

MACKENZIE VALLEY ENVIRONMENTAL

IMPACT AND REVIEW BOARD

PUBLIC HEARING

SNAP LAKE DIAMOND MINE AMENDMENT PROJECT

EA1314-02

Mackenzie Valley Review Panel:

Chairperson	JoAnne Deneron
Board Member	Kirby Marshall
Board Member	Yvonne Doolittle
Board Member	James Wah-Shee
Board Member	Sunny Munroe
Board Member	John Curran
Board Member	Mike McLeod

HELD AT:

Explorer Hotel

Yellowknife, NT

June 5, 2014

Day 1 of 2



“When You Talk - We Listen!”



1 APPEARANCES

2	Alan Ehrlich	) MVEIRB
3	Chuck Hubert)
4	Stacey Menzies)
5	Simon Toogood)
6	Sachi DeSouza)
7	Mark Cliffe-Phillips)
8	Catherine McManus)
9	John Donihee	) Counsel
10		
11	Kathy Racher	) MVLWB
12	Lindsey Cymbalisty)
13	Zabey Nevitt)
14	Ryan Fequet)
15	Jessica Pacunyan)
16	Elissa Berrill)
17		
18	Alex Hood	) De Beers Canada
19	Julie L'Heureux)
20	Erica Bonhomme)
21	Dave Putnam)
22	Glen Koropchuk)
23	Steven Ridge)
24	Tom Omsby)
25	Terry Kruger)

	APPEARANCES (Con't)	
1		
2	Shirley Tsetsa	) De Beers Canada
3	Doreen Apples)
4	Martin Ignasiak	) Counsel
5		
6	Peter Chapman	) Golder Associates
7	Hilary Machtans)
8	Alison Snow)
9	Tasha Hall)
10	R. Bourke)
11	K. Brettlauff)
12		
13	Sarah-Lacey McMillan	) Environment Canada
14	Carey Ogilvie)
15	Anita Li (by phone))
16		
17	Matt Hoover	) NSMA
18		
19	Sean Whitaker	) GNWT
20	Robert Jenkins)
21	Paul Green)
22	Rick Walbourne)
23	Lorraine Seale)
24	F. Jackson)
25	Paul Mercredi)

	APPEARANCES (Con't)	
1		
2	Lori McGregor	) GNWT
3	Lionel Marcinkosky)
4	Jason Steele)
5	Scott Stewart)
6	Marty Sanderson)
7	Ariane Vincent)
8	Valene Gordon)
9	Angela Norris)
10	Lindsay Armer)
11	Shafic Khouri)
12	Tracey Covey)
13	Leila Beaudouin)
14	Rohan Brown	) Counsel
15	Don MacDonald	) MESL
16	Jesse Sinclair	) MESL
17		
18	Todd Slack	) YKDFN
19	Josh Campbell)
20		
21	Marc d'Entremont	) DKFN
22	Stanley Louine)
23		
24	Mike Tollis	) LKDFN
25	Ron Desjerlais)

1	APPEARANCES (Con't)	
2	Don Hart	) EcoMetrix
3		
4	David Alexander	) CANNOR/NPMO
5	Marie Adams)
6		
7	Zhong Liu) SLEMA
8	Philippe DiPizzo)
9		
10	Walter Orr) Stantec
11		
12		
13		
14		
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1 --- Upon commencing at 9:02 a.m.

2

3 THE CHAIRPERSON: Good morning and
4 welcome to this public hearing. We will begin our
5 morning with an opening prayer, if we all could stand,
6 please.

7

8 (OPENING PRAYER)

9

10 THE CHAIRPERSON: Masi, James. My name
11 is JoAnne Deneron, and I am the Chair of the Mackenzie
12 Valley Impact Review Board. For those requiring
13 translation, there are receivers available with English
14 on channel 1, Chipewyan on channel 4, and Tlicho on
15 channel 3.

16 Please be mindful of the translators as
17 they would need people to speak at a moderate pace so
18 that they would be able to keep up to the translation.
19 Microphones are at the tables, and we ask that every
20 time you're going to be speaking that you state your
21 name and press the little button at the end of the
22 speaker.

23 Some of the logistics for this room:
24 The washrooms are just across the hall as you exit the
25 door. The emergency exits are straight out the door

1 and signed across the room.

2 We are here today to listen to what you
3 have to say about De Beers Canada's proposed amendment
4 to Snap Lake's water licence. The proposal includes
5 changing the quality of effluent released into Snap
6 Lake.

7 The Review Board is a co-management body
8 established under Part 5 of the Mackenzie Valley
9 Resource Management Act. The Review Board is the main
10 instrument in the environmental assessment and
11 environmental impact review of developments in the
12 Mackenzie Valley. Board members are northerners
13 nominated by First Nations organizations and by the
14 Tlicho, territorial, and federal governments. The
15 Review Board makes its decisions by consensus.

16 I will now briefly talk about the
17 process that got us to this point. On December 20th,
18 2013, De Beers Canada Incorp., the Developer, made an
19 application to the Mackenzie Valley Land and Water
20 Board to amend its existing water licence for the Snap
21 Lake diamond mine.

22 On January 22nd, 2014, this application
23 was referred by the Mackenzie Land and Water Board to
24 the Review Board for environmental assessment. The
25 water licence amendment application was referred to

1 environmental assessment based on judicial questions
2 and concerns raised by parties.

3 The amendment would exceed De Beers's
4 current limit for one (1) water quality perimeter,
5 total dissolved solids, or TDS. The current limit was
6 included by the Review Board in Measures number 51 and
7 number 102 in the original Snap Lake environmental
8 assessment that was completed in 2003.

9 On February 24th, 2014, the Review Board
10 issued a draft EA scoping document for comment. Based
11 on comments received from reviewers and the Developer,
12 the Review Board issued its reasons for decision on the
13 scope of EA for the Snap Lake diamond mine amendment on
14 March 28th, 2014.

15 The reason for decision concluded that
16 the proposed amendments would be assessed by the Review
17 Board would only include total dissolved solids and all
18 its constituents.

19 Since the Developer's amendment
20 application included sufficient information to commence
21 an assessment of those amendments, the Review Board did
22 not issue a terms of reference and did not require the
23 preparation of a Developer's assessment report.
24 However, the Review Board required the Developer to
25 submit additional information in order to satisfy

1 Sections 114, 115, and 117 of the Mackenzie Valley
2 Resource Managements Act.

3 In particular, these sections require
4 the Developer to describe the biophysical,
5 socioeconomic, and cultural impacts of the amendment
6 activities, as well as cumulative impacts, accidents
7 and malfunctions, and alternative means of carrying out
8 these activities.

9 The reasons for decision further stated
10 that the water licensing process would address all of
11 the proposed amendments that may be outside the scope
12 of this EA. On March 25th the Land and Water Board and
13 the Review Board issued a combined work plan; that plan
14 describes joint process steps and timelines, as well as
15 a separate EA hearing phase and regulatory phase.

16 Due to the limited scope of this EA, the
17 Review Board has worked to follow a very efficient
18 process coordinating information, gathering steps with
19 the Land and Water Board. The two (2) Boards held a
20 technical meeting -- a joint technical meeting on April
21 15th and 16th with follow-up Information Requests and
22 Developer responses submitted by April 30th.

23 The two (2) Boards also hired an
24 independent consultant provide -- to provide a neutral
25 perspective on Snap Lake amendment application for the

1 benefit of all parties. The independent consultant,
2 EcoMetrix, submitted its report on May 8th, and will
3 present its findings later today.

4 Board staff held a pre-hearing
5 conference May 13th, 2014, which described document
6 submission deadlines for parties and the Developer and
7 the outlined hearing procedures. Parties were
8 instructed to submit technical reports by May 21st.
9 Technical reports were received from the Government of
10 the Northwest Territories, the Yellowknives Dene First
11 Nation, Lutsel K'e First Nation, Environment Canada,
12 the North Slave Metis Alliance, and the Deninu K'ue
13 First Nation.

14 De Beers submitted a response document
15 on May 28th, and the parties were required to submit
16 hearing presentations by May 30th and De Beers by June
17 2nd. Notification of this public hearing was posted on
18 the Review Board's website on April 24th and was
19 advertised in News North Northwest Territories on May
20 5th.

21 If we are able to complete the public
22 hearing today, or tomorrow morning we will. However,
23 we have this venue reserved tomorrow as a contingency.
24 We will have coffee breaks and break for lunch at 12:00
25 to 1:15 and for dinner from 5:00 to 6:30 p.m. If the

1 proceedings are not completed, we will reconvene
2 tomorrow morning at 9:00 a.m. We are here to listen to
3 your views about Snap Lake Water Licence Amendment
4 Project. The operator of the existing Snap Lake Mine
5 is De Beers Canada, Incorp., and it is the Developer in
6 this environmental assessment.

7 This amendment application to the
8 existing Snap Lake Mine Water Licence proposes changes
9 to total dissolved solids discharged into Snap Lake
10 from the mine. De Beers will present its application
11 later this morning. Over the course of the day, we ask
12 that you do your best to help the Review Board to
13 understand your views about the proposed development's
14 potential environmental, socioeconomic, and cultural
15 impact, and your view of the potential significance of
16 these impacts.

17 The Review Board will consider these
18 views while it is deliberating on its decision in this
19 environmental assessment. Once that decision is made,
20 the Board will prepare a report of environmental
21 assessment and send it to the GNWT Minister of Lands to
22 consider and to distribute to other responsible
23 ministers.

24 Before we go any further, I would like
25 to introduce our Board members, and then introduce our

1 staff and counsel. Our Board members include Michael
2 McLeod, Sunny Munroe, Kirby Marshall, John Curran,
3 Yvonne Doolittle, and James Wah-Shee.

4 Our staff include Mark Cliffe-Phillips,
5 our executive director; John Donihee, our counsel;
6 Chuck Birchall, counsel; Alan Erlich, manager of EA;
7 Simon Toogood, EA officer and project head lead; Sachi
8 DeSouza, EA officer, Chuck Hubert, senior EA officer --
9 he's around? Way at the back, okay. Stacie Menzies,
10 logistics and planning director officer.

11 I have some additional comments on
12 today's proceedings that I hope will make sure that
13 everything goes smoothly. We have limited time, and
14 the Review Board wants to hear what everyone has to
15 say. Please note that there is agenda for the hearing
16 which is available at the door.

17 At the pre-hearing conference, parties
18 described their time requirements, and Board staff made
19 every effort to meet those requests. I ask everyone to
20 respect the time allotted for their presentations and
21 questions and to use their time effectively.

22 Presenters will be timed and given five (5) minute
23 warnings. Please be advised that when your time is up,
24 you may be interrupted. Keeping to your allotted time
25 is important to make sure that everyone gets their fair

1 chance to be heard and that the Board is committed to
2 fairness.

3 The Review Board will be producing an
4 official transcript of this hearing. This transcript
5 will be available through our website and the public
6 registry for this environmental assessment. Parties
7 should be aware that they will be invited to ask
8 questions in turn after each presentation. The order
9 of questions will follow the list of parties shown on
10 the agenda. After party questions, I will invite
11 questions of staff, counsel, and Board members. Please
12 address all questions to the Chair.

13 De Beers will give a presentation first.
14 And after they have given their presentation, we have
15 scheduled time to allow parties to ask questions. The
16 order of questioning after each presentation will be as
17 follows: The Government of the Northwest Territories,
18 Yellowknives Dene First Nation, Lutsel K'e Dene First
19 Nation, Environment Canada, the North Slave Metis
20 Alliance, Deninu K'ue First Nation, De Beers Canada
21 Incorp.

22 Questions must be asked with a
23 microphone so that everyone can hear and the
24 transcriber can properly record them.

25 There will be a public comment period

1 this evening. A list will be prepared for people who
2 want to speak. Board staff at the back table will
3 prepare this list. The Chair will call the names of
4 people from this list during the public comment period.

5 I would also like to remind presenters
6 that the scope of this assessment for the Snap Lake
7 Mine licence amendment application includes only total
8 dissolved solids and all its constituents. This is
9 clearly stated in the Board's reasons for decision on
10 March 28th.

11 As Chair, I will stop a presentation if
12 the discussion is outside the scope of assessment. For
13 example, discussion of consultation issues and the
14 timelines for this assessment are outside the scope of
15 this assessment and will not be included in
16 presentations. Parties can briefly discuss matters
17 concerning consultation during open statements.

18 At this time, I would like to ask legal
19 counsel, John Donihee, to provide statements on
20 preliminary matters.

21 MR. JOHN DONIHEE: Thank you, Madam
22 Chair. John Donihee, Board counsel. There -- there
23 are three (3) items that have come to the Board's
24 attention which are of the nature of preliminary
25 matters, and we want to bring them up for the parties

1 to -- to address.

2 The first of those is simply a
3 notification we received from EcoMetrix, that they were
4 making a correction to slide number 8 (sic) in their
5 PowerPoint presentation.

6 The Board's understanding is that this
7 is simply a correction to bring the text of the
8 PowerPoint into conformity with the actual evidence.
9 So it's not new; it's just a correction of an error.
10 And from the Board -- from the Board's standpoint, we'd
11 invite anybody who has any issues or concerns with that
12 to speak right now.

13 My apologies, slide 4.

14

15 (BRIEF PAUSE)

16

17 MR. JOHN DONIHEE: Madam Chair, it
18 doesn't appear there's any issue there, so I'll -- I'll
19 move on to the second of the items.

20 The -- the second item relates to a
21 notification that the Board provided to the parties on
22 the 30th of May, and it relates to new Board member,
23 Yvonne Doolittle, and the fact that she is an employee
24 of the Government of the Northwest Territories. The
25 parties were notified and ident -- and -- and the

1 Board's position with respect to questions related to
2 conflict and apprehension of bias where I -- were
3 indicated, and we invited comments from parties, if --
4 if there were any concerns about Ms. Doolittle's
5 participation in the hearing.

6 There -- there were no comments from any
7 of the parties except for the Government of Northwest
8 Territories. We received a letter on -- on the 3rd of
9 June, and the issue from the Board's perspective is
10 simply wanting to have clarification of -- of one (1)
11 portion of that letter on the record.

12 And I'm referring specifically to the --
13 the indication that the Government of Northwest
14 Territories has -- is suggesting that Ms. Doolittle
15 would have to excuse herself from any involvement in
16 any application in which the GNWT is an applicant or a
17 participant. They're obviously not an applicant in
18 this particular case.

19 It's less than clear to the Board what
20 GNWT meant when they said, "or a participant," and
21 we're -- we're inviting GNWT to clarify that for the
22 Board on the record at this point.

23 MR. ROHAN BROWN: It's Rohan Brown,
24 GNWT Legal Division. To clarify, then, with respect to
25 this Environmental Assessment, GNWT's position is that

1 there is no conflict, and that Ms. Doolittle can
2 continue as a Board member. GNWT will, however,
3 undertake to better clarify what was intended in the
4 letter that was sent to the Board.

5 MR. JOHN DONIHEE: I thank -- thank you
6 very much, sir. Madam Chair, I'll move on to the --
7 the third issue. It's John Donihee.

8 The -- the third issue relates to some
9 concerns raised by the Yellowknives Dene First Nation
10 about some new information which they suggest has been
11 included in a PowerPoint presentation that De Beers is
12 about to make.

13 And I won't go much farther than that
14 with it, Madam Chair. I'll -- I -- I -- perhaps we
15 could invite the Yellowknives to speak to their
16 concerns, and then I would suggest that you hear from
17 the other parties, and finally from De Beers Canada
18 with respect to their views about how this matter ought
19 to be dealt with.

20

21 (BRIEF PAUSE)

22

23 MR. JOHN DONIHEE: John Donihee, again.
24 Madam Chair, Mr. -- it was Mr. Slack from the
25 Yellowknives that raised this matter. Perhaps he can

1 speak to it and indicate what -- what he would like the
2 Board to do about it?

3 THE CHAIRPERSON: Mr. Slack...?

4 MR. TODD SLACK: Thank you, Madam
5 Chair. Excuse me. I -- I think it's probably best if
6 I just read the email that -- in which I raised this
7 concern yesterday, and it's addressed to all of the
8 parties who received this presentation, including Board
9 staff and the proponent. And I'll read it verbatim.
10 It -- it says:

11 "Hi, Simon and Alan. I've been doing
12 some thinking, and I'm hoping the
13 Board can make a quick decision on
14 this, this morning -- tomorrow
15 morning. I think that there is
16 certainly a procedural issue to be
17 considered, and that it -- and there
18 may be a technical issue, as none of
19 the consultants have had an
20 opportunity to review the matters,
21 and thus, I can't review the comments
22 that they put into the public forum.
23 To be clear, I'm not saying that
24 there is a technical issue. I don't
25 have the kind of expertise or

1 ability, but if it hasn't -- if there
2 hasn't been the ability for folks who
3 have that expertise and ability to
4 thoroughly review and challenge, I
5 don't think it should form part of
6 the discussion. I've just gotten off
7 the phone with the proponent, Erica
8 and Peter, and they stated that it --
9 and 'it' being the new evidence is
10 not going to change anything they're
11 going to present tomorrow. To me,
12 this makes it easy. I think that the
13 appropriate remedy is to ask the
14 project to roll back their
15 presentation and discussion to the
16 point at which all of the parties had
17 reviewed the -- the submission."

18 And by that, I mean the technical
19 response that they provided. "That" -- oh, and I
20 would go on to say that. Pardon me:

21 "That of the submission of the
22 technical reports."

23 So -- so the technical reports were
24 submitted maybe three (3) weeks ago, I'm not sure of
25 the exact date, and these new numbers that were

1 included in the presentation were provided since that
2 point, and none of -- I don't believe any of the
3 parties have reviewed the methods, or any of the
4 technical information that go behind those.

5 And that's the concern that we have.

6 THE CHAIRPERSON: Thank you, Mr. Slack.
7 I would like to ask each of the parties if they have
8 any comments into Mr. Slack's comments that he has
9 made.

10 If I could ask the Government of the
11 Northwest Territories, any comments?

12 MR. ROBERT JENKINS: Thank you, Madam
13 Chair. It's Robert Jenkins, with the Government of
14 Northwest Territories.

15 In regards to what was put forward by --
16 by the Yellowknives, you know, in a general sense, new
17 information that -- that arises right before the
18 hearing is -- is, in our position, not appropriate for
19 discussion at the hearing, because parties haven't had
20 a chance to fully review or assess that, and even, I
21 guess, with the limited time to -- to make a fulsome
22 conclusion on whether this additional information even
23 changes anything.

24 So, I guess we would put forward that
25 it's probably not appropriate for inclusion in this

1 hearing, as parties have not had sufficient time to
2 review and assess.

3 Now, that said, the work plan moving
4 forward could provide an opportunity for this -- for
5 this information that was submitted recently to be --
6 to be looked at, and parties could, you know, make an
7 assessment of it, and they could reflect that in their
8 closing statements.

9 Important to note though, Madam Chair,
10 that -- that the public record would need to stay open
11 for this to occur.

12 THE CHAIRPERSON: Okay. Thank you.
13 Lutsel K'e Dene First Nation, any comments?

14 MR. MIKE TOLLIS: Hi, Madam Chair.
15 It's Mike Tollis, from the Lutsel K'e Dene First
16 Nation.

17 We agree with the Yellowknives. We
18 think it's inappropriate to present that material at
19 this time as nobody's had a chance to review it, and
20 I'd just like to note that it's not the first time that
21 the Company has put forward information right before a
22 -- a session with -- with the parties, so maybe we
23 should -- I think we should not allow that to happen
24 too much any more. Thank you.

25 THE CHAIRPERSON: Environment Canada,

1 comments?

2 MS. SARAH-LACEY MCMILLAN: Sarah-Lacey
3 McMillan, with Environment Canada.

4 It is difficult for Environment Canada
5 to make an opinion on the new material presented
6 because we would like to review the lab reports and
7 tests. So given the option, we would like to have the
8 opportunity to be able to do that.

9 THE CHAIRPERSON: North Slave Metis
10 Alliance, comments?

11 MR. MATT HOOVER: Thank you, Madam
12 Chair. Matt Hoover, from the North Slave Metis
13 Alliance.

14 The NSMA has been vocal about this since
15 the beginning of this process, that the timelines have
16 been extremely tight for technical review. As with the
17 Yellowknives Dene, Lutsel K'e, we depend heavily on the
18 opinions and expertise of those more scientific
19 reviewers such as the GNWT, and we would like to agree
20 with what's been stated so far, that we believe this
21 information requires more thorough review and is not
22 appropriate at this time. Thank you.

