



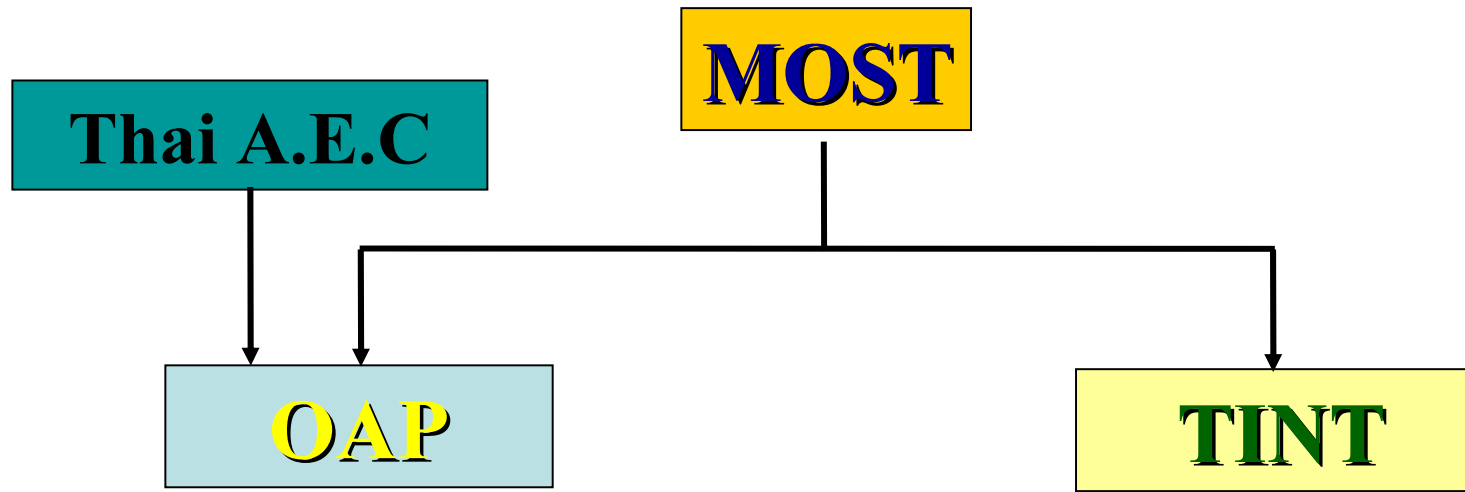
Extraction of Uranium from Thai Monazite Ore

