



# April 2019 Environmental Update for SLEMA Board

May 3, 2019

# Outline

1. Mine Update
2. Reports
3. De Beers Submissions
4. Regulators' Update
5. Aboriginal Update
6. Stakeholders' Update
7. SLEMA's Activities



# Acronyms

- AEMP – Aquatic Effects Monitoring Program
- ARD – Acid Rock Drainage
- DFO – Fisheries and Oceans Canada
- ECCC – Environment and Climate Change Canada
- ECM – Extended Care and Maintenance
- ENR – Department of Environment and Natural Resources, GNWT
- EQC – Effluent Quality Criterion
- GNWT – Government of the Northwest Territories
- INAC – Indigenous and Northern Affairs Canada (formerly Aboriginal Affairs and Northern Development Canada [AANDC])
- MVEIRB – Mackenzie Valley Environmental Impact Review Board
- MVLWB – Mackenzie Valley Land and Water Board
- PK – Processed Kimberlite
- SLEMA – Snap Lake Environmental Monitoring Agency
- SNP – Surveillance Network Program
- SSWQO – Site-Specific Water Quality Objective
- TDS – Total Dissolved Solids
- WEMP – Wildlife Effects Monitoring Program
- WTP – Water Treatment Plant
- WMP – Water Management Pond



# 1. Mine Update for March 2019

- The Snap Lake Mine is currently under Extended Care and Maintenance (suspended operations);
- Zero occupancy ended March 4, 2019 as Snap Lake Mine resumed Care and Maintenance activities at site on that date;



# 1. Mine Update for March 2019

## ➤ March 2019:

- The quantity of water extracted from Snap Lake for camp operations, site services was 328 m<sup>3</sup>;
- Water monitoring was reported for SNP 2-15 (Water Intake from Snap Lake) and analysis are attached to the March SNP Report;



# 1. Mine Update for March 2019

## ➤ March 2019:

- The sewage treatment plant (STP) operated during 4 days, the treated sewage volume was 18.1 m<sup>3</sup>;
- Treated sewage was disposed;



# 1. Mine Update for March 2019

## ➤ March 2019:

- No spill reported;
- Monitoring performed as per approved Surveillance Network Program (SNP) for Care and Maintenance;



## 2. Reports

- 2.1 De Beers March 2019's SNP Report:
- An update of activities at site in March was provided in the March 2019 SNP Report submitted by De Beers on April 30, 2019





## 2. Reports

### 2.1 De Beers March 2019's SNP Report

During that period, monitoring at Snap Lake Mine included the following:

- Fuel tank inspections;
- Monthly North Pile, ditch and perimeter sump monitoring;



## 2. Reports

### 2.1 De Beers March 2019's SNP Report

- North Pile Thermistor and Piezometer monitoring;
- Dams and Water Management Pond monitoring;
- Main camp building Inspection;
- Sampling and analysis at SNP 2-15 Snap Lake Water Intake (one sample).



## 2. Reports

### ➤ 2.2 March Inspection Reports

- No Regulatory inspections were reported during March 2019.



# 3. De Beers Submissions to MVLWB

## ➤ 3.1. AEMP Low Action Level Exceedances Notification

- On March 22, De Beers notified that a low action level has been triggered as per the approved AEMP Plan (Jul 2016) at Snap Lake Mine;
- As per Condition G 7 of Water Licence, De Beers is required to submit an AEMP Response Plan for Board approval;
- De Beers have requested that the AEMP response plan to not be required.



## 3. De Beers Submissions to MVLWB

### ➤ 3.2 . De Beers 2018 Annual Report Submission

- On March 26, 2019, De Beers submitted the 2018 Annual Water Licence Report as required by MVLWB Water Licence MV2011L2-0004 under Part B, condition 7 and Schedule 1, Condition 1.



## 3. De Beers Submissions to MVLWB

### ➤ 3. 3. De Beers Renewal Application Submission

- On March 29- De Beers submitted a complete renewal application for a type A water licence;
- On April 12, the Water Licence Application for renewal was deemed complete by the MVLWB;



### 3. De Beers Submissions to MVLWB

- The purpose of this Application is to support the closure and post-closure phases of the Snap Lake Mine;
- The Proponent has also requested an exemption from preliminary screening, because it believes that the Closure and Post-closure are planned phases in the life of the Mine that were included in the original Environmental Assessment (EA1314-02).



