Saligny site characterization and community confidence building

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Outlines

- Research activities on waste management
- Activity on Saligny site characterisation
- Participation in social science research
- Community concerns regarding LILW disposal at Saligny
- Conclusions

Research activities on waste management

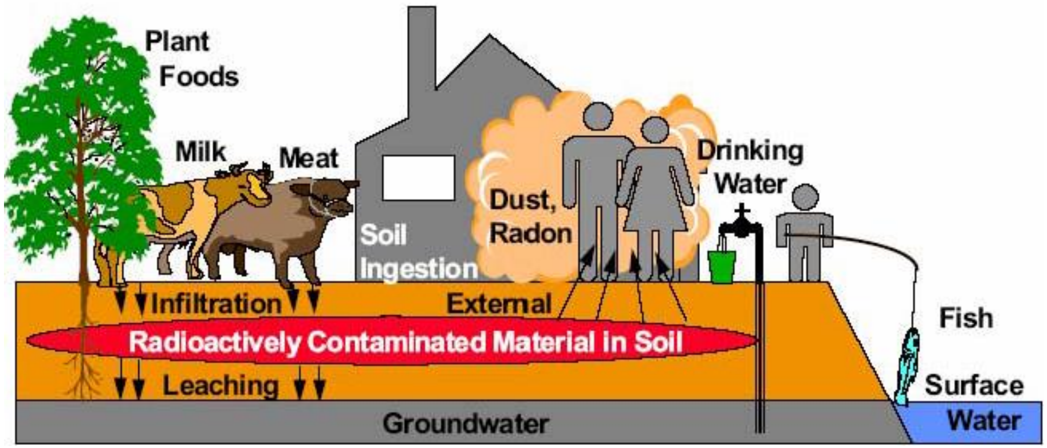
- **R&D Program 5: Safe management of the spent fuel and radioactive waste**
  - Waste characterisation
  - Treatment and conditioning methods
  - Site characterisation and performance assessment
  - Deep geological disposal

- **Euratom R&D Program on nuclear fission**
  - Technical Collaborative projects (CARBWASTE, FORGE, CAST, CEBAMA, CHANCE)
  - Social science research projects (COWAM 2, CIP, IPPA, EAGLE)

- **Bilateral Collaboration**
  - Los Alamos National Laboratory – USA
  - CEA France
  - SCK.CEN Belgium

Activitis on Saligny site characterisation

- Focused on safety
  - **No danger for the population**
  - **Annual Individual dose of a resident <0.3mSv/an**
    - **Direct exposure**
    - **Inhalation (particles, Ra)**
    - **Ingestion (foods, meat, milk, fish, and soil)**



Effective radiation dose in adults

What means 0.3 mSv/y?

Natural background:

3mSv/y

Abdominal CT:

6 – 10 mSv

Mammography :

0.4mSv

For this procedure:	* An adult's approximate effective radiation dose is:	Comparable to natural background radiation for:
ABDOMINAL REGION:		
Computed Tomography (CT)-Abdomen and Pelvis	10 mSv	3 years
Computed Tomography (CT)-Abdomen and Pelvis, repeated with and without contrast material	20 mSv	7 years
Computed Tomography (CT)-Colonography	6 mSv	2 years
Intravenous Pyelogram (IVP)	3 mSv	1 year
Radiography (X-ray)-Lower GI Tract	8 mSv	3 years
Radiography (X-ray)-Upper GI Tract	6 mSv	2 years
BONE:		
Radiography (X-ray)-Spine	1.5 mSv	6 months
Radiography (X-ray)-Extremity	0.001 mSv	3 hours
CENTRAL NERVOUS SYSTEM:		
Computed Tomography (CT)-Head	2 mSv	8 months
Computed Tomography (CT)-Head, repeated with and without contrast material	4 mSv	16 months
Computed Tomography (CT)-Spine	6 mSv	2 years
CHEST:		
Computed Tomography (CT)-Chest	7 mSv	2 years
Computed Tomography (CT)-Lung Cancer Screening	1.5 mSv	6 months
Radiography-Chest	0.1 mSv	10 days
DENTAL:		
Intraoral X-ray	0.005 mSv	1 day
HEART:		
Coronary Computed Tomography Angiography (CTA)	12 mSv	4 years
Cardiac CT for Calcium Scoring	3 mSv	1 year
MEN'S IMAGING:		
Bone Densitometry (DEXA)	0.001 mSv	3 hours
NUCLEAR MEDICINE:		
Positron Emission Tomography – Computed Tomography (PET/CT)	25 mSv	8 years
WOMEN'S IMAGING:		
Bone Densitometry (DEXA)	0.001 mSv	3 hours
Mammography	0.4 mSv	7 weeks