Pipat Pichestapong

**Research and Development Division,
Thailand Institute of Nuclear Technology, Bangkok, Thailand**

Technical Meeting on Low Grade Uranium Ore

29 – 31 March, 2010



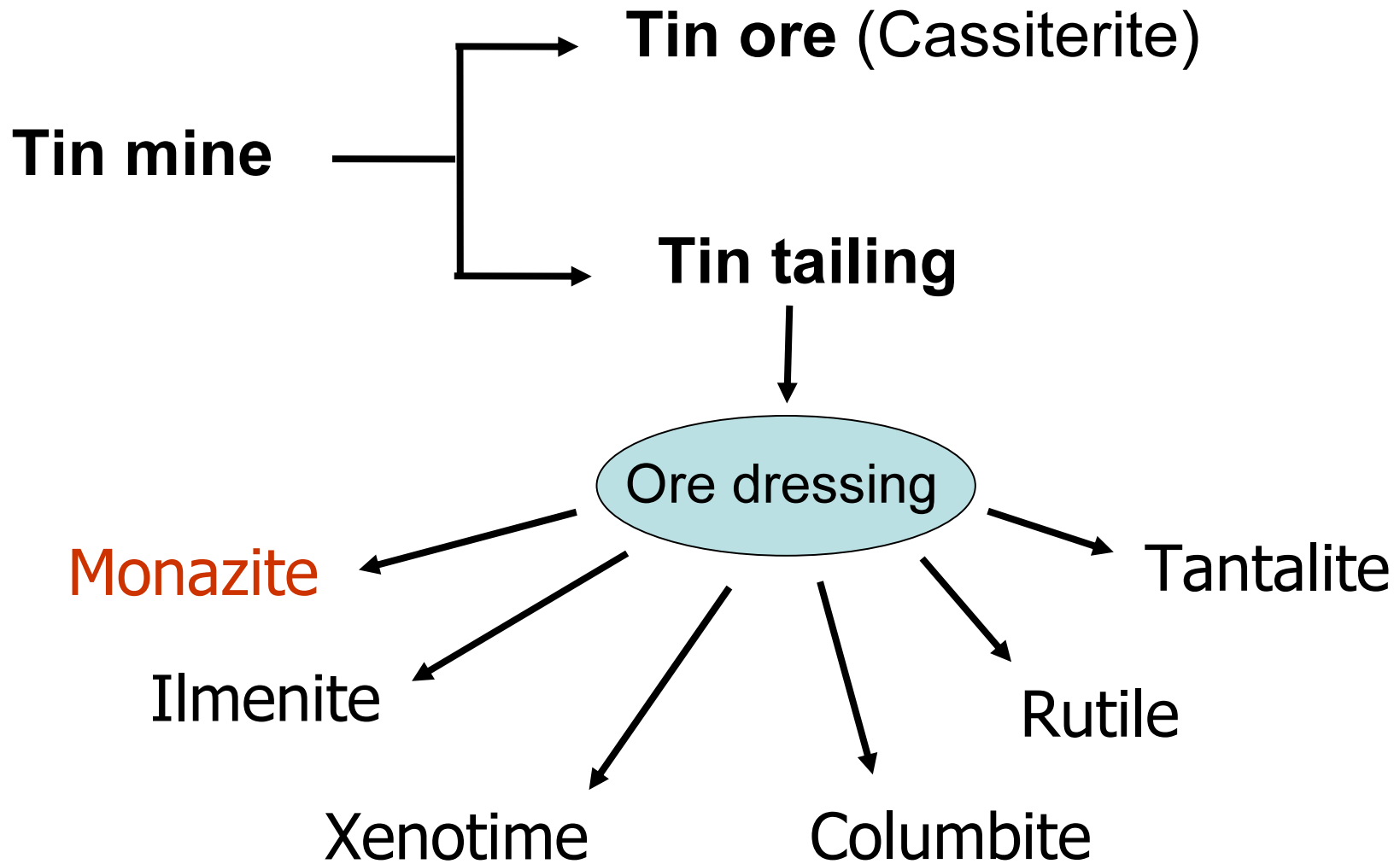
- Thai Atomic Energy Commission (Thai A.E.C)
- Ministry of Science and Technology (MOST)
- Office of Atoms for Peace (OAP)
- Thailand Institute of Nuclear Technology (TINT)

สถาบันเทคโนโลยีนิวเคลียร์แห่งชาติ **สทท**
Thailand Institute of Nuclear Technology **TINT**





Tin Mine





Composition of rare earths in domestic monazite ore

Composition	%
Thorium oxide (ThO_2)	4.5 – 10.6
Uranium oxide (U_3O_8)	0.24 – 0.79
Total rare earth oxide	37 – 58
- Cerium oxide (CeO_2)	19 – 23
- Lanthanum oxide (La_2O_3)	7 – 15
- Neodymium oxide (Nd_2O_3)	6 – 11
- Praseodymium oxide (Pr_6O_{11})	1.6 – 3.4
- Samarium oxide (Sm_2O_3)	0.7 – 1.6
- Gadolinium oxide (Gd_2O_3)	•0 – 1.4
- Dysprosium oxide (Dy_2O_3)	0.4 – 1.9



