TECHNICAL REVIEW SNAP LAKE ICRP

Presentation to Snap Lake Environmental Review Board

by

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Why do Closure Planning?

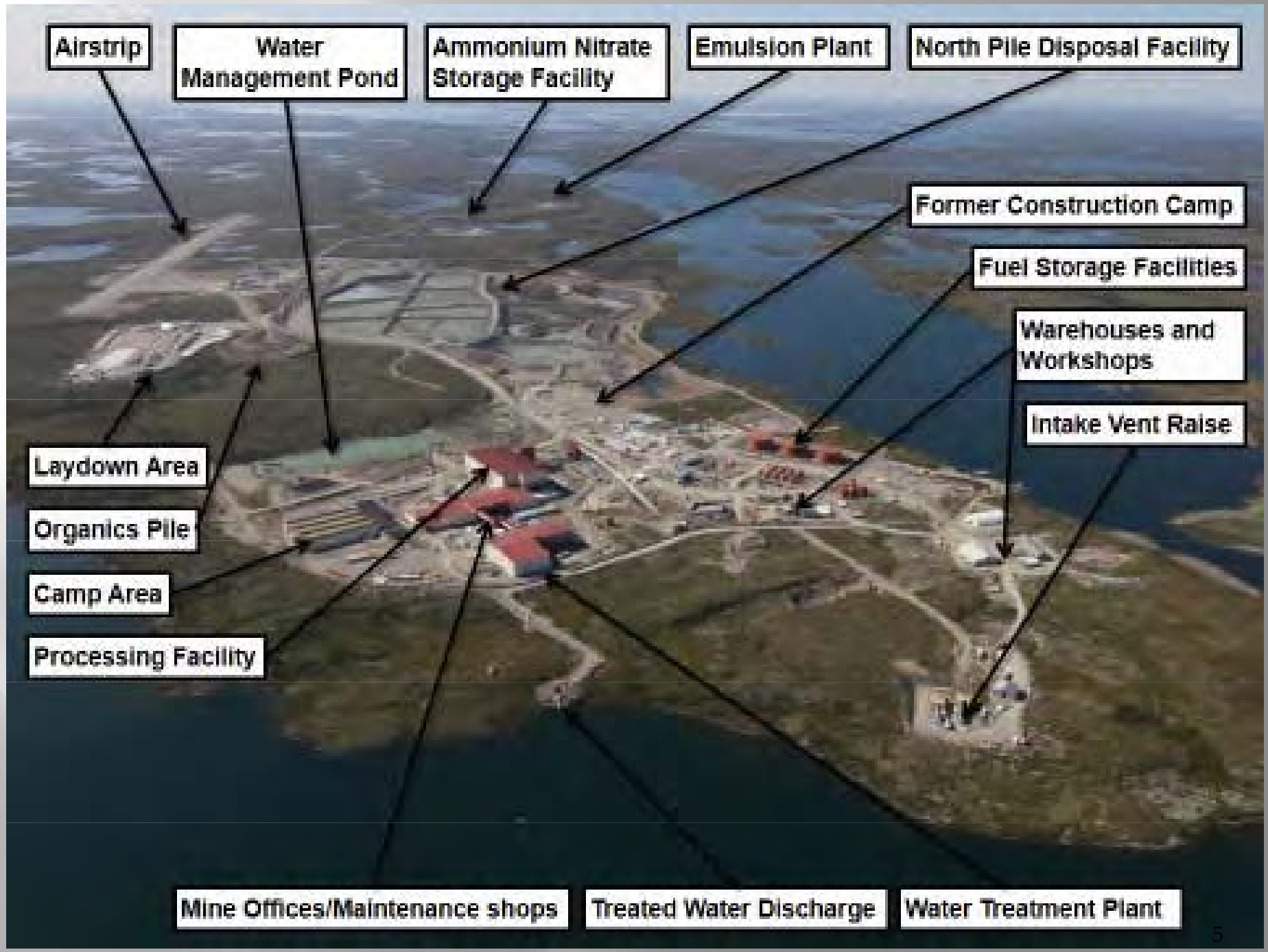
1) Design for Closure
2) Financial Assurance (Security)
3) Demonstrate Project Financial Viability
4) Identify R&D needs to address uncertainties
5) Assure Local Knowledge and Expectations are integrated into the closure plan
6) Assure Long Term Environmental Protection

Stages for Closure Planning

- Conceptual Closure and Reclamation Plan- Required at planning Stage (CRP)- Submitted as part of EA and updated based upon comments from regulators and communities.
- Water Licence issued
- Interim Closure and Reclamation Plan (ICRP) within 12 months
- Regular updates (typically every 3 years) and annual reports (includes revisions to financial assurance)-implement progressive closure
- Final Closure and Reclamation Plan- Submitted 2 years prior to closure

Guiding Principles For Each Components

- Physical Stability- does not erode, subside, or move from its intended location under natural extreme events or disruptive forces (challenge for hydraulic structures and dams)
- Chemical Stability- chemical constituents released from the project components should not endanger human, wildlife, or environmental health and safety.(achievable especially for well designed projects- expectation for most diamond mines)
- No Long Term Active Care- all practical efforts to ensure that any project component that remains after closure does not require long-term active care and maintenance. Essentially not achievable without some inspection, monitoring and maintenance .
- Future Use- should be compatible with the surrounding lands and water bodies upon completion of the closure activities.