23 THE CHAIRPERSON: Deninu K'ue First
24 Nations?

25 MR. MARC D'ENTREMONT: Thank you, Madam

1 Chair. My name is Marc d'Entremont, a technical
2 adviser to the DKFN.

3 I would agree with the other parties on
4 this issue. We, in particular, have kind of limited
5 capacity and -- and resources available to participate
6 in this, and -- and other types of hearings like this,
7 and it's part -- partly evidenced by our late
8 submissions to this process as well. So as said, I
9 think we would agree with the -- the matter presented
10 today by the YKDFN. Thank you.

11 THE CHAIRPERSON: De Beers Canada?

12 MR. MARTIN IGNASIAK: Good morning,
13 Madam Chair. Thank you.

14 It is true that slide 8 introduces two
15 (2) new test results. You'll see that -- that those
16 slides consist of a table and two (2) rows have been
17 added, and they've been clearly marked, "New."

18 I think that's to be expected, given De
19 Beers has been and continues to undertake scientific
20 testing to better understand Snap Lake. Really, that
21 information was provided in this process as part of De
22 Beers' ongoing commitment to engage stakeholders and
23 regulators on the progress of its work.

24 I think even if these test results
25 weren't provided in slide 8, it's quite likely that

1 they would be introduced as part of this process,
2 because I find it hard to believe we'd go through this
3 process without any of the regulatory bodies or
4 stakeholders asking De Beers to provide an update on
5 the scientific work its undertaking and will continue
6 to undertake.

7 So this is not the case where a -- a new
8 type of evidence has been introduced and that it
9 changes the position De Beers is -- is trying to
10 advance through this hearing. It's simply two (2)
11 additional test results to be added to many others. So
12 our position's no one's prejudiced by this. It's part
13 of the ongoing work that De Beers is committed to and
14 that the slide should stay as is.

15 However, if this Board determines
16 otherwise, what we'd propose is that the Board simply
17 disregard the two (2) rows in that table for the
18 purposes of its deliberation and that we not -- we --
19 and we proceed as scheduled this morning as opposed to
20 having a requirement to take a break to physically
21 alter the slides.

22 And I think that makes sense given these
23 -- these test results are likely to come up at some
24 point during the course of the day in any event. Thank
25 you, Madam Chair.

1 THE CHAIRPERSON: What the Board would
2 like to do right now then in hearing all the comments
3 from members is that we would like to call a five (5)
4 minute break while we deliberate and make a decision.
5 Thank you.

6
7 --- Upon recessing at 9:33 a.m.
8 --- Upon resuming at 9:45 a.m.

9
10 THE CHAIRPERSON: Okay. If we could
11 call everybody back, please. Just before the Board
12 gives our ruling, we would like to ask if there's
13 anyone online? Apparently we have Environment Canada,
14 and I don't know if there's any other parties, but we
15 would just like to test to see if they're able to hear
16 us and if the connection is viable.

17
18 (BRIEF PAUSE)

19
20 THE CHAIRPERSON: Environment Canada,
21 are you --

22 MS. ANITA LI (BY PHONE): Yes, Anita
23 Li's here.

24 THE CHAIRPERSON: Okay. Thank you very
25 much. It's working.

1 (BRIEF PAUSE)

2

3 BOARD RULING:

4 THE CHAIRPERSON: The Board has ruled
5 as follows. The evidence is late, and we want parties
6 to have a fair opportunity to review and comment on it.
7 De Beers should be -- should file these study -- or
8 these reports on the rec -- on the record before the
9 end of the hearing.

10 The rows of new evidence in the
11 PowerPoint should not be referred to. Slides do not
12 need to be changed. The Board wants to proceed with
13 the hearing. And the parties are to review new
14 evidence and to speak to it on closing comments. We
15 would want to proceed on current -- on a current
16 timeline, and we can adjust it as -- if needed and De
17 Beers has a final right to reply.

18 With that, we would like to start
19 today's hearing with opening statements from De Beers,
20 the parties, and the independent consultant, EcoMetrix.
21 Opening statements are intended to briefly introduce
22 each party and their team to the Review Board. De
23 Beers Canada, please begin your opening statement.

24

25 OPENING COMMENTS BY DE BEERS:

1 MS. ERICA BONHOMME: Thank you, Madam
2 Chair and Board members. My name is Erica Bonhomme.
3 I'm the manager of environment at Snap Lake Mine, De
4 Beers Canada. And I'm pleased first to introduce our
5 panel representing De Beers here today.

6 To my far right is Dr. Peter Chapman,
7 senior environmental scientist with Golder Associates.
8 On my right is Mr. Glen Koropchuk, chief operating offi
9 -- officer for De Beers Canada. On my left, from De
10 Beers Canada, are Dave Putnam, head of safety health
11 environment for De Beers Canada; Steven Ridge, regional
12 engineering manager; and Julie L'Heureux, water
13 manager.

14 Behind me from De Beers are Alexander
15 Hood, permitting superintendent; and from Golder
16 Associates, Tasha Hall, water quality specialist;
17 Alison Snow, water quality modeller; Hilary Machtans,
18 fisheries biologist; and Mr. Ignasiak, our legal
19 counsel.

20 I'll now turn the mic over to Mr.
21 Koropchuk.

22 MR. GLEN KOROPCHUK: Thank you very
23 much, Erica. Madam Chairman, I'm Glen Koropchuk, chief
24 operating officer for De Beers Canada. First of all,
25 I'd like to thank you and the members of the Mackenzie

1 Valley Review Board, the other regular -- regulatory
2 bodies, and community participants for this opportunity
3 today.

4 I am pleased to be here to say a few
5 words as you assess certain aspects of De Beers's
6 application to amend the Snap Lake water licence. I'd
7 like to thank you for being here today to help us work
8 through this very important process.

9 Basically, we're here because nearly two
10 (2) years ago De Beers was required to develop site-
11 specific water quality objectives for total dissolved
12 solids and its components, as well as a number of other
13 response plans.

14 First of all, I would like to provide
15 you and the Board members and the other participants
16 with some information about De Beers Canada. We
17 operate the Snap Lake mine, and in 2013 provided seven
18 hundred and seventy-six (776) years of employment,
19 including approximately two hundred and seventy-five
20 (275) person years of Northwest Territory resident
21 employment.

22 We have spent nearly \$2 billion to build
23 and operate the mine between 2005 and the end of 2013,
24 which includes about \$1.4 billion with NWT-based
25 companies and joint ventures. We also operate the

1 Victor Mine in Northern Ontario and we are a joint
2 venture partner in the Gahcho Kue Project. This will
3 be our third mine in Canada and our second mine in the
4 Northwest Territories.

5 Across Canada, De Beers employs directly
6 approximately a thousand people. At De Beers, we
7 remain focussed on safety and sustainably achieving our
8 business targets. We develop and work hard to ensure a
9 skilled Northern workforce. We're contributing to a
10 growing Northwestern Territories economy, and to the
11 livelihood of the residents in the NWT. We also assist
12 communities through capacity development and social
13 investment, and, key, we are active partners in
14 protecting the land, water, air, and wildlife around
15 our operations with our community participants.

16 As I said to the Mackenzie Valley Land
17 and Water Board in December 2011, we recognize that
18 Snap Lake has not always been trouble free. It is a
19 very challenging mine. However, I would strongly
20 suggest that anyone who visited the mine in mid 2011
21 would see a far different operation if they went back
22 today.

23 During the past three (3) years, we have
24 continued to improve our water management systems, and
25 by the end of 2014 we will have invested -- we will

1 have invested approximately another \$20 million to
2 enhance our ability to capture, pump, treat, and safely
3 release water.

4 We agree that there have been unforeseen
5 changes at the mine since preconstruction predictions.
6 Those are facts. But Snap Lake is no ordinary mine.
7 We are mining a very thin kimberlite dike beneath an
8 Arctic lake. Through nearly six (6) years of mining
9 and three (3) years of construction, our understanding
10 of the mine has grown significantly.

11 We know the rock that separates the mine
12 from the lake is fractured. We continue to work to
13 stop the flow of naturally occurring ground water that
14 has been trapped in the rock for thousands of years.
15 We have improved our mining operations, and we have
16 adapted to the changes we have experienced. And we
17 continue to adapt, we continue to do test work, and
18 work to get better.

19 We know that the amount and quality of
20 water entering mine workings is different than
21 predicted prior to the start of mining. Even so, the
22 water in Snap Lake remains safe to drink, and the fish
23 safe to eat. In fact, Elders from communities close by
24 Snap Lake who came to our mine for a visit and ate some
25 of the fish caught in our September 2013 fish tasting

1 rated the taste as very good or excellent. We know
2 that's subjective, but it's indicative of our community
3 engagement and the processes that we go through.

4 We're here today to demonstrate why the
5 establishment of site-specific water quality objectives
6 for TDS and its components will not result in
7 significant adverse impacts to the environment. The
8 Review Board has set a very clear scope for this
9 assessment. Some participants may wish to raise other
10 issues and ask other questions, and we will be willing
11 to provide those answers in the appropriate forum.

12 In deciding back in 2004 that the mine
13 could proceed to licensing, the Review Board set a
14 limit for TDS that was based on predictions about water
15 quality and quantity. It was not based on impact on
16 the specific Snap Lake aquatic environment. Our
17 continuing studies for this application have shown that
18 higher levels of TDS in released water are protective.

19 We know from our ongoing engagement with
20 communities that they are closely connected to the
21 land, water, and wildlife. We also know they want to
22 be assured that they will continue to be able to fish
23 and hunt as they have for millennia. They want to know
24 that their sacred sites will be protected. We also
25 want that, too.

1 De Beers has built a strong,
2 transparent, and respectful relationship with the
3 communities and an engagement framework that will
4 continue throughout this process, and throughout the
5 life of mine. We are committed to that.

6 Finally, while we work to set
7 appropriate and achievable water quality objectives, we
8 continue to test a range of mitigation options that can
9 be applied in parallel with new protective site-
10 specific water quality objectives for TDS.

11 In undertaking the groundbreaking
12 scientific studies that we will share with you and the
13 public today that support our application, De Beers has
14 added to the base of knowledge about the Arctic
15 ecosystem. We have a greater understanding about fish
16 and other organisms that live in Snap Lake.

17 The weight of evidence clearly
18 demonstrates that releasing water which contains higher
19 levels of TDS is safe and sustainable for the life of
20 the mine. The water will be safe to drink and the fish
21 safe to eat while mining is underway, and most
22 importantly, when operations have ceased. We look
23 forward to setting this and other water licence
24 criteria with the Mackenzie Valley Land and Water Board
25 later this year.

1 Madam Chairperson, panel members,
2 regulatory and community representatives, thanks again
3 for this communi -- for this opportunity. I would like
4 now to go back to the program and turn over to the
5 Chair or Ms. Erica to continue with our presentation.
6 Thank you.

7

8 (BRIEF PAUSE)

9

10 THE CHAIRPERSON: For the next opening
11 statements, we would like to follow the agenda. The
12 Government of the Northwest Territories, opening
13 statements, please.

14

15 OPENING COMMENTS BY GNWT:

16 MS. LORRAINE SEALE: Thank you, Madam
17 Chair. My name is Lorraine Seale. I'm the manager of
18 the Project Assessment Branch in the Department of
19 Lands with the GNWT. My group coordinates GNWT
20 technical input into environmental assessments.

21 With devolution, the type and nature of
22 the technical advice government provides to the Review
23 Board is very similar to what it was before April 1st.
24 The main difference is that the GNWT is now providing
25 much of the advice that Aboriginal Affairs Canada and

1 Northern Development Canada used to devi -- provide.

2 The development under assessment today
3 deals largely with water issues. One (1) of the main
4 reasons Lands is involved is because the AANDC minister
5 has delegated to the minister of lands the authority to
6 sign the final decision letter for this environmental
7 assessment. Additionally, Lands has responsibility for
8 land and water compliance and enforcement at Snap Lake.

9 Given the narrow scope of the
10 development Robert Jenkins, to my right, with the
11 director of water resources with the -- the Department
12 of Environment and Natural Resources will be presenting
13 on behalf of the GNWT, and he will be introducing his
14 team as part of the presentation.

15 ENR now has responsibility for managing
16 water resources in the Mackenzie Valley, and the
17 minister of ENR has the delegated authority to approve
18 Type A water licences.

19 (BRIEF PAUSE)

20

21 THE CHAIRPERSON: Thank you. Just
22 again, some logistics. I have to state my name every
23 time I push the button here, too. So JoAnne Deneron,
24 Chair of MVEIRB. Our next opening statement will be
25 from Environment Canada.

1 OPENING COMMENTS BY ENVIRONMENT CANADA:

2 MS. SARAH-LACEY MCMILLAN: Good
3 morning. It's Sarah-Lacey McMillan. I am an
4 environmental assessment coordinator with Environment
5 Canada here in Yellowknife. Later this afternoon,
6 Carey Ogilvie, the head of EA North for the prairie and
7 northern region will be joining me. Also on the phone
8 I'd like to introduce Anita Li. Anita is a senior
9 engineer with the Expert Support and Contaminated Sites
10 Division of Ontario. Anita has been providing our
11 technical expertise with regards to water quality.

12 Given the time difference, she will not
13 be available this evening to answer questions if
14 Environment Canada is requested to present after the
15 dinner break, and I just wanted to raise that for the
16 Board in their consideration if the proceedings
17 continue after the public has an opportunity to speak.

18 Environment Canada has been
19 participating in the EA review process in order to
20 provide specialist advice through its mandated
21 responsibilities as it relates to water quality and
22 impacts to receiving environments. The presentation
23 we've prepared for these hearings summarizing --
24 summarizes our results, and we have identified some
25 recommendations for consideration for the Board, so we

1 look forward to making our presentation later today.

2 THE CHAIRPERSON: JoAnne Deneron, Chair
3 of MVEIRB. Our next opening statement will be from
4 Yellowknives Dene First Nation.

5

6 OPENING COMMENTS BY YKDFN:

7 MR. TODD SLACK: Thank you, Madam
8 Chair. My name is Todd Slack. I'm the research and
9 regulatory specialist for the First Nation. And I'm
10 going to take the opportunity that you afforded to us
11 to just briefly talk about the engagement that has or
12 hasn't occurred on this file, and I'm very mindful of
13 the time.

14 So this goes back to especially in 2011
15 when there was a water licensing technical session
16 where we talked about TDS issues. At that -- at that
17 session, the Yellowknives were very concerned about
18 this issue, and advocated for the project to commence
19 this -- both the establishing what the regulatory
20 process would be and to get some meaningful action on
21 what they were going to do about it.

22 Now, we can fast forward to 2013, when
23 the project submitted a letter to you that all of these
24 TDS issues had been addressed at the water -- the
25 previous water licence, and that the Yellowknives had

1 not raised any concerns, which isn't true whatsoever.
2 And at those very sessions that they're referencing,
3 they had promised further consultations.

4 None of this really happened. The first
5 consultation that occurred in -- on TDS occurred on
6 January 6th, and there was one (1) small session
7 following that, and yet here we are today at an
8 Environmental Assessment, where there hasn't been a
9 meaningful opportunity for the First Nation to be part,
10 and to work with the Company to resolve concerns.

11 Now, last thing that I'll say is that I
12 think that there's an important perspective here
13 between the Yellowknives and the Company, and it was
14 revealed in their opening comments in which they felt
15 that we're here because they were required to develop a
16 site-specific water quality object -- objective for
17 TDS.

18 No, they're -- we're here because they
19 are not complying with the Board's previous decision to
20 meet that 350 milligram per litre limit, and that is
21 the central issue that the Yellowknives will be talking
22 to today, and we look forward to presenting that --
23 that perspective, and hope that you find it compelling
24 later today. Thank you.

25 THE CHAIRPERSON: JoAnne Deneron, Chair

1 of MVEIRB. Thank you, Mr. Slack. Our next opening
2 comments is from the North Slave Metis Alliance.

3

4 OPENING COMMENTS BY NSMA:

5 MR. MATTHEW HOOVER: Thank you, Madam
6 Chair, Matthew Hoover, North Slave Metis Alliance. The
7 NSMA would like to thank you for the opportunity to
8 speak here today. The NSMA has been involved with the
9 project since the initial water licence approval and
10 subsequent renewal in 2012/2013.

11 This water licence incur --
12 Environmental Assessment process is of significant
13 interest to the NSMA members, especially at this time,
14 due to the ongoing challenge of protecting the health
15 of the aquatic environment. That being said, and in
16 reference to the comments you made earlier today, we
17 will do our best to limit comments on consultation
18 during the presentation. If we do touch on that issue,
19 I think you will see that it's in a concise way that
20 does relate to worthwhile recommendations that are
21 relevant to this process.

22 I hope that's appropriate today. And
23 again, thank you for the opportunity to present.

24 THE CHAIRPERSON: JoAnne Deneron, Chair
25 of MVEIRB. Thank you. Our next opening statement will

1 be from Deninu K'ue First Nation.

2

3 OPENING COMMENTS BY DKFN:

4 MR. MARC D'ENTREMONT: Thank you, Madam
5 Chair. My name is Marc d'Entremont. I'm a technical
6 advisor to the DKFN, and with me today is Mr. Stanley
7 Louine, councilman and Elder from the community as
8 well. So then -- so we thank you for allowing us to be
9 here today.

10 I guess the main reason we're here is
11 because this is -- the Snap Lake is one (1) of the main
12 projects that's within the traditional territory of the
13 DKFN. However, DKFN has always been supportive of this
14 and -- and other projects, as it sees the -- the
15 benefits to both the -- the Northwest Territories, and
16 in particular, the -- its community, and has always
17 acted in good faith in -- in any discussions and -- and
18 hearings and -- and processes in -- in regards to
19 project development, despite the fact that there has
20 been very minimal movement towards social impact
21 benefit agreements within the community, which is also
22 -- helps to hinder, as I mentioned earlier, some of the
23 capacity and resources to participate in these types of
24 processes.

25 So again, we -- we look forward to our

1 presentation later today. And thanks again for
2 allowing us to be here.

3 THE CHAIRPERSON: JoAnne Deneron, Chair
4 of MVEIRB. Opening statements from Lutsel K'e Dene
5 First Nations.

6
7 OPENING COMMENTS BY LKDFN:

8 MR. MIKE TOLLIS: Thank you, Madam
9 Chair. My name is Mike Tollis, representing the Lutsel
10 K'e Dene First Nation. And just a quick comment on
11 consultation. We were unable to be present at the
12 technical sessions that happened -- that happened
13 earlier. And we have not actually met with the Company
14 to discuss this -- to discuss this environmental
15 assessment since it began. The first participation
16 that we had was submitting the technical report. So we
17 haven't really had a chance to have a conversation.
18 And I just wanted to put that on the record.

19 But since our participation started,
20 we've been participating with the mandate of protection
21 and conservation of the territory that the Lutsel K'e
22 Dene have survived on since time immemorial.

23 The Lutsel K'e Dene have always lived in
24 a -- in a balance that is sustainable, accessing
25 natural and renewable resources in a way that protects

1 the resources for future generations. Through our
2 technical report and our presentation today, we look to
3 encourage the Review Board and the Land and Water Board
4 to require the Company to adhere to a higher -- to
5 higher standards of environmental protection that have
6 been practised at Snap Lake to date. That is to say, a
7 more sustainable operation.

8 We believe that it is the responsibility
9 of the Company to adhere to impact predictions that the
10 original assessment was approved upon and that we
11 understand predictions can occasionally be inacc --
12 inaccurate. If there are mitigation measures that can
13 help the company attain these original discharge
14 levels, then these strategies should be the first
15 priorities rather than seeking higher limits.

16 The cost of environmental protection is
17 a necessary cost. And if the Company is not
18 voluntarily undertaking the necessary mitigations, then
19 LKDFN is putting our faith in the Board to take a
20 strong stance for protection of the land, and
21 especially the water, for all time. Thank you very
22 much.

23 THE CHAIRPERSON: JoAnne Deneron, Chair
24 of MVEIRB. Opening statements from EcoMetrix.

25

1 OPENING COMMENTS BY ECOMETRIX:

2 DR. DON HART: I'm Don Hart, with
3 EcoMetrix. I'm here as an independent consultant,
4 invited by the Boards. I'm a senior ecotoxicologist
5 with EcoMetrix. I was asked with several colleagues to
6 review the documents that have been submitted by De
7 Beers as part of the licence amendment application.

