

# Looking for rational environmentally friendly approach for development of concept for safe **nuclear waste repository** in preparing for future projects

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## *Main points of the contents*

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- 2) General overview of the safety requirements of the IAEA, European and national legislation and regulations important for successful SF&RAW management**
- 3) Main steps of the rational approach in behalf of joint preparing for future projects and joint activities within IGD-TP**
- 4) Main expertise and priorities of interest of TUS in participation as partner in future projects**

# 1) Background of the considered approach and some activities for SF&RAW research and management in Bulgaria

**Starting point:** When we consider and and talk about NPPs, as a necessary presence in our lives, regardless of their great environmental advantage of “zero” CO2 emissions, we even more have to think about the residuum of the nuclear fuel cycle.

**Bulgarian (and not only) reality:** Overhaul of the opportunities for further transports of SF&RAW for processing in Russia and searching of decisions for construction of repository in the country.

**TUS expertise for EIA:** Prof. Ivan Ivanov is a team leader for the EIA of Kozloduy NPP (2000) and for the EIA of Investment Proposal for Construction of new Belene NPP (2004) in Bulgaria, and many other EIAs in energy and industrial sectors.

**Review and update of the documents of the Bulgarian policy of SF&RAW management, and input of appropriate practices for:**

- i. Limitation SF management to be carried out only by entities with a license for a nuclear facility;
- ii. Ban on RAW import to the country;
- iii. Acceptance of the deep geological repository as a most suitable option for durable guaranteed safety in the isolation of highly active and long-life RAW.

# 1) Background of the considered approach and some activities for SF&RAW management in Bulgaria ..... cont'd

The management of RAW in Bulgaria outside the place of their generation is carried out by the **State Enterprise Radioactive Waste (SE RAW)**, which is established pursuant to art. 78 (1) of the Safe Use of Nuclear Energy Act.

In 2008-2012 Units 1-4 of Kozloduy NPP (under a Council of Ministers' Decree) have been announced as RAW management facilities and have been transferred to SE RAW.

In 2013 the Bulgarian Nuclear Regulatory Agency (BNRA) issued licenses to SE RAW for decommissioning those units of Kozloduy NPP.

## 2) General overview of the safety requirements of the IAEA, European and national legislation and regulations important for successful SF&RAW management

	<b>SF &amp; RAW</b>	<b>Spent Fuel</b>	<b>Radioactive Waste</b>
<b>Safety</b>			
<b>IAEA and EU safety requirements</b>	<ul style="list-style-type: none"> <li>• General overview of IAEA safety standards</li> <li>• Directive 2003/122/Euratom</li> </ul>	❖ Joint Convention' 1998 on the Safety of Spent Fuel Management <i>and</i> on the Safety of RAW Management	
<b>National Safety Requirements</b>	<ul style="list-style-type: none"> <li>• Bulgarian Safe Use of Nuclear Energy Act' 2002</li> <li>• Regulation on ensuring the safety of NPP' 2004</li> </ul>	❖ Strategy for management of spent nuclear fuel and radioactive waste'2011 – <i>until 2030</i>	❖ Regulation for safe management of the radioactive waste' 2004

### 3) Main 5 steps of the rational approach in behalf of joint preparing for future projects and joint activities within IGD-TP

**1<sup>st</sup> step:** Overview of European and national legislation and IAEA regulations and requirements, definition of criteria and indicators, and selection of most suitable site for environmentally sound and safe building of a SF&RAW repository

**2<sup>nd</sup> step: Environmental Impact Assessment (EIA) of the Investment proposal for building of a SF&RAW repository**

**The purpose of the EIA study and report is defined as follow:**

- to study and analysis of possible reasons, sources and levels of impact and determination of potential risk for the environment and human health during construction, normal operation and possible design basis and beyond design basis accidents at the repository for the selected site, and**
- to define recommendations and measures to decrease the impact to the all components of the environment and to the population**



**2<sup>nd</sup> step: Environmental Impact Assessment (EIA) of the Investment proposal for building of a SF&RAW repository** ..... **cont'd**

**The rationale for EIA is based on European and National Regulations of various countries and the standards and requirements of the IAEA, as:**

- **EIA Convention in Transboundary Context (Ratified in Bulgaria by law – SG, 1995)**
- **Safe Use of Nuclear Energy Act, 2002**
- **Environment Protection Act, 2002**
- **Ordinance on the Conditions and Procedure for Performance of EIA of Investment Proposals for Construction, Activities and Technologies, 2003, etc.**



