

*Radioactive waste Management at
Institute for Nuclear Research
(ICN)-Pitesti*

Waste quantities and average annual arising at Radioactive Wastes Treatment Plant

Type of Radioactive Waste	Main Source	Processed Quantity	Specific Activity	Main Nuclide
Liquid activity	TRIGA Reactor	600 m ³	<10 ⁻³ Ci/m ³	Co-60;Co-58; Mn-54;Cs-137
Solid activity	TRIGA Reactor	400 Kg	<10 ⁻³ Ci/m ³	Co-60;Co-58; Mn-54;Cs-137
Spent ion exchange resin	TRIGA Reactor	1.5 m ³	[10 ⁻³ -10 ³]Ci/m ³	Co-60;Co-58; Mn-54;Cs-137; Cs-134
Liquid – natural uranium	Nuclear Fuel Factory (FCN)	1200 m ³	<5 g/l	Natural Uranium
Solid-natural uranium	Nuclear Fuel Factory (FCN)	1000 Kg	<5Kg/m ³	Natural Uranium



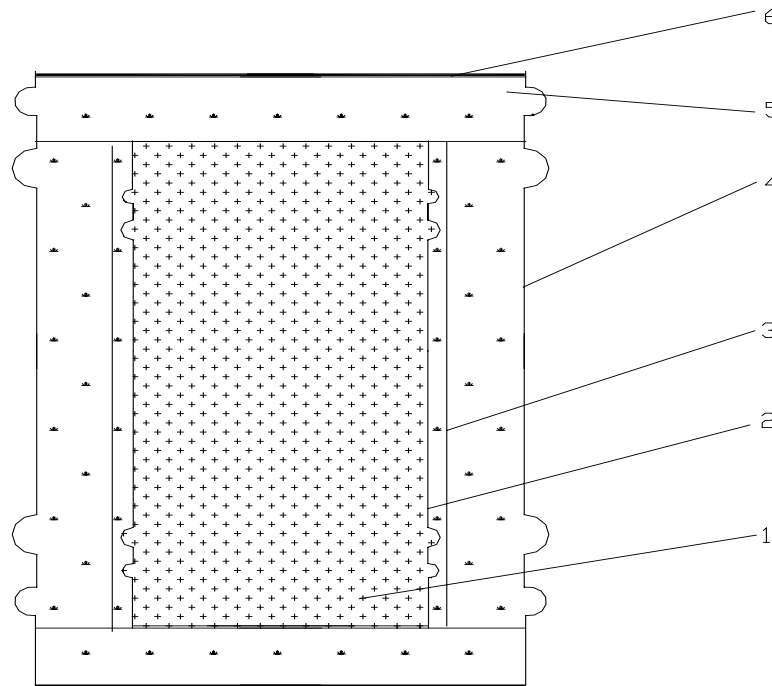
Technologies for treatment & conditioning of radioactive wastes

- Technology for evaporation treatment of low – active liquid wastes generated by reactor;
- Technology for the conditioning in concrete of the radioactive concentrate resulted from the evaporation treatment of low active liquid wastes;
- Technology for conditioning in concrete of low active solid wastes;
- Technology for treatment and conditioning in bitumen of spent ion exchangers (regarded as low or medium active wastes);
- Technology for treatment and conditioning of organic liquid wastes-liquid scintillation resulting from Cernavoda NPP;
- Technology for treatment and conditioning of organic liquid wastes-oils resulting from Cernavoda NPP.

The final product:metallic drum-concrete-radioactive wastes (type A package) for the final disposal at the National Repository Baita, Bihor

Where:

- 1.conditioning matrix;
2. 60 l drum;
3. mettalic basket;
4. 200 l drum;
5. non-radioactive concrete;
6. cover with garnish



Condition regarding the maximum activity of radionuclides contained in the 200 l drum

Radionuclide	Max. admitted activity [Bq/m ³]
C-14	$1 \cdot 10^9$ (*)
Ni-59	$2 \cdot 10^9$
Nb-94	$2 \cdot 10^7$
Tc-99	$1,5 \cdot 10^8$
I-129	$3 \cdot 10^5$
Cl-36	$1,5 \cdot 10^7$
H-3	$1,5 \cdot 10^{10}$
Co-60	$1 \cdot 10^{11}$
Ni-63	$1 \cdot 10^{11}$
Sr-90	$5 \cdot 10^9$
Cs-137	$1 \cdot 10^{10}$
Radionuclides with a lifetime below 5 years	$5 \cdot 10^{11}$
α -emitting radionuclides with a lifetime over 5 years	$1 \cdot 10^7$ (**)
β and γ -emitting radionuclides with a lifetime over 5 years, not included in this table	$5 \cdot 10^8$ (**)



Facilities for radwaste management at ICN Pitesti

- Plant for treatment, with uranium recovery, of liquid radwaste resulting from the fabrication of CANDU –type nuclear fuel

Characteristics of **Rotating cellular filter for uranyl phosphate filtering:**

- treatment capacity; 2000 m³ /year;
- max. U concentration in waste: 5g/l;
- max. U concentration in the effluent: 1 mg/l;
- uranium separation is done by selective precipitation

- Plant for treatment of low –active β- ? liquid wastes

Characteristics of **Evaporator for treatment of low-active low –active β- ? liquid wastes:**

- treatment capacity: 2,2 m³ hour;
- Decontamination factor: 10⁵ ;
- treatment is done by evaporation.