8 I should mention my colleagues, Mr. Ian
9 Collins, a professional engineer, was responsible for
10 looking at the water quality modelling. Mike Venhuis
11 is a geoscientist. He was responsible for looking at
12 the downwater flow modelling. And I've looked at the
13 toxicology and the proposed WQOs.

14 We've focussed on several specific
15 questions as posed by the Boards; in particular, are
16 the proposed water quality objectives appropriate based
17 on the modelling that's been done and the confidence in
18 that modelling? Are those proposed objectives likely
19 to be exceeded in the absence of mitigation? If that
20 were to happen, what would be the potential effects in
21 Snap Lake? And we were asked to -- to comment to the
22 extent possible on -- on the feasibility of mitigation.

23

24 We've prepared a report expressing
25 opinions on these issues. That report is on the

1 record. And in my presentation today I'll try to
2 summarize our thoughts on those issues.

3 THE CHAIRPERSON: JoAnne Deneron, Chair
4 of MVEIRB. At this time then, we would like to ask De
5 Beers Canada for their presentation to proceed.

6

7 (BRIEF PAUSE)

8

9 PRESENTATION BY DE BEERS:

10 MS. ERICA BONHOMME: Good morning.
11 Erica Bonhomme. This presentation is in three (3)
12 parts. My colleague, Dr. Peter Chapman, will provide
13 additional commentary towards the middle of the
14 presentation. My presentation will focus on the
15 purpose and alternatives to the development proposal,
16 and the extensive scientific investigation that has
17 been completed to support it.

18 I will provide information about efforts
19 underway to mitigate potential effects from the
20 development, and summarize the assessed effects and
21 cumulative effects of the development. I will cover
22 how the development ties into the comprehensive
23 monitoring undertaken by De Beers, and will conclude by
24 providing an update on De Beers's ongoing engagement
25 activities. Throughout this presentation, I will

1 address comments and recommendations made by parties in
2 technical reports that are within the scope of this
3 environmental assessment.

4 De Beers proposes to change the quality
5 of mine water to be discharged to Snap Lake.
6 Specifically, De Beers is proposing to discharge mine
7 water with a total dissolved solid, or TDS, content
8 that is higher than currently allowable but that will
9 not affect -- adversely affect the Snap Lake aquatic
10 environment.

11 De Beers proposes that the current whole
12 lake limit for total dissolved solids of 350 milligrams
13 per litre be removed based on evidence that a site-
14 specific water quality objectives, or SSWQO, of 684
15 milligrams per litre is protective of the environment.

16 De Beers proposes that the Mackenzie
17 Valley Land and Water Board make a determination
18 whether a site-specific water quality objective of at
19 least 684 milligrams per litre TDS, and monthly
20 effluent quality criterion, EQC, of at least 684
21 milligrams per litre TDS is appropriate, and that it
22 consider the application of an interim EQC for a period
23 of up to two (2) years.

24 The scope of this environmental
25 assessment includes total dissolved solids and its

1 constituents in Snap Lake. This includes chloride,
2 fluoride, nitrate, nitrite, and sulphate. The
3 development proposal derives from the requirement in
4 the current operational water licence to submit three
5 (3) management plans related to water quality by
6 December 31st, 2013.

7 Two (2) of these specifically pertain to
8 the scope of this environmental assessment. The TDS
9 Response Plan and Nitrogen Response Plan are to include
10 recommendations to the Mackenzie Valley Land and Water
11 Board for appropriate site-specific water quality
12 objectives for TDS including chloride and fluoride,
13 nitrate and ammonia, in Snap Lake, as well as
14 recommendations for associated EQC to be measured in
15 mine water discharge at the end of pipe in order to
16 protect aquatic life in Snap Lake.

17 These recommendations were to be based
18 on the results of toxicity testing. The plans are also
19 required to include identified sources of TDS and
20 current practices, ongoing investigations, and issues
21 related to minimizing TDS loadings to the environment.

22 This requirement to develop site-
23 specific water quality objectives for Snap Lake was an
24 outcome of the process to renew the operational water
25 licence. During that process De Beers informed the

1 Mackenzie Valley Land and Water Board that mine water
2 discharge and TDS loadings were greater than originally
3 predicted in 2003, and that further evaluation of
4 appropriate site-specific limits in the absence of
5 national or provincial guidelines, as well as options
6 for reducing TDS loadings to the environment, would be
7 required.

8 The response plans and the development
9 application provide comprehensive results of the
10 scientific studies as well as investigations that have
11 been completed or are underway to reduce loadings of
12 TDS and nitrogen to the environment.

13 The studies show that the current
14 licence limits for TDS and its constituents are overly
15 protective and unnecessarily low, and that the proposed
16 site-specific water quality objective for TDS,
17 including chloride and fluoride, that are based on
18 studies specific to Snap Lake are appropriate in that
19 they are achievable, as well as protective of the
20 aquatic environment over the life of the mine.

21 De Beers commissioned toxicity testing
22 of nine (9) aquatic genera representative of Sna -- of
23 Snap Lake using water also representative of Snap Lake.
24 Results to date have shown that the proposed benchmark
25 for TDS, 684 milligrams per litre, is lower than it

1 could be with the exception of one (1) genus of water
2 fleas which comprise only a small percentage of the
3 zooplankton in the water.

4 Other organisms tested showed chronic
5 responses very near to or well beyond a thousand
6 milligrams per litre. Based on replicated testing of
7 the water flea genus that is found in Snap Lake, they
8 appear as a group to have a sensitivity to TDS at
9 levels considerably greater than 684 milligrams per
10 litre. And I -- as I said, in fact greater than a
11 thousand milligrams per litre.

12 This table shows the present status of
13 TDS toxicity testing. And although we've been asked to
14 withdraw the results of testing of copepods which
15 represent the dominant genus within Snap Lake, as well
16 as three (3) additional tests of *Daphnia magna*. We
17 note that with the exception of the water flea,
18 *Ceriodaphnia dubia*, which is not found in Snap Lake,
19 the TDS effect concentrations are greater than a
20 thousand milligrams per litre. And De Beers concludes
21 that the proposed TDS site-specific water quality
22 objective of six-eighty-four (684) is not only
23 conservatively protective, but an even higher water
24 quality objective could be considered.

25 De Beers points out that since mining

1 operations began, the relative composition of mine
2 water and Snap Lake water, including percentages of
3 chloride and fluoride, has remained relatively constant
4 and that a site-specific water quality objective for
5 TDS inclusive of all its constituents will be
6 protective of aquatic life as long as the composition
7 of the mine water remains constant. The composition of
8 mine water, which is reported monthly, is not expected
9 to change.

10 In response to the recommendation that
11 additional study be conducted on the reduction time of
12 hardness, post-mining operations, De Beers has
13 previously presented information that indicates that
14 hardness will not decrease faster than those water
15 quality objectives that are hardness dependent.

16 Dr. Chapman will now speak to other
17 comments regarding the influence of hardness in his
18 portion of the present -- oh, not yet, sorry, in his
19 portion of his presentation.

20 An understanding of where TDS originates
21 is important. In the groundwater and site models,
22 which have been filed as part of the application, De
23 Beers has reported that around 90 percent of the load
24 to Snap Lake of total dissolved solids is from mine
25 water pumped from underground mine workings. More

1 specifically, ancient groundwater that is high in
2 mineral salts called connate water is released during
3 mining, particularly during footwall development.

4 De Beers has been investigating options
5 to reduce overall mine inflows and to selectively
6 reduce inflows of high TDS water through grouting. And
7 while a full grout curtain has been deemed impractical,
8 localized grouting continues to be undertaken and
9 evaluated as a means to reduce TDS loading in mine
10 water.

11 Following on De Beers's commitment to
12 sustainability, De Beers continues to investigate other
13 economically and technologically appropriate methods to
14 reduce TDS and nitrogen loadings to the environment.
15 Results are expected to be known later this year. A
16 determination by the Mackenzie Valley Land and Water
17 Board in a subsequent hearing on the final site-
18 specific water quality objectives and associated EQC
19 remains a critical design factor.

20 Our ongoing evaluation necessarily
21 assumes that a site-specific water quality objective of
22 six eighty-four (684) or higher for TDS will be
23 approved. De Beers has previously presented a timeline
24 for the evaluation of water treatment options, as well
25 as factors that need to be taken into account when

1 evaluation system feasibility.

2 Currently, De Beers is evaluating the
3 results of pilot studies which will report on
4 effectiveness, reliability, scalability, energy
5 requirements, infrastructure, and waste outputs of a
6 system intended to achieve the proposed effluent
7 quality criteria specifically for the Snap Lake Mine.

8 The removal of TDS from mine effluent
9 using proven technologies, such as reverse osmosis, ion
10 exchange, evaporation, and crystallization, is
11 certainly achievable. However, whether Snap Lake Mine
12 can continue to operate as a mine if these mitigations
13 are applied will be dependent on the factors listed
14 above, as well as the final site-specific water quality
15 objectives and effluent quality criteria approved for
16 the mine.

17 Previous evaluation commissioned by De
18 Beers, as well as a recent study commissioned by
19 Environment Canada during the review of the metal
20 mining effluent regulations, conclude that treatment
21 for TDS, and in particular, the constituent ion
22 chloride, will not be achievable if the current licence
23 limits are maintained. Cost, infrastructure
24 requirements, energy outputs, and importantly waste
25 generation and its disposal will be prohibitive.

1 But although these are certainly
2 critical limitations, De Beers has demonstrated in the
3 evidence it has filed in its application that the
4 current licence limits for TDS and chloride are likely
5 overprotective and that higher limits will continue to
6 be protective while supporting the current life-of-mine
7 plan. For illustrative purposes, De Beers has provided
8 models and predictions depicting the long-term water
9 quality of Snap Lake and downstream lakes based on a
10 mitiga -- unmitigated and mitigated scenarios.

11 The unmitigated scenarios depict the
12 possible range of life-of-mine water inflows, outflows,
13 and quality based on predictive water quality models.
14 They are important in that they show how, over the life
15 of the mine, water quality will change within Snap
16 Lake.

17 De Beers cannot be certain that the
18 proposed interim and final water quality objectives and
19 effluent quality criteria proposed will be approved,
20 and therefore, the unmitigated scenarios provide a
21 picture of what would happen if no measures were
22 applied to reduce TDS in effluent to meet a particular
23 site-specific water quality objective.

24 De Beers does not expect this to be the
25 case in the future. As a result, De Beers has

1 presented models that depict life-of-mine quality if
2 the proposed site-specific water quality objective of
3 684 milligrams per litre TDS is applied. The mitigated
4 scenario depicts treated effluent discharge that will
5 not cause significant adverse effects to the
6 environment.

7 Over the time that mitigation options
8 are being evaluated, designed, and implemented, De
9 Beers proposes a TDS interim effluent quality criterion
10 of 850 milligrams per litre, which will maintain TDS
11 concentrations in Snap Lake below the site-specific
12 water quality objective of six eighty-four (684) or
13 higher until the -- at the earliest, 2016.

14 Predictive models submitted and
15 previously presented by De Beers indicate that TDS
16 concentrations in Snap Lake may approach those site-
17 specific water quality objectives and associated EQC
18 sometime in 2016 if no mitigation measures to reduce
19 TDS loadings to the lake are applied.

20 In response to recommendations to
21 consider the unmitigated scenario as a worst case, De
22 Beers considers this scenario to be unrealistic, as an
23 approved EQC will become a regulatory limit. De Beers
24 agrees with the intent of the recommendation to
25 implement mitigation sufficient to protect the aquatic

1 environment and maintain traditional use of Snap Lake,
2 and commits to implementing mitigation to achieve an
3 appropriate and achievable site-specific water quality
4 objective in Snap Lake.

5 In response to the recommendation that
6 additional studies be submitted, De Beers points out
7 that these studies are underway, that they are
8 dependent on a determination of an appropriate site-
9 specific water quality objective, and that De Beers has
10 committed to providing regular progress updates to the
11 Mackenzie Valley Land and Water Board.

12 De Beers agrees that mitigation to
13 achieve an EQC will be based on a BATEA-type review.
14 As mentioned previously, De Beers agrees that
15 mitigation will be required to meet an approved site-
16 specific water quality objective, and has committed to
17 providing regular updates regarding progress to
18 evaluate source control and treatment options.

19 In response to the recommendation that
20 treatment and source control take priority over raising
21 licence limits, De Beers has committed to implementing
22 mitigation to reduce TDS loading to meet a site-
23 specific water quality objective that is achievable,
24 appropriate, and protective of the environment. De
25 Beers has previously noted that lower site-specific

1 water quality objectives than proposed will not likely
2 be achievable.

3 I will now move on to summarizing the
4 effects on the environment of the development. The
5 proposed site-specific water quality objective upon
6 which the proposal is based are conservative. Those
7 results have been shown previously.

8 The site-specific water quality
9 objective repro -- represents benchmark concentration
10 of TDS inclusive of chloride and fluoride, below which
11 there will be no adverse effects to the aquatic
12 environment, and above which there may or may not be
13 adverse effects. And by no significant adverse
14 effects, we mean that the water will remain safe to
15 drink and the fish safe to eat, and the ecosystem
16 function of Snap Lake, specifically the fish and the
17 food web they -- that supports them, will continue.

18 In proposing the water quality
19 objective, De Beers has considered the potential
20 effects to drinking water. We've provided evidence to
21 demonstrate that the proposed water quality objectives
22 for TDS will not pose any risk to the health of people
23 who do, or who may in the future, drink water from Snap
24 Lake.

25 While the water in Snap Lake may taste

1 different from what it did prior to mining began, the
2 taste of the water will remain fair during the life-of-
3 mine as measured against the Canadian Drinking Water
4 Quality Guidelines.

5 De Beers has heard from Aboriginal
6 groups that they would like to ensure that their
7 potential use of Snap Lake in the future for fishing
8 and other activities is not affected. De Beers
9 predicts that with a site-specific water quality
10 objective of TDS -- for TDS of 684 milligrams per
11 litre, the taste of the water in Snap Lake will return
12 to good within four (4) years, and excellent within ten
13 (10) years of completion of mining activities.

14 The effects of discharging effluent to
15 Snap Lake with higher TDS are reversible, and will not
16 cause significant impacts to the environment or prevent
17 potential land users from utilizing Snap Lake in the
18 future.

19 De Beers has predicted that the effluent
20 from Snap Lake Mine at the proposed eff -- EQC will be
21 measurable in waters up to 44 kilometres downstream of
22 the outlet of Snap Lake. There are no other
23 developments within this section of the Lockhart River
24 watershed that are known to, or may have, an effect on
25 water quality within the same area.

1 It's obvious that the current operation
2 of Snap Lake Mine is a factor to be considered relative
3 to downstream water quality. However, the development
4 proposal, if approved, will simply replace the current
5 overly restrictive TDS limits with less restrictive but
6 still conservative TDS EQC. As such, the development
7 proposal inherently assesses the cumulative effects on
8 the environment of concurrent and proposed mine
9 effluent discharge to Snap Lake, and hence to
10 downstream waters.

11 The assessment concludes that there is
12 no potential overlap of the project's effects with
13 other past and reasonably foreseeable developments, and
14 that as such, the discharge of effluent at the proposed
15 limits will not contribute to cumulative effects on
16 water quality within the Lockhart River watershed.
17 This map shows the predicted extent of effluent from
18 other developments within the Lockhart River watershed.

19 In regards to several recommendations
20 that the Canadian Drinking Water Quality Guideline of
21 500 milligrams per litre be applied, De Beers notes
22 that this guideline pertains to aesthetic objectives,
23 such as taste. Although we note that not everyone will
24 notice a change in taste, the scientific studies
25 undertaken for the water licence demonstrate that with

1 the proposed site-specific water quality objectives,
2 the water will remain safe to drink, and the fish safe
3 to eat.

4 In response to the recommendation to
5 also apply Canadian Drinking Water Guidelines to
6 fluoride, again, the guideline is intended to protect
7 against cosmetic effects to teeth, and is not based on
8 adverse effects to human health.

9 De Beers has high confidence that the
10 proposed water quality objective for TDS is
11 conservatively protective. While the taste of the
12 water will change for the duration of mine operations,
13 the taste of the water will return to below the
14 guideline in Snap Lake within several years of stopping
15 mining. Throughout, the water will remain safe to
16 drink and the fish safe to eat.

17 In regards to several recommendations
18 for measures to ensure protection of Lady of the Falls,
19 De Beers acknowledges the importance of this area to
20 the Yellowknives Dene and Lutsel K'e Dene First
21 Nations. The models that De Beers has presented using
22 the proposed site-specific water quality objective at
23 Snap Lake show that Snap Lake effluent will not be
24 measurable beyond MacKay Lake, which is almost 400
25 kilometres upstream of Lady of the Falls. However, De

1 Beers commits to verifying its predictions by
2 monitoring downstream of Snap Lake as far as the inlet
3 to MacKay Lake as part of its Aquatic Effects
4 Monitoring Program.

5 In regards to returning Snap Lake to
6 pre-mining conditions post-closure, De Beers notes that
7 water quality in Snap Lake will improve immediately
8 post-mining, as there will no longer be TDS loading due
9 to the discharge of mine water.

10 And I'll now turn the mic over to Dr.
11 Peter Chapman.

12

13 (BRIEF PAUSE)

14

15 DR. PETER CHAPMAN: Peter Chapman.
16 Masi, Erica. I will be presenting eleven (11) slides
17 dealing with technical issues arising from the parties'
18 reports and presentations. I will start with
19 Environment Canada, who had two (2) recommendations.
20 The first recommendation was to determine the
21 concentrations of TDS, total dissolved solids, and
22 chloride entering Snap Lake from both the North Pile
23 and the water management pond via seepages.

24 We do not believe this -- this
25 determination is either necessary nor useful. The

1 major source of TDS and chloride to Snap Lake is
2 clearly the treated effluent discharge. Adequate
3 information on seepage quality is provided in the ARD
4 annual acid rock drainage reports, which are provided
5 annually. This information was also provided in the
6 mine site water quality out -- update in the water
7 licence amendment application that was submitted to the
8 Board in December last year.

9 The next slide shows sources of inflows.
10 In other words, of substances including TDS and
11 chloride to Snap Lake for both the lower and upper
12 bound effluent discharge scenarios. Note on the slide
13 that effluent comprises greater than 80 percent of
14 inflows in both cases. Streams which would not have
15 elevated concentrations of TDS or chloride comprise
16 several for less. Seepage inflows are minuscule in
17 comparison to these two (2) sources.

18 Environment Canada's second
19 recommendation was for monitoring to allow the early
20 warning of possible stratification of Snap Lake. In
21 fact, the monitoring recommended by Environment Canada
22 is conducted and reported annually as part of the AEMP,
23 the Aquatic Effects Monitoring Program. Snap Lake as a
24 whole is not stratified. It's not expected to become
25 such during operations. The lake becomes well-mixed

1 over the open water season. Given wind-driven mixing
2 of this relatively shallow lake, it is highly unlikely
3 that Snap Lake as a whole will become stratified.

4 I'd now like to talk about peer review.
5 As pointed out by the NS -- North Slave Metis Alliance
6 and others, technical review is critically important,
7 not just in terms of getting the science right, but
8 also in terms of confidence in the answers that science
9 provides. The technical work done in preparing for
10 this application has been reviewed by two (2)
11 independent groups, EcoMetrix, representing the Board,
12 and MacDonald Environmental Sciences representing the
13 GNWT.

14 The -- those technical reviews, with the
15 exception of three (3) questions raised by MacDonald
16 Environmental Sciences, and which I will discuss later,
17 suggest that we really have gotten the science right,
18 and hopefully they provide some level of confidence in
19 the findings.

20 Conducting on -- continuing on the
21 subject of peer review, I note we are preparing a total
22 of thirteen (13) manuscripts for submission to
23 international peer-reviewed scientific journals. I
24 have two (2) slides on these manuscripts, most of which
25 are in preparation. However, two (2) have been

1 submitted to journals and being peer-reviewed while the
2 manuscript of strontium has undergone peer review and
3 has been judged acceptable for publication with some
4 revisions.