## 4. MVLWB's Update

- **4. 1. Invitation to submit comments on De Beers - Snap Lake - AEMP Low Action Level Exceedances Notification**
- Reviewers were invited to submit comments, and recommendations using the Online Review System (ORS) by Apr 24, 2019;
- Proponent Responses were due by May 1, 2019.





## 4. MVLWB's Update

### ➤ 4. 2. Invitation to submit comments on De Beers - Snap Lake – 2018 Annual Licence Report

- Although formal approval of this Report is not required under the WL, the Report must satisfy Licence requirements;
- Reviewers were invited to submit comments, and recommendations using the ORS by Apr 26, 2019;
- Proponent Responses were due by May 3, 2019.



## 4. MVLWB's Update

- **4. 3. Invitation to submit comments on De Beers - Snap Lake – Application for Renewal of Type A Water Licence**
- Reviewers were invited to submit comments, and recommendations using the ORS by May 17, 2019
- Proponent Responses are due by May 30, 2019.



## 4. MVLWB's Update

### ➤ 4. 4. Regulatory Process Timeline for the Processing of the DeBeers Application for the Renewal of the WL

#### Milestone Dates:

- Technical Session July 18-19;
- Prehearing Conference September 16, 2019;
- Public Hearing October 22-23, 2019;
- Board Decision on Application late January 2020;
- Final Decision from the GNWT Minister late April 2020



## 5. Aboriginal Update

- No news related to aboriginal activities.



## 6. Stakeholders' Update: De Beers & SLEMA

### ➤ 6.1. LUP: Follow up Letter from DeBeers to SLEMA

- On April 12, 2019, DeBeers' Sarah McLean sent an email to Philippe Di Pizzo SLEMA's E.D. to follow-up with any questions about the land use permit amendment application that De Beers was planning to submit on April 29<sup>th</sup>;
- SLEMA ED answered that there were no concerns at this time on the LUP application.



## 7. 1 SLEMA's activities: Comments on DB Low Level Exceedances Notification

In order to satisfy Section G, item 9 of the Water License MV2011L2-0004, De Beers reported that the following parameters have exceeded the Low Action Level Triggers as per the AEMP:

- Nutrient Enrichment for phytoplankton biomass,
- Nutrient Enrichment for benthic community density,
- Thallium in fish tissue chemistry (small-bodied fish).



## 7.1 SLEMA's activities: Comments on DB Low Level Exceedances Notification

At the same time, DeBeers informed that the AEMP Response Plan, as requested under Schedule 6, Item 5 of the Water Licence “will not be completed at this time because the Mine is currently in Care and Maintenance and De Beers has already implemented the following management actions”:



## 7.1 SLEMA's activities: Comments on DB Low Level Exceedances Notification

- A decrease in treated effluent discharge as a consequence of a decrease in volume of mine water pumped to the surface;
- The installation of a Reverse Osmosis (RO) water treatment system that would improve the water quality of the treated effluent;
- And, that water quality of the effluent will have a continuum improvement as a consequence of a substantial reduction of the “main stressor”





## 7.1 SLEMA's activities: Comments on DB Low Level Exceedances Notification

### ➤ SLEMA COMMENTS:

- It agrees that a reduction in the volume of discharge of treated effluent may result in an improvement in the Snap Lake water quality; and
- That once the RO treatment plant is in operation, it will improve the water quality of the effluent.
- However, there is no indication that the RO plant is in operation or when it will start to treat water.



## 7.1 SLEMA's activities: Comments on DB Low Level Exceedances Notification

### ➤ SLEMA COMMENTS:

- Also that, in addition to mine water, nutrients have also been reported in significant levels for the following SNP monitoring stations:
  - SNP 2-2 North Pile Collection Ditch, and
  - SNP 02-16i Sewage discharge from Sewage Treatment Plant. Particularly, a value as high as 501 mg/L of N-Nitrite has been reported for SNP 02-16i on the April 26, 2018.