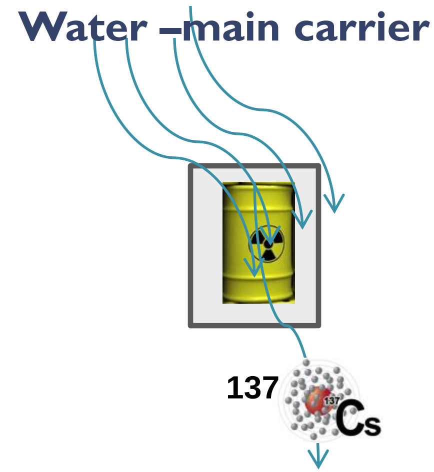
https://www.radiologyinfo.org/en/info.cfm?pg=safety-xray

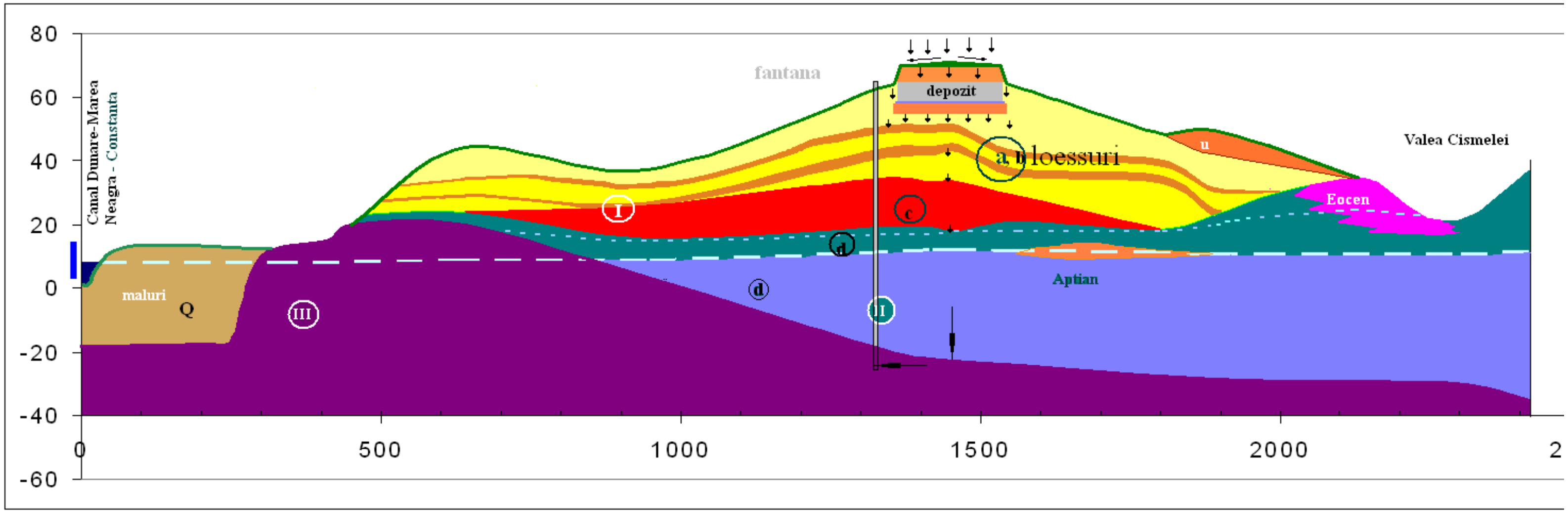
Safety concept

- **physical containment:**
  - **ensured by a waterproof barrier able to isolate the radioactive waste from groundwater; no radionuclides release can occur from the waste form as long as this barrier is effective; it prevents dispersion of radionuclides during the transient initial phase of the repository**
- **slow release:**
  - **after containment failure, when groundwater comes in contact with the conditioned waste, leaching of radionuclides from the waste matrix starts in combination with the degradation of the waste matrix; (precipitation, sorption or co-precipitation strongly limit the radionuclide releases into the surrounding layers);**
- **retardation:**
  - **the radionuclides dissolved in the groundwater that is in contact with the waste will start to migrate through the buffer materials and the host formation; Low groundwater fluxes in potential host formations, sorbtion on minerals and retardation of the host formation delays the releases and drastically limits the amounts of radionuclides that are released into the biosphere per unit of time;**
- **dispersion and dilution:**
  - **once the radionuclides reach the aquifer the dispersion and dilution processes in the aquifers and surface waters will further reduce the radionuclide concentrations in the waters that are directly accessible by man.**

Main safety elements of the Saligny site

- **Low precipitation rate**
  - **Romania: 637 l/a**
  - **Dobrogea (Cernavoda): 440l/a (over 100 years)**
- **Thick unsaturated zone : 40m**
  - **Low water content, small water flow**
- **Red clay layer: 10 m thick**
  - **Strong radionuclides retention and very low permeability and**
- **Aquifer connected to Danube and Canal**
  - **Dilute the potential radionuclide release**