Monazite Ore





Monazite Ore Breakdown by Alkali Process

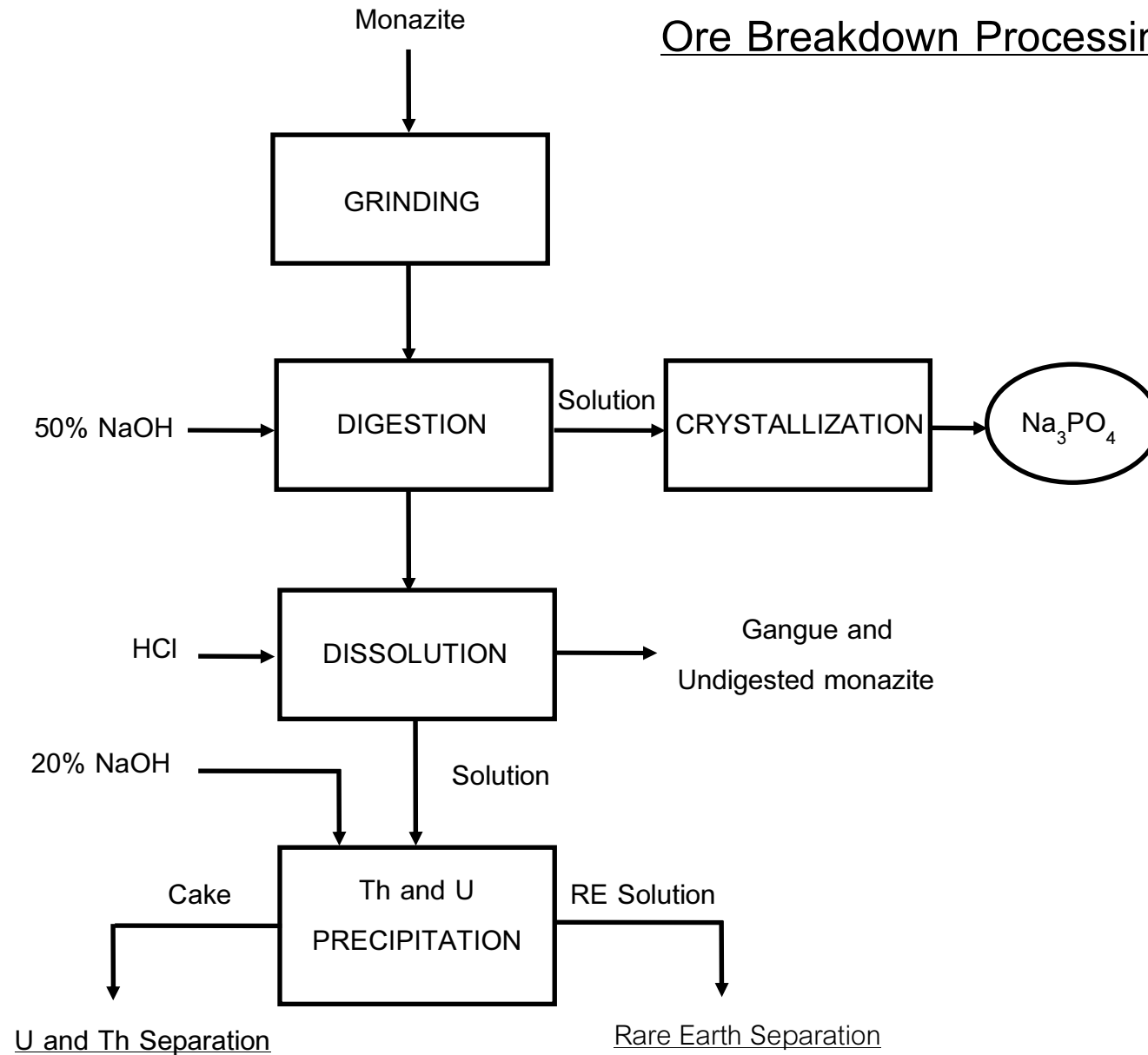
Monazite ore, $(RE, Th, U)PO_4$, reacts with 50% NaOH at $140^\circ C$ for 3 hours using the ore : NaOH ratio of 1 : 2 in a stainless steel digester with heating jacket. The chemical reaction is occurring as follows :



The hydrous metal oxide cake of Th, U and mixed rare earths can be dissolved in HCl :



