Ms. Violet Camsell-Blondin  
Chair  
Wek’èezhíi Land and Water Board  
Box 32  
Wekweeti, NT X0E 1W0

20 October 2015

Re: W2015L2-0001 Amendment Application


Part H Item 31 states that:

“31. The Licensee shall ensure that all in-lake dredging, dike Construction, or other in-lake activities meet the following criteria: At SNP Station #1645-82 to 1645-84 inclusive, and at a 200 metre distance in any direction from the centerline of the dike footprint the maximum concentration for Total Suspended Solids shall not exceed 25 mg/L over the background concentration at SNP station #1645-55, in any grab sample. “

DDMI is requesting that Part H Item 31 be revised to read as follows:

“31. The Licensee shall ensure that all in-lake dredging, dike Construction, or other in-lake activities meet the following criteria: At SNP Station #1645-82 to 1645-84 inclusive, and at a 200 metre distance in any direction from the centerline of the dike footprint the maximum concentration for Total Suspended Solids shall not exceed a 30-day moving average of 25 mg/L over the background concentration at SNP station #1645-55, as calculated from daily in any grab samples. “

Rationale – TSS Limit

Management of total suspended solids (TSS) is an important aspect of A21 dike construction as it was for A418 and A154 dikes previously. Construction activities and TSS control measures can be managed adaptively in response to changing site conditions and measured TSS concentrations.

TSS concentrations during dike construction are affected by many changing variables including wind speed, wind direction, wind duration, lake current, thermal stratification, and TSS particle size in addition to the changing construction activities of dredging, boulder removal, dumping, buttress dumping, filter blanket placement, embankment advancement, and anchor movement. Most of these variables change regularly within a given day.

DDMI periodically monitors turbidity (an indicator of TSS) within the construction area, continuously monitors turbidity at two SNP locations and daily collects samples for direct TSS analysis at the three SNP stations. Collectively these data provide a measure of local
variability and assist in providing early warnings to trigger adaptive management. However any regulatory limit established based on daily grab samples would be including variability caused by events beyond DDMI’s control and variability caused by abnormal construction activities before they could be corrected.

DDMI has no control over the ambient conditions faced during A21 construction (for example wind driven lake currents). Even extreme corrective actions (for example stopping all in-lake construction) are not expected to have immediate effects on TSS levels. Construction activities cannot be managed with the same level of control as, for example, a water treatment plant. In a water treatment plant where there is a very high level of engineering control, taking corrective actions such as re-routing a discharge during an abnormal operating event has a high likelihood of being able to ensure compliance with a license limit.

It is DDMI’s view that for activities like dike construction that are subject to highly variable conditions with limited control in the short-term, a time averaged TSS limit is more appropriate. DDMI proposed a 30-day average for TSS in the Dredging TSS Management & In-Lake Construction Plan (NKSL September 2000) submitted under Part C Item 9 of Water License N7L2-1645 for the A154 dike construction:

“Each of the SNP locations identified above will be sampled daily. Daily TSS results are necessary to get a measure of variability in conditions that will occur at site. However, daily results are not an appropriate measure of best management performance. Daily results include variability due to specific events such as storm, localized activity such as anchor movements, or short periods of abnormal operations before adaptive management actions correct conditions. For this reason moving 30 day average TSS concentrations will be tracked from each SNP location as the relevant performance indicator.”

The A154 Dredging Management Plan was reviewed by the Technical Committee to the Mackenzie Valley Land and Water Board (MVLWB) on October 5, 2000 and October 30, 2000. Environment Canada specifically supported a 30-day averaging period in their submission of October 25, 2000:

“The results of daily samples averaged over 30 days as proposed by DDMI would provide a reasonable method of tracking long term trends in the management of TSS. Unfortunately this sampling schedule can not track short term exceedance effectively. The thirty day average for the 25 mg/L TSS limits for the water license is acceptable to EC, however EC also recommends that DDMI implement within its Environmental Management System, a second, shorter period (i.e. seven day average) to ensure Best Management Practices are effectively implemented. Monitoring of TSS averages on a short term basis will allow earlier detection if the limit is being approached.”

The MVLWB approved the Dredging TSS Management & In-Lake Construction Plan on November 20, 2000.

