Is In-Pit Tailings Management the only future for Uranium Mining in Saskatchewan?

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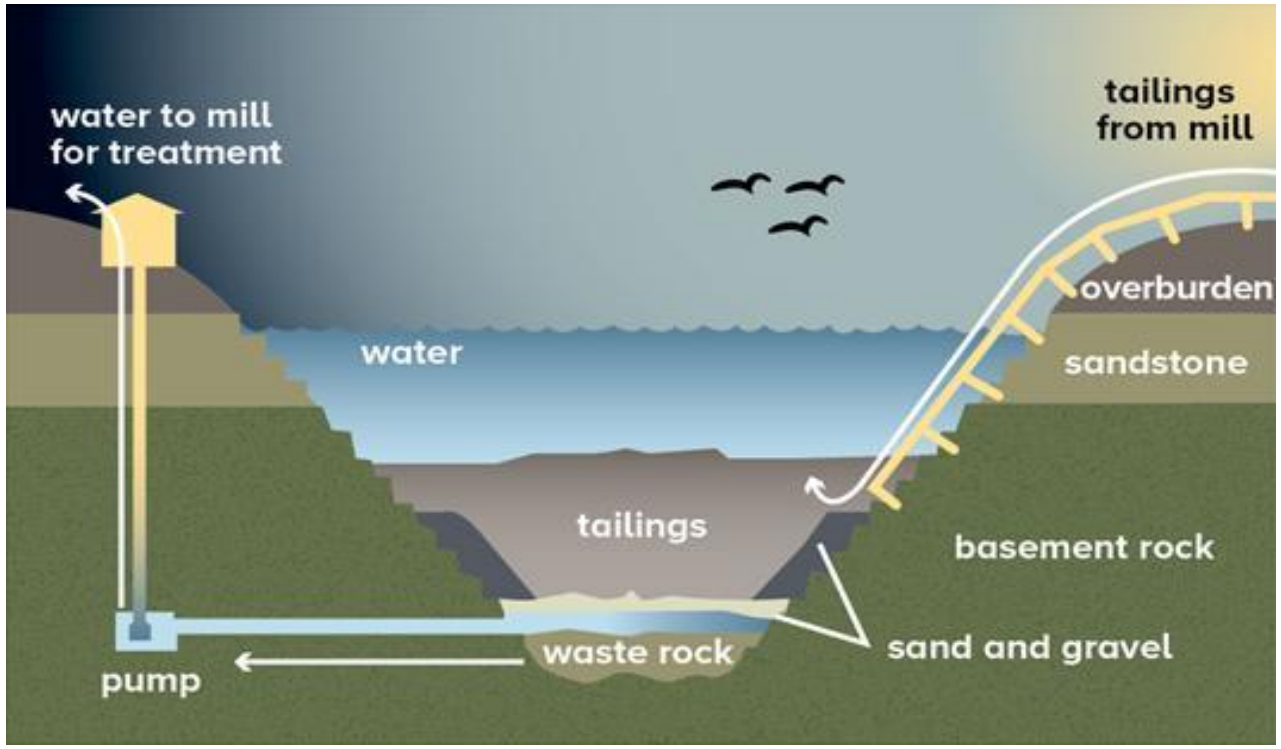

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Introduction

- History of U tailings management
- Recent past to current day practices
- What we should we consider moving forward ?

History of U Tailings Management

- Early days, Uranium City
- 1950s and 60s followed the regulations of the day
- Not a lot of engineering involved in waste management