Airstrip
Water Management Pond
Ammonium Nitrate Storage Facility
Emulsion Plant
North Pile Disposal Facility
Former Construction Camp
Fuel Storage Facilities
Warehouses and Workshops
Intake Vent Raise
Laydown Area
Organics Pile
Camp Area
Processing Facility
Mine Offices/Maintenance shops
Treated Water Discharge
Water Treatment Plant


De Beers
GROUP OF COMPANIES

Current Mine Status

- Mine operations ceased in December 2015
- De Beers indicated future could be:
  1) Reopening the mine;
  2) An Extended Care and Maintenance period; or
  3) Permanent Mine Closure.
- Current status is extended care and maintenance
- Given the potential for permanent mine closure, it is clear that movement towards a Final Closure and Reclamation plan is required.

Key Findings

- North Pile Containment
- Cover Concept for the North Pile
- Site Wide Vegetation
- Progressive Reclamation North Pile
- Paste Deposition
- Closure Criteria
- Proposed Closure Works
- Reclamation Research Program
- Financial Security

North Pile Containment

- Originally designed to store about 50% of the PK as paste.
- Paste trials were unfavorable and paste deposition now not proposed for surface.
- Result is major increase in volume of PK to be disposed on surface.
- Has required containment dams to be redesigned (formerly upstream construction) and larger footprint.
- There will be a requirement for increased security to address larger footprint.

Cover Concept for the North Pile

- Original plan was placement of 0.5m of quarried granite on the surface.
- Research programs were conducted on the starter cell. This work was completed and decommissioned.
- Detailed cover design was to have been completed in 2016. Current status could not be determined.
- Given the potential that the mine may not be reopened, movement towards development of a defensible final cover design is important.

Site Wide Vegetation

- The report is unclear as to what areas are proposed for vegetation.
- There is an ongoing Research Program and adequate data should be available to develop a preliminary plan.
- Security allowance for vegetation is miniscule at $150,000 or 0.4% of the reclamation budget.
- This is an area where much more detail is required. None of the diamond mines have adequate information on revegetation of the sites.

Progressive Reclamation North Pile

- The schedule for progressive reclamation has not been updated. The current schedule call for final reclamation of the Starter Cell in 2016.
- The security estimate allows for $10 million to be spent in 2016 for progressive reclamation.
- Based upon 2015 annual report prepared in 2016, final reclamation of the Starter Cell was not completed. (Note testing program on the Starter Cell was decommissioned)

Paste Deposition

- What is paste?
- What are the benefits?
- Where is it used? (mines and surface deposits)
- Implications of slurry deposition for Snap Lake
  - Conventional practice but may lead to development of slime pools and ice lensing.
  - Could complicate cover application at closure and could lead to other issues such as differential settlement, piping of tailings into the cover etc.

Closure Criteria

- New criteria are being developed for the ICRP Revision 4.
- Key criteria will include:
  - Measures to assess vegetation success

Proposed Closure Works

- The Mine- To be flooded. Primary issue relates to release of contaminants to surface waters. Potential remedial measure- Plug the ramp.
- North Pile Cover-Plan is 0.5 m of quarried crushed granite. Predicated on the ability readily apply cover. Potential issues include:
  - Trafficability and access to apply cover in areas with slimes (if present).
  - Differential settlement as ice lenses thaw (if present).
  - Potential for piping of TK to surface as cover settles.
  - Adequacy of cover depth (0.5m)

Reclamation Research Program

- Reclamation Research plans are reasonable and should provide data required to address uncertainties in closure plans.
- Primary concern is timing. Programs should probably be accelerated where possible to assure data are available when mine closes.

Financial Security

- The estimate will be updated in Version 4.
- Security held is currently about $80 million. This appears to be adequate based upon all information available at this time.
- General Comments:
  - The basis for quantity estimates is not provided.
  - Allowances for vegetation are inadequate.
  - Better description of post closure monitoring requirements
  - No allowances for long term care.

Summary and Conclusions

- Version 3.2 ICRP is a credible document for an ICRP. Major issue is that the mine may never reopen and as such a final Closure and Reclamation Plan may be required in near future.
- The primary issue relates to closure of the North Pile. Concept remains conceptual and need to be finalized.
- Long term impacts are likely to be aesthetic and impacts to surface water quality are unlikely.
- The long term care and maintenance requirements should be minimal.

Expectations for Version 4

- Finalized Cover Design based upon Reclamation Research Program
- Improved set of Closure Criteria
- Conceptual Revegetation Plan for all disturbed areas
- Updated Security estimate
- Improved 3d visualization for the reclaimed mine site