5 Those revisions do not include any
6 changes to the site-specific water quality objective,
7 the SSWQO. The TDS manuscript is almost ready to go.
8 We're just waiting to incorporate additional testing
9 with *Daphnia magna*, the water flea, and copepods, both
10 of which are small animals living in the water column.
11 That testing was committed to in the mid-April
12 technical session. I'll talk more about these tests
13 later.

14 This slide shows the other six (6)
15 manuscripts we are preparing and the international
16 peer-reviewed journals we intend to submit them to.
17 Okay.

18

19 (BRIEF PAUSE)

20

21 DR. PETER CHAPMAN: I would now like to
22 turn to three (3) issues raised -- raised by the GNWT
23 related to questions from MacDonald Environmental
24 Sciences. The first issue relates to the fact that the
25 Canadian Councils of Ministers of the Environment, the

1 CCME, in their document entitled, "A Protocol for the
2 Derivation of Water Quality Guidelines for the
3 Protection of Aquatic Life 2007," specify testing three
4 (3) fish species, and I quote:

5 "Including at least one (1) salmonid
6 and one (1) non-salmonid."

7 Unquote. We tested two (2) salmonids,
8 lake trout and Arctic grayling. In April 2011, we
9 began consultations with regulators and communities
10 regarding toxicity testing to determine a TDS site-
11 specific water quality objective. We were well aware
12 of the CCME re -- requirements. I was the final peer
13 reviewer on that document before it was released, and I
14 did that on behalf of Environment Canada.

15 We could have met those requirement
16 easily using standard laboratory test species. Lake
17 trout and Arctic grayling are not standard test
18 species, particularly when one is conducting testing
19 beginning with the eggs and continuing testing through
20 several months as the eggs develop. But lake trout and
21 Arctic grayling live in Snap Lake.

22 And the testing we did with them was
23 directed to the most sensitive life stage of both
24 species to TDS, the developing egg. We tested both
25 species two (2) ways, following input from Fisheries

1 and Ocean Canada and others, we exposed the eggs after
2 they were fertilized. In other words, after the sperm
3 had reached the eggs to TDS, and we also fertilized the
4 eggs in the presence of TDS. We got the same response
5 in both cases for both test species -- both -- both
6 fish species.

7 They are relatively tolerant to Snap
8 Lake TDS compared to water fleas. We could have, as
9 has been suggested, also have condu -- tested with the
10 standard laboratory test species, fathead minnow, which
11 is not a salmonid, but this fish species does not live
12 in Snap Lake, and the standard test end points, growth
13 and survival, are not as sensitive to TDS as those we
14 tested for lake trout and arctic grayling.

15 We see no point in conducting additional
16 tests that will provide the same answer as we already
17 have. Fish are less sensitive to TDS than water fleas.
18 Note also that EcoMetrix, on the basis of the testing
19 conducted, supports the proposed TDS site-specific
20 water quality objective.

21 We will, of course, as you saw
22 previously, be publishing in the peer review literature
23 on both the TDS site-specific water quality objective
24 and the novel fish testing conducted as part of that
25 SSWQO development.

1 Although we see no point in additional
2 fish testing, at the technical session last month, we
3 agreed to additional testing with other animals to
4 address uncertainties. Specifically, we agreed to
5 conduct additional replica tests for the water flea
6 species, *Daphnia magna*, whose sensitivity to TDS forms
7 a basis for that site-specific water quality objective,
8 and to also conduct testing with copepods, which
9 comprise a major portion of the zooplankton.

10 They are the small animals that live in
11 the water and form part of the food chain for fish.
12 Water fleas are a minor component of the zooplankton.
13 Copepod testing was difficult, as there is no protocol
14 for such testing in fresh waters. However, a salt
15 water protocol was successfully adapted, and a fresh
16 water copepod successfully tested against Snap Lake.
17 At this point, I was going to talk briefly about these
18 new results. I'm a scientist. We love data. We get
19 excited about new data that'll help us solve
20 environmental problems. However, given the Board's
21 ruling, I will restrain myself, and simply note that
22 reports on both the copepod and replicate *Daphnia magna*
23 tests will be prepared and will be available for
24 assessment and discussion before the end of the hearing
25 process.

1 In summary, we believe that the testing
2 conducted to develop a site-specific water quality
3 objective for TDS is not only appropriate with this
4 focus on fish and other organisms that actually live in
5 Snap Lake, but has also produced a conservative result
6 that will protect the aquatic environment of Snap Lake.
7 There is no need for the additional level of
8 conservatism from a safety factor. For example,
9 dividing six eighty-four (684) by ten (10) to get
10 sixty-eight (68).

11 I'd now like to turn to GNWT's third
12 issue. CCME, in its 2007 document, states that water
13 quality objectives can be modified by exposure and
14 toxicity modifying factors. The GNWT does not
15 disagree. However, they argue that changes in these
16 modifying factors that occur following mining should
17 not be considered.

18 This is not a new argument. It was made
19 and dismissed at the Ekati water licence hearing for
20 the very good reason that it does not make scientific
21 sense.

22 The response provided by EcoMetrix, the
23 Board's consultant that hearing, which you can see on
24 the screen and which I will now read into the record,
25 says it all. Quote:

1 "AANDC's argument ignores the
2 scientific fact that increased water
3 hardness, no matter its source, does
4 reduce the toxicity of some
5 substances. When asked about the
6 validity of using anthropogenically
7 modified hardness for calculating
8 SSWQO, Dr. Dan -- Don Hart replied,
9 quote, 'As far as I'm concerned, and
10 I recognize that there are various
11 opinions out there, but as far as I'm
12 concerned, the organisms don't make a
13 distinction as to where the hardness
14 came from, so, yes, we're going to
15 get a benefit from hardness that's
16 released anthropogenically. It's
17 still a benefit. I see no reason to
18 ignore it'."

19 End both quotes.

20 My last two (2) slides relate to the
21 spacial extent of TDS downstream of Snap Lake. With
22 mitigation in place, predicted TDS concentrations were
23 generally within the baseline range from MacKay Lake,
24 which is approximately 44 kilometres downstream of Snap
25 Lake.

1 Water in Lac Capot Blanc immediately
2 downstream of Snap Lake is not predicted to exceed the
3 drinking water aesthetic objectives for TDS or
4 chloride.

5 This last slide shows the predicted
6 spacial extent of TDS downstream under the mitigated
7 scenario. The 2002 environmental assessment
8 predictions are only exceeded upstream of King Lake.
9 Further downstream, TDS concentrations are predicted to
10 be within baseline.

11 Note that given the reality of both
12 natural variability and laboratory analytical
13 variability, and that point about laboratory analytical
14 variability was noted by the Board technical staff
15 during the mid-April technical session, small
16 differences in TDS concentrations, such as 1 or 2
17 milligram per litre, do not provide good evidence that
18 a change has occurred. This is why GNWT's suggestion
19 that spacial changes will be measurable more than 65
20 kilometres downstream and possibly up to 155 kilometres
21 downstream is an overestimation.

22 I will now hand back to Erica. Masi
23 cho.

24 MS. ERICA BONHOMME: Erica Bonhomme.
25 Thank you, Dr. Chapman. De Beers is required to

1 conduct comprehensive monitoring -- monitoring of the
2 aquatic environment related to the Snap Lake Mine
3 operation. The mine's Aquatic Effects Monitoring
4 Program, or AEMP, includes requirements to conduct site
5 characterizations as well as monitoring of water
6 quality, sediment quality, plankton, benthic
7 invertebrates, fish community, fish health, and fish
8 taste in Snap Lake.

9 De Beers studies water quality and
10 hydrology at downstream lakes and applies a weight-of-
11 evidence approach to analysis. The AEMP defines action
12 levels in accordance with an approved response
13 framework that is part of an ada -- overall adaptive
14 management system to ensure ongoing identification,
15 action, and monitoring of potential effects to the
16 aquatic environment. A comprehensive report is
17 submitted annually on May 1st. Similarly, a compliance
18 report related to the Project Surveillance Network
19 Program is submitted monthly.

20 To confirm predicted effects related to
21 the development proposal, De Beers commits to
22 undertaking monitoring of water quality at the inlet to
23 MacKay Lake, and suggests that this be added into the
24 current downstream lakes monitoring conducted under the
25 AEMP.

1 In regards to the recommendation related
2 to defining a high action level of response framework
3 if the effluent reaches the outflow in MacKay Lake, De
4 Beers will work under the Mackenzie Valley Land and
5 Water Board process to review the AEMP response
6 framework as may be required related to monitoring the
7 effluent plume as part of the next AEMP redesign
8 process.

9 And as an update to the information
10 provided during the technical sessions, De Beers has
11 recently met with members of the Deninu K'ue First
12 Nation, North Slave Metis Alliance, Northwest Territory
13 Metis Nation, Tlicho, and Yellowknives Dene First
14 Nation communities regarding the proposed changes to
15 effluent from Snap Lake Mine.

16 Chiefs and three (3) other members of
17 the Yellowknives Dene First Nation toured Snap Lake
18 Mine site on May 27th with a focussed -- with a focus,
19 at their request, on water management during freshet
20 conditions. On May 28th, De Beers presented
21 information regarding management of chloride in
22 effluent to the Snap Lake working group, and although
23 we note at the meeting, at the request of the Mackenzie
24 Valley -- we -- we note the meeting, at the request,
25 the Mackenzie Valley Land and Water Board, was focussed

1 on other aspects of mine operations.

2 De Beers will file an update to the
3 engagement record by June 23rd, 2014. De Beers notes
4 that questions and concerns related to the application
5 were responded to during meetings, and are previously
6 addressed in the application and supporting materials,
7 but notes that in some of those meetings, no comments
8 whatsoever were raised.

9 De Beers notes that in addition to the
10 information presented to communities recently on the
11 proposed amendments, environmental effects and
12 mitigations, De Beers will invite community members to
13 visit the Snap Lake Mine again in 2014, as we do every
14 year, and to observe water management and other aspects
15 of mine operations firsthand.

16 De Beers notes that it -- its meetings
17 with communities often cover more than one (1) topic,
18 since it often takes many months of communication to
19 ensure that a mutually suitable time is arranged.

20 In summary, the proposed change to the
21 quality of effluent to be discharged to Snap Lake will
22 not have significant adverse impacts on the
23 environment. De Beers has demonstrated that site-
24 specific water quality objectives proposed for TDS,
25 chloride, fluoride, and nitrate are appropriate and

1 protective of the environment of Snap Lake.

2 Throughout mine operations and beyond,
3 the water in Snap Lake will remain safe to drink, and
4 the fish safe to eat. TDS in effluent will be
5 measurable downstream as far as the inlet to MacKay
6 Lake, and without overlap with the effects of other
7 developments, there will not be adverse cumulative
8 effects. Thank you.

9 THE CHAIRPERSON: JoAnne Deneron, Chair
10 of MVEIRB. At this time we would like to call a ten
11 (10) minute break, and right after the break, we'll
12 proceed with questions.

13 Just a quick announcement, please. If
14 you are coming into the forum here, could you please
15 sign in by the door? There's a sheet there for you to
16 sign in. Thank you.

17

18 --- Upon recessing at 10:55 a.m.

19 --- Upon resuming at 11:11 a.m.

20

21 THE CHAIRPERSON: JoAnne Deneron, Chair
22 of MVEIRB. We will now go into the question period.
23 Our first questions will come from the Government of
24 the Northwest Territories.

25

1 QUESTION PERIOD:

2 MR. ROBERT JENKINS: Thank you, Madam
3 Chair. My name is Robert Jenkins. I'm director of
4 Water Resources with the Government of the Northwest
5 Territories, Department of Environment and Natural
6 Resources.

7 I'll probably just quickly introduce the
8 people I have with me today because the questions will
9 be coming from several people here in the group. So to
10 my -- to my left I have Mr. Don MacDonald, of MacDonald
11 Environment Services Limited. To my right I have Mr.
12 Jesse Sinclair, also of MESL.

13 At the table behind me I have Mr. Paul
14 Green and Rick Walbourne. They're both regulatory and
15 science advisors in the Water Resources Division of --
16 of Environment and Natural Resources. And there's also
17 behind me Mr. Sean Whitaker. He's a mining specialist
18 with the Environment Division, again, within
19 Environment and Natural Resources.

20 So I'll -- there'll be questions coming
21 from several different people here in the group. And
22 the first question will come from -- from Mr. Sinclair.

23 MR. JESSE SINCLAIR: Madam Chair, my
24 name is Jesse Sinclair, with MESL, representing GNWT.

25 De Beers states in their presentation

1 that a site-specific water quality objective that is
2 protective of the environment would be proposed.
3 Protection of the environment is the key issue in this
4 hearing, yet this statement means different things to
5 different people.

6 What does De Beers define this to mean?

7

8 (BRIEF PAUSE)

9

10 MS. ERICA BONHOMME: Erica Bonhomme.
11 For us, at a very high level, pro -- something that's
12 protective of the aquatic environment at Snap Lake
13 means that the fish -- the fish will remain safe to eat
14 and the water will remain safe to drink.

15 MR. JESSE SINCLAIR: Madam Chair, I
16 have a follow-up question, please. What are the
17 specific metrics and targets example effect levels
18 being used to determine if the site-specific water
19 quality objectives that are proposed is going to be
20 protective of the environment?

21 MR. PETER CHAPMAN: Peter Chapman. I
22 would like clarification from Mr. Sinclair's question
23 because I'm not sure whether he's talking about the end
24 points for the site-specific water quality objectives
25 or the monitoring that will be done afterwards.

1 MR. JESSE SINCLAIR: Madam Chair, Jesse
2 Sinclair here again. What we mean by that is to get an
3 understanding of the effect levels that will be used on
4 the monitoring program to determine whether or not the
5 site-specific water quality objectives being proposed
6 would be protective of the environment.

7 MR. PETER CHAPMAN: Peter Chapman.
8 Madam Chair, give us a second just to talk here.

9
10 (BRIEF PAUSE)

11
12 MR. PETER CHAPMAN: Madam Chairman and
13 Board members, Peter Chapman. I'd refer Mr. Sinclair
14 to the Aquatic Effects Monitoring Program which has all
15 that information. I would also note that every --
16 periodically, every three (3) years, that is revised
17 and there is a redesign. And the next redesign is
18 coming up, I believe, in -- I'm not -- in a couple of
19 years anyway.

20
21 (BRIEF PAUSE)

22
23 MR. ROBERT JENKINS: Thank you, Madam
24 Chair. It's Robert Jenkins, with Environment and
25 Natural Resources, GNWT. I guess -- Dr. Chapman, thank

1 you for that answer and -- and referring us to the
2 AEMP. I guess it's just -- in the interest of -- of
3 those here today, I'm sure some of which are -- are not
4 -- have an intricate understanding of the AEMP, or --
5 or remembrance of the AEMP, if you would be able to
6 give a little bit more detail on some of the effects
7 levels and -- and/or provide perhaps in an undertaking
8 just what those are from the AEMP at some point in the
9 near future?

10 DR. PETER CHAPMAN: Peter Chapman,
11 Madam Chair. Give us a second, because I think we
12 submitted the whole AEMP and it's also available on the
13 record. I just want to check that.

14

15 (BRIEF PAUSE)

16

17 MS. ERICA BONHOMME: Erica Bonhomme.
18 We -- the -- the information that's being sought after
19 is in Chapter 6 and 7 of the Design Plan for the
20 Aquatic Effects Monitoring framework and we -- plan.
21 And we'd be happy to provide that for the Board's
22 record.

23 It is, of course, on Mackenzie Valley
24 Land and Water Board's website, but we'll make sure
25 it's provided to the Review Board.

1 That sets out some of the action levels
2 that fall in -- fall under the -- the framework that I
3 think Mr. Jenkins is referring to.

4

5 (BRIEF PAUSE)

6

7 THE CHAIRPERSON: JoAnne Deneron, Chair
8 of MVEIRB. I would like to have our legal counsel
9 speak to the issue, please.

10 MR. JOHN DONIHEE: Thank you, Madam
11 Chair. It's, John Donihee. I just want to note then
12 that that will be Undertaking number 1. The date, of
13 course, for the filing of undertakings is set out in
14 the work plan. And that will be to file Chapter 6 and
15 7 of the AEMP on the -- on the Review Board's record.
16 Thank you.

17

18 --- UNDERTAKING NO. 1: De Beers to file chapter 6
19 and 7 of the Aquatic Effect
20 Monitoring Program (AEMP)
21 Design report to the Review
22 Board

23

24 THE CHAIRPERSON: If we could continue
25 on with questions from the Government of the Northwest

1 Territories.

2 MR. ROBERT JENKINS: Thank you, Madam
3 Chair. It's Robert Jenkins, Government of Northwest
4 Territories. Thank you for that and for providing that
5 information for the -- for the record for -- for the
6 Review Board.

7 Moving on, I'll pass -- I'll pass it
8 over to Mr. Don MacDonald to ask the next question.

9 MR. DON MACDONALD: Madam Chair, Don
10 MacDonald, with MESL on behalf of GNWT. On the sixth
11 slide that we had from the presentation there, De Beers
12 stated that they have completed comprehensive
13 toxicological studies on the effects of TDS. This work
14 was specifically conducted to support the development
15 of water quality objectives for TDS.

16 I note though that in Canada there are -
17 - the CCME has established formal protocols and
18 guidance for developing water quality objectives and
19 water quality guide -- guidelines. This guidance
20 identifies minimum toxicological data requirements for
21 developing the Type A water quality guidelines for the
22 protection of aquatic life.

23 And they require data on three (3) fish
24 species, three (3) invertebrate species, and one (1)
25 aquatic plant species. Well, the data that De Beers

1 has generated to support the water -- proposed water
2 quality objectives for TDS do not meet these minimum
3 requirements.

4 So I'm hoping that De Beers can explain
5 how these toxicological studies that they've described
6 are conc -- comprehensive, when in fact they don't even
7 meet the minimum data requirements for developing water
8 quality guidelines and water quality objectives using
9 the approved procedures and protocols that have been
10 established by the Canadian Council for Ministers of
11 the Environment?

12 THE CHAIRPERSON: JoAnne Deneron, Chair
13 of MVEIRB. De Beers?

14 DR. PETER CHAPMAN: Peter Chapman. I
15 think I provided a fairly comprehensive answer in my
16 opening comments, but I will go further. I'd like to
17 note to the Board that in the document entitled, "A
18 Protocol for the Deriv" -- "Derivation of Water Quality
19 Guidelines for the Protection of Aquatic Life 2007,"
20 which I believe is the document that Mr. MacDonald is
21 referring to, in Part 2, Section 1-9, two (2) things
22 are stated. First of all, and I quote:

23 "In fresh water systems salmonids are
24 generally considered to be among the
25 most sensitive fish and are routinely

1 tested."

2 Unquote. We tested two (2) salmonids.
3 We tested two (2) salmonids that live in Snap Lake. We
4 tested them with a unique procedure that was developed
5 based on people's concerns and based on the science
6 that clearly indicated that routine testing was not
7 appropriate. What we needed to do was test with the
8 eggs, which would be the most sensitive, to really see
9 what happens.

10 I'd also point on the same page, Part 2,
11 Section 1-9, where under minimum toxicological data
12 requirement CCME says that under exceptional
13 circumstances you can make a change. And I put forward
14 that these are exceptional circumstances because we
15 focussed on the fish that were in the lake. We
16 focussed on the organisms in the food chain that
17 sustain the fish.

18 Way back in April 2011, we went through
19 with people and we've continued to go through the food
20 chain and what we needed to test. Getting consulting,
21 you know, getting agreement from Fisheries and Oceans
22 Canada and from everyone else as what we're testing.
23 Sure, we could go out and we could test fathead minnow.
24 We could do a survival and grow test. It would not
25 give us anything else.

1 And in that line I would like to point
2 out that it puzzles me that in MacDonald Environmental
3 Sciences and their report which was appended to the
4 GNWT technical report, they suggested using a SSD, a
5 species sensitivity distribution, with some but not all
6 of our data to develop a number that was a lot lower,
7 in fact below the three-fifty (350). And I note that
8 in there they added fathead minnow. But the
9 interesting thing is they added fathead minnow in a
10 study done by Wes Birge, et al in 1985, that the USEPA
11 quotes as a chloride value.

12 It's -- really what we did was site-
13 specific testing with the appropriate species to really
14 understand and be protective of Snap Lake. We believe
15 that we've done that and as soon as we complete, as I
16 mentioned in my opening presentation, the reports on
17 the additional testing, the copepods and the daphnia
18 test -- and I do note with the daphnia test that we
19 have done five (5) tests.

