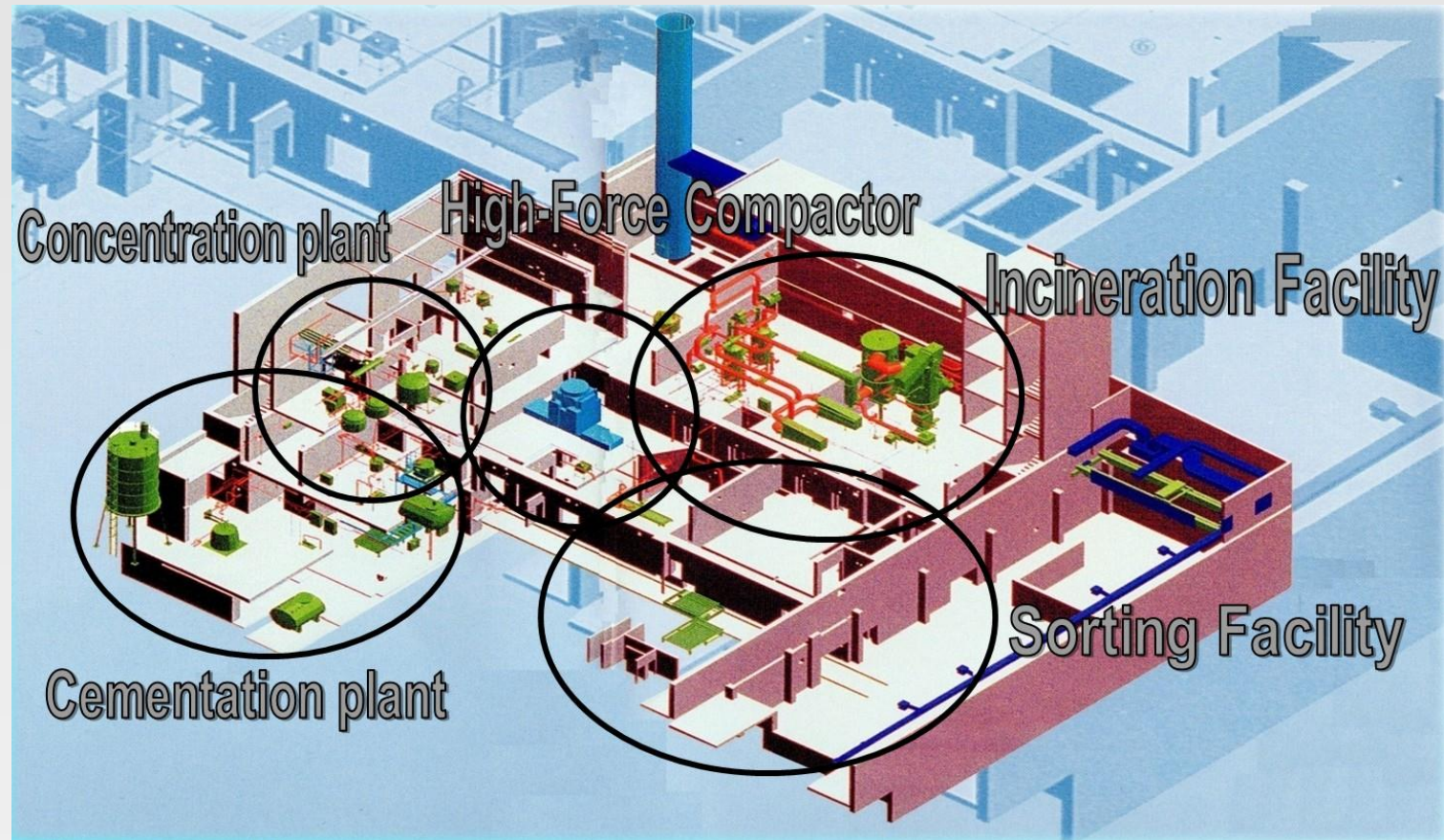
Project tasks of Stage II:

- D&D of external active equipment and objects + D&D activities in the A1 main building;
- RAW treatment and conditioning;
- Contaminated soil management;
- Technical support and protection of environment.

National Background : RAW treatment facilities at Bohunice nuclear site (1)

- Bohunice RAW Treatment Centre (in operation);
- Bituminization facility (in operation);
- Vitrification facility (reconstruction preparation);
- Movable cementation facility (in operation);
- Facility for sorting of contaminated soil (in operation);
- + National RAW disposal facility for low and intermediate level radioactive waste is also in operation near Mochovce NPP.