Ore Breakdown Processing





Ball Mill



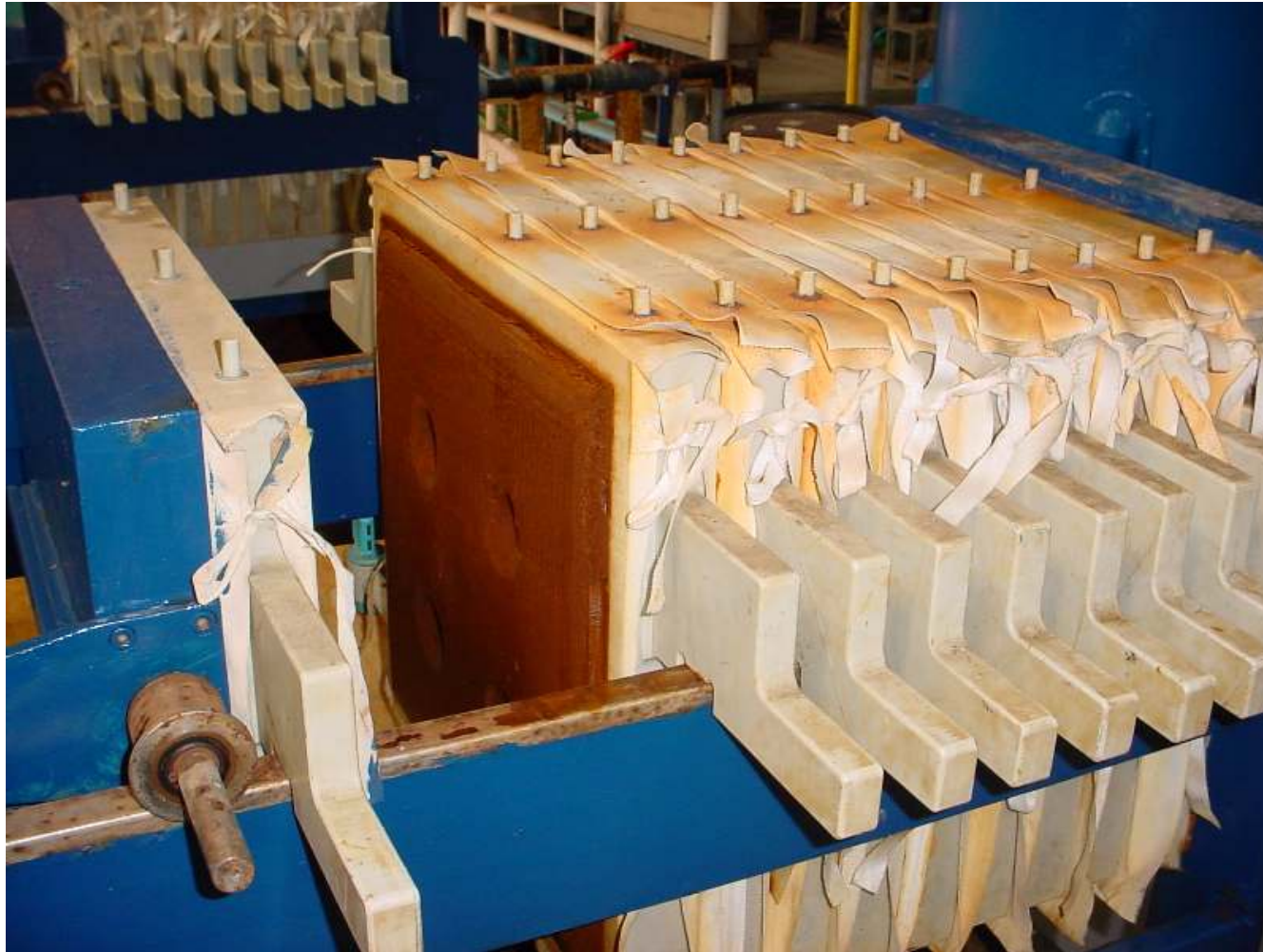
Digester



Drum Filter