History of U Tailings Management

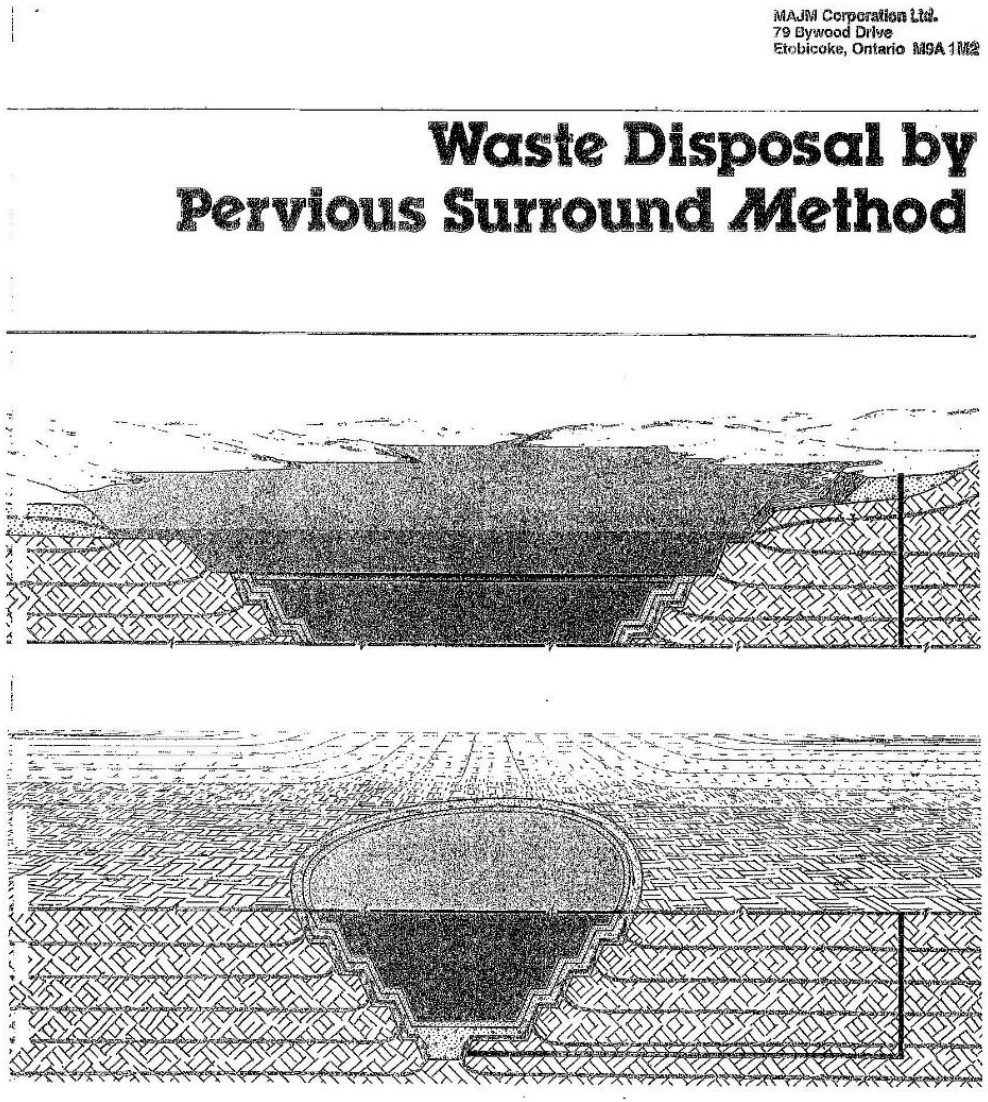
- Second Generation
- 1970s and early 80s
- Introduced some engineering, utilizing earthen dams and topo lows

History of U Tailings Management

- Third Generation
- 1980s
- Significant advancement to the level of Engineering attention
- Engineered liners, seepage detection and collection was incorporated

History of U Tailings Management

- Forth Generation
- 1985 to present
- In-Pit TMF – Pioneered by Cameco – Rabbit Lake
- Re-engineering of mine out pits
- Under drain, supernatant recovery, pervious surround