## 7.1 SLEMA's activities: Comments on DB Low Level Exceedances Notification

### ➤ SLEMA COMMENTS:

With respect to thallium in fish tissue chemistry, SLEMA notes that:

- In 2013, low action levels were triggered for both cesium and thallium in fish tissue;
- Related to that, in 2015 there was a Response Plan for thallium and cesium;
- In 2016 the Annual AEMP Report states “mean round whitefish muscle thallium concentration in Snap Lake in 2016 was greater than that of Snap Lake in 2013 and 2009”.



## 7.1 SLEMA's activities: Comments on DB Low Level Exceedances Notification

### ➤ SLEMA COMMENTS:

- However, according to the approved AEMP proposed for the 2016-2017 period only one small-bodied fish health/fish tissue was scheduled for 2018.
- It seems that the Response Plan did not work, also that just one sample in a period of four years for a component that still shows issues is not enough.



## 7.1 SLEMA's activities: Comments on DB Low Level Exceedances Notification

- SLEMA recommends the MVLWB to request De Beers the following information:
  - Whether the RO treatment plant is ready to be operated;
  - When the RO treatment plant would be operational;
  - If significant volume of not treated seepage from the North Pile ditch is likely to reach the Lake;



## 7.1 SLEMA's activities: Comments on DB Low Level Exceedances Notification

- SLEMA recommends the MVLWB to request De Beers the following information:
  - Whether the small-bodied fish health/fish tissue sampling frequency as presented in the approved AEMP is adequate considering that thallium in fish is already an issue;
  - What De Beers considers is the main route of thallium transportation to Snap Lake, through sediments or dissolved in the treated effluent?



## 7.1 SLEMA's activities: Comments on DB Low Level Exceedances Notification

- Further to that, SLEMA recommends DB to work on the improvement of the sewage treatment system, that can lead, assuming WL compliance, to the direct discharge of the treated sewage to SL.



## 7.2 SLEMA's activities: Comments on DB 2018 AR

- The 2018 Annual Report was found to meet the Water Licence requirements prescribed under Part B, Item 7 and Schedule 1.
- In addition, SLEMA recommended the MVLWB to request De Beers provide more information on the following issues:
  1. Runoff Compliance with Water Licence:
    - According to both, the WMP for ECM and the ARD and Geochemical Characterization runoff at site is directed to the WMP;





## 7.2 SLEMA's activities: Comments on DB 2018 AR

- However, according to 2018 AR's Table 8-1, there was no runoff water pumped to the WMP during 2018;
- Also, SLEMA noted that the following runoffs sampled during the 2018 water quality monitoring campaign, presented maximum grab limits exceedances for these parameters:



## 7.2 SLEMA's activities: Comments on DB 2018 AR

- SNP 2-3 (core facilities and collection ditch near WMP),
- SNP 2-4 (uncontrolled surface runoff at culvert by air strip),
- SNP 2-5 (uncontrolled runoff at bulk sample rock pad),
- SNP 2-6 (uncontrolled surface runoff at quarry site),
- SNP 2-7 (uncontrolled surface runoff at road to Bulk Emulsion Plant),



## 7.2 SLEMA's activities: Comments on DB 2018 AR

- SNP 2-8 (uncontrolled surface runoff at Winter Access Road),
  - SNP 2-9 (uncontrolled surface runoff at Emulsion Plant Area).
- SLEMA recommends De Beers discuss how it managed water runoff at site in order to satisfy Water Licence condition under Part F, Item 8 “All Water or Waste from the Project that enters the Receiving environment .... shall meet the WL effluent quality criteria”.



## 7.2 SLEMA's activities: Comments on DB 2018 AR

### 2. Disposal of Residuals from the Water Treatment Plant (WTP):

- Residue originated by the water treatment process, i.e. coagulation sludge and filtered solids, usually contain elevated concentrations of contaminants removed during the treatment process;
- The addition of water to the WMP may later redissolve some of these contaminants;



## 7.2 SLEMA's activities: Comments on DB 2018 AR

### 2. Disposal of Residuals from the Water Treatment Plant (WTP):

- As a result, the level of contaminants (as TDS or as TSS) in the Water at the WMP may increase.
- SLEMA recommends De Beers discuss the rationale for the disposal of WTP residual into the WMP instead of the NP landfill.