20 I'm not going to mention three (3) of
21 the tests, but we -- we -- the two (2) tests that we
22 did showed a benchmark higher than a thousand
23 milligrams per litre. So it really is a convincing
24 data set, and it's a unique data set. I really
25 honestly don't know of another data set that has so

1 many unbounded values. By 'unbounded values', what I
2 mean is, when we test it -- and we tested the high
3 concentrations where we expect to see effects. We saw
4 no effects.

5 So really if you look at our data set,
6 they're all greater than. And EcoMetrix noted that as
7 well in their analysis of what might happen at higher
8 TDS levels. We just have those lower levels. Six-
9 eighty-four (684) was derived based on the initial
10 daphnia test. We've done five (5) tests in total. I'm
11 not going to talk the last three (3), but the first two
12 (2) were reported at the technical session.

13 When we put those together -- and CCME
14 advises when you have two (2) tests or more tests that
15 were done the same with the same organism, you use the
16 geometric mean. We got greater than a thousand. I
17 could go on at greater length, but really this is a --
18 quite a good data set and we really believe it is going
19 to protect Snap Lake. Thank you.

20 THE CHAIRPERSON: JoAnne Deneron, Chair
21 of MVEIRB. Response, GNWT?

22 MR. DON MACDONALD: Madam Chair, Don
23 MacDonald here, MDSL on behalf of GNWT. That answer,
24 as long as it was, didn't answer the question
25 unfortunately. And the -- the challenge we have with

1 the work that has been done is that in Canada there are
2 formal protocols and procedures for deriving site-
3 specific water quality objectives or water quality
4 guidelines. And what Dr. Chapman has described is a
5 resident species procedure, and in Canada there's a
6 clear set of steps that you must go through to
7 implement the resident species procedure for deriving
8 water quality objectives.

9 One (1) of those steps involves meeting
10 minimum data requirements, which I identified
11 previously. And the challenge we have is that although
12 we've -- we've tried to implement the procedure, it
13 hasn't been done properly. And so that results in some
14 uncertainty about the results -- the -- the resultant
15 site-specific water quality objective that has been
16 proposed.

17 And then as a -- as a follow up to that,
18 these -- these -- the CCME guidance on how to develop
19 the water quality guidelines and site-specific
20 objectives indicates that the objectives should be
21 based preferentially on no effect levels, and these are
22 things like concentrations of a contaminant that would
23 effect 10 percent or fewer of the animals that are
24 exposed to the contaminant under investigation.

25 And yet De Beers didn't report the low -

1 - the no effect levels for at least some of the
2 toxicity tests that were conducted. And what I'm
3 trying to understand then is why De Beers didn't design
4 these tests so that they could provide reliable
5 estimates of those no effect levels that we need to
6 support the derivation of water quality guidelines
7 using the Type A approach.

8 THE CHAIRPERSON: JoAnne Deneron, Chair
9 of MVEIRB. De Beers...?

10 DR. PETER CHAPMAN: Peter Chapman here.
11 Give me a minute. I just want to look at our response
12 to the IRs because I believe we answered that there,
13 and I'd like to quote from that.

14

15 (BRIEF PAUSE)

16

17 THE CHAIRPERSON: JoAnne Deneron, chair
18 of MVEIRB. De Beers, are you ready?

19 DR. PETER CHAPMAN: Peter Chapman here.
20 I haven't been able to find it. I'm going to rely on
21 the people behind me to find it so I can quote from it,
22 but I -- excuse me? They found it.

23

24 (BRIEF PAUSE)

25

1 DR. PETER CHAPMAN: Peter Chapman. In
2 May 20 -- on May 28th, 2014, we provided a technical
3 response. Section 2.1.1 talked about 10 percent versus
4 20 percent effect levels. I'm not going to waste time
5 in going through that. That has been submitted.

6 Basically in that document what we did -
7 - in the section is we pointed out the reality. We'd
8 like to measure 10 percent levels. We'd like to
9 measure zero percent levels. But it's not
10 realistically possible in all tests for a variety of
11 reasons that are outlined in that response. I can read
12 it into the record, it's a long one, if you want, but
13 you have it.

14 Yes, I totally agree with Mr. MacDonald.
15 What we want to do is get down to no effect levels. I
16 would point out also that USEPA clearly identifies 20
17 percent effect -- 20 percent effect levels as
18 effectively no effect levels because with natural
19 variability the problems with the tests, and trying to
20 determine an effect from the variation in the test --
21 and we give examples there.

22 If you have a control -- because when
23 you're doing testing, you have a control. And if you
24 have one (1) animal die there -- anyway, I'm sorry.
25 I'm going to get into details, and I don't want to bore

1 you with technical details. The answer is there. We
2 believe that we have determined no effect levels, and
3 we've responded previously concerning that.

4 THE CHAIRPERSON: JoAnne Deneron, Chair
5 of MVEIRB. GNWT's response, please.

6 MR. DON MACDONALD: Madam Chair, Don
7 MacDonald, MESL, on behalf of GNWT. What I'd -- I'd
8 like to emphasize here is that the Canadian Council of
9 Ministers of the Environment is the national body that
10 is responsible for the development of water quality
11 guidelines in Canada. They have established formal
12 protocols for developing these guidelines, and they are
13 based preferentially on the use of no effect levels of
14 contaminants for the purpose of identifying what the
15 water quality guidelines would be. Those are -- are
16 explicitly values that are associated with a 10 percent
17 or less effect on the animals that have been exposed.

18 The CCME is comprised of a number of
19 experts from across the country who are -- have a very
20 strong understanding of the toxicological data -- data
21 set and information with which they are utilizing and
22 on the design of toxicity tests that are needed to
23 support the -- the generation of data that can be used
24 in this process.

25 And so -- and they've explicitly

1 identified the 10 percent effect type level as the --
2 or less as the no effect level and a 20 percent level
3 that Dr. Chapman has referred to as a low observed
4 effect level.

5 And so I'm -- I'm struggling still with
6 trying to understand why De Beers seems either
7 unwilling or unable to understand the guidance that has
8 been established by our national body on this topic.

9 THE CHAIRPERSON: JoAnne Deneron, Chair
10 of MVEIRB. De Beers, response?

11 DR. PETER CHAPMAN: Peter Chapman here.
12 Okay, when we started out -- everyone wants to get a 10
13 percent effect level. That's the goal. You cannot
14 realistically always get it. If you look at our data
15 set, where possible, we have a 10 percent effect level.
16 We documented why in some cases we went to 20 percent.

17 And I'll refer you back to two (2)
18 portions of the CCME 2007 document which Mr. MacDonald
19 is talking about. I'll refer you to Part 2, Section
20 3.1-2, at the top in the left-hand column. They talk
21 about a preference ranking in the following order, from
22 the most preferred acceptable to the least preferred
23 acceptable endpoint repre -- representing a no effects
24 threshold.

25 I fully agree that 10 percent, which is

1 the first one, is what we want to strive for. But CCME
2 also says 11 to 25 percent is the next choice. And
3 then I would also refer you to Part 2, Section 1-7 of
4 that same document. And at the top on the right-hand
5 side they talk about -- and I'll quote:

6 "A threshold level for negative
7 effects is generally defined to the
8 thre -- an effect level on more than
9 15 or 20 percent of the exposed
10 individuals, so the negative effect
11 greater than 20 percent."

12 So I contend again, not only are we --
13 you know, the science, as we believe it, is very clear.
14 We have reached a no effect level. We are not in
15 contradiction in any way of CCME 2007.

16 THE CHAIRPERSON: JoAnne Deneron, Chair
17 of MVEIRB. To the question, Government of Northwest
18 Territories.

19 MR. ROBERT JENKINS: Thank you, Madam
20 Chair. It's Robert Jenkins, with GNWT. Thank you, Dr.
21 Chapman for that response. And we will refer to some
22 of that information and provide a response as necessary
23 in our closing statements.

24 Moving on, I'm going to pass it over to
25 Mr. Sean Whitaker. He's got a couple questions. And

1 then we have an additional question after that by Mr.
2 MacDonald. So we -- we've got, I think, about four (4)
3 questions or so left, Madam Chair.

4 THE CHAIRPERSON: JoAnne Deneron, Chair
5 of MVEIRB. Continue with questioning, Government of
6 the Northwest Territories.

7

8 (BRIEF PAUSE)

9

10 MR. SEAN WHITAKER: Okay. Thank you,
11 Madam Chair. Sorry, the microphone didn't work back
12 there. I'd like to refer to slide 10. We're going to
13 slightly change topics. Slide 10 states that the model
14 for long-term reversibility shows that all parameters
15 decline at the same rate as hard -- as the hardness.

16 De Beers's model shows this because all
17 parameters were modelled conservatively. Parameters
18 such as nitrates and metalloids may not behave
19 conservatively in the environment and may cycle.

20 Did De Beers consider the potential for
21 some parameters to not actively -- to not act
22 conservatively as modelled?

23 THE CHAIRPERSON: JoAnne Deneron, Chair
24 of MVEIRB. Could I please ask you to identify
25 yourself, too?

1 MR. SEAN WHITAKER: Sorry, Madam Chair.
2 Sean Whitaker, with Environment and Natural Resources.

3 THE CHAIRPERSON: Thank you. De
4 Beers...? Sorry, JoAnne Deneron, Chair of MVEIRB. De
5 Beers...?

6 DR. PETER CHAPMAN: Peter Chapman. I'm
7 going to call on Alison Snow, modelling expert, to
8 answer that question.

9 MS. ALISON SNOW: Alison Snow. For our
10 closure modelling, where we ran our model for an
11 additional one hundred (100) years, all of our
12 parameters were modelled conservatively. So I did -- I
13 -- we did not run the Snap Lake hydrodynamic model,
14 which would...

15

16 (BRIEF PAUSE)

17

18 MS. ALISON SNOW: So for the closure
19 modelling, as I said, all parameters were modelled as
20 conservative constituents. We ran our closure model
21 and our mass balance model for an additional one
22 hundred (100) years after mining. I did not run our
23 Snap Lake model, which models certain parameters non-
24 conservatively for a hundred years after closure. I
25 did not do that mainly because of timing.

1 THE CHAIRPERSON: JoAnne Deneron, Chair
2 of MVEIRB. Government of Northwest Territories...?

3 MR. SEAN WHITAKER: Thank you, Madam
4 Chair. Sean Whitaker, with Environment and Natural
5 Resources. I guess my question would be, then, are you
6 aware of any long-term studies that demonstrate that
7 this is not important? I realize that you say timing,
8 but the Government of the Northwest Territories is
9 concerned that hardness may drop faster than the
10 predicted rates of other metalloids, essentially
11 creating a toxic condition post-closure.

12 THE CHAIRPERSON: JoAnne Deneron, Chair
13 of MVEIRB. De Beers, your response, please?

14

15 (BRIEF PAUSE)

16

17 MS. ALISON SNOW: Alison Snow, no, we
18 are not aware of any studies.

19 THE CHAIRPERSON: JoAnne Deneron, Chair
20 of MVEIRB. Questions, GNWT?

21

22 (BRIEF PAUSE)

23

24 MR. SEAN WHITAKER: Thank you, Madam
25 Chair. Sean Whitaker, with the Government of the

1 Northwest Territories, Department of Environment and
2 Natural Resources. Thank you for that response.

3 I'm going to move on to another topic.

4 It's building slightly on what Don had said, the
5 national guidance for the der -- derivation of site-
6 specific water quality objectives state that:

7 "A safety factor of ten (10) to one
8 hundred (100) is required when
9 developing Type D1 site-specific
10 water quality objectives."

11 Which is what De Beers has done in this
12 case. However, the department notes that De Beers'
13 site-specific water quality objectives prior to the
14 application of their safety factor was six eighty-four
15 (684), yet after the application of the safety factor,
16 it was still six eighty-four (684).

17 Can De Beers clarify how a safety factor
18 of one (1) is a safety factor, given that its
19 application resulted in no change to the original
20 number?

21 THE CHAIRPERSON: JoAnne Deneron, Chair
22 of MVEIRB. De Beers, to the question?

23 DR. PETER CHAPMAN: Peter Chapman. In
24 response to Mr. Whit -- Mr. Whitaker's question, I'd
25 refer him again to the May 28th, 2014, responses to

1 technical issues arising from party's technical reports
2 where we actually answer that. Again, in the interest
3 of time, I don't see the point in referring to it, and
4 I did answer it as well in my presentation, but I will
5 provide some additional comments.

6 If you look at the data set, now that
7 we've done the two (2) daphnia -- I'm not going to talk
8 about the five (5), but everything is over a thousand
9 milligrams per litre. Greater than. EcoMetrix did a
10 analysis -- and I'm just going to find it here, if I
11 may. Forgive me. A lot of paper.

12

13 (BRIEF PAUSE)

14

15 DR. PETER CHAPMAN: Okay. Peter
16 Chapman again. Apologies, finding things. EcoMetrix,
17 in their technical report, Section 4.1, did an analysis
18 of our -- our data and what it looked like, and I
19 remind the Board that EcoMetrix is the consultant to
20 the Board. They're an independent consultant charged
21 with looking at the science and seeing if it's right or
22 not.

23 And basically, what they say in the
24 second paragraph that in terms of the daphnia, which
25 are the water fleas -- and I remind the Board the water

1 fleas only comprise a two (2) -- a few percentage, 2 to
2 3 percent on average, of the zooplankton, and
3 zooplankton are the little animals that live in the
4 water. They're not a major component there. The major
5 component are the rotifers, which we tested and
6 reported on, and the copepods we tested, but I can't
7 talk about those results. So we have data for both of
8 those as well as the ones that aren't that important.

9 But anyway, to quote from the last two
10 (2) sentences of the second paragraph from Section 4.1:

11 "At the worst case prediction of
12 1,700 milligrams per litre, we would
13 expect at least 20 percent inhibition
14 of reproduction
15 water fleas] and probably more.
16 Extrapolation beyond the range of
17 test concentrations is uncertain."

18 The next paragraph, and I quote:

19 "For the other invertebrates tested,
20 rotifer..."

21 I'm not going to give the scientific
22 name, because then we'll have problems putting it down
23 in the record. I'll just leave it at that and if you
24 trust me, I'm not -- you can read the thing:

25 "...rotifer, midge, and the fish

1 tested, lake trout, Arctic grayling,
2 there was no dose response up to the
3 highest test concentrations, 1,400 to
4 1,500 milligrams per litre. Daphnids
5 are a minor but sensitive part of the
6 zooplankton community. Therefore, at
7 TDS concentrations of 1,700
8 milligrams per litre, we might expect
9 reduced abundance or possibly loss of
10 sensitive zooplankton species
11 [referring to the daphnias], but
12 little effect on low tolerant
13 invertebrates or fish."

14 So in addition to the previous answers
15 I've given, from the EcoMetrix report -- and again,
16 we're looking at six-eighty-four (684), not seventeen
17 hundred (1,700) or a thousand at this point in time.
18 You know, it's not going to have a big effect on the --
19 it's not going to affect the functioning of Snap Lake.

20 Now, that leads me to the safety factor
21 question. Safety factors are something arbitrary. We
22 have a safety factor of ten (10), frankly because we
23 have ten (10) fingers on hands. If we had -- sorry,
24 five (5) fingers on each hand, I apologize, which makes
25 a total of ten (10). If we had six (6), we'll have

1 safety factors -- probably factors of twelve (12).

2 They're arbitrary.

3 And in one (1) of the responses -- I'm
4 not going to -- I can look for it if you want, but one
5 (1) of our responses, I went back and I pointed out the
6 CCME quotes, the paper that I and colleagues wrote back
7 in 1998, looking at the whole issue of safety factor
8 and how arbitrary they are. Nowhere is it stated that
9 you can -- you must have a safety factor of a certain
10 amount, except in the case -- I'm sorry. Let me go --
11 let me back forward.

12 In CCME, there's two (2) -- there's a
13 couple of ways that you can do -- develop your
14 benchmarks. One (1) is by means of a species
15 sensitivity distribution, and in our evidence, we tried
16 to do that, but the problem we had is that all -- so
17 much -- so many of the data points we don't know the
18 end point. They're just too high. We only have those
19 smaller data points.

20 The other way is, again, if you have to
21 find data points, to add a safety factor of ten (10).
22 As I mentioned, six-eighty-four (684) divided by ten
23 (10) gives sixty-eight (68), which is nonsensical.
24 It's far too low. So we looked at the data, we
25 evaluate it, and basically what we're looking at is a

1 no effect level, 20 percent perhaps, but effectively a
2 no effect level, we would argue, to a small organism
3 that comprises a very small proportion of the
4 zooplankton community, everything else will be fine
5 above that. It makes logical sense to us that this
6 will be protective, and we don't need a safety factor
7 beyond one (1).

8 THE CHAIRPERSON: JoAnne Deneron, Chair
9 of MVEIRB. Just to be mindful again of our translators
10 that are trying to keep up to the speaking of the
11 members. GNWT, your response, please, or question?

12 MR. SEAN WHITAKER: Thank you, Madam
13 Chair. Sean Whitaker, with the Government of the
14 Northwest Territories Department in Environment and
15 Natural Resources, and I am going to slow myself down
16 right now.

17 Thank you, Dr. Chapman, for that
18 response. We note the sections that you have provided.
19 We will provide that in our closing comments. We have
20 a point of disagreement, so I'm going to move on to
21 another question.

22 Madam Chair, on slide 13 -- I would like
23 to refer to slide 13, if you guys want to go -- switch
24 forward, or -- throughout the environmental assessment
25 process, the Government of the Northwest Territories

1 has requested detailed information on specific
2 mitigation measures to be implemented by De Beers.
3 However, to date, there has been no definitive response
4 from the Company.

5 As a result of the uncertainties related
6 to these unknowns, the Government of the Northwest
7 Territories was forced to assess an unmitigated
8 scenario. It is important to establish the level of
9 mitigation prior to activities to assess things like
10 accidents and malfunctions, cumulative effects.

11 ENR additionally notes that on slide 25,
12 that De Beers has noted that a site-specific water
13 quality objective for TDS may not be achievable at five
14 hundred (500). Our question is, we would like to -- De
15 Beers to describe the level at which De Beers believes
16 is an achievable extent of mitigation.

17 THE CHAIRPERSON: JoAnne Deneron, Chair
18 of MVEIRB. De Beers, your response, please?

19 MS. ERICA BONHOMME: Erica Bonhomme.
20 I'd like to thank Mr. Whitaker for pointing out an
21 important point that we've made as well, which is we
22 need to assess the site-specific wal -- water quality
23 objective prior to activities. We need to know what
24 that is before we can advance to developing certain
25 mitigation technologies that will meet that objective.

1 A summary of best available technologies
2 for treatment of Snap Lake effluent was provided to the
3 Board in April 30 -- on April 30th in response to the
4 Review Board's IR number 3, and was based on studies
5 completed by a number of consultants, including one (1)
6 commissioned by Environment Canada.

7 We've undertaken and evaluated a number
8 of technologies to reduce TDS loadings to the
9 environment. We've -- we've acquired additional data
10 to reduce uncertainty in our models, and we've
11 completed the toxicity testing that supports our site-
12 specific water quality objectives.

13 We have committed to providing the
14 Board, as soon as they're available, the results of the
15 evaluations of pilot treatment -- pilot studies for
16 treatment options that are currently underway, and
17 we've provided some additional steps -- the timeline
18 for additional steps that go along with that.

19 THE CHAIRPERSON: JoAnne Deneron, Chair
20 of MVEIRB. Response, GNWT?

21 MR. SEAN WHITAKER: Thank you, Madam
22 Chair. Sean Whitaker, with Department of Environment
23 and Natural Resources. I'm going to pass it back to
24 Mr. Don MacDonald.

25 MR. DON MACDONALD: Madam Chair, Don

1 MacDonald, MESL, on behalf of GNWT. I'd like to move
2 on, please, to slide number 40 in De Beers's
3 presentation.

4

5 (BRIEF PAUSE)

6

7 MR. DON MACDONALD: Thank you. This is
8 Don MacDonald, again with MESL on behalf of GNWT. The
9 graph on the lower left of this slide seems to support
10 De Beers's prediction of how far downstream water
11 quality changes can be detected, and -- and I think
12 this is an important slide for everybody to understand,
13 including me, and so I have a couple of questions
14 related to this.