Radioactive plumes of Cs-137 and H-3

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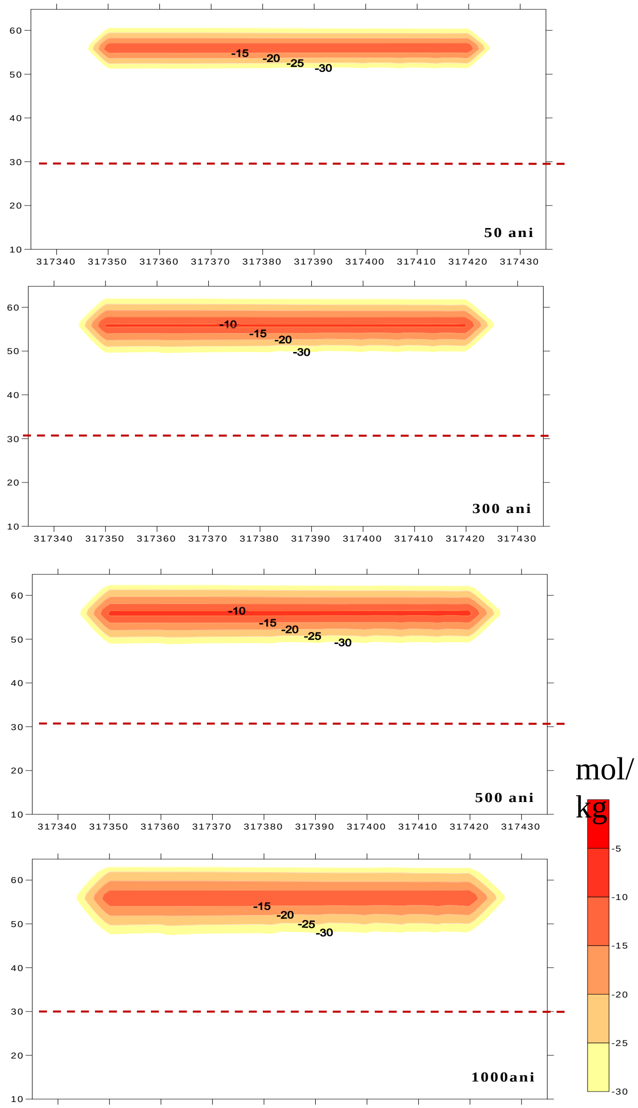
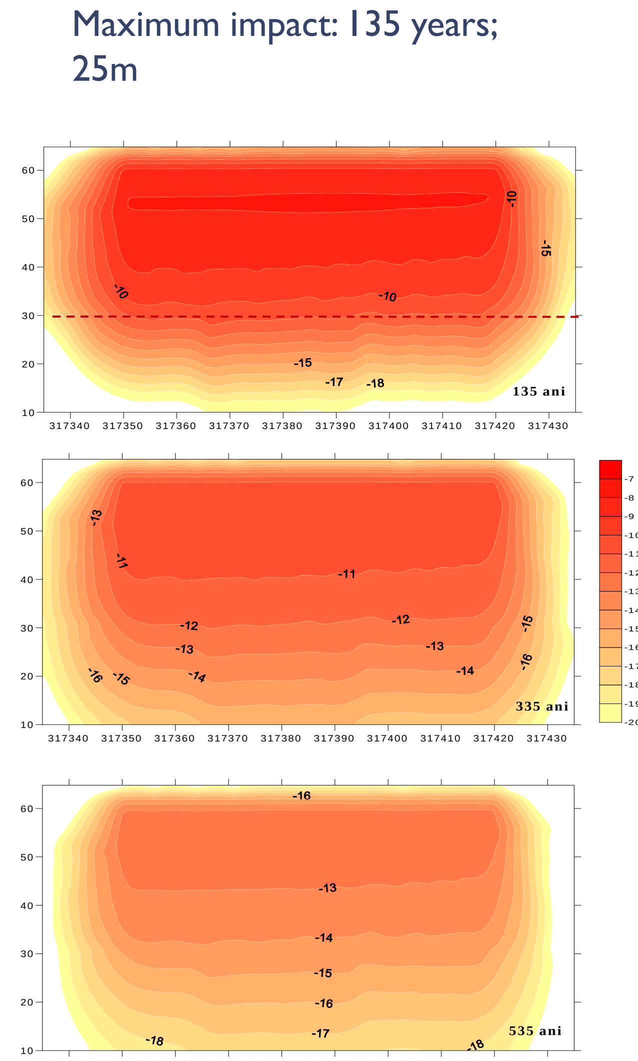


Maximum impact: 135 years; 25m