## 7.2 SLEMA's activities: Comments on DB 2018 AR

### 3. Water quality of seepage and runoff from the North Pile

Since the beginning of tailings deposition in the NP, the disposal of the tailings as past switched to the disposal of tailings as slurry;

Changes due to this “switch” of plans imply the following:

- The amount of water initially predicted to come from the North Pile has increased from what was initially planned;



## 7.2 SLEMA's activities: Comments on DB 2018 AR

### 3. Water quality of seepage and runoff from the North Pile

- As well as the length of time that the NP would expel all the water inside;
- The cryoconcentration effect may produce water with a significant concentration in contaminants;
- It is very likely that the water chemistry of NP seepage change with time;



## 7.2 SLEMA's activities: Comments on DB 2018 AR

### 3. Water quality of seepage and runoff from the North Pile

- For Instance, it has been detected an increase in the amount of sulfate in the water from the NP;
- None of these issues has been discussed in the ARD and Geochemical Characterization Report;
- The predicted composition of NP seepage/runoff is very important to assess the type of treatment that it will require.





## 7.2 SLEMA's activities: Comments on DB 2018 AR

### 3. Water quality of seepage and runoff from the North Pile

- SLEMA recommendation: The following are important points to discuss in this Report:
  - Why sulfate is increasing? Is it related to ARD? And, how much of the increase can we expect, and for how long?
  - How long will it take for the pile to freeze, and the effect of cryoconcentration in the water quality on the long term.



## 7.2 SLEMA's activities: Comments on DB 2018 AR

### 3. Water quality of seepage and runoff from the North Pile

- Also, SLEMA recommends
  - That tables in the Report include under major ions, all the actual major ions present in the water and not just fluoride as they are presented.



## 7. Case Study: An Overview of Costs related to the SL Mine Closure



# An Overview of Costs related to the SL Mine Closure

- Activities proposed for the closure of SL Mine are:
  - Underground Mine (UM): Plugging and blocking off all access points (e.g. portal, raises, etc.);
  - North Pile: covering the surface with a 0.3 m to 2 m thick rock cover and slope the constructed cells towards spillways to promote runoff;



# An Overview of Costs related to the SL Mine Closure

- Buildings and Equipment: Equipment is decontaminated, drained of fluids (which will be disposed of off-site);

All buildings are demolished;

Buildings and Equipment will be disposed of in the onsite landfill;



# An Overview of Costs related to the SL Mine Closure

- Hazardous materials and chemicals will be disposed of off-site in a licensed facility;
- Additional surface reclamation work including grading, contouring and revegetation (North Pile is not revegetated);
- Contaminated soil from light hydrocarbon spills will be excavated and treated using an on-site landfarm to remediate the soil to acceptable soil quality criteria;





# An Overview of Costs related to the SL Mine Closure

- NP Drainage Management and Treatment:

Some factors influencing the water quality of drainage released from NP are:

interaction of runoff with PK,

interflow,

pile draindown,

and freezing concentrations within the pile;



# An Overview of Costs related to the SL Mine Closure

- NP Drainage Management and Treatment:

The North Pile currently contains layers of frozen and unfrozen kimberlite;

It is expected that as freezing continues, seepage rates will decrease, whereas seepage water concentrations may increase;





# An Overview of Costs related to the SL Mine Closure

- NP Drainage Management and Treatment:  
*“It is not possible to fully evaluate how these competing factors will influence the water quality in the intermediate term;*

*Over the long-term, it is expected that freezing of the pile will reduce the overall concentrations and loading from the North Pile.”*



# An Overview of Costs related to the SL Mine Closure

- NP Drainage Management and Treatment

After four years of active treatment, if required, drainage will be treated by a constructed wetland;

This constructed wetland and auxiliary system (passive treatment system) are permanent features that will remain into the Post Closure.



# An Overview of Costs related to the SL Mine Closure

## ➤ RECLAMATION COMPONENTS and COSTS:

For each reclamation component, the objective (i.e., condition) at closure was selected and the reclamation actions required to achieve the closure objective were selected;

For each reclamation action a cost was assigned, and the total cost for all reclamation activities was calculated;

The land and water liabilities were split for each cost.