15 So, first of all, there's -- it looks
16 like two (2) lines that are virtually superimposed on
17 one another, one (1) of which is the base -- sorry, one
18 (1) of which is the EAR -- my eyes are not so good
19 anymore, EAR predictions, and the second is the upper
20 bound and lower bound.

21 I'm -- I'm just trying to understand
22 what levels of TDS in the effluent were used in
23 generating this prediction of the concentrations of
24 total dissolved solids in the receiving waters of the
25 Lockhart River basin?

1 THE CHAIRPERSON: JoAnne Deneron, Chair
2 of MVEIRB. De Beers...?

3 MS. ERICA BONHOMME: Erica Bonhomme.
4 The -- as the inset suggests, it -- it is a mitigated
5 scenario. These -- it applies a model where the site-
6 specific water quality objective in Snap Lake is 684
7 milligrams per litre. What changes under the upper
8 bound and lower bound is the flow itself.

9 THE CHAIRPERSON: JoAnne Deneron, Chair
10 of MVEIRB. The Government of Northwest -- or the
11 Government of Northwest Territories, your response,
12 please?

13 MR. DON MACDONALD: Thank you, Madam
14 Chair. Don MacDonald, MESL, on behalf of GNWT. Okay,
15 so that's -- that's helpful. Thank you ver -- thank
16 you for that.

17 Now, there's also a couple of other
18 lines that are -- horizontal lines on this figure. One
19 (1) is -- I think they identify the baseline range, if
20 I can read that carefully from here.

21 Could someone from De Beers please
22 confirm that that is in fact the baseline range, and
23 then maybe tell us a little bit about what those -- how
24 those numbers were arrived at so that we can better
25 understand how the prediction of 44 kilometres was

1 generated?

2 THE CHAIRPERSON: JoAnne Deneron, Chair
3 of MVEIRB. De Beers, your response, please?

4 MS. ERICA BONHOMME: Erica Bonhomme.
5 I'm going to ask Alison Snow to respond.

6 MS. ALISON SNOW: Alison Snow. So the
7 baseline range was based on data from the EAR that was
8 collected in 1993, 1994, and 1999, and our baseline
9 range just represents the minimum and the maximum of
10 those data points for total dissolved solids.

11 THE CHAIRPERSON: JoAnne Deneron, Chair
12 of MVEIRB. GNWT, to the question, please.

13 MR. DON MACDONALD: Madam Chair, thank
14 you. This is Don MacDonald, MESL, on behalf of GNWT.
15 So what I understand, then, is that the prediction of
16 44 kilometres downstream, where the influence of the
17 mine could be detected relative to baseline conditions
18 is where those predictions of future water quality
19 cross the upper bound of that reference range.

20 Is that correct?

21 THE CHAIRPERSON: JoAnne Deneron, Chair
22 of MVEIRB. De Beers, your response, please.

23

24 (BRIEF PAUSE)

25

1 MS. ERICA BONHOMME: Erica Bonhomme.

2 Yeah, we're just reviewing the information. Give us a
3 moment, please.

4

5 (BRIEF PAUSE)

6

7 MS. HILARY MACHTANS: Hilary Machtans,
8 for De Beers. That is not correct.

9 So the -- the -- this plot is just a
10 schematic to give a frame of reference. The model
11 material and how the downstream concentrations are
12 calculated is found in Section 2 of the supplemental
13 filing, so all the specific details of the modelling
14 and how it was done are provided there. This plot is
15 just to give a frame of reference for how the
16 predictions fit within the existing baseline data, and
17 -- and the -- and the Environmental Assessment
18 predictions from 2003.

19 So it's just supposed to give context.

20 THE CHAIRPERSON: JoAnne Deneron, Chair
21 of MVEIRB. GNWT...?

22 MR. DON MACDONALD: Thank you, Madam
23 Chair. Don MacDonald, MESL, on behalf of GN -- GNWT.

24 And so I'm -- I'm still trying to
25 understand the process, then, that De Beers has used to

1 develop their predictions of how far downstream the
2 effluent -- the influence of the effluent can be
3 detected within the Lockhart River system.

4 I'm -- I'm still unclear, and -- and
5 maybe it's just happenstance that -- that those
6 predictions cross the line about 44 kilometres
7 downstream of Snap Lake. So I'm -- I'm just -- I'm
8 really trying to understand what has been done here in
9 these predictions.

10 THE CHAIRPERSON: JoAnne Deneron, Chair
11 of MVEIRB. De Beers, your response, please, in one (1)
12 moment.

13

14 (BRIEF PAUSE)

15

16 MS. ERICA BONHOMME: Erica Bonhomme.
17 It's -- it's very simple. It -- where we say there's a
18 -- an -- an effect 44 kilometres downstream is where we
19 can detect a measurable change above baseline that's
20 attributable to Snap Lake effluent.

21 THE CHAIRPERSON: JoAnne Deneron, Chair
22 of MVEIRB. GNWT, response to the question, please?

23 MR. DON MACDONALD: Yes, this is Don
24 MacDonald again, MESL, on behalf of -- of GNWT. So
25 what I'm really trying to understand is -- is what

1 baseline was used specifically.

2 So what's shown on this graph is a range
3 of baseline conditions. I -- what I think I just heard
4 was although that's on this graph, this wasn't used in
5 this analysis. So I'm trying to understand, then, what
6 was used?

7 Could -- could De Beers please enlighten
8 me?

9 THE CHAIRPERSON: JoAnne Deneron, Chair
10 of MVEIRB. De Beers, your response, please?

11 MS. HILARY MACHTANS: Hilary Machtans,
12 for De Beers. Can I just clarify, is your question:
13 What is the origin of the baseline data and what year
14 was it collected?

15 THE CHAIRPERSON: GNWT...? JoAnne
16 Deneron, Chair of MVEIRB. GNWT, your response, please?

17 MR. DON MACDONALD: Thank you, Madam
18 Chair. Don MacDonald, MESL, on behalf of GNWT.

19 No, that's not the question. The
20 question is specifically how was -- there's a number of
21 data points that are shown on this graph with 'X's.
22 And you'll see that sort of line that -- that starts
23 off around some value, maybe around eighty (80) or so,
24 and then drops down across that baseline line, and then
25 goes up and down.

1 And on -- along that line, I see various
2 'X's, and what I'm trying to understand is what -- what
3 specific data were used to establish baseline for each
4 of the locations for which these predictions were made?

5 THE CHAIRPERSON: JoAnne Deneron, Chair
6 of MVEIRB. De Beers, your response, please?

7 MS. HILARY MACHTANS: Hilary Machtans,
8 for De Beers.

9 That -- each 'X' on the plot represents
10 -- represents the prediction that was made in the
11 original EA, and the same data that was used in the
12 original EA, that represented baseline data from which
13 the horizontal line is created. So the range of
14 baseline data was collected by the federal government
15 in the 1990s, and that's the same data set that was
16 used.

17 And that was presented in the original
18 EA, as well as rediscussed in the supplemental filing.
19 So the range of those -- those exact data points
20 represent sample stations from the federal government
21 along the Lockhart River. And that's what those yellow
22 dots are, if you will, along the plot.

23 There's -- there's stations, long-term
24 monitoring stations from the federal government. And
25 the data set used was the data set from the 1990s.

1 This was also discussed in the technical session on
2 April 14th and 15th, and De Beers had committed to
3 updating that data set to see what additional data was
4 available now from that. And so De Beers is continuing
5 to work with both the GNWT, Environment Canada, and
6 Aboriginal Affairs to obtain that data and then have it
7 updated based on the data set for the Lockhart River.

8 THE CHAIRPERSON: JoAnne Deneron, Chair
9 of MVEIRB. GNWT, to the question, please.

10 MR. DON MACDONALD: Thank you, Madam
11 Chair. Don MacDonald, MESL, on behalf of GNWT. That's
12 -- that explanation was very helpful and it sets up, I
13 think, what is my last question here.

14 And it's -- it really gets at the
15 question, from De Beers's perspective, what procedure
16 would be used to evaluate a deviation from baseline
17 conditions? And I mean specifically, what procedure
18 would be used? What arithmetic procedure would be used
19 to evaluate a deviation from baseline conditions, and
20 what would the minimum deviation from baseline
21 conditions that could be measured? What is that? What
22 is that value in terms of milligrams per litre for TDS?

23 THE CHAIRPERSON: JoAnne Deneron, Chair
24 of MVEIRB. De Beers, your response, please.

25 MS. ERICA BONHOMME: Erica Bonhomme.

1 If you'd just give us a moment, please?

2

3

4 (BRIEF PAUSE)

5

6 MS. HILARY MACHTANS: Hilary Machtans,
7 for De Beers. Thank you, Madam Chair, for the break
8 there. So it -- it's a very good question.

9 So the -- the De Beers Aquatic Effects
10 Monitoring Program is the place where that level of
11 detection is possible, so De Beers currently monitors
12 at what -- what's labelled on that map as King Lake,
13 and we are able to detect changes within, you know, a
14 number of milligrams per litre.

15 So the precision around the detection is
16 not fully known yet, so that's a fair question, and De
17 Beers has plans to work with the various government
18 departments to determine where -- what the range of
19 natural variability is within the Lockhart River so
20 that you could determine how sensitive you are to those
21 changes.

22 But again, we stress that all the
23 predictions are already within, like, the -- what we --
24 what's shown as those black lines is the range of the
25 data that exists already. So TDS between, say, ten

1 (10) and forty (40) or -- or fifty-three (53) is the
2 peak measured in the 1990s.

3 So I think, in summary it's within --
4 the predictions are within the natural range of data
5 that's been collected to date, but work will be done in
6 -- through the AEMP in conjunction with the Land and
7 Water Board and other parties and -- and the government
8 parties who are monitoring to further develop what is
9 the range of natural variability in the river system.

10 THE CHAIRPERSON: JoAnne Deneron, Chair
11 of MVEIRB. GNWT...?

12 MR. ROBERT JENKINS: Thank you, Madam
13 Chair. It's Robert Jenkins, with GNWT. I want to
14 thank Ms. Machtans for -- for that response, and De
15 Beers for answering our questions. That concludes our
16 questioning today. Thank you.

17 THE CHAIRPERSON: Thank you. At this
18 time, the Board would like to call a break for lunch
19 from 12:00 to 1:15. Thank you.

20

21 --- Upon recessing at 12:06 p.m.

22 --- Upon resuming at 1:27 p.m.

23

24 THE CHAIRPERSON: Okay. If we could
25 have everyone's attention and come back to the tables,

1 please, so recon -- we can reconvene the hearing.

2

3 (BRIEF PAUSE)

4

5 THE CHAIRPERSON: The chair would like
6 to make a couple of introductions. We would like to
7 recognize Kathy Racher, the technical director for --
8 what is it, for Mackenzie Valley Land and Water Board.
9 And the other introduction is for Cathy McManus, at the
10 back by the door, our receptionist.

11 At this time we would like to reconvene
12 then with the questions. Next on questions we have
13 Environment Canada to be asking questions. And we have
14 a person on line so we just have to be cognizant of the
15 person on line, that there would be probably a little
16 bit of a delay when a person asks questions. Okay.
17 Environment Canada...?

18 MS. SARAH-LACEY MCMILLAN: Good
19 afternoon. It's Sarah-Lacey McMillan, and Anita Li on
20 line does have a couple questions.

21 MS. ANITA LI (BY PHONE): Thank you,
22 Madam Chair. I have a few questions. On slide 3 --
23 oh, it's Anita Li, from Environment Canada.

24 On slide 3 the last bullet it says,
25 "Interim EQC," and then I think on page -- I'm trying

1 to find the page here, and it lists -- let's see, page
2 15. It gives the interim EQC at 850 milligrams per
3 litre, and I -- I don't believe I've seen that interim
4 EQC before.

5 Is it something new?

6 MS. ERICA BONHOMME: Erica Bonhomme.

7 We did propose an interim EQC in our response to
8 technical reports. That was filed on May 28th.

9 MS. ANITA LI (BY PHONE): When you
10 first developed a site-specific water quality objective
11 of 684 milligrams per litre, it equated to an EQC of
12 684 milligrams per litre, so the site-specific water
13 quality objective was the same as the EQC.

14 In this case, with the interim EQC are
15 you suggesting that the site-specific water quality
16 objective could possibly be eight-fifty (850) as well
17 within the two (2) years?

18 MS. ERICA BONHOMME: Erica Bonhomme.
19 No. The site-specific water quality objective that
20 we've proposed for Snap Lake does not change with the
21 application of an interim EQC.

22 So remember the site-specific water
23 quality objective is a concentration of TDS within Snap
24 Lake that will ensure the protection of aquatic life.
25 An effluent quality criterion is the level of that TDS

1 in the effluent that will ensure that that site-
2 specific water quality objective is not exceeded.

3 So if we -- we can continue to load TDS
4 -- TDS in mine effluent into Snap Lake without
5 exceeding that site-specific water quality objective in
6 Snap Lake. So what we've proposed is that because
7 there is no mitigation applied at this time, that
8 essentially the effluent would be discharged at -- in a
9 -- in an unmitigated state up to a point where the Snap
10 Lake water quality objective of six eighty-four (684)
11 would be achieved. So that is where that interim EQC
12 comes from.

13 MS. ANITA LI (BY PHONE): Anita Li,
14 from Environment Canada. Thank you.

15 So what has changed that between -- I
16 guess, why are you asking for an interim EQC now? Why
17 is it higher than the six eighty-four (684) that you
18 had initially stated in the documents?

19 MS. ERICA BONHOMME: Erica Bonhomme.
20 This was a discussion -- a fairly lengthy discussion at
21 the technical session. We are responding to some
22 suggestions during the technical session that we look
23 at how -- how we could continue on with this process in
24 the absence of mitigation.

25 So, as you know, we've presented a

1 mitigated and an unmitigated scenario. And we've
2 suggested that in the -- while a final site-specific
3 water quality is -- is determined by the Land and Water
4 Board, we will continue with our mining operations.

5 At this time, we are proposing that an -
6 - an interim effluent quality criter -- cri --
7 criterion for TDS will allow us to continue in an
8 unmitigated situation for effluent while still ensuring
9 the protection of the aquatic environment in Snap Lake.

10 MS. ANITA LI (BY PHONE): Anita Li,
11 from Environment Canada. Thank you.

12 And is this interim EQC, is it the
13 average monthly limit that you're talking about, the
14 850 milligrams per litre?

15 MS. ERICA BONHOMME: Erica Bonhomme.
16 That's correct.

17 MS. ANITA LI (BY PHONE): Another
18 question is: On page 6 of the slide, you've indicated,
19 "The current practices to reduce TDS loading to the
20 environment."

21 Can you tell me what are the current
22 practices?

23

24 (BRIEF PAUSE)

25

1 MS. ERICA BONHOMME: Erica Bonhomme.
2 Cur -- the cur -- our current practice to reduce TDS
3 loadings to the environment is through dilution.

4 MS. ANITA LI (BY PHONE): Anita Li,
5 from Environment Canada. Okay. Thank you. And my
6 last question is on slide 32. I know you've indi --
7 oh, Anita Li, from Environment Canada.

8 I know that you've indicated that
9 modelling provides no indication that meromixis will
10 occur during operation and that there's no evidence
11 that Snap Lake is becoming meromitic.

12 But can you explain how the models tell
13 you that there is no increased -- that the increased
14 TDS would not lead to stratification?

15

16 (BRIEF PAUSE)

17

18 MS. ERICA BONHOMME: Erica Bonhomme.
19 Alison Snow will respond to that question.

20

21 (BRIEF PAUSE)

22

23 MS. ALISON SNOW: Alison Snow. The
24 hydrodynamic model that is used to model Snap Lake
25 calculates water density. So as concentrations of

1 total dissolved solids increase in Snap Lake, the model
2 will calculate density. And then we can look at
3 vertical profiles in the water column to see if
4 stratification is being predicted or not.

5 MS. ANITA LI (BY PHONE): Okay. Thank
6 you. Now, Dr. Chapman had said that during the open
7 water season there's wind mixing the water, so there's
8 no chance of stratification.

9 What about in the ice covered season?
10 Is there a possibility of stratification?

11 MS. ALISON SNOW: Alison Snow. So the
12 hydrodynamic model is run daily, so we model both the
13 ice covered season and the open water season. And the
14 hydrodynamic model does not predict stratification
15 occurring during the ice covered season either.

16 MS. ANITA LI (BY PHONE): Thank you.
17 Anita Li, from Environment Canada. When you say
18 there's no possibility of stratification in the lake,
19 is there -- I guess Dr. Chapman had said the whole
20 lake.

21 Is there a possibility there could be
22 stratification in parts of Snap Lake?

23

24 (BRIEF PAUSE)

25

1 MS. ALISON SNOW: Thermal
2 stratification occurs in the open water season in the
3 deep holes in Snap Lake. So there's a deep area in the
4 northwest arm. And there's also a deep location where
5 the diffuser discharges into Snap Lake. But that is
6 not -- the stratification occurring is not based on
7 water density. It's just due to temperature.

8 So the hydrodynamic model we can look at
9 different locations in the lake. It's not just based
10 on a whole lake average. So we can look at different
11 locations and look at the predicted profiles at those
12 locations. And as I stated, the hydrodynamic model
13 does not predict that stratification will occur.

14 MS. ANITA LI (BY PHONE): Anita Li,
15 from Environment Canada. You were talking about
16 thermal density. What about the density due to
17 salinity?

18 MS. ALISON SNOW: Alison Snow. Sorry
19 for the confusion. I'm referring to not only thermal
20 stratification due to temperature, but also
21 stratification that would be caused by density.

22 MS. ANITA LI (BY PHONE): Anita Li,
23 from Environment Canada. Thank you. That's all my
24 questions.

25 THE CHAIRPERSON: Any other questions

1 from Environment Canada?

2 MS. SARAH-LACEY MCMILLAN: Sarah-Lacey
3 McMillan, with Environment Canada. No further
4 questions.

5 THE CHAIRPERSON: Thank you. The next
6 set of questions, Yellowknives Dene First Nations?

7 MR. TODD SLACK: Todd Slack, on behalf
8 of the Yellowknives. And thank you, Madam Chair. I've
9 just got a couple of short ones. The first is a
10 clarification as to what Mr. Whitaker was asking. And
11 if we can just go back to Slide 25?

12 So bullet number 2 there you suggest
13 that a lower SSWQO may not be achievable. So what
14 exactly can be achieved? Well -- I think that's an
15 important number to -- to set the -- the framework by
16 which we're -- we're considering this.

17 MS. ERICA BONHOMME: Erica Bonhomme.
18 Theoretically, pretty much anything is achievable. Is
19 it achievable at Snap Lake mine? That's the question
20 we're addressing right now. We are currently
21 evaluating treatment as a feasible technology for what
22 we believe to be a protective site-specific water
23 quality objective of six hundred and eighty-four (684).

24 MR. TODD SLACK: Thanks for that. I
25 might come back to that in a second.

1 Just as a -- a starting point for -- for
2 our questions, can you just tell us when mining
3 commenced at Snap Lake and what the planned lifespan of
4 the mine was?

5 MR. DAVID PUTNAM: Madam Chair, Dave
6 Putnam, with De Beers. We commenced mining in 2008 and
7 the current plan life of mine is 2028.

8 MR. TODD SLACK: Todd Slack, with the
9 Yellowknives. Thanks.

10 And at what point did De Beers have data
11 that indicated the TDS loadings were different than
12 those predicted in the environmental assessment?

13

14 (BRIEF PAUSE)

15

16 MR. DAVID PUTNAM: Madam Chair, Dave
17 Putnam, with De Beers. We first presented the
18 information as part of the proceedings leading up to
19 the water licence renewal in 2011.

20 MR. TODD SLACK: And would you say that
21 -- sorry, Todd Slack, with the Yellowknives.

22 Would you say that that presentation was
23 a summary of the data that you'd been collecting over
24 that time? Or was that the -- the first indication
25 that there was deviation from the predictions?

1 MR. DAVID PUTNAM: Madam Chair, Dave
2 Putnam, De Beers. That was the first time that the --
3 that the -- the modelling -- the predictive modelling
4 was updated, and so that was the -- the first
5 indication that we had the -- the TDS was trending in a
6 different way than originally predicted.

7 MR. TODD SLACK: Thanks for that. And
8 so -- Todd Slack, for the Yellowknives. Pardon me.

9 I -- I'm guessing -- I'm -- I'm a little
10 confused in -- in term -- in terms of what the previous
11 environmental assessment decision said. There was a
12 number of measures contained within that, that if these
13 issues deviated, the project would immediately
14 implement mitigation status.