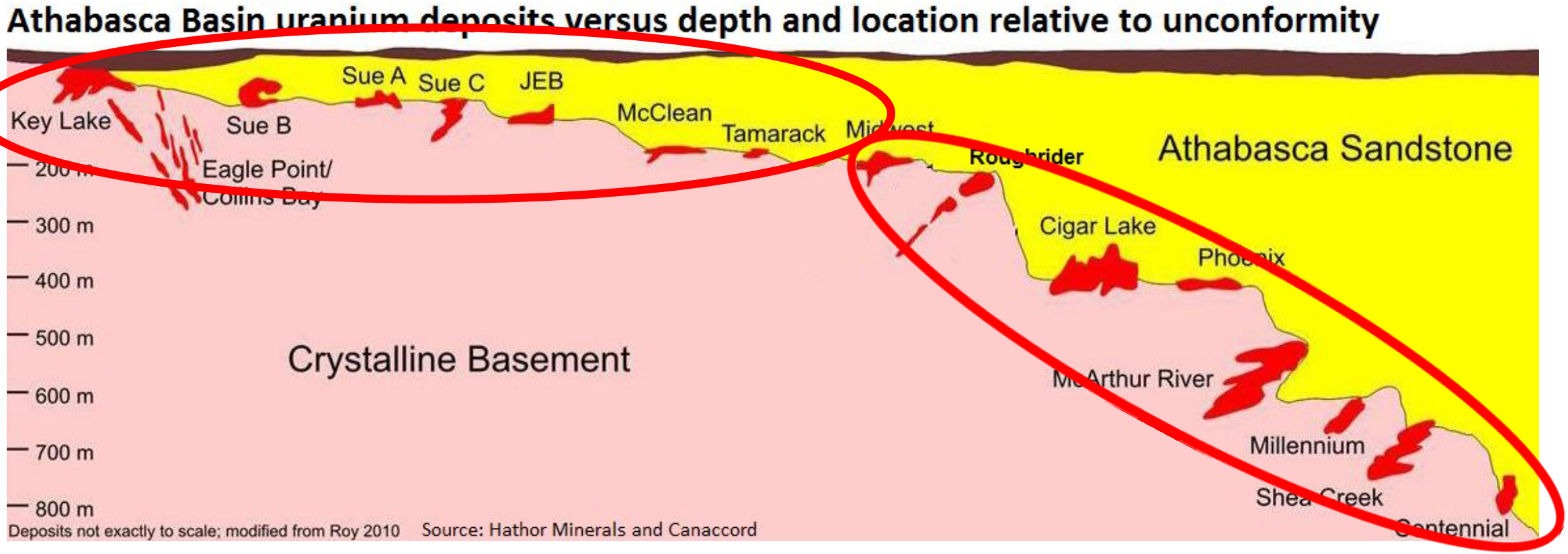


History of U Tailings Management

- Since Rabbit two more facilities came on line
- Variations of the same theme
- Subaqueous deposition, dewatering wells, combination of pervious and natural surround

History of U Tailings Management

- Management system very successful in the 80s and 90s
- Mines provided the raw material for the management system



Recent Past - Present Day

- Continued our focus on In Pit technology
- McClean Lake stockpiled ore for 2 years
- Most recent efforts have focused on evaluating purpose built pits
- We seemed to have abandoned above grade facilities or the use of lakes
- Hope Bay Tailings Management Area – approved 2006, Water License 2007, Sched 2, 2008
- Evaluation methodology adopted by Env. Canada 2011

Tailings Management Area – Hope Bay Project, Nu

Recent Past - Present Day

- Why not in the Uranium Industry?
- Is it because these facilities are that much better?
- The concept certainly has strengths
  - Below grade, reuse disturbed areas
- The concept remains the front runner
  - Industry promoted the strengths of the design since 1985
  - Accepted by public and regulatory community as…