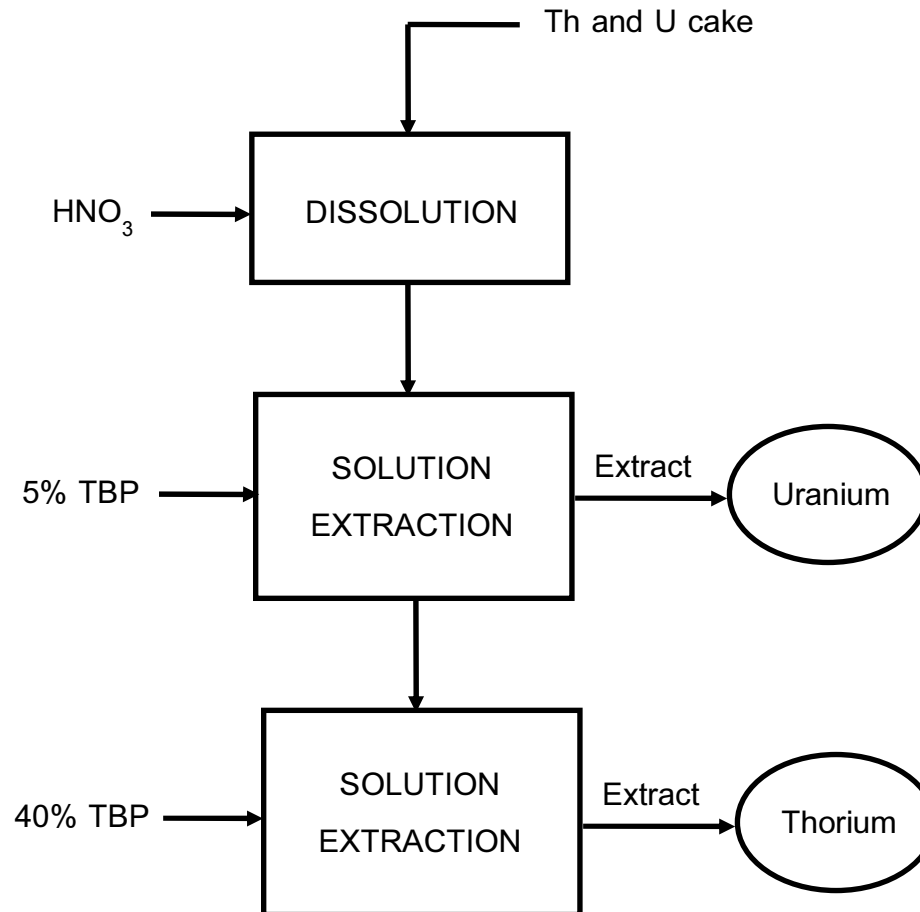


Dissolution Tank

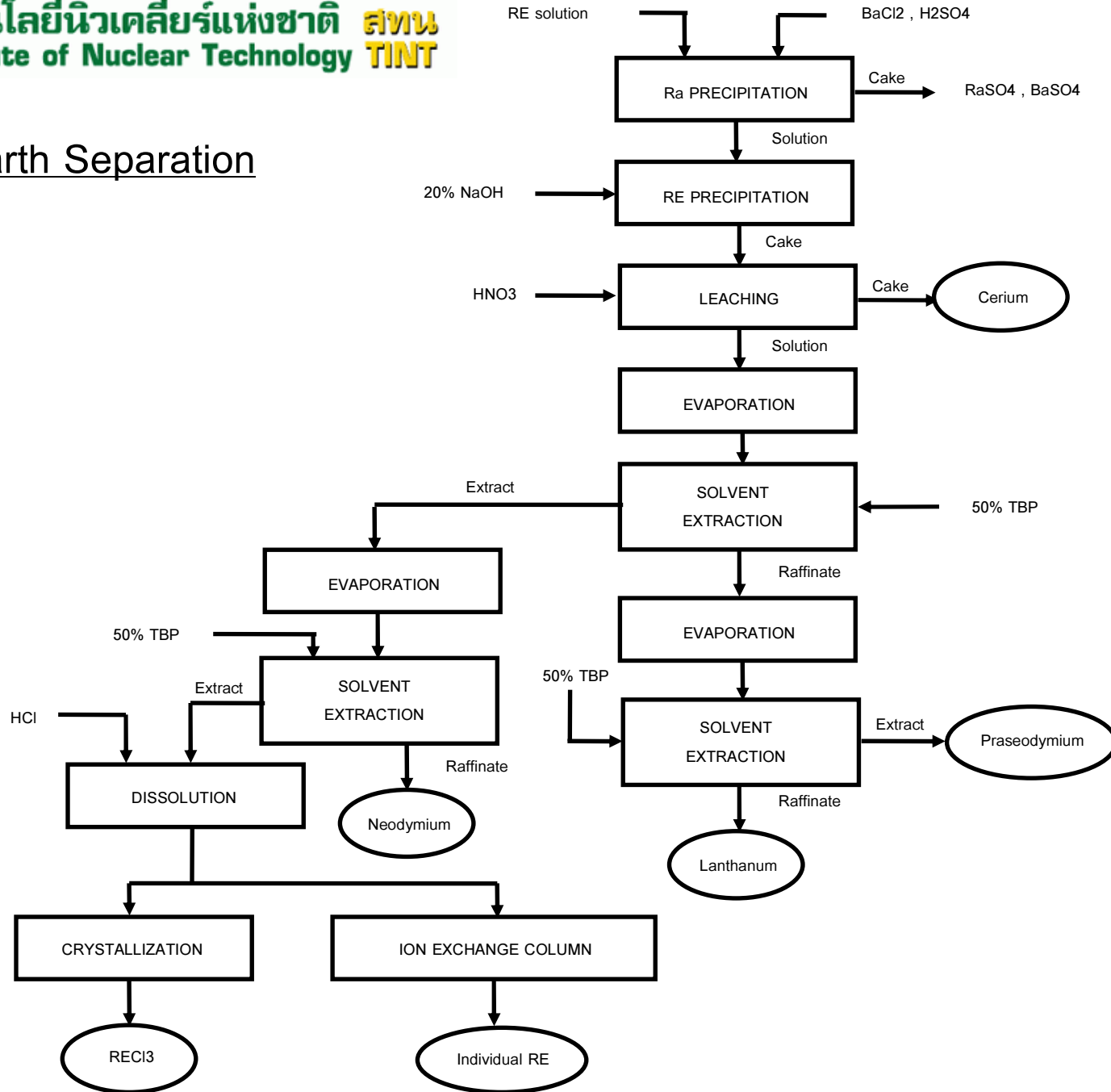