15 Now, I understand that you undertook
16 grouting -- a grouting study, which we learned the --
17 at the technical session was not going to be feasible.
18 However, it seems that there should have been more done
19 at that point in time.

20 Can you tell us about what you had done
21 previously?

22

23 (BRIEF PAUSE)

24

25 MS. ERICA BONHOMME: Erica Bonhomme.

1 Prior to 2011, we commissioned several studies, both of
2 which have been filed -- two (2) studies, both of which
3 have been filed on the registry regarding the
4 feasibility of applying treatment mitigation to Snap
5 Lake Mine with the information available at the time.
6 I should note that since -- since that process --
7 renewal process in 2011, we've -- we've undertaken a --
8 and evaluated grouting as a means to reduce TDS
9 loadings.

10 We've addi -- acquired additional
11 hydrogeological data to reduce our uncertainties in the
12 groundwater model, and as I mentioned, we -- we -- as
13 we've been talking about, we've completed the toxicity
14 testing. We've also updated the BATEA study -- BATEA
15 type studies that we had done prior to that renewal,
16 and that -- that -- those two (2) reports have also
17 been filed with the Review Board here.

18 MR. TODD SLACK: Thank you. Todd
19 Slack, on behalf of the Yellowknives.

20 So the study that you -- you just
21 referenced, and then that is on the registry, if the
22 data indicating deviation from the EA predictions
23 wasn't in place until 2011, what exactly was the
24 impetus behind that study in which you undertook and
25 you arrived at this \$180 million in terms of capital

1 cost to treat the -- the effluent to the three-fifty
2 (350) limit?

3 MS. ERICA BONHOMME: Erica Bonhomme. I
4 think that's the first point where we really had
5 comprehensive data from the underground to update our
6 hydrogeological models, and to start evaluating
7 different mean -- ways in which the current TDS loading
8 limits could be achieved. But what's important here is
9 that, you know, you need some -- you need a goal to
10 strive for, and this is where the toxicity studies that
11 we've done are extremely important, because they inform
12 the level of protection that we're striving for.

13 And there have been many studies done,
14 including ones by Environment Canada on this very issue
15 that have -- to which De Beers has provided input that
16 talk about treatment generally and its applicability to
17 mines, but I think what's very important is the very
18 unique context and conditions at Snap Lake that require
19 a process to be undertaken for us to fully evaluate
20 what options for source control, which include grouting
21 and -- and treatment, that we -- we have a -- a -- the
22 full in -- fullest information we can have before we
23 proceed to fully evaluating their applicability
24 specifically at Snap Lake Mine.

25 MR. TODD SLACK: Todd Slack, on behalf

1 of the Yellowknives, and just to wrap this up, so the
2 earliest study that looks at treatment dates from 2008,
3 and the first indication that you had deviation from
4 your predictions dates from 2011.

5 Do I have that correct?

6 MR. DAVID PUTNAM: Madam Chair, Dave
7 Putnam, with De Beers.

8 Yes, the first time we pre -- we
9 presented an updated set of modelling results was in
10 2011. That was based on having obtained a couple of
11 years of operating experience with the mine, and just
12 to support what Erica Bonhomme has just said, and so
13 really that was -- that was the point where we -- we
14 had enough information about the underground workings
15 of the mine to be able to update the model.

16 MR. TODD SLACK: Todd Slack, with the
17 Yellowknives.

18 And, sorry, the second part of that was
19 to clarify that the initial treatment study data from
20 2008, do I have that right?

21 MR. DAVID PUTNAM: Madam Chair, Dave
22 Putnam, with De Beers.

23 The initital -- initial desktop review
24 of potential technologies was done in 2008. It wasn't
25 a -- a full engineering study, but an initial -- an

1 initial review of possible -- possible technologies.

2 MR. TODD SLACK: Thank you. Todd
3 Slack, on behalf of the Yellowknives.

4 So I -- I am just at a bit of a loss as
5 to what the impetus behind that 2008 one -- eight (8) -
6 - treatment study was, and what objectives and things
7 were considered within that, if you didn't know that
8 your -- that the predictions were wrong relative to the
9 flows that you were seeing?

10 Can you help us understand what went
11 into that model, or that modelling exercise, and why
12 there's a -- a discord here?

13

14 (BRIEF PAUSE)

15

16 MS. ERICA BONHOMME: Erica Bonhomme. I
17 don't have the exact scope of work in front of me for
18 that -- for that. Obviously, to have to -- to check on
19 that for you, but, you know, we -- we do these studies
20 not to just inform, you know, the -- the conditions and
21 the decisions of the day, but, you know, we -- we think
22 ahead to a life of mine planning, and this was an
23 important aspect of -- of understanding the life of
24 mine conditions and what may be required into closure.

25 Some of those requirements are -- are

1 contained within our -- our operating licences, and I
2 think that the information there, while now outdated,
3 would have been the best available information at the
4 time. That would have contributed to us evaluating how
5 better to meet our sustainability commitments.

6 MR. TODD SLACK: Thanks for that.

7 Would it be fair to say that in 2008, that you
8 understook -- undertook that study because you thought
9 you may have a problem with TDS?

10 THE CHAIRPERSON: Mr. Slack, could you
11 please identify yourself when you speak?

12 MR. TODD SLACK: My apologies, Madam
13 Chair. It's Todd Slack, on behalf of the Yellowknives.
14 Thank you.

15

16 (BRIEF PAUSE)

17

18 MR. DAVID PUTNAM: Madam Chair, Dave
19 Putnam, with De Beers.

20 You may recall in 2008, there was a -- a
21 global recession, and we were just -- just -- I -- I
22 would like to confirm that that was part of -- part of
23 a planning exercise that we did considering, you know,
24 the possibility that we may actually have to close the
25 mine.

1 So you may recall that we also presented
2 during the water licence renewal, a period in 2009
3 where we actually stopped production at the mine. So
4 it was a -- it was really an exercise around looking at
5 what we might need to -- to consider in a -- in a
6 closure scenario.

7 MR. TODD SLACK: Todd Slack, on behalf
8 of the Yellowknives.

9 I -- I'm just having difficulty
10 understanding why De Beers did this work if they didn't
11 think they had a problem with TDS, global recession
12 notwithstanding. If you did close the mine, would you
13 have had a problem with TDS? It seems that that is the
14 driver behind this, and I'm just looking for
15 confirmation with that.

16 MS. ERICA BONHOMME: Erica Bonhomme. I
17 -- I think we address all environmental considerations
18 proactively. We're not, you know, saying that there
19 may not have been an issue with TDS down the road. Our
20 latest model predictions that we have confidence in are
21 from 2011, and -- and I -- I think that that is the
22 issue before us here.

23 We are providing you with information
24 that shows how best we may be able to carry forward and
25 achieve the objectives we've set based on the best

1 available information we have to date, which is models
2 and studies that are dated from 2011 onwards.

3 MR. TODD SLACK: Madam Chair, Todd
4 Slack, on behalf of the Yellowknives. I'll -- I'll
5 just move on.

6 I'm wondering if the project has
7 undertaken any research to consider interactive effects
8 between total dissolved solids and other elements or
9 other compounds?

10 DR. PETER CHAPMAN: Peter Chapman.
11 When we test the total dissolved solids, we're testing
12 all of the components to those total dissolved solids
13 together. So we're not just testing them individually.

14 Now -- so the research does take that
15 into account. If you look at the literature, total
16 dissolved solids, when this increases, also increases
17 hardness, and hardness can be what CCME in 2007 calls
18 an exposure toxicity modifying factor. In other words,
19 it can change whether something is toxic and bioavail -
20 - bioavailable or not.

21 And as you know from the record, aside
22 from TDS, we've also suggested for chloride and for
23 nitrate site-specific water quality objectives that are
24 based on hardness as an exposure toxicity modifying
25 factor, which is exactly what was done for Ekati and

1 approved in their water licence. So, yes, we have
2 considered those.

3 MR. TODD SLACK: Thanks for that
4 answer. It's Todd Slack, with the Yellowknives.

5 Did you consider in conjunction with
6 metals, you know, let's say cesium, which is shown to
7 be a potential issue, other elements and compounds
8 along those lines that don't form the constituents of
9 TDS itself?

10 DR. PETER CHAPMAN: Peter Chapman. The
11 -- when you do a scientific study and you look to see
12 what you need to look at, you look -- you identify your
13 contaminants of potential concern. The metals are
14 very, very low levels. They're not something that
15 would have an effect here, particularly as hardness
16 increases, because hardness has been well-shown in the
17 literature to reduce the bioavailability and toxicity
18 of metals. It's an exposure toxicity modifying factor
19 for metals, as well.

20 MR. TODD SLACK: Thanks for that. And
21 the only reason I bring this up, because, listen, I
22 don't understand how the synergy and these sort of
23 things, but it was a young Peter Chapman who brought
24 this up at the last hearing and seemed quite concerned
25 about it.

1 And so I'm wondering if you had
2 recommended this as a -- a potential concern for all of
3 us to be looking at and investigating?

4 THE CHAIRPERSON: Mr. Slack, please
5 identify yourself when you speak again.

6 MR. TODD SLACK: I'm sorry.

7 DR. PETER CHAPMAN: Peter Chapman. I
8 assume that Todd is referring to way, way back when in
9 2001 when there was the A hearing, and at that time, I
10 was working, not for De Beers, I was working for INAC,
11 subsequently AANDC, now GNWT. And at that point, earl
12 -- before the mine had started working and before we
13 had real data, I raised some concerns and so did --
14 including a concern that, you know, about the level of
15 TDS.

16 And at that time I was actually, as a
17 representative of INAC, quite willing to give De Beers
18 the default value of -- of 500 milligrams per litre,
19 because typically although all TDS is not the same,
20 generally as long as you're below five hundred (500)
21 without doing site-specific testing, you're fine.

22 And that's one (1) of the reasons, I
23 assume, that the Wek'eezhii Land and Water Board gave
24 that default value to Diavik. So yes, I considered
25 those at the time, but it's a very different situation

1 now. We have data from the mine, and I am considering
2 what's happening at this time.

3 And just to add to this and my previous
4 answer, in terms of mixtures, I just remembered, we do
5 do effluent toxicity mix -- testing. We test with two
6 (2) sensitive organisms. One's a daphnid -- the
7 Ceriodaphnia, the very, very sensitive one that doesn't
8 live in the lake, and the other with an -- with an
9 algae periodically in the effluent and at the edge of
10 the mixing zone, and toxicity testing considers the
11 interactive effects of everything that's there, and in
12 this case, we're doing it in the lake.

13 MR. TODD SLACK: Todd Slack, on behalf
14 of the Yellowknives.

15 My last question here is -- I think it's
16 my last question. The project noted that the grouting
17 program is currently ongoing.

18 I'm just wondering how effective it is
19 at reducing inflows into the mine?

20 MR. STEVE RIDGE: Steve Ridge, from De
21 Beers.

22 I'm -- currently we're -- we're looking
23 at -- we are actually grouting for localized high TDS
24 concentrations. As was mentioned before, we looked at
25 putting in a full cork and grout, and deemed that the -

1 - A) That the technology wasn't there, nor the
2 reliability.

3 And -- but we are currently -- and --
4 and we don't have -- we have instances where we can
5 actually show how much the -- the TDS again will reduce
6 if we grout in certain localized areas. However,
7 there's a couple of added complexities if we try and
8 expand that, and namely, okay, first priority for us is
9 the safety of the people who are working underground.

10 If we continue developing our footwall
11 where we intersect the high connate water and we will
12 have to install a series of bulkheads, and -- and
13 obviously we're -- we're slightly concerned that we're
14 going to build up pressure, and then as we continue
15 mining, then we'll get intersections of that water
16 again.

17 So we're currently looking at, then, a
18 possible solution for engineering these bulkheads as
19 well as -- and different products that we're going to
20 try for -- for reducing -- for -- for the grouting
21 methods.

22 MR. TODD SLACK: Todd Slack, on behalf
23 of the Yellowknives.

24 If I -- I might just indulge one (1) --
25 one (1) last clarification. So the full curtain

1 grouting program, that started when, I -- I guess is my
2 question? And then when can we expect to have more
3 information as to the amount of inflows that the local
4 curtain grouting will inter -- intercept?

5 MS. ERICA BONHOMME: One (1) moment,
6 Madam Chair.

7

8 (BRIEF PAUSE)

9

10 MR. STEVE RIDGE: And Steve Ridge, De
11 Beers.

12 The -- the localized grouting, we're
13 more concerned with really trying to -- or sorry, I'll
14 take a step back. We have in the last twelve (12)
15 months detailed, okay, mapping of our -- our high TDS
16 sources right down to -- we're trending it on -- on the
17 hour, and we also have a -- we also monitor each face
18 where there's a new intersection of water.

19 And we measure that with conductivity
20 meters. So what we're able to do is more targets where
21 the high TDS is, and not necessarily where the -- the
22 high flows -- the high flows are. And if we were to
23 give you an example, where we're currently, this week,
24 undergoing a -- a grouting program where we're trying
25 to reduce from 10 milligram per litre in one (1)

1 particular area. But again, it's -- it's more the --
2 more the quality not the quantity that we can -- that
3 we can measure.

4 The -- the full curtain, as I say, was -
5 - I think there was -- there was a submission that was
6 -- that was put in there in terms of the work that was
7 done, and -- and our reasons for discounting full
8 curtain grouting.

9 MR. TODD SLACK: Thank you. Mr. Chair
10 -- or -- or Madam Chair, pardon me, sorry. And thank
11 you for that answer, but I -- I'm looking to just
12 extrapolate when we can expect to see results of the
13 local curting -- curtain efforts, like that research.

14 So I'm wondering if you can tell us when
15 the -- the full curtain one started, because we know it
16 wrapped up and wasn't going to be effective a few weeks
17 ago.

18 So how -- can we get the start date on
19 that? And then if you have any information in terms of
20 when we could expect to have good results out of this
21 local curting -- local grouting -- whatever.

22 MR. STEVE RIDGE: And we have to -- we
23 have to bring up some material, so we've got to fly
24 some cement in. We've got to fly some -- some resin up
25 there. And I would -- best guess at the moment is

1 three (3) months' time that we'll have some sort of
2 indicative figures of what we can -- what reduction we
3 can achieve with the -- with the localized grouting.

4 Having said that, I just want to stress
5 the point, though. When we look at -- if we do have to
6 construct bulkheads, and that may be further, because
7 obviously, the concern is that we're drilling into the
8 -- the host rock, and where -- where -- while you're
9 putting in a -- a very solid bulkhead, okay, the host
10 rock may not be as competent, and our concern is that
11 we would lose that if we -- if we built up pressure.

12 THE CHAIRPERSON: Please identify
13 yourself when you're speaking again. Thank you.

14 MR. TODD SLACK: No further -- Todd
15 Slack, on behalf of the Yellowknives. No further
16 questions. Thank you.

17 THE CHAIRPERSON: Okay. Thank you.
18 Next questions, Lutsel K'e Dene First Nations.

19 MR. MIKE TOLLIS: Thank you, Madam
20 Chair. It's Mike Tollis, from the Lutsel K'e Dene
21 First Nation. In your presentation, you mention that
22 there are no national guidelines for total dissolved
23 solids.

24 Are -- are you aware of the Canadian
25 Drinking Water Quality Aesthetic guideline of 500

1 milligrams per litre of TDS?

2 MS. ERICA BONHOMME: Erica Bonhomme.

3 Yes, although I point out those are aesthetic
4 guidelines, not guidelines for the protection of
5 aquatic life.

6 MR. MIKE TOLLIS: Mike Tollis, from
7 Lutsel K'e. Aesthetic guidelines, I think you
8 reference it in your -- in your presentation that it
9 impacts the taste of the water.

10 Is that true?

11 MS. ERICA BONHOMME: Erica Bonhomme.
12 According -- it's -- it's based on a taste panel, a
13 panel of testers. It could, so some people may
14 perceive changes at the levels that have been
15 identified in the drinking water guideline.

16 MR. MIKE TOLLIS: Mike Tollis, from
17 Lutsel K'e. Thanks for that -- that answer. We just
18 want to make -- make the point that there is a
19 guideline and it does exist, and we don't think that
20 it's unattainable.

21 Another question is, do you treat your
22 water before it comes out of the taps for your
23 employees at Snap Lake?

24

25 (BRIEF PAUSE)

1 MS. ERICA BONHOMME: Erica Bonhomme.

2 We do add chlorine to the water.

3 MR. MIKE TOLLIS: Mike Tollis, from
4 Lutsel K'e. Thank you. So in your technical report,
5 when talking about drinking water quality, you state,
6 quote:

7 "However, the water will remain safe
8 for human consumption. Up to seven
9 hundred (700) people working at the
10 mine rely on Snap Lake water for
11 drinking. De Beers is required to
12 monitor and report on drinking water
13 quality to the territorial health
14 inspector."

15 End quote. So I just want to make a
16 point here that drinking water quality that you report
17 to the terri -- territorial health inspector is not the
18 same drinking water quality when we say we want to be
19 able to drink the water. We're talking about people
20 who have grown up drinking the water right out of the
21 lakes and rivers, so when we talk about drinking water
22 quality, it's without any treatment, and I just wanted
23 to be clear on that.

24 And, Madam Chair, that's one (1) of a
25 couple definitions that -- that the community kind of

1 disagrees with the Company on. Another one (1) is
2 overprotective. It was mentioned a couple of times in
3 the presentation and we don't believe that there -- you
4 can be overprotective when we're talking about water
5 quality.

6 And -- and the same with cumulative
7 effects. It was mentioned a few times that the --
8 it'll not contribute to cumulative effects, but if you
9 have -- when we look at a -- at a watershed level, if
10 you have -- if -- if Snap Lake contamination is
11 detectable 44 kilometres downstream and Gahcho Kue, for
12 example, is detected 44 kilometres downstream, that's
13 88 kilometres, and that's -- that's a cumulative effect
14 as far as we're concerned.

15 I just have one (1) more line of
16 questioning here. I heard a couple of numbers that
17 were -- that were mentioned, and I -- and I read a
18 couple of different ones. So I just wanted to be
19 clear.

20 How far downstream will the effluent be
21 detectable at the end of the mine life?

22 MS. ERICA BONHOMME: Erica Bonhomme.
23 Snap Lake effluent will be measurable 44 kilometres
24 downstream of Snap Lake if the site-specific water
25 quality objective of 684 milligrams per litre is

1 applied over life-of-mine.

2 MR. MIKE TOLLIS: Thank you. Mike
3 Tollis, from Lutsel K'e.

4 Would you say that this is a
5 conservative -- conservative estimate, or a prediction
6 that's going to be bang-on?

7

8 (BRIEF PAUSE)

9

10 MS. ERICA BONHOMME: Erica Bonhomme. I
11 -- I think that we consider it to be a reasonable
12 estimate. Our modelling that we've been verifying
13 through ongoing monitoring under the Aquatic Effects
14 Monitoring Program has been very close to the -- the EA
15 predictions we originally had. We have no reason to
16 believe that those predictions will be any different.

17 I should also point out that as soon as
18 mining stops, the TDS loads to Snap Lake will
19 dramatically decrease, and the water quality will
20 improve almost immediately.

21 MR. MIKE TOLLIS: Thank you. Mike
22 Tollis, from Lutsel K'e Dene First Nation.

23 Where is the furthest monitoring station
24 that exists right now downstream from Snap Lake?

25 MS. ERICA BONHOMME: Erica Bonhomme.

1 It -- it's at King Lake, and if you look at the --
2 slide 43 in the presentation we gave this morning, it
3 shows where that station is located in relation to Snap
4 Lake.

5 MR. MIKE TOLLIS: Mike Tollis, from
6 Lutsel K'e. How far downstream is that from Snap Lake?

7 MS. ERICA BONHOMME: Erica Bonhomme.
8 My colleagues inform me it's 25 kilometres downstream
9 from Snap Lake.

10 MR. MIKE TOLLIS: Mike Tollis, from
11 Lutsel K'e Dene First Nation.

12 How, then, if that's your furthest
13 downstream monitoring station, are you going to be able
14 to detect effluent at the 44 kilometre point at the
15 inlet of MacKay Lake?

