Power Reactor Thoria Reprocessing Facility (PRTRF)

- Salient features
  - Solvent: 5% TBP/dodecane for extraction
    - (Higher Fissile Content)
  - High $^{232}\text{U}$ content calls for new design philosophy for Reconversion
    - (Reconversion in shielded alpha tight facilities)

**Feed Composition**
- $\text{Th} = 200 \text{ g/L}$
- $^{233}\text{U} = 2.35 \text{ g/L}$
- FPs = 50 CI/L
- $^{232}\text{U} \sim 500 \text{ ppm}$

**Product specification**
- $\text{Th} = 100-200 \text{ ppm}$
- $^{232}\text{U} \sim 500 \text{ ppm}$
- FPs = 0.25 mCi/g
- Met. Imp. <3000 ppm
- EBC <5 ppm

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**Flow-sheet for $^{233}\text{U}$ recovery from irradiated Thoria rods in Power Reactor**

- **Feed**
  - $\text{Th} = 200 \text{ g/L}, \text{U} = 4 \text{ g/L}, \text{FPs} = 40 \text{ g/L}$
  - $\text{HF} = 0.01 \text{ M}, \text{NaNO}_3 = 0.1 \text{ M}$

- **Raffinate**
  - $\text{Th} = 125 \text{ g/L}, \text{U} = 0.1 \text{ g/L}$

- **Extraction (O/A = 2:1)**
  - 5% TBP in kerosene
  - $5\text{mM NaNO}_3 (O/A = 5:1)$

- **Organic Phase**
  - $\text{U} = 1 \text{ g/L}, \text{Th} = 0.1 \text{ g/L}$

- **Striping**
  - 0.01 M $\text{HNO}_3 (O/A = 2:1)$

- **Lean TBP (Recycle)**

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**Purification & I/U Precipitation**

**Recovery of U & (Am/Pu Precipitation)**