#### "It's all about the Water!" Integrating Water Management as a Primary Consideration in Tailings Management Practices

Erik Ketilson, MEng, PEng SRK Consulting – Saskatoon



## **Presentation Outline**

- How do we manage water
- Responsible Tailings Management
  - water balance
  - deposition planning
  - integrating the water balance and deposition planning
- Operational Examples (2 Cases)
- Conclusions

## How Do We Manage the Water?

- Tailings continuum
- What's feasible

annital /



#### **TAILINGS DAMS ARE NOT WATER DAMS**

- Risk increases with volume of water
- How do we manage the risk with slurried tailings



## Responsible Tailings Management What's the Risk? Why do we care?



Image Source: america.Aljazeera.com

#### Responsible Tailings Management How do we Implement?



## **The Water Balance**

- Typical water balance schematic
  - Problems
    - · Hard to track / measure / quantify
      - Seepage (to/from facility)
      - Evaporation
      - Direct run-off
      - Evapotranspiration
      - Groundwater recharge Mill
- A Focus on Things we Can Measure
  - Simple Water Balance
    - 3 key elements to track



## The Simple Water Balance A Focus on Things we can Measure



## **Deposition Planning**

- Typically this has stopped at the end of pipe
- How do I maximize the capacity in facility?
- How do I maintain my minimum beach length, or water cover?



## **Deposition Planning**

- A proper plan will give you:
  - How long do I discharge from a given point?
  - Discharge sequencing
  - Discharge duration
  - Where do I position my discharge points / reclaim barge
  - Were do the access roads need to be?
  - Depth / limits & changing storage capacity of the pond



# Integrating the Water Balance and Deposition Planning

- Ensure you're prepared for:
  - Changes in pond inventory due to wet / dry years
  - Potential for encroachment on the flood storage and freeboard
  - Maintaining minimum beach lengths
  - Changes in water treatment or discharge rates

## **OPERATIONAL EXAMPLES**

- 21 years of operation
- 10 Years C&M
  - 6 Ownership changes
  - Did not retain design engineer
  - Loss of corporate memory
- Designed for flood storage
- Water treatment required prior to discharge
- No requirement to record water levels



- Lack of water balance understanding
  - Dam Instability
  - Repair Costs
    - Engineering
    - Construction





- Operating Site
- Slurried tailings deposition
- Must store design flood
- Maintain minimum beach length of 100 m
- Strict operating levels for reclaim
- Integrated tailings deposition planning & water balance

- Water Balance
  - Target water level
  - Predicted WL based on wet / average / dry year
    - Do we need to do anything?
    - What will happen if we don't do anything?
  - Operator's can easily see / track water level
- Deposition planning
  - Timing & placement of deposition points
  - Plan for where the pond should be
  - Plan to achieve final closure configuration



## Conclusions

- There are methods to reduce the risk associated with slurried tailings facilities
- Integration of the water balance with deposition planning is critical
- For deposition planning you need the "Simple Water Balance"
- Tailings dams are not water dams!