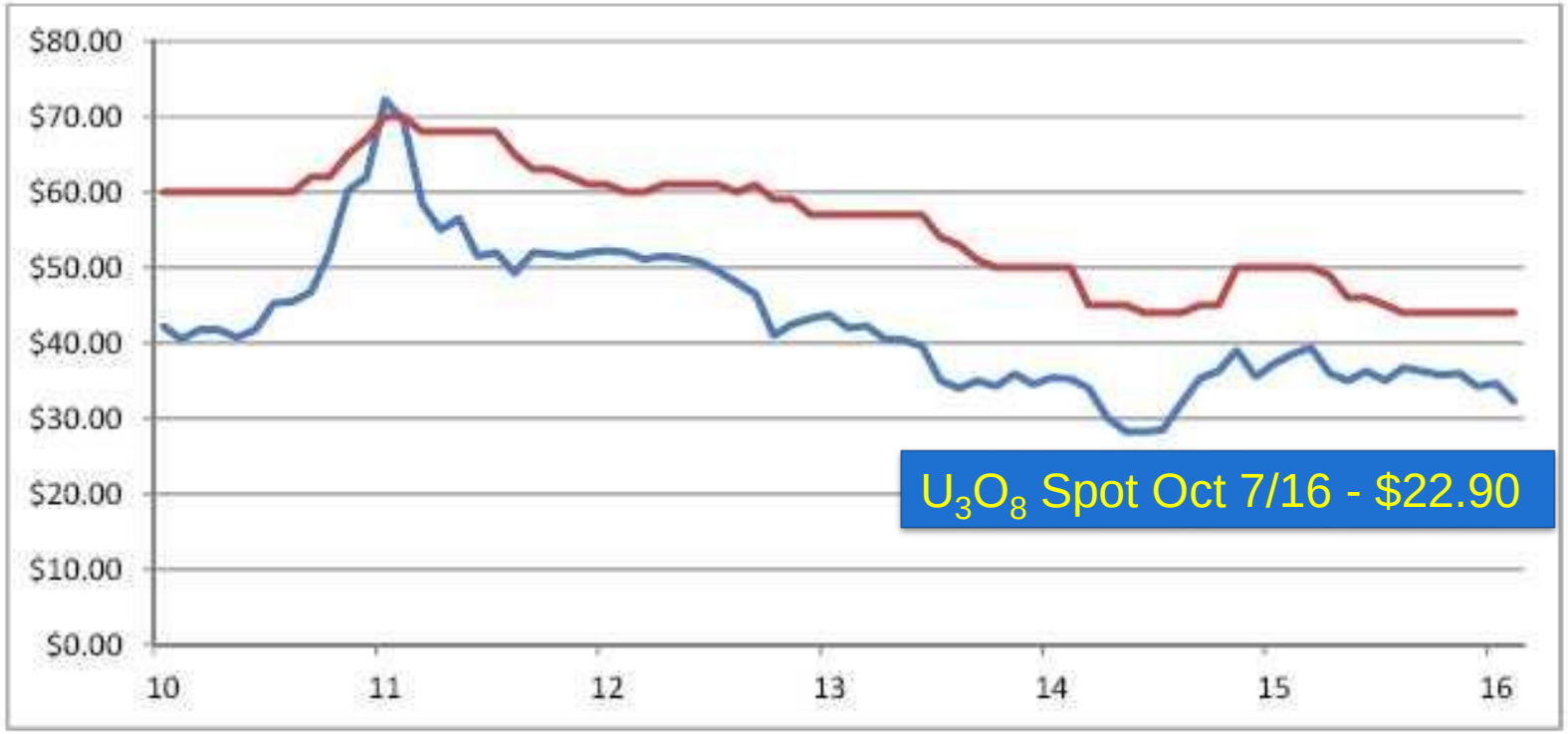
Recent Past - Present Day

- What we have not done is promote the successes from the 2nd and 3rd generations
  - Rabbit above ground
  - Cluff Lake above ground
  - Key Lake above ground
- These facilities are all geotechnically stable
- One has been successfully closed and in a monitoring phase, a 2nd is nearing this point
- If we were to design these today, these designs would benefit from the engineering lessons learned over the past 40 years
  - Canadian Dam Association Guidelines
  - Mining Association of Canada Guidelines

Cluff Lake Tailings Management Facility 2016

Future

- We are no longer mining > $40/lb
- Need to look at all possibilities
  - Natural basins – Lakes
  - We need to consider incorporating Synthetic liners
- Why are these off limits?