*EIA report's structure and content are:*

- **Part 1.** Annotation of the **Investment Proposal** for SF&RAW repository building.
- **Part 2. Alternatives** for execution of the Investment Proposal.
- **Part 3.** Description and analysis of the **environment components and factors**, material and cultural heritage, and their interaction.
- **Part 4.** Analysis and **assessment** of hypothetical **impact** on the population and the environment during construction, normal operation of SF&RAW repository and emergencies, **incl. extreme external events** (natural and man-made hazards).
- **Part 5.** Information on the methods used to **prognosticate** and assess the impact on the environment.
- **Part 6.** Description of the **measures** intended to prevent, decrease or stop hazardous impact on the environment, as well as a plan for execution of these measures.
- **Part 7.** Standpoints and opinions of the public, competent bodies on EIA, and concerned countries **in transboundary context** resulting from the **consultations** held.

**Conclusions and Appendixes**

3) Main 5 steps of the rational approach in behalf of joint preparing for future projects and joint activities within IGD-TP ..... cont'd

**3<sup>rd</sup> step: Emergency zoning and planning**

From the EIA Report' purposes:

- ▶ Study and analysis of possible **reasons, sources and levels of impact** and determination of potential **risk for the environment and human health** during construction, normal operation and possible accidents at the SF&RAW repository (**incl. by extreme external events**), and
- ▶ Definition of recommendations and measures to decrease the impact

**follows**

the necessity to be determined the **risk/emergency zones** and thence to be implemented the **emergency planning**.

### 3) Main 5 steps of the rational approach in behalf of joint preparing for future projects and joint activities within IGD-TP ..... cont'd

**4<sup>th</sup> step:** Application of SWOT analysis as technique of the strategic management for identification of the influences of the SF&RAW repository in all above indicated cases (incl. by extreme external events), but not ordinary and **Extended SWOT analysis**

Extended SWOT analysis		Internal environment	
		Pluses (S)	Minuses (W)
Ex -environment	Opportunities (O)	<b>S-O-strategies:</b> Opportunities for pluses realizations	<b>W-O- strategies:</b> Weaknesses destruction for creating of new opportunities
	Dangers (T)	<b>S-T- strategies:</b> Using of pluses for weaknesses elimination	<b>W-T- strategies:</b> Creating of strategies which not allow activation of the weaknesses from the dangers

- 3) Main 5 steps of the rational approach in behalf of joint preparing for future projects and joint activities within IGD-TP ..... cont'd

**5<sup>th</sup> step: Application of ALARA Principle  
(As Low As Reasonably Achievable)**

**for operational safety of the SF&RAW repository and protection of the employees, public and environment from hazards and harmful effects.**

- 3) **Main 5 steps of the rational approach in behalf of joint preparing for future projects and joint activities within IGD-TP** ..... **cont'd**

## **For implementation of the above 5 steps**

**Technical University of Sofia -  
Safety and Environmental & Engineering  
Laboratory**

**can provide research and technical support  
and consulting services with researchers  
and senior experts**

**to the developers and investors, and to  
management body of SF&RAW repository.**

#### 4) Main expertise and priorities of interest of TUS in participation as partner in future projects

- i. Identification of **safety margins** and development of environmentally sound safety cases of RAW' geo-disposal
- ii. Safety case **uncertainty assessment** of all phases of repository evolution for models, parameters and scenarios and their couplings
- iii. Identification of **environmental and safety indicators** and definition of **range of solutions** for public and decision makers
- iv. **Resilience** of RAW repositories to **extreme** (natural and man-made) **events**
- v. **3S (safety, security and safeguards)** systems' development for long time-scale application in the RAW geo-disposal
- vi. Real-time **radiological assessment** and **communication** of safety and environmental aspects **to the public**
- vii. **Cross cutting scientific issues** concerning the **safety** and **environmental requirements** for disposal concept improvement

(I suppose the considered six draft proposals for EURATOM WP 2016-2017 call THERAMIN, BEACON, DISCO, CHANCE, SAEXFUEL and TraCK, are already submitted, but the above information for TUS could be useful for next call)



***Dear coordinator of a future project,  
for high level Bulgarian partner you can rely on TUS***



**Thank you  
for  
the attention**