The Department of Fisheries and Oceans (DFO) also recently suggested a moving-average TSS limit in their A21 CEMP review submission of September 23, 2015:

“DDMI has expressed a concern that daily grab sample concentrations may not be optimal for adaptive management of TSS concentrations without real-time monitoring information (p. 75). DFO-FPP suggests that the WLWB may wish to consider a moving-average TSS concentration related to existing (25.0 mg/L) or proposed (turbidity equivalent to 20 mg/L; p 76) Water License TSS limits in the development of a Regulatory TSS Response Plan. Such an average may more effectively act as a trigger for a TSS Response Plan, particularly during dike construction when significant transient increases in TSS are more likely to occur compared to other activities.”
In response to the DFO suggestion the WLWB noted that such a change would require a Water license amendment (WLWB letter of October 6, 2015).

Amending Part H Item 31 from a grab limit of 25 mg/L to a moving 30-day average limit of 25 mg/L is unlikely to cause adverse effects to the environment. TSS thresholds at which effects to fish might occur due to dike construction activities were specifically considered for the Environmental Assessment of the Project (Comprehensive Study Report, Canada 2000 and Environmental Effects Report - Fish & Water, Diavik 1998) and during subsequent regulatory approvals including the original Fisheries Authorization (SC98001). The attached Table 1 provides scientific evidence that the expected concentration and duration of exposure for TSS at which adverse effects to fish might occur is significantly greater than the 25 mg/L for both a grab and 30 day-moving average duration. Table 1 is also the science basis for the Project Environmental Assessment and the original Fisheries Authorization.

Rationale – Location Reference

The amendment application includes removing the phrase “and at a 200 metre distance in any direction from the centerline of the dike footprint” from Part H Item 31 and specify the location of each SNP Station (1645-82 to 1645-84) as georeferenced locations in the Surveillance Network Program (as they are currently). Removing the location reference would allow changes to be made to a location with approval of the WLWB rather than with an amendment to the license. DDMI is concerned that Station 1645-84 in particular may be too close to the turbidity barrier during 2016 construction. We note that the locations of A154 and A418 monitoring were specified in the SNP and/or CEMP and they were not necessarily aligned with the description in Part H Item 31 resulting in a conflict between the water license and SNP.

2015 Conditions

DDMI’s experiences during the 2015 construction season provide additional evidence in support of this amendment application.

Figure 1 shows the TSS monitoring results for the 2015 construction season. Presented are the TSS levels (as mg/L above background) at each of the three SNP locations. Included for reference is the Water License limit of 25 mg/L above background. With the exception of 4 days all daily results were below 10 mg/L. On August 8, 2015 the TSS level spiked to 32 mg/L at 1645-84 as the result of a wind/lake current event and a malfunctioning turbidity barrier. Real-time turbidity monitoring at 1645-84 indicated that estimated TSS levels went from less than 5 mg/L to greater than 30 mg/L in under 10 minutes between 8:40 and 8:50 am. TSS levels returned to below 5 mg/L by 11:30 am. The regulatory SNP sample that measured 32 mg/L was collected at 10:20 am.

The Inspector’s expectation is for DDMI to ensure that TSS that approaches the compliance limit of 25 mg/L can be detected and can be mitigated before compliance limits are exceeded (Inspector letter August 19, 2015). The example above demonstrates the challenge in trying to adaptively manage to a daily TSS limit. Even if all in-lake activities were stopped and the turbidity barrier malfunction corrected instantly when the elevated TSS was detected at 8:50 am on August 8, 2015; the SNP sample at 10:20 am would likely still have exceeded the 25 mg/L limit. Regulatory compliance based on a single point-in-time grab limit is not practical for activities like dike construction where conditions are substantially affected by events beyond the control of construction management.

DDMI took substantive measures in 2015 in an attempt to ensure compliance with the TSS limit of 25 mg/L. In addition to the continued application of best management practices to all in-lake construction activities, DDMI stopped or delayed in-lake construction activities for 28 days in 2015 as mitigation to ensure compliance with the TSS limit. These 28 days of stopped or delayed construction is 26% of the typical 106 ice-free days when in-lake construction can proceed. In addition to the 28 days when construction did not occur for
regulatory reasons, 6 additional days of construction were lost due wind speeds exceeding construction equipment limits.

Diavik Diamond Mines (2012) Inc. requests the Wek’éezhíi Land and Water Board to consider this application in a timely manner and importantly with sufficient time that a decision can be integrated effectively into the 2016 A21 Construction season that will commence mid-July. This would include and necessary revisions to the TSS Response Plan.