National Background : RAW treatment facilities at Bohunice nuclear site (2)



Bohunice RAW Treatment Centre

National Background : RAW treatment facilities at Bohunice nuclear site (3)



National RAW Disposal Facility, Mochovce

National Background : RAW treatment facilities at Bohunice nuclear site (4)



Movable Cementation Facility

TCP SLR/3/002(3) Management of Historical RAW from the A1 NPP Decommissioning (1)

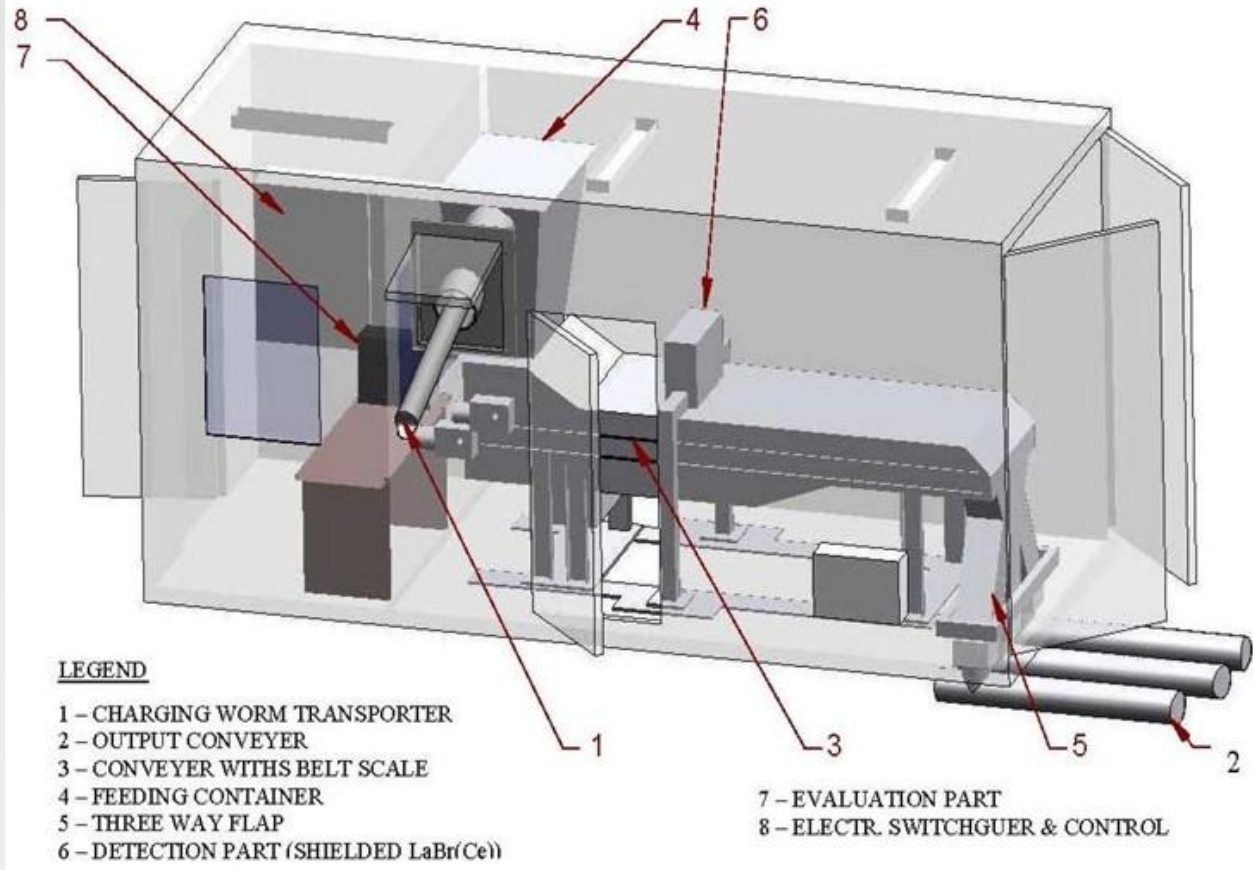
- TC Project SLR/3/002 was approved for 2007-2008 cycle as the IAEA support of some particular activities important for the implementation of the overall national project;
- Duration of the project was extended for 2009-2011 cycle as TCP SLR/3/003 (Phase II);
- TCP SLR/3/002 thus interacted with Stage I of the A1 NPP decommissioning project and TCP SLR/3/003 interacted with Stage II.