# An Overview of Water Quality at Snap Lake Mine Site During C&M

## ➤ RECLAMATION COMPONENTS:

- Underground mine
- Processed kimberlite facility (North Pile)
- Buildings and equipment
- Chemicals and contaminated soil management
- Surface and groundwater management
- Interim care and maintenance



# An Overview of Water Quality at Snap Lake Mine Site During C&M

## ➤ CLOSURE TIMELINE:

Following the approval of the Final Closure and Reclamation Plan (FC&RP), De Beers proposed timelines is:

- 1) One year more of EC&M;
- 2) Eight years of Closure Phase;
- 3) Twenty years of Post-Closure



# An Overview of Water Quality at Snap Lake Mine Site During C&M

## ➤ CLOSURE TIMELINE:

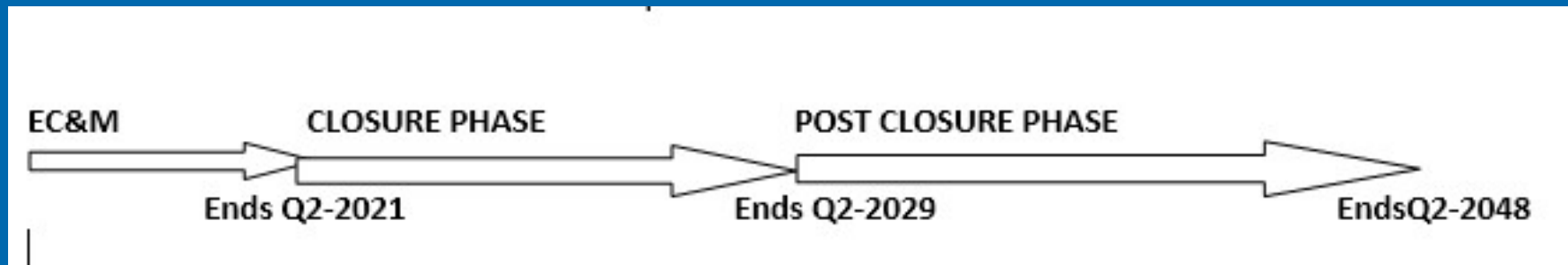


Fig 1 Closure Timeline



# CLOSURE ACTIVITIES COMPLETED & TIMELINE:

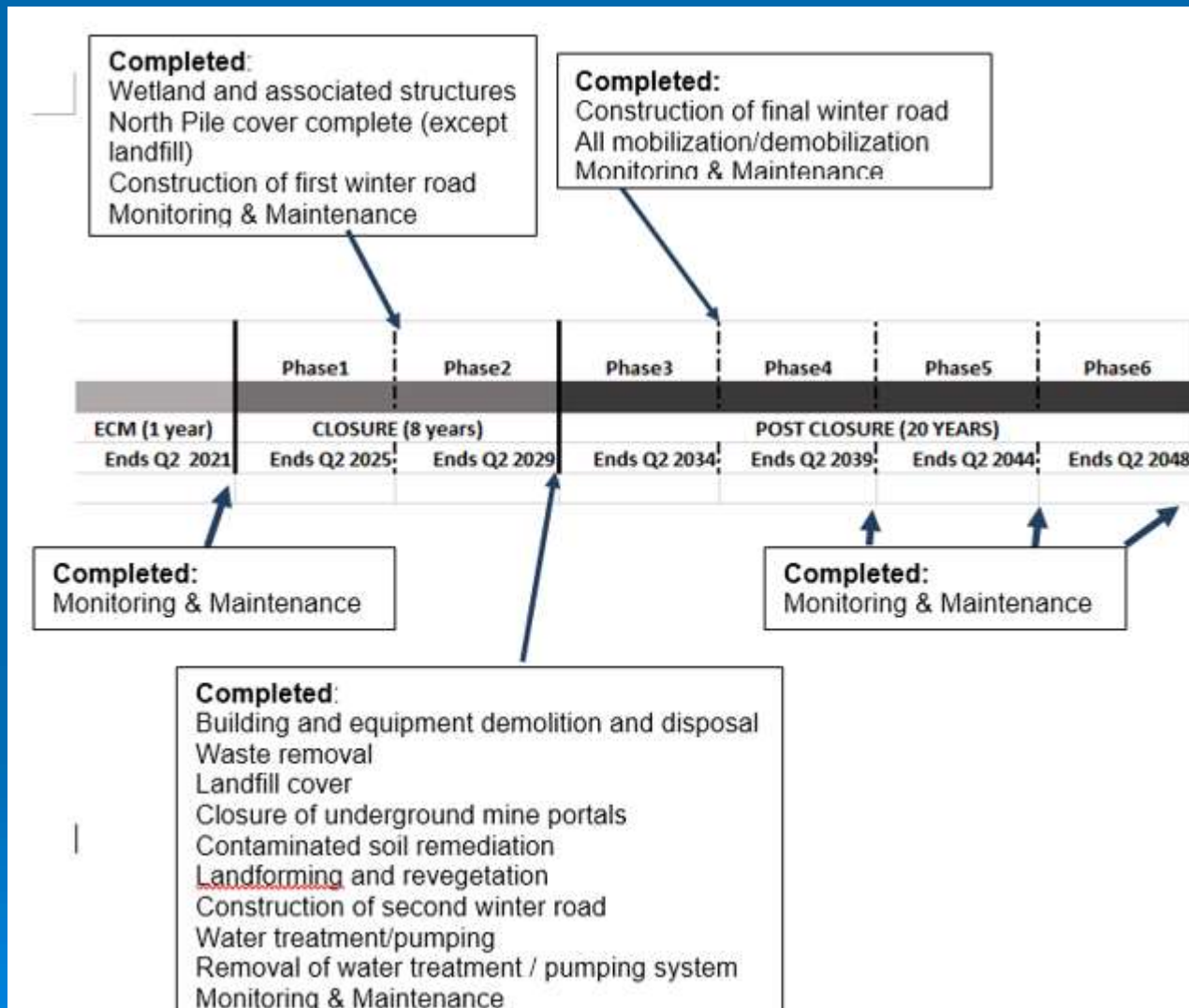


Fig 2 closure activities completed



# An Overview of Costs related to the SL Mine Closure

- Summary of the total reclamation security for the Mine

TOTAL COSTS	LAND LIABILITY	WATER LIABILITY
\$85,129,915	\$39,574,494	\$45,555,421

- The water related liability should be placed within the Water Licence and the land related liability within the Land Use Permit;
- DB requests that the total security hold by the WL and LUP be reduced from the amount hold by the Environmental Agreement.





# An Overview of Costs related to the SL Mine Closure

- Summary of the total reclamation security for the Mine
  - A phased reduction in reclamation security is proposed with time;
  - Thus, as reclamation is completed and/or after a set monitoring duration is completed, a reduction in security occurs;
  - The following Table summarizes the staged reduction in security amount requested by DB