Retardation

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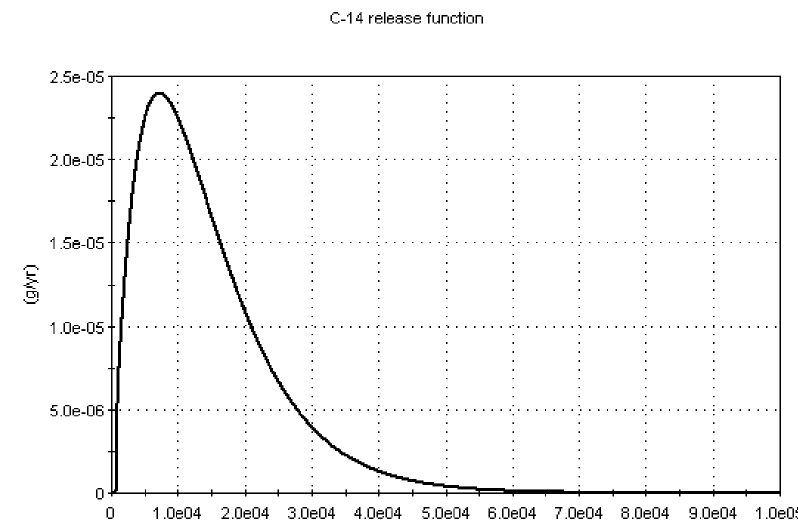
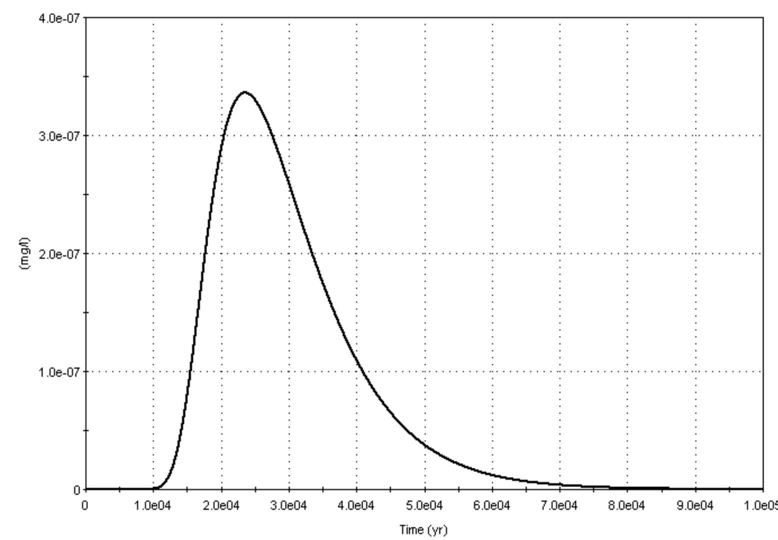
C-14 release from repository