We believe this application is both clear and complete, however if you have any questions please direct them to my attention.

Regards,

Gord Macdonald

cc  Sarah Elsasser
    Ryan Fequet

Attachment : Amendment Application Form

References:

Department of Fisheries and Oceans (DFO) September 23, 2015. Letter to Wek’éezhíi Land and Water Board – Comments on Diavik A21 CEMP (Version 4.2).


Figure 1. SNP Monitoring Results – A21 Construction - 2015

A21 Total Suspended Solids (mg/L) over Control Site 1645-55
Integrated Depth Sampling of Water Column – Water License
Table 1: Threshold total suspended solids (TSS) concentrations to minimize adverse effects on adult and juvenile fish.

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APPLICATION FOR A NEW WATER LICENCE, AMENDMENT OF LICENCE, OR RENEWAL OF LICENCE

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1. **Name and Mailing Address of Applicant**
   
   Diavik Diamond Mines (2012) Inc. (DDMI)
   Suite 300, 5201 - 50th Ave
   P.O. Box 2498
   Yellowknife, NT X1A 2P8
   
   Telephone: 867-669-6500
   Fax: 867-669-9058

2. **Address of Head Office in Canada if Incorporate**
   
   Same as in #1

3. **Location of Undertaking (Describe and attach a map, indicating watercourses and location of any proposed waste deposits).**

   The Diavik Diamonds Project is located on and adjacent to the east island located on the eastern side of Lac de Gras, which is approximately 300 kilometers northeast of Yellowknife.
4. Description of Undertaking (Describe and attach plans)

In brief, the undertaking involves the dewatering of inland lakes, the construction of dikes adjacent to the east island, transferring of water, followed by open pit mining and underground mining to excavate kimberlite from four identified economical kimberlite pipes and mine closure.

The kimberlite will be processed to extract diamonds. Mined country rock will be placed on the east island with a considerable amount of the material being utilized in dike construction. All other infrastructure associated with the undertaking (including processed kimberlite containment (PKC) area) will be located on the east island.

The Comprehensive Study Report CSR.pdf provides a more complete description.

5. Type of Undertaking.

1. Industrial
2. Mining and Milling   X
3. Municipal
4. Power
5. Agriculture
6. Conservation
7. Recreation
8. Miscellaneous
6. **Water Use**

   - To obtain water: X
   - Flood control: 
   - To cross a watercourse: 
   - To divert water: X
   - To modify the bed or bank of a watercourse: X
   - To alter the flow of, or store water: X

   Other (describe): 

7. **Quantity of water involved (litres per second, litres per day or cubic meter per year), including both quantity to be used and quality to be returned to source.**

   The mine operations use water from Lac de Gras as make-up water to supplement recycle water for ore processing. DDMI’s current and proposed future Water License state a maximum annual withdrawal rate of 1.28 Mm\(^3\) for domestic, mining, milling and associated purposes. Additionally, DDMI estimates 6.7 Mm\(^3\) for A21 pool dewatering and 1.5 Mm\(^3\) during in lake dredging operations. These estimates are within the amounts currently specified in W2015L2-0001.

8. **Waste deposited (quantity, quality, treatment and disposal)**

   A Waste Management Plan for the proposed activities is to be developed in accordance with the Board’s *Guidelines for Developing a Waste Management Plan* (accessible at [www.mvlwb.com](http://www.mvlwb.com)) and submitted as an attachment to the application form. A template for this Plan is provided in the Guidelines. Applications for a municipal licence do not need to include a Waste Management Plan as this information is required under the Operation and Maintenance Plan.

   In addition, applicants are referred to the Board’s *Water and Effluent Quality Management Policy* (accessible at [www.mvlwb.com](http://www.mvlwb.com)) to understand the Board’s approach to managing the deposit of waste into the receiving environment through enforceable terms and conditions set in water licences.

   DDMI developed a Waste Management Plan in accordance with the Board’s Guidelines and submitted this plan on January 16, 2015 with the application to renew Water License W2007L2-0003. Water License W2015L2-0001 at Part H Item 1 specifies that a Waste Management Plan must be submitted within 90 days of the effective date of the License. DDMI requests that a revised Waste Management Plan be submitted as per Part H Item 1 rather than with this amendment application.