# An Overview of Costs related to the SL Mine Closure

Table 10. Summary of the staged reduction in total reclamation security for the Mine.

Closure Phase	Total Costs	Land Liability	Water Liability
Total reclamation security	\$85,129,915	\$39,574,494	\$45,555,421
Phase 1 – End of year 4 of Closure	\$51,939,091	\$42,584,983	\$9,354,108
Phase 2 – End of year 8 of Closure	\$19,680,631	\$9,840,315	\$9,840,315
Phase 3 – End of year 5 of Post Closure	\$1,782,350	\$891,175	\$891,175
Phase 4 – End of year 10 of Post Closure	\$1,181,567	\$590,783	\$590,783
Phase 5 – End of year 15 of Post Closure	\$590,783	\$295,391	\$295,391
Phase 6 - End of Post Closure (Year 20)	\$0	\$0	\$0

Extracted from DB, 2019 Reclaim Financial Security Estimate,  
Appendix F of FCRP



# An Overview of Costs related to the SL Mine Closure

DB is requesting that by end of Phase 1, the Security posted be reduced to \$51,939,091;

According to DB presented costs calculation, that is the amount corresponding to Phase1, once all the reclamation activities of that phase are completed.

However, according to Figure 2 (Closure activities completed) the costs executed by the end of Phase 1 is **CAD 25,048,628.66**



# An Overview of Costs related to the SL Mine Closure

And the cost executed by the end of Phase 2 is **CAD 46,571,094 .**

There is a difference in the proposed staged reduction of security (Table 10) and the activities completed or executed during periods 1 and 2.



# An Overview of Costs related to the SL Mine Closure

A reduction in security may occur when a reclamation component is completed and/or after a set monitoring duration is completed, for the amount required to complete the activity.

Also, the request for security reduction should be accompanied by

“Credible evidence that the reclamation objectives for that phase or component were achieved as planned”