Future

- Industry needs to take the lead
  - Think outside the box (Matich,Tao, 1985)
- SRK recently designed a TMF for a U mine in Namibia
  - Based on pervious surround tech.
  - Incorporates waste rock berms for containment as well as non-woven Geosynthetic liners
  - This design addresses and incorporates long term closure concerns
- One size does not fit all – Tailings management must be site specific
  - Improve our ability to produce dewatered tails if above ground facilities are right site specific answer
  - Re-evaluate the use of lakes– engineer them to fit for purpose

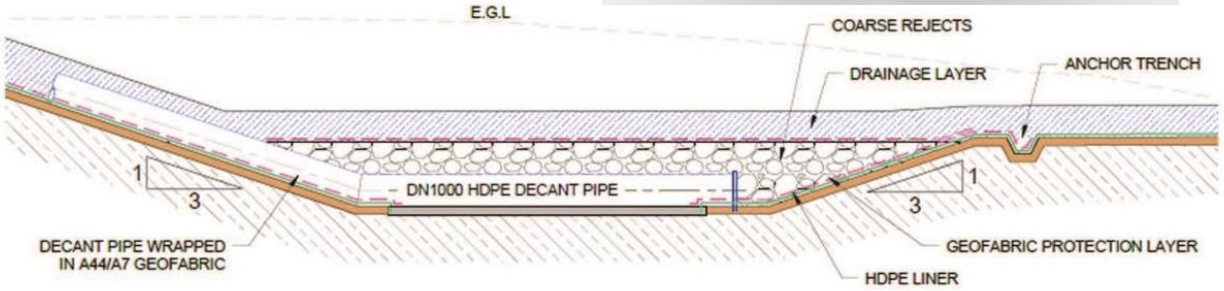


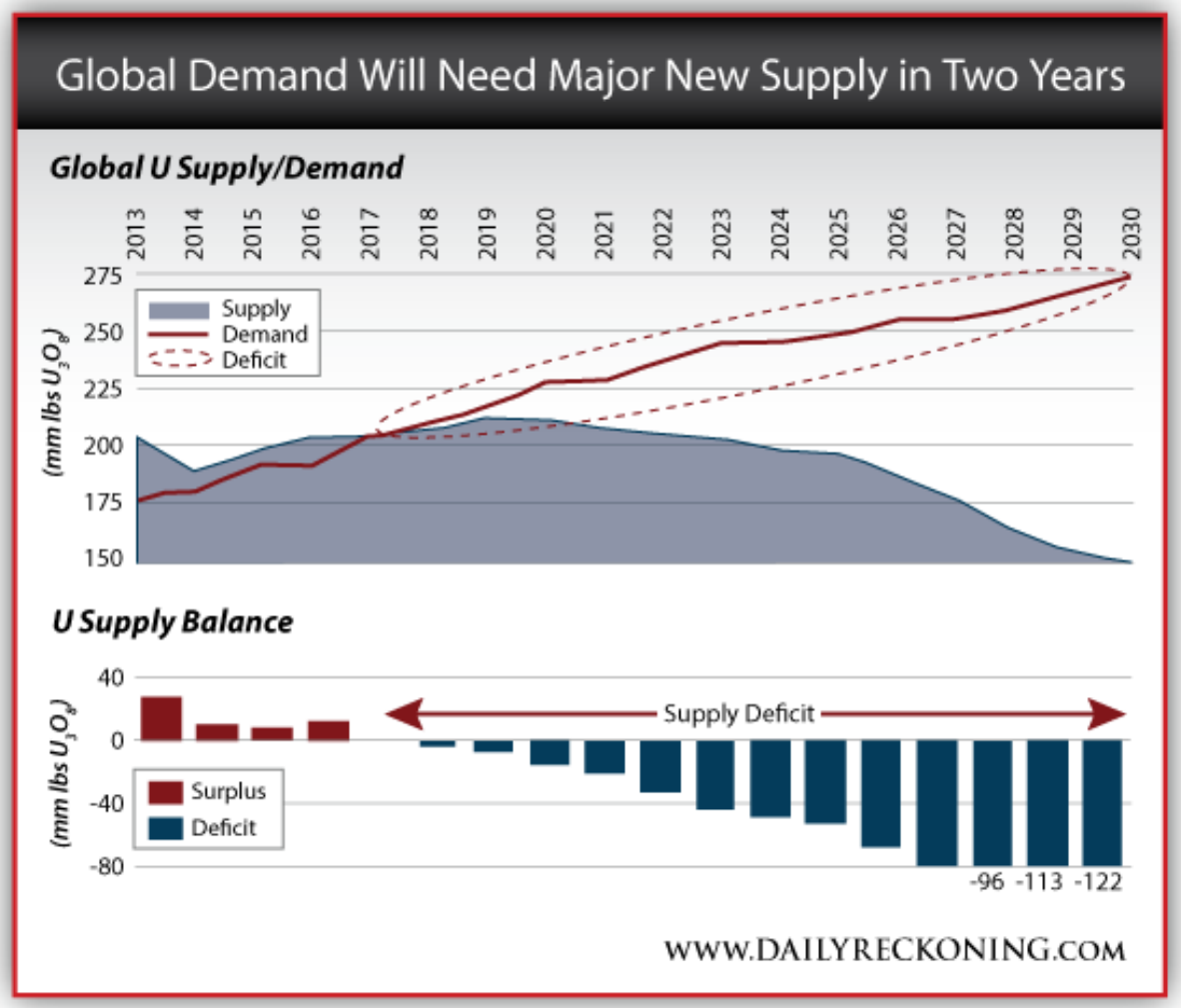
FIG 7 – Collection sump – typical section 1.