Facilities for radwaste management at ICN Pitesti

- Plant for conditioning in concrete of the radioactive concentrate obtained during the evaporation treatment of liquid radwaste
 - Characteristics:
 - treatment capacity: 280 l/hours;
 - conditioning container: 200 l drum

- Plant for incineration of solid radwaste contaminated with natural uranium
 - Characteristics of **Incinerator for radwaste contaminated with U—nat.**
 - treatment capacity: 5 kg/hour;
 - incineration temperature: 900 °C ;
 - the plant includes a module for treating roast gas.



Facilities for radwaste management at ICN Pitesti

- Plant for treatment and conditioning of organic liquid radwaste with tritium content

This wastes are generated by Cernavoda-NPP operation.

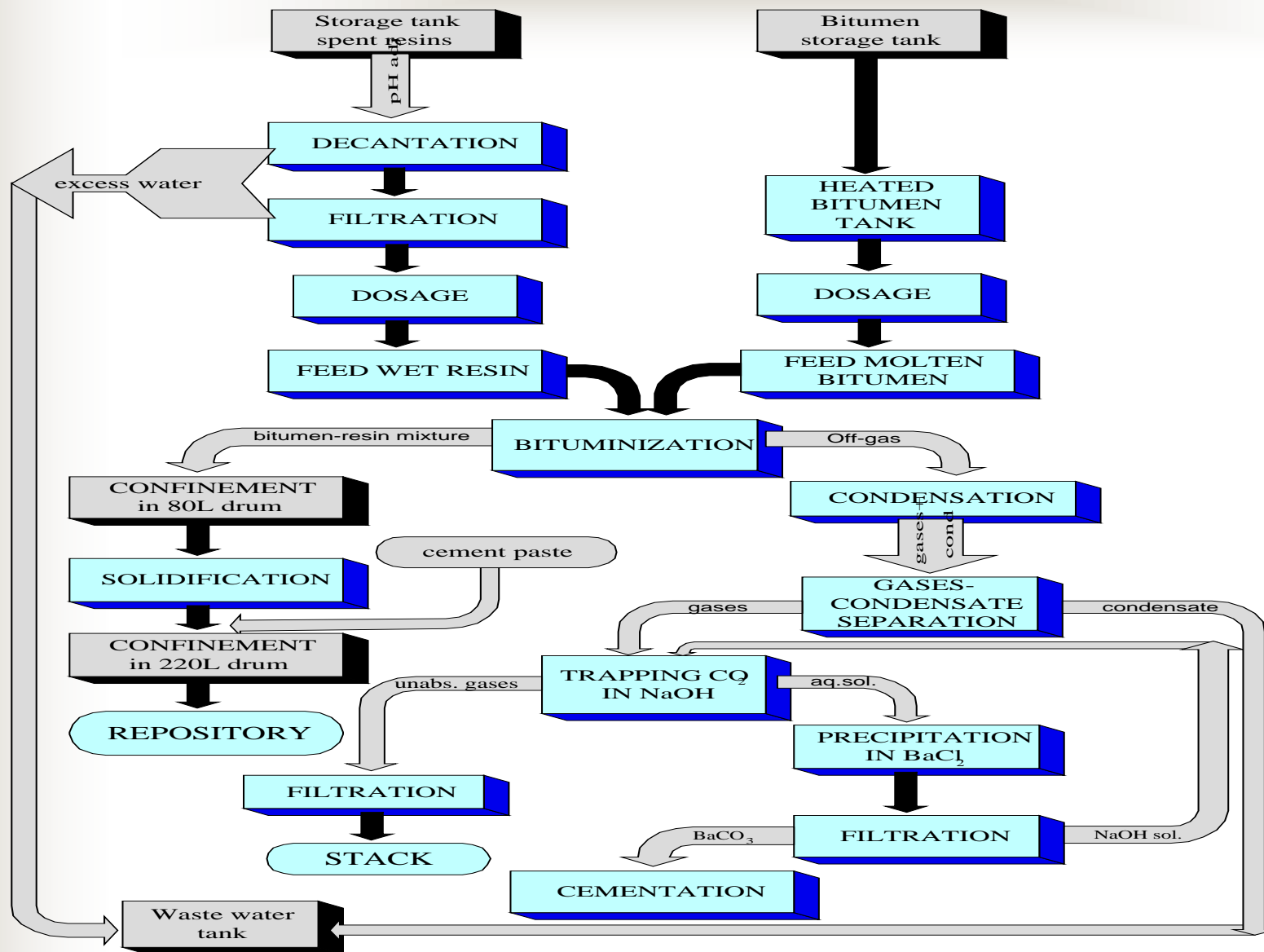
Characteristics:

- treatment capacity: max. 200 l/ 8 hours;
- Conditioning container: 200 l drum.

- Plant for conditioning into bitumen of spent ion exchangers at TRIGA reactor

Characteristics:

- treatment capacity: 32 dm³ / 8 hours;
- conditioning container: 60 l drum;
- bitumen type: I 60/70.





Disposal Facilities

- Existing Facilities : Baita repository- It represents two rock cavities of an uranium mine and the total capacity is 21000 containers (200 l drums);
- Barriers:
 - Natural-rock;
 - Engineered-drums, concrete backfill, bentonite between drums;
- Site:
 - Location-Baita, Bihor district;
 - Geological Information-the host rock is crystalline;
- Morfology: the site is located at the 840 m altitude.