Maxim: 725yr

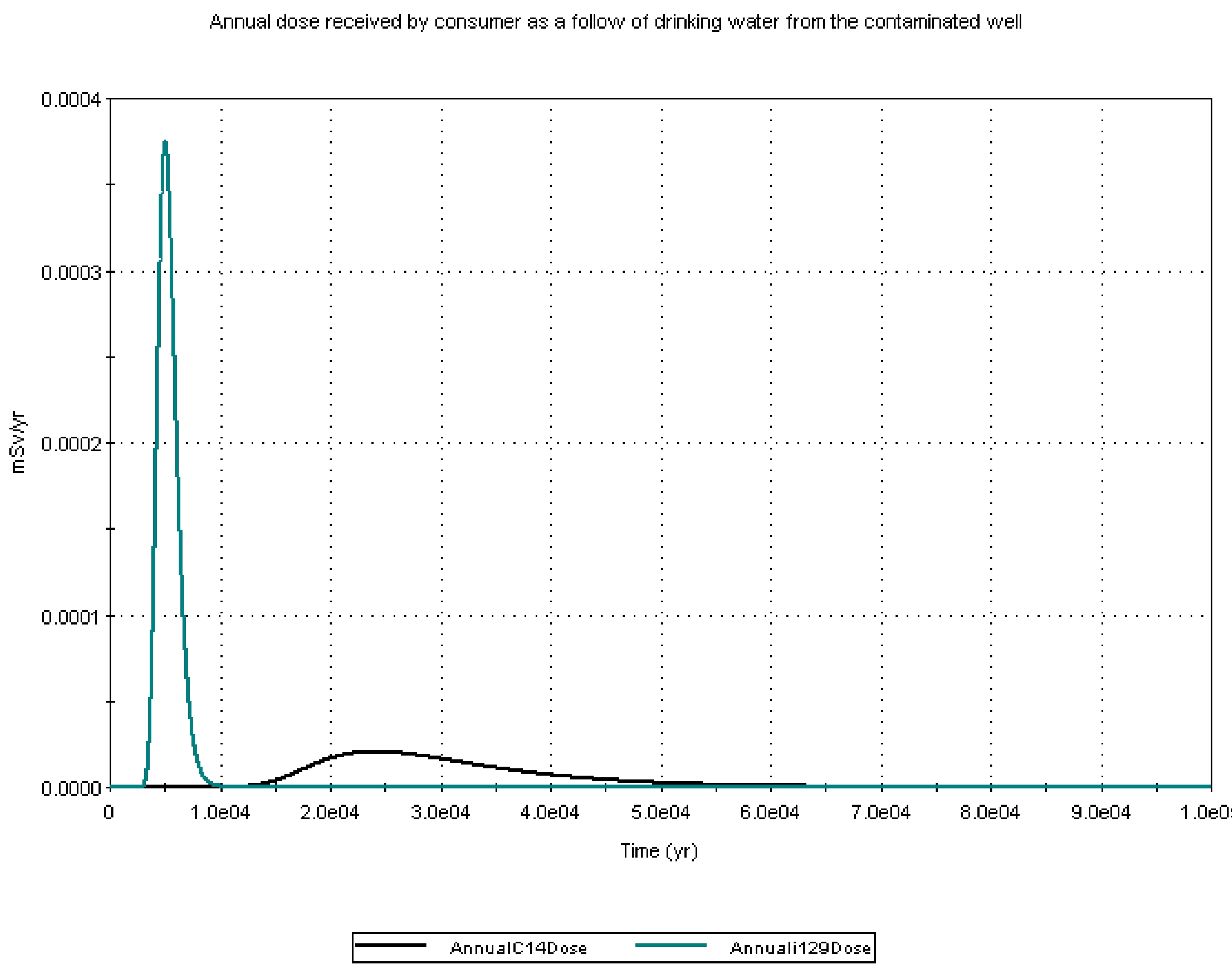


C-14 release from unsaturated zone

Maxim: 23718 yr

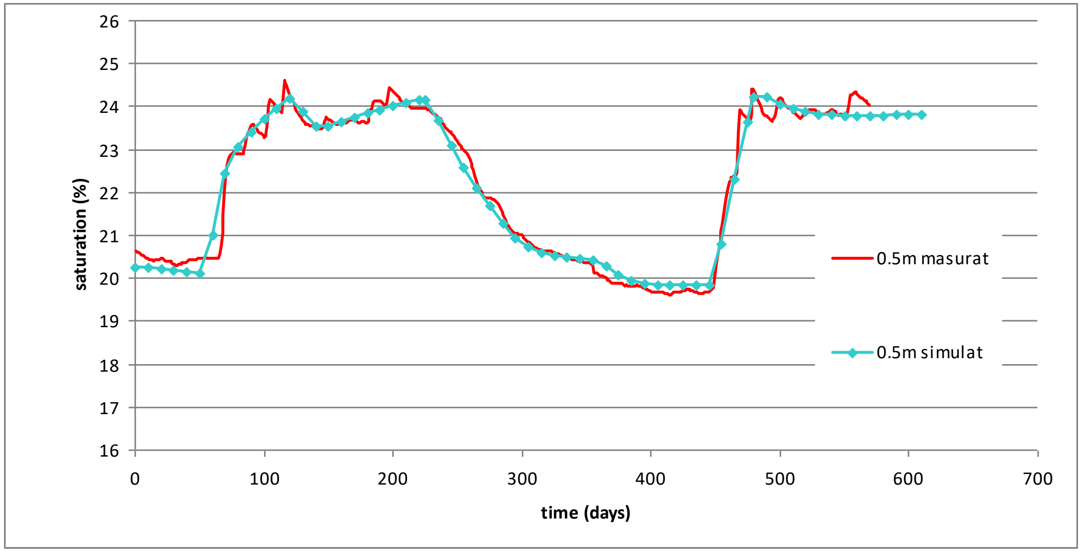


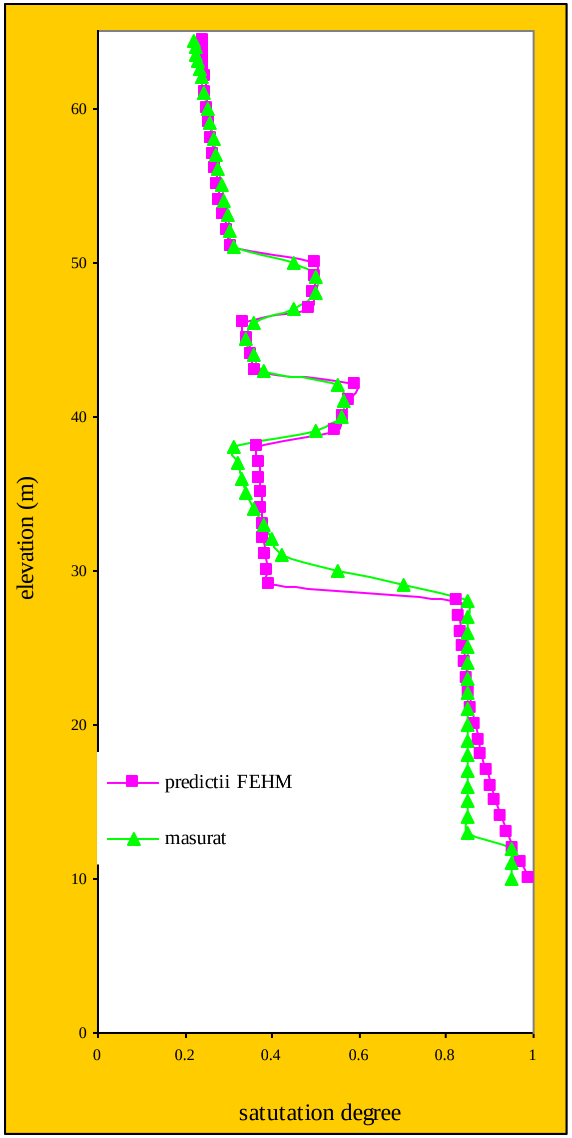
Annual individual dose



Confidence in simulations?

- **Calculations are based on large statistic of site specific data**
- **Predictions are validated by comparison with independent in-field measurements**
  - **Moisture profiles**
  - **Time variation moisture content**
  - **Tracer tests**





Activities in social science

- Cooperative Research on the Governance of Radioactive Waste Management (2004-2006)
- CIP – COWAM In Practice (2007-2009)