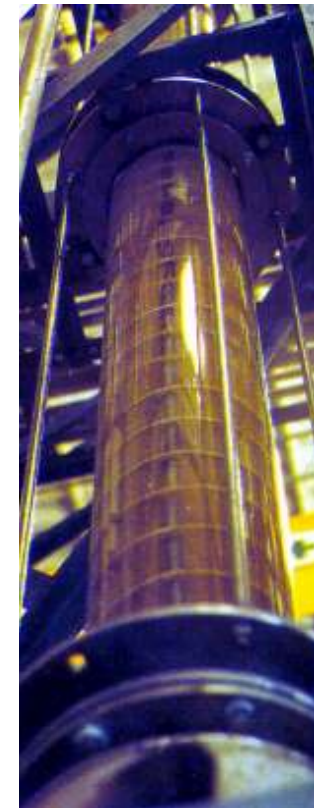
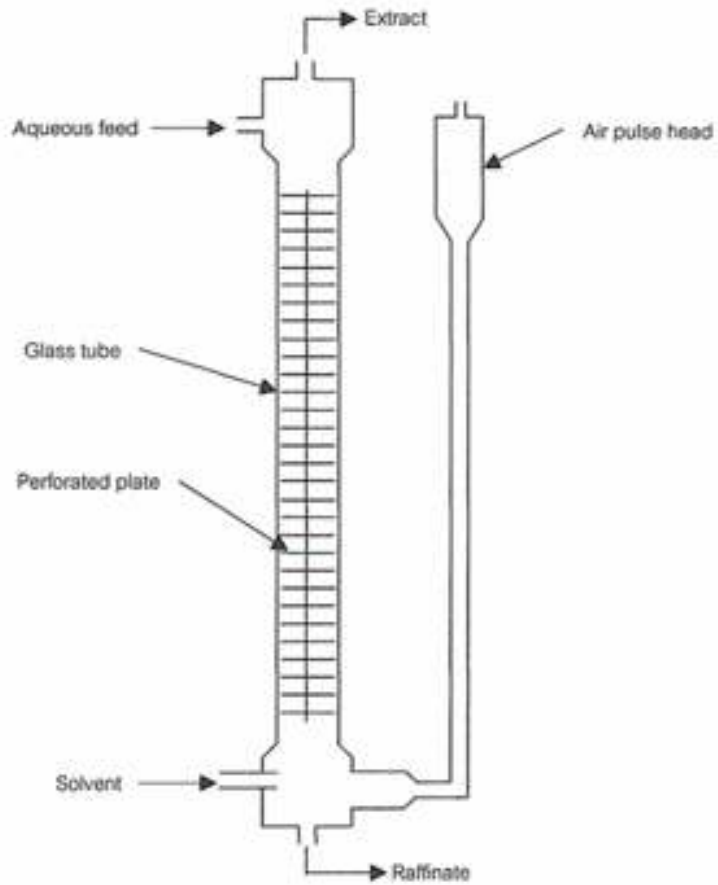
Filter Press

