RICE E&C FORUM
MONTHLY ROUNDTABLE
MARCH 3 , 2006

“ Nuclear Power –
A Technology in Arrested Development

Topics

- Principles
- What Happened in the 1950s and ’60s
  Divergence into PWR, BWR (some CanDU)
- Nuclear Cycle (Where might your Company “fit”?)
- Where are we Headed ?

Principles

- Speaking on Nuclear Fission only, not Fusion
- Fissioning possible by neutrons being absorbed by the nucleus of a few (heavier metal) isotopes":

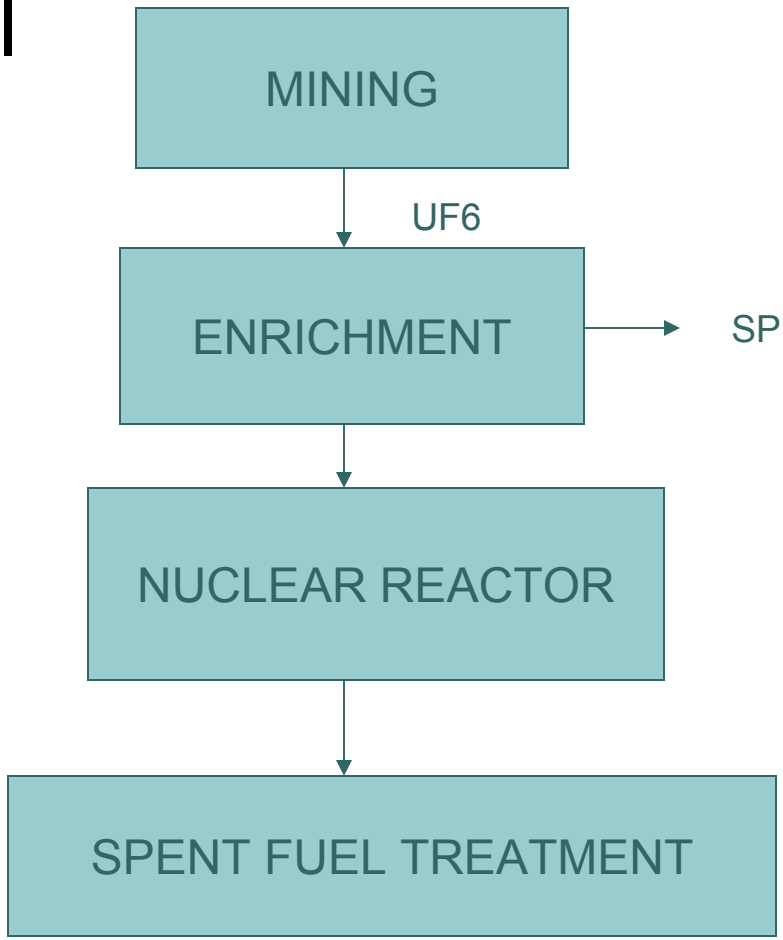
  U235 ,Pu* , Th* (* not naturally occurring)
- The binding energy is released in decay daughters and in the high velocity neutrons produced
- Requirements to use this energy:
  - **Heat Removal (Water, gas , NAK…)**
  - **Moderators to slow neutrons (Water, Graphite, ..)..k = 1**
  - **Shielding / Reflection**
  - **Many designs and prototypes in the 1950s & 60s**

What happened ?

- All expected Nuclear Power to be very cheap. New design development costly, long term, no apparent need
- The Molten Salt Breeder Reactor burned out in late 50s
- GE and Westinghouse “bought “ a Commercial Reactor position by offering “market penetration pricing” e.g fixed price of say $ 100 /KWe.
- Other technology developers dropped out (AMF , General Atomics,..). Canadians stayed on and developed their CanDU Reactor using D2O as a moderator / coolant with Graphite and Natural Uranium

The Nuclear Cycle

(where might your company fit)



Diffusion, Centrifuges,
Thermal, Becker Nozzle, etc.

Nuclear Heat Source, Bal. of Plant

Where are we headed ?

IEA is pushing Innovative Reactor Designs

New (non electric power) demands developing

- energy for Oil Sands Thermal Flooding, space heating
- reduces BOP investment

CO2 Limitations favor nuclear over fossil

Advances in El.Transmission favor remote Nuclear Plants

Now let's hear from Joe….

Remember your questions for the discussion