- Implementing Public Participation Approaches (2010-2013)
- Enhancing Education, Training and communication process for informed behaviour and decission making related to ionizing radioation risks - (2013-2016)

... together with all Romanian stakeholders in waste management!!!

Public participation

- **Understanding**
  - **Principles**
  - **Methods**
  - **Challenges**

- **Practicing**
  - **Identify the players in RWM**
  - **Create a structure**
  - **Learn and discuss the decision making**

Preparing public participation

National Stakeholders Group – NSG

- created in 2007 ;
- extended in 2011;
- chaired by Cernavoda Mayor
  - AN&DR
  - Cernavoda NPP
  - CNCAN – observer
  - Environment and Health Agencies
  - Mayors of Cernavoda and Saligny;
  - Local councilors
  - Local NGOs: AGIA, SIDO, UP, ADAPT - Cernavoda, Mare Nostrum Constanta)
  - National NGOs: ARIN, Terra Millenium III)
  - RATEN ICN - mediator

15 meetings 2007 – 2013

Input from the Methodological Task Force

Topics of concern

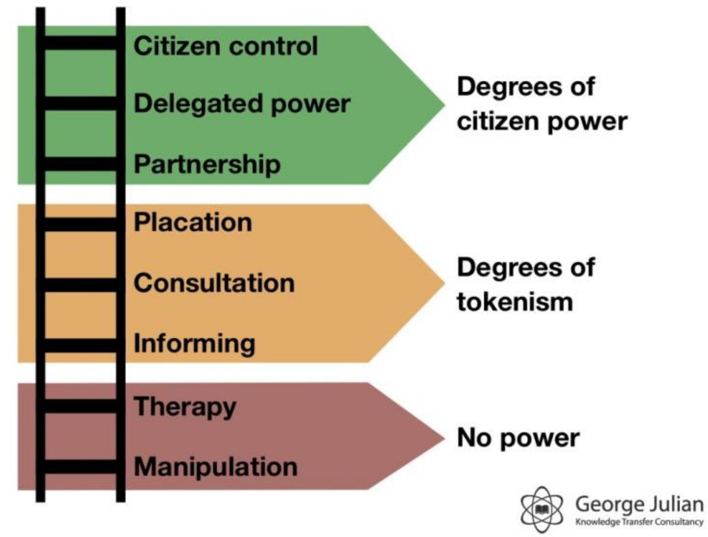
- Local Committee for Cernavoda-Saligny Zone
- Environmental and health monitoring near nuclear facilities
- Community benefits
- Local development needs and nuclear development in Cernavoda area