U and Th Separation

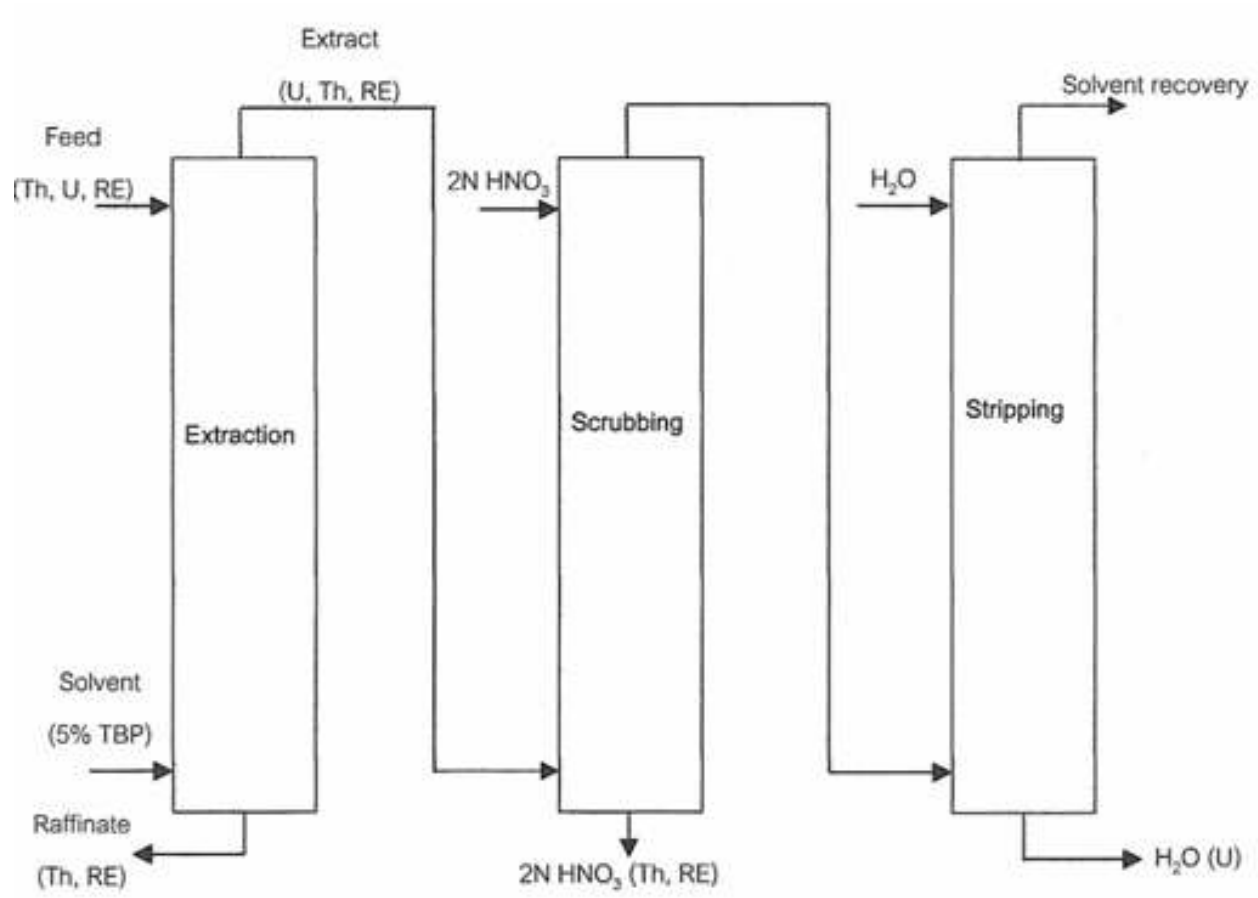


Rare Earth Separation





Pulsed Perforated Plate Column



Schematic Solvent Extraction of Uranium



Mixer Settler



Ion Exchange Column



Uranium Cake

สถาบันเทคโนโลยีนิวเคลียร์แห่งชาติ สทท
Thailand Institute of Nuclear Technology TINT



UV Visible Spectrophotometer



ICP Spectrometer
(Optima 5300 DV, Perkin Elmer)



XRF Spectrometer (S4, Bruker)



Thank You