9. **Other persons or properties affected by this Undertaking (give name, mailing address and location). Attach a list if necessary.**
10. **Predicted environmental impacts of Undertaking and proposed mitigation.**

As part of the response to this section, a spill contingency plan for the proposed activities is to be developed in accordance with INAC’s *Guidelines for Spill Contingency Planning, April 2007.* (Accessible at [http://www.ainc-inac.gc.ca/ai/scr/nt/pdf/SCP-EUD-eng.pdf](http://www.ainc-inac.gc.ca/ai/scr/nt/pdf/SCP-EUD-eng.pdf)). This plan is to be submitted as an attachment to the application form.

11. **Contractors and sub-contractors (names, addresses and functions). Attach a list if necessary.**

Over the past 15 years, Diavik has retained a number of contractors in order to complete the environmental baseline studies, the impact assessment studies, engineering studies and environmental monitoring programs. Listed below are the key consultants involved in the areas related to the water license:

i) Bryant Environmental Consulting Ltd/Acres International  
   Yellowknife, N.T. X 1 A 2N9  
   (Function - Baseline data collection in 1994 and 1995)

ii) Golder Associates  
    Yellowknife, NT  
    (Function - Baseline data collection for water quality, fisheries, hydrology, EA document, monitoring studies, Geotechnical and Hydrogeological investigations, AEMP, air quality)

iii) Vista Engineering  
     Yellowknife, N.T. X1A 2P5  
     (Function - Baseline data collection and air quality)

iv) Sala Groundwater Inc  
    Dr. David Blowes  
    University of Waterloo  
    Waterloo, Ontario  
    (Function - Baseline geochemistry program)

v) Geochemica  
   Mr. Mark Logsdon  
   Ojai, California  
   (Function - baseline geochemistry programs)

vi) Jacques Whitford Consulting Engineers and Environmental Consultants  
    Yellowknife, NT  
    (Function - Collection of meteorological/climate baseline data, environmental monitoring studies)

vii) Cirrus Consultants  
     Vancouver, B.C. V6B 4M9  
     (Function - Impact analysis for air quality - 1998)

viii) EBA Engineering Consultants Ltd
Edmonton, Alberta T5L 2M7  
(Function - Geotechnical/foundation investigations)  

ix) Acres International Engineering Ltd  
Calgary, Alberta T2W 4X9  
(Function – Design Engineering)  

xi) Nishi-Khon / SNC Lavalin  
Calgary, Alberta  
(Function – Design Engineering)  

xii) Rescan Environmental Services Ltd  
Yellowknife, NT  
(Function – Environmental monitoring studies)  

xiii) Dillon Consulting Ltd.  
Yellowknife, NT  
(Function – Environmental monitoring studies)  

xiv) Canadian Rivers Institute and University of Manitoba  
Winnipeg, Manitoba  
(Function – Environmental monitoring studies)  

xv) Rae Band  
(Function – fish salvage programs)  

xvi) Kitikmeot Inuit Association  
(Function – fish salvage programs)  

xvii) University of Alberta  
Edmonton, Alberta  
(Function – Environmental monitoring studies, test piles research, revegetation studies)  

xviii) University of British Columbia  
Vancouver, B.C.  
(Function – Environmental monitoring studies, test piles research)  

xix) University of Waterloo  
Waterloo, Ontario  
(Function – Environmental monitoring studies, test piles research)  

xx) University of Saskatchewan  
Saskatoon, Saskatchewan  
(Function – Environmental monitoring studies)  

xxi) AMEC Earth and Environment  
Vancouver, B.C.  
(Function – closure planning and engineering)  

xxii) ERM Rescan  
Vancouver, B.C.  
(Function – air quality, risk assessment)  

xxiii) Environmental Monitoring Advisory Board  
Yellowknife, NT  
(Function – Community Based monitoring programs)  

12. Studies undertaken to date. Attach a list if necessary.  

See attached list.
13. Proposed time schedule.

Start date: 2000  
Completion date: Post-Closure Monitoring 2030

Name (print): Gord Macdonald  
Signature:

Title (print): Principal Advisor, Sustainable Development  
Date: October 23, 2015

Please make all cheques payable to “Receiver General of Canada”

FOR OFFICE USE ONLY

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Water Use Deposit Amount: $___________  
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Operations and Notifications


Other


Pits Dikes Ponds-North Inlet


Pits Dikes Ponds-A21


Waste Rock Seepage

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