TCP SLR/3/002(3) Management of Historical RAW from the A1 NPP Decommissioning (2)

The main objectives of the projects were as follows:

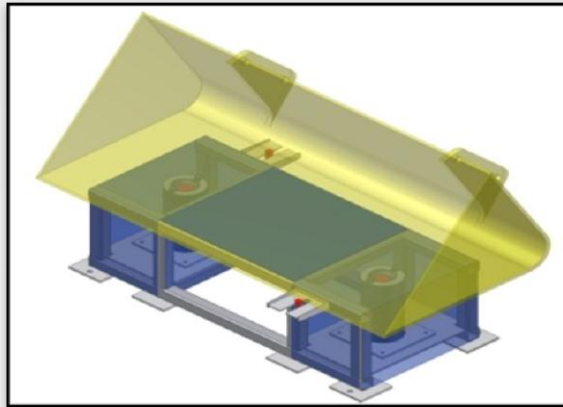
- Support in development of technologies for treatment and conditioning of sludge, contaminated soil and crushed concrete;
- Support in the field of disposal of very low level waste;
- Improvement of equipment for RAW characterization;
- Improvement of equipment for assurance of radiation safety during the implementation of decommissioning and RAW management.

TCP SLR/3/002(3) Management of Historical RAW from the A1 NPP Decommissioning (3)



Facility for Sorting of Contaminated Soil

TCP SLR/3/002(3) Management of Historical RAW from the A1 NPP Decommissioning (4)



Facilities for Sorting of Contaminated Materials

TCP SLR/3/002 activities (1)

- **IAEA Expert mission to Slovakia for visit of the A1 NPP, companies JAVYS and VUJE, May 2007;**

Expert mission recommendations:

- Purchase of a mobile HPGe spectrometric device;
- Purchase of a hand held scintillation detector for on-site investigation;
- Consideration of on-site measurement of Sr-90 in cooperation with Kurchatov Institute;
- Need for an automatic conveyor monitor to sort contaminated soils.

TCP SLR/3/002 activities (2)

- Scientific visit of Slovak specialists to SCK.CEN and Belgoprocess, June 2007:
 - characterization and decontamination techniques;
 - waste treatment facilities;
 - training course in Visiplan and MCNP5 dose rate calculation SW.
- Support of participation on EPRI/IAEA decommissioning workshop, Vienna, October 2007;
- Support of participation on MARSSIM training course, ORNL, USA, January 2008;

TCP SLR/3/002 activities (3)

- Group scientific visit of Very Low Level Disposal Facilities in France, January 2009;
- Support of participation on two coordination meetings on LIT, UKR and SLR joint actions for waste management (IAEA, November 2008; Slovakia, Modra - Harmonia, May 2010), meeting in Slovakia was also final workshop of TCP SLR/3/002.

TCP SLR/3/002 activities (4)

➤ Procurement :

- Two laboratory semiconductor HPGe detectors (upgrade of old ones at VUJE laboratories);



Fields of application:

- ✓ Gamma spectrometry of samples coming from decommissioning of NPP A1;
- ✓ independent measurements of A1 NPP Decommissioning impact on environment;

TCP SLR/3/002 activities (5)

➤ Procurement :

- Gasless surface contamination counter for foot and hand (upgrade at VUJE);
- ✓ for measurement of hands and legs contamination in the laboratory, where historical radioactive waste are managed;
- Inspection equipment for visual control of hardly accessible vessels, tanks and tubes with historical radioactive waste (e.g. liquid waste, sludge etc.) including accessories;

TCP SLR/3/002 activities (6)

➤ Procurement :

- Broad energy semiconductor Germanium detector and two digital gamma spectrometry chains (DSP and AIM units);
- Portable gamma spectrometry system with CZT detectors for dose rate and surface contamination determination, including accessories (Inspector 1000 hand hold MCA, calculation SW, tungsten collimator for CZT detector);

TCP SLR/3/002 activities (7)

Applications of portable gamma spectrometry system:

- ✓ in-situ and on-site measurements of surfaces and objects within control area;
- ✓ soils clearance measurements;
- ✓ concrete clearance measurements;
- ✓ concrete tanks clearance measurements.



TCP SLR/3/002 activities (8)

Quantitative summary of the TCP SLR/3/002:

- Five experts nominated by the IAEA were involved in the project;
- Four visits of abroad institutions were organized for Slovak specialists + support of participation on one international workshop and on one training course;
- Total budget was more than 275 kUSD what included procurement of equipment as well as support of HR (equipment procurement approx. 200 kUSD).