Paladin Energy Ltd. – Langer Heinrich U Mine

FIG 8 – Collection sump during construction.

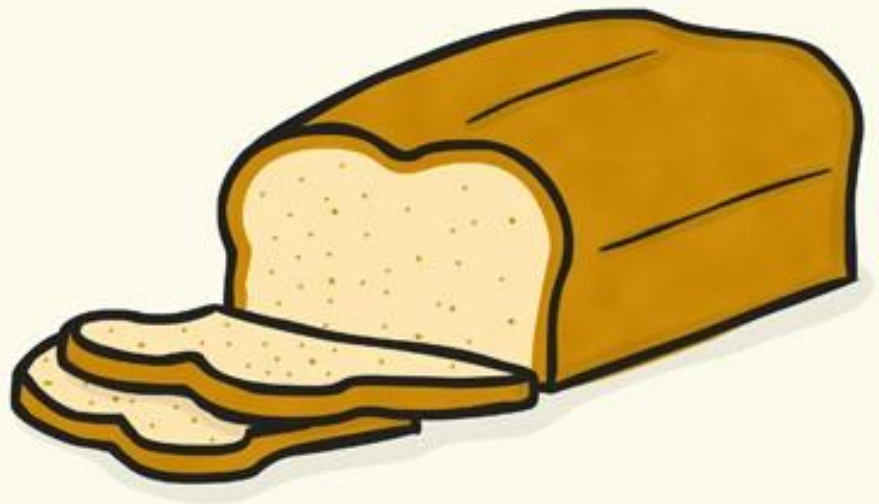
Future

- Yes In Pit TMFs are environmentally sound
- Yes they are a good option to consider
- However they are not the only viable option
- Economics must be part of the evaluation criteria
- $25-$40/tonne - Purpose built pits
- $2 - $10/tonne – Conventional facility
- Cost/tonne waste management shouldn't be a fatal flaw – global demand is not decreasing
- Are we encouraging uranium development in regions with significantly lower Env. standards?



Future

- Industry sustainability and superior environmental stewardship in Saskatchewan's uranium industry can continue
- Collectively we need to remove the blinders
- In Pit management should not be the only alternative evaluated….



Questions ?