Evaluation of public participation methods

Methods

(M1) Citizen juries;
(M2) Consensus conferences;
(M3) Scenario workshops;
(M4) Focus-groups;
(M5) Partnerships;
(M6) Referendum;
(M7) Panel debates;
(M8) Consensus construction exercise;
(M9) Public consultation meetings;
(M10) Web-sites with feedback;
(M11) Web-sites without feedback;
(M12) Open days;
(M13) Questionnaires investigations;
(M14) Presentation meetings;
(M15) Dissemination of booklets, posters, sheets, etc

Arnstein (1969) Ladder of citizen participation



Criteria applied

- existing experience and methodological support;
- experience of the public & participatory level of the public; resources to be involved;
- time constraint;
- local context

Investigating Community views on LILW disposal at Saligny

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Focus groups – February 2013

- Group 1 – local decision-makers
- Group 2 – public opinion vectors
- Group 3 – common citizens

Topics of discussion:

- Perception on the siting process
- Importance of the investment for the community; expectations
- Concerns of local authorities/public/citizens
- Recommendations for the evolution of the process

Outcomes of the focus groups

- LILW disposal - safer solution to the current storage; built at high safety standards
- Positive impacts:
  - contribution to the budget;
  - increased visibility;
  - stimulus for an improved education of youngsters
- Needs:
  - constant information;
  - continuous dialogue and collaboration with implementer and designer

Steps wise approach for public involvement in the Saligny project

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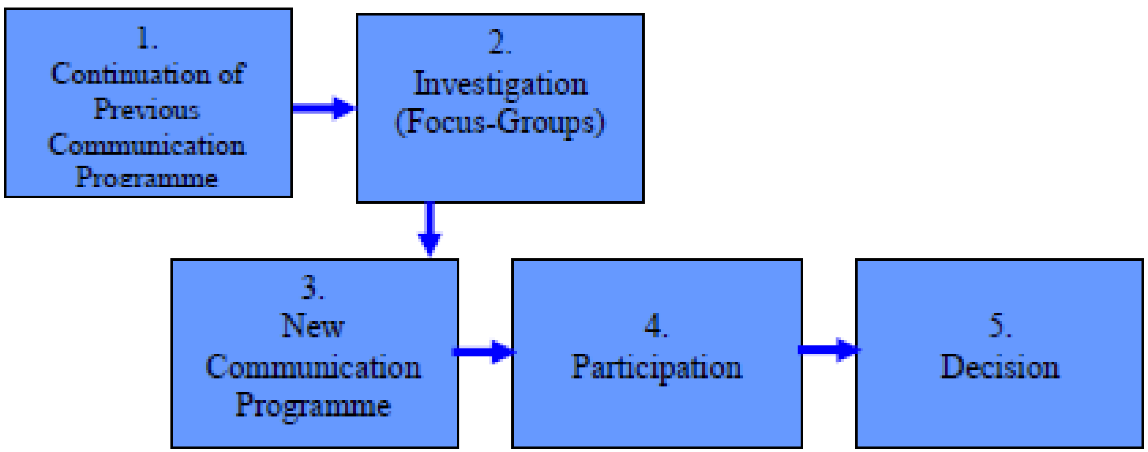

Steps wise approach for public involvement in the Saligny project

Conclusions

- **Particularities and hydro-geological characteristics of the Saligny site make it an environment able to host the repository in safe conditions; together, repository design and site itself are fulfilling the regulatory safety requirements;**
- **Repository should be harmonized with the social environment too; to fulfill the social requirements, community involvement in decision process is the key element.**
- **Active collaboration of the implementer and designer should be establish taking benefit of the openness of local community; a participatory method adapted to the national and local context should be agreed between these actors.**

Many thanks for your attention!