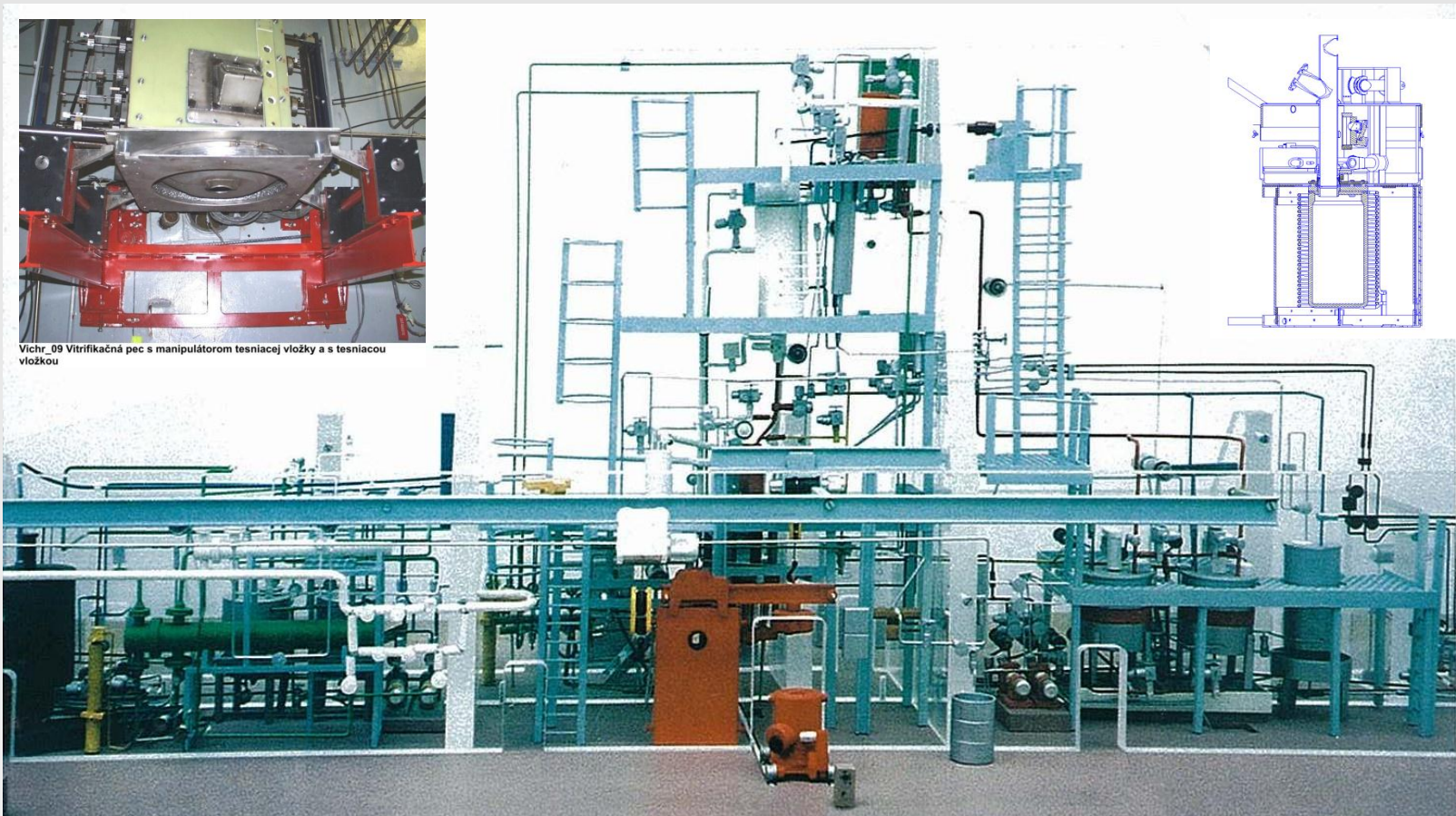
TCP SLR/3/003 activities (1)

- Support of participation on conference WM 2009 (two papers);
- Support of participation on ICEM 2009, Liverpool, UK, October 2009 (three papers + one poster);
- Scientific visit to Moscow RADON, November 2009:
 - Radioactive waste characteristics at VVER NPP;
 - Monitoring of SIA RADON disposal site environment;
 - Pre-treatment and sorting of contaminated soils at Kurchatov Institute;
 - Characterisation of contaminated concrete and soil techniques at Kurchatov Institute.

TCP SLR/3/003 activities (2)

- Expert mission to Slovakia : A peer review for planned alternatives of processing of high level radioactive chrompik (liquid + sludge), June 2010;
Expert mission recommendations:
 - Recovery and upgrade of vitrification plant;
 - Chrompik liquid treatment in existing vitrification facility;
 - Processing of chrompik sludge in combination with its liquid phase, considering of different fixation methods;
 - Detailed chemical and radiological analyses of chrompik (including sludge phase) are required and impact of chrompik composition on the whole process and final product should be carefully considered.

TCP SLR/3/003 activities (3)



Chrompik Vitrification Facility

TCP SLR/3/003 activities (4)

Present state of chrompik treatment preparation:

- Furnace's melting bin has been removed;
- Rooms decontamination is prepared;
- Improvements of furnace connections and system of off-gasses from furnace have been redesigned;
- Several chrompik samples have been taken at different levels in storage tanks; levels of different phases were identified; samples with lower activity have been analysed;
- Sludge samples will be taken and their chemical and radiological analyses will be performed.

TCP SLR/3/003 activities (5)

- Support of participation on Argonne National Laboratory Decommissioning course, Nevada, USA, March 2010;
- Support of participation on INSINUME 2010 Symposium, Dubna, RF, October 2010 (presentation “Experience in in-situ monitoring of contaminated soil in surroundings of underground tanks at A1 NPP”).
- Support of participation on coordination meeting on UKR and SLR joint actions for waste management (IAEA, December 2010);
- Support of participation on WM 2011 (presentation “Database of Contaminated Concretes and its Role within Conception of Buildings Clearance”);

TCP SLR/3/003 activities (6)

- Expert mission from Kurchatov Institute to Slovakia on integration of Sr-90 monitor to contaminated soil belt monitor at A1 NPP, March 2011 (collaboration established in the field of using of Kurchatov Sr-90 spectrometry monitor);



TCP SLR/3/003 activities (7)

- Support of participation on conference “Emergency Management & Robotics for Hazardous Environments”, Knoxville, USA, August 2011 (two papers);
- Support of participation on ICEM 2011, Reims, France, September 2011 (e.g. presentation of free release and contaminated soil sorting monitors);
- Support of participation on EPRI workshop on decommissioning and RAW management, Malmö, Sweden, September 2011 (one paper).

TCP SLR/3/003 activities (8)

Quantitative summary of the TCP SLR/3/003:

- Eight experts nominated by the IAEA were involved in the project;
- One visit of abroad institution was organized for Slovak specialists + support of participation on seven international conferences or workshops and on one training course;
- Total budget 90 kUSD (none procurement).

Conclusions (1)

Activities performed within both TC projects included expert missions, peer review, scientific visits, delivery of specialized equipment mainly for RAW characterization and inspection and support of participation on conferences and workshops.

Abilities and skills of VUJE and JAVYS staff in the field of management of non-standard and historical RAW from the A1 NPP decommissioning were improved thanks to the TCP SLR/3/002 and SLR/3/003 activities.

Specialists had possibilities to visit institutes, sites and facilities recognized as top ones in implementation of state-of-the-art approaches, methodologies and technologies in related areas.

Conclusions

(2)

Equipment procured is used in fields of the characterization of radioactive waste and radiation protection. It has very positive effect on improvement of radiation safety within management of non-standard and historical radioactive waste from the A-1 NPP decommissioning.

Further national technical cooperation with the IAEA : Another national TC project between IAEA and Slovakia „**Improvement of characterization techniques for the A1 NPP decommissioning**“ was approved by the IAEA for period 2012 & 2013.

Conclusions

(3)

Other cooperation with the IAEA :

- Slovakia is actively involved in IAEA on-going regional projects in the field of decommissioning and RAW management;
- Slovak representatives are members of IDN Advisory committee and WATEC;
- Leading nuclear organizations in Slovakia are able to provide various services for the IAEA (e.g. hosting of SV, fellowships or training events, expert services etc.).

Thank you for your attention



First SLR/3/002 EM to Slovakia : IAEA experts – E. Cantrel (SCK.CEN), V. Efremenkov (IAEA retired), L. Piotrowski (EDF), Ch. Le Goaller (CEA); IAEA TO – Z. Drace; IAEA PMO – S. Steyskal; Slovakian participants – V. Michal (VUJE / IAEA), O. Chren, J. Balaz (both JAVYS)