16 MS. ERICA BONHOMME: Erica Bonhomme.
17 That -- that same slide indicates that we will
18 undertake monitoring of water quality at the inlet to
19 MacKay Lake. That is 44 kilometres downstream from
20 Snap Lake, so that's additional monitoring we've
21 committed to undertaking to verify the predictions
22 we've made.

23 MR. MIKE TOLLIS: Thank you. Mike
24 Tollis, from Lutsel K'e Dene First Nation.

25 Say, for example, your predications are

1 inaccurate. How will we be able to know the extent of
2 the effluent if you're not monitoring beyond 44
3 kilometres?

4

5 (BRIEF PAUSE)

6

7 MS. ERICA BONHOMME: Erica Bonhomme.
8 We -- when -- our response framework, and -- and we
9 hope that this monitoring will become part of the
10 Aquatic Effects Monitoring Program, when we start to
11 detect changes, we can first of all verify that those
12 are -- those changes are occurring, but then -- and
13 assign a -- assign an appropriate action in response to
14 that.

15 I should also note, though, that there
16 are -- there is other monitoring being undertaken. As
17 Ms. Machtans pointed out earlier today in -- in her --
18 her response, other government agencies do conduct
19 monitoring throughout the Lockhart River watershed, and
20 ourselves, as well as everybody else, has access to
21 that information.

22 MR. MIKE TOLLIS: Thank you. Mike
23 Tollis, from Lutsel K'e Dene First Nation.

24 There was one (1) slide up there, I --
25 I'm not sure which number it was, but it -- it showed

1 some of the -- some of the monitoring stations that are
2 monitored by government agencies, and it looked like,
3 if I was reading the map correctly, that the -- the
4 next monitoring station along the Lockhart River was
5 not until Aylmer Lake.

6 Is that -- is that where the -- the next
7 one after MacKay Lake is?

8 MS. ERICA BONHOMME: Erica Bonhomme.
9 Actually, if you look at slide 40, again, in the
10 presentation from this morning -- oh, I forgot we had
11 the controls. The yellow dots you see on that map show
12 where the current monitoring stations exist. Not De
13 Beers' monitoring stations; these are government
14 monitoring stations. So you do see several stations
15 within MacKay Lake itself.

16 MR. MIKE TOLLIS: Mike Tollis, from
17 Lutsel K'e Dene First Nation.

18 Sorry, I just can't see the -- the
19 yellow dots from here, but I'll -- I'll take your --
20 take your word for it that they're -- that they're in
21 there.

22 Yeah, we just wanted to make sure that
23 there's -- there is some baseline data being collected
24 beyond the -- the predicted endpoint for -- for
25 contaminant being detected, you know, in the -- in the

1 case that we're going beyond 44 kilometres.

2 But thank you, Madam Chair. I think
3 that's all my questions.

4 THE CHAIRPERSON: Okay. Thank you.
5 Questions from North Slave Metis Alliance?

6 MR. MATT HOOVER: Thank you, Madam
7 Chair. Matt Hoover, from North Slave Metis Alliance.
8 We have no questions at this time. Thank you.

9 THE CHAIRPERSON: Thank you. Questions
10 from Deninu K'ue First Nations?

11 MR. MARC D'ENTREMONT: Thank you, Madam
12 Chairman. It's Marc d'Entremont, here on behalf of the
13 Deninu K'ue First Nation.

14 I did have a couple questions regarding
15 mitigation, but the previous parties have sort of
16 addressed them already, so I won't repeat them here.
17 But the one I will ask is in regards to management
18 operation.

19 So, De Beers, in some of the responses
20 you just gave you had indicated that there was a
21 temporary, I guess, stop in production of the mine in
22 2009. So my question is: Was that a planned stoppage
23 in response to an attempt to maintain compliance with
24 the water licence?

25 And then, if yes or no, the follow-up to

1 that would be: Have there been other management or
2 operational actions that you've taken to -- in an
3 attempt to maintain compliance with the water licence?
4 Thanks.

5

6 (BRIEF PAUSE)

7

8 MS. ERICA BONHOMME: Erica Bonhomme.

9 On the -- the first part of your question, the 2009
10 mine shut -- quote/unquote, "shutdown," was an economic
11 decision.

12 On the second part of your question, I -
13 - maybe just -- could you be a little bit more specific
14 in your -- in your question, please?

15 MR. MARC D'ENTREMONT: Marc
16 d'Entremont, for the DKFN. Sure. So I guess the --
17 the answer I -- I don't want to hear is about
18 mitigation, since that's already been discussed.

19 What I'm interested in knowing is if
20 there's been management or operational actions, such as
21 either stopping mine production or slowing it or
22 changing certain practices at the mine that would have
23 been implemented as a potential mitigation measure to
24 reduce or to, like I say, stay within compliance of the
25 water licence. Thank you.

1 MR. STEVE RIDGE: Steve Ridge, from De
2 Beers. And there's a series of -- obviously, as we got
3 better information as to where our -- our high TDS
4 water was coming from, we undertook a complete mapping,
5 okay, of all our reticulation systems. And we're
6 currently ongoing with the segregation plan to try and
7 separate our dirty water from our -- our clean water.

8 Currently -- I mean, right now, as -- as
9 we speak, we have developed some areas in -- in our
10 footwall which allow us time, okay. So when we -- when
11 we have instances of high TDS intersection and we have
12 a reticulation system where we can divert the water
13 into those areas, okay. And then we -- we can continue
14 to see monitoring from a discharge point.

15 We've introduced some automation there
16 where we can -- we can see that realtime, or within --
17 within an hour, and then take the appropriate actions
18 to the undergrounds crews as to -- as to the
19 conductivity levels, and also what actions they must
20 take based on those -- those conductivity levels. We
21 have a -- a detailed program and, I suppose, of
22 communication between the -- the technical services
23 department and also the -- the mining crews and to make
24 sure that there's a -- a level of understanding there,
25 which is -- which is obviously very important. And

1 that communication happens shiftly.

2 And we also have a -- obviously a cover
3 drilling program. So when we -- before we take a
4 round, okay, with our -- with our drill rigs we go in
5 there and we will take a -- a 13 metre hole, okay, each
6 round in the -- in the footwall development to see if
7 we're going to intersect it. Obviously, if -- if we
8 intersect it, then we can -- we can measure it and then
9 we can -- we can build that into our -- our mine plan
10 whether or not we have to, okay, take any remedial
11 action and -- and prepare for another -- another
12 storage area or whether we have to prepare for
13 grouting.

14 The other thing that we have done is
15 we've updated our struct -- structural model, which
16 we're waiting for the results of, this year to
17 incorporate to see where -- where -- if we -- if we
18 know the intersections that we're going to hit okay,
19 com -- structure, we can change our -- our mine plan
20 and try and take those strikes more perpendicular to
21 the -- to the falls and then get through them without
22 exposing a larger footprint -- footprint.

23 MR. MARC D'ENTREMONT: Marc d'Entremont,
24 for the DKFN. Thank you for that answer. It was very
25 helpful. We have no more questions at this time.

1 Thanks.

2 THE CHAIRPERSON: Okay. Thank you.

3 Questions from Board staff?

4 MS. SACHI DESOUZA: Sachi DeSouza, from
5 the Review Board.

6 There was discussion earlier about the
7 effect of hardness on parameters that was raised by the
8 GNWT. And I understand there's an assumption in the
9 model, and it's a conservative assumption, that says
10 hardness will reduce at the same rates as other TDS
11 parameters.

12 And my question is: If there's any
13 uncertainty associated with that assumption?

14

15 (BRIEF PAUSE)

16

17 MS. ERICA BONHOMME: Erica Bonhomme.
18 Alison Snow will answer that question.

19

20 (BRIEF PAUSE)

21

22 MS. ALISON SNOW: Alison Snow. So for
23 hardness -- we -- we don't model hardness directly. We
24 model calcium and magnesium as constituents of TDS and
25 then we calculate hardness based on calcium and

1 magnesium.

2 So in the hydrodynamic model of Snap
3 Lake and in the site model, we calibrate it, our model
4 predictions, to monitor data from 2003 to the present.
5 So we have calcium and magnesium and also total
6 dissolved solids calibrated to monitor data. We treat
7 it, total dissolved solids, calcium, and magnesium as
8 conservative parameters during the calibration period.

9 So we carried that assumption forward
10 into the closure period. So we treated TDS, calcium,
11 and magnesium as conservative constituents.

12 MS. SACHI DESOUZA: Sachi DeSouza, from
13 the Review Board.

14 It's -- it's good to know that there is
15 a calibration inserted into the model. My question is
16 this: If there is any uncertainty that remains --
17 well, if -- because that calibration is for the
18 existing information and your model is simulating
19 future conditions.

20 So is -- what's the uncertainty with
21 that calibration going into the future?

22 MS. ALISON SNOW: Alison Snow. We did
23 not quantify, so I can't give you a number in terms of
24 uncertainty, but every model prediction has uncertainty
25 built into it. So in terms of the Snap Lake model, the

1 driv -- the key driver for water quality in Snap Lake
2 is going to be the mine water discharge and the mine
3 water discharge water quality.

4 So we -- we modelled a range of
5 conditions underground, both in terms of the mine water
6 discharge flow and in terms of TDS water quality. And
7 we expect that our model -- or the actual
8 concentrations in Snap Lake in the future are going to
9 fall somewhere within that range.

10 MS. SACHI DESOUZA: Sachi DeSouza.
11 Thank you for that. My next question is related to the
12 toxicity testing.

13 And I understand what's been proposed
14 and the toxi -- there has been two (2) tests put forth
15 before us so far about the toxicity testing. And that
16 testing was done in a lab simulating the water
17 conditions in the lake. And with the theme of
18 uncertainty, once in the environment, the environment
19 is going to be different from the lab conditions.

20 Is there -- is there any risk or
21 uncertainty associated that those predictions might be
22 a little bit different?

23 DR. PETER CHAPMAN: Peter Chapman.
24 Testing in the lab is generally recognized as being
25 conservative. By that, I mean it is worst-case

1 testing. There's no chance of avoidance. The animals
2 are in there. The more sensitive that we can make
3 them, for instance, you know, the daphnids are
4 laboratory cultured. They have no chance to get used
5 to what they're put into. They're put into it right
6 away.

7 So typically we are over-predicting, in
8 terms of what we see. Not always, but typically we're
9 over-predicting in terms of what we see in the
10 laboratory. But that's also why, as I mentioned
11 earlier, we do testing with sensitive organisms, with
12 the sensitive daphnid, with algae and the effluent and
13 at the edge of the mixing zone.

14 MS. SACHI DESOUZA: Sachi DeSouza, for
15 the Review Board. Thank you. That's -- that's all I
16 have there. I'm going to pass it off to Kathy.

17 DR. KATHY RACHER: Kathy Racher, for
18 the Board. I just have three (3) or four (4)
19 questions.

20 My first question is kind of -- I've
21 been trying to -- I've been struggling with how to ask
22 this question. And it's based on the -- the
23 conversation -- the discussion this morning and wanting
24 to get clear on -- on what we're -- what we're talking
25 about.

1 So -- so normally when -- when someone
2 submits a study or something, evidence to the Board,
3 you know, we don't just read it and go, Oh, that looks
4 okay. You know, we kind of evaluate and try to figure
5 out what the standard for review is. So when you look
6 at something, you think, Well, what is the standard
7 under which I should know whether this is good or bad?

8 And so when I'm looking at the TDS
9 benchmark study, as it's called, I -- and I'm -- I'm
10 hearing from other parties about the -- didn't use a
11 safety factor as per the -- the protocol for developing
12 water quality guidelines, or didn't use the right
13 number of species as -- as referred to in the resident
14 species procedure for developing a site-specific water
15 quality objective.

16 And -- and I'm -- you know, just -- I
17 just want to understand what the study was intended to
18 do and, therefore, what the standard of review would
19 be. So, for example, the protocol for the development
20 of a water quality guideline does talk about a safety
21 factor of ten (10) or more, and certain data
22 requirements. But it doesn't say in your benchmark
23 study that you were trying to develop a water quality
24 guide -- a -- a national water quality guideline with
25 your study. So I just find that -- you know, so is

1 that standard of review the right one?

2 And same -- when I look at the resident
3 species procedure, which GNWT has brought up as -- as
4 what they assume you were trying to do, I see it didn't
5 say it -- it never said you were trying to follow that
6 procedure in the document you submitted as the TDS
7 benchmark study. So I'm not sure if that's the
8 standard of review.

9 So I just wanted -- if you could tell me
10 in your -- in your own words what you've come up with
11 for us, and what's it based on, and how in your opinion
12 should -- should we review that information?

13 DR. PETER CHAPMAN: Peter Chapman.
14 Thanks, Kathy, for that question. I'll try and make it
15 simple.

16 Basically, what we wanted to do -- we
17 started off in April 2011 by presenting people with a
18 drawing, a drawing that showed the food web, very
19 simply, in Snap Lake. It showed that the fish, which
20 we're ultimately trying to protect, depend on the
21 plants in the water, depend on the animals in the
22 water, depend on the animals in the sediment.

23 So, in other words -- in other words --
24 so in order to protect the fish, we need to protect not
25 just the fish, but we need to protect the food they

1 depend on. So we're protecting from two (2) types of
2 effects: direct; in other words, the TDS could be at a
3 concentration that would affect the fish, and again, we
4 tested the most sensitive life stage. Could it affect
5 reproduction, or could the TDS affect the food of the
6 fish, so the fish wouldn't have enough food to eat? We
7 spent a fair bit of time consulting and talking to
8 people about this. As I mentioned, we got input from
9 Fisheries and Oceans Canada.

10 What we were trying to do was do
11 sufficient testing with animals that were found in Snap
12 Lake. Now, the lake trout and the Arctic grayling are
13 certainly found in Snap Lake. In the other cases,
14 they're not the exact species, but the genuses, which
15 is pretty darn close aside from two (2), one (1) of
16 which I can't mention, the copepods -- actually, no,
17 the copepods were in the -- an algae and one (1) of the
18 daphnids.

19 The genera were there, so we were trying
20 to get as close as we could to giving the best possible
21 information to protect Snap Lake. In doing that, we
22 were well-aware of CCME. And as I mentioned, we're not
23 in a -- away from CCME. What we had thought we'd be
24 able to do in analyzing the data is do what's called a
25 Type A approach, where you do a species sensitivity

1 distribution, and you draw a line from the highest to
2 the lowest to determine what's there.

3 The problem we face is this data set is
4 so different, because we have so many where it's such a
5 high level we saw no effects, which is reassuring in
6 terms of six eighty-four (684) being protective, which
7 again, is not very far off the five hundred (500),
8 which I mentioned as a default.

9 So I -- I believe we did that because if
10 you look at the data, I don't believe you need to be a
11 scientist. If you look at the data with honest and
12 open eyes, and you look at it and you say, My goodness,
13 way up here everything is protected by this TDS at this
14 high level, and it's just these daphnids down here that
15 represent a small proportion, I think we've done it.
16 We've made our case.

17 But, Kathy, I hope that explains. I've
18 probably talked too long as usual. My wife says I talk
19 too long, and I apologize for that, but I hope that
20 explains what we were trying to do.

21 DR. KATHY RACHER: Kathy Racher for the
22 Board. I -- oh, I won't comment on your wife's opinion
23 about anything.

24 Okay. I think that -- that is somewhat
25 helpful. I -- I just wanted to clear up though. You -

1 - you were not trying to develop a national water
2 quality guideline for TDS? This could be a 'yes' or
3 'no' answer for you, Peter.

4 DR. PETER CHAPMAN: Peter Chapman. No;
5 however, we are going to publish this as soon as I can
6 get the other two (2) reports out, 'cause I think it's
7 very exciting what was done, and I think it has broad
8 applications at northern work in similar situations,
9 and also elsewhere.

10 DR. KATHY RACHER: Kathy Racher, for
11 the Board. I told you it was a 'yes' or 'no' answer,
12 but anyway. Okay. My next question.

13 So given -- so initially, when -- when
14 this was evaluated in the last EA, and we've talked
15 about this, the three fifty (350) was based on the
16 management -- or what you thought was going to happen,
17 not necessarily based on any particular science about
18 protectiveness to aquatic life, for example. But on
19 the basis, you made certain predications in the EA at
20 the time about effects to aquatic life.

21 And in the -- in the TDS Response Plan,
22 there's a section there that's meant to talk about the
23 ecological implications of the -- of the benchmark, or
24 water quality objective that you came up with for TDS,
25 and in that -- in there, there's a lot of discussion

1 about why the water quality objective is -- is
2 conservative and protective.

3 But there was no real link to the
4 original EA predictions to help us to know, like, you
5 know, in a -- in both an unmitigated and a mitigated
6 case, what would, you know, what are the -- what are
7 the cur -- what are the predictions now for the
8 effects, say, to zooplankton, since that seems to be
9 the most sensitive species?

10 DR. PETER CHAPMAN: Peter Chapman here.
11 Going back to the EA, I was -- I was on -- working for
12 INAC at the time, so I wasn't fully involved in what
13 was being done on the EA. I was in a hearing such as
14 this commenting. But basically -- so I can't comment
15 in detail.

16 But basically, from the EA, expected
17 effects would occur, because with any human
18 development, you're going to have effects, and the
19 question is: Are the effects acceptable or not?

20 So changes were predicted, that they
21 would occur, but that the changes would occur, shifts
22 in species, some changing back and forth would not
23 affect the food chain that the fish depend upon, okay?
24 And that is still the case with the six eighty-four
25 (684). With the six eighty-four (684), because as I

1 mentioned earlier, copepods, the rotifers, which
2 comprise the main zooplankton compared to the daphnids,
3 very tolerant to TDS. We're not going to see effects
4 that would affect the functioning of Snap Lake.

5 In other words, the fish will still be
6 there and the food chain on which they depend will
7 still be there. And just be aware that naturally,
8 changes do occur. You can never expect the same
9 species to be there in perpetuity. Things change, but
10 as long as there's, you know, the changes within
11 parameters that the fish can still find the food they
12 need to eat and so on, the lake will still function.
13 That occurs naturally.

14 This will occur -- there were
15 predictions in the EA, the six eighty-four (684), we
16 should be within the EA predictions. You mentioned the
17 unmitigated case, and you've already heard De Beers say
18 that this is not a reasonable case, because they are
19 going to do mitigation.

20 However, you also heard me read into the
21 record some comments from EcoMetrix, because both they
22 and we looked at the unmitigated case, and I'm not
23 going to repeat those comments. They're in the record,
24 so hopefully those were enough for you.

25 DR. KATHY RACHER: Kathy Racher, for

1 the Board. Okay, thank you. I have two (2) more
2 questions.

3 One (1) is to just to discuss an
4 apparent inconsistency related to the -- the nitrate
5 water quality objective that was proposed. You've
6 proposed a value of -- I think it's sixteen (16) or
7 sixteen (16) point something based on the protection of
8 aquatic life, and you've made your case for that.
9 That's fine.

10 But we also recognize that the -- and
11 it's been brought up by other Intervenor, that the --
12 that the drinking water guideline, the maximum
13 acceptable concentration for nitrate is at 10
14 milligrams per litre. That's a health-based guideline,
15 and, you know, you've said the -- the water will be
16 safe to drink.

17 And I'm just -- I'm just wondering why
18 you would propose a -- a water quality objective that's
19 higher than a drinking water guideline for nitrate in
20 Snap Lake?

21 DR. PETER CHAPMAN: Peter Chapman here.
22 The testing we do -- we did was directed at the
23 ecology. It was directed at the fish and the animals
24 and plants living in the lake. So we developed that
25 scientifically based on that. So that's sitting there.

1 Then you have the water quality. So you
2 need to put the two (2) together. In the case of
3 nitrate, I fully agree that this is something that you
4 should look at, because the nitrate, you know, is -- is
5 more of an -- much more of an issue potentially for
6 human health than the -- oh, God, sorry. Give me a
7 sec.

8 Peter Chapman. My apologies. I hate
9 getting old, because sometimes your brain goes kaboom
10 and you sort of forget what you're saying. But we were
11 talking about TDS earlier, and just to use the example
12 of TDS, and Mike, with Lutsel K'e, mentioned TDS in the
13 five hundred (500). Remember, that's an aesthetic
14 guideline. It's a matter of taste. A lot of people
15 will not be able to taste it.

16 So in that case, you know, I would say
17 that the issue is more ecological than human health.
18 In the case of nitrate, we've got the two (2) together
19 and we've developed one (1) for ecological, but in that
20 case, look at the nitrates, because it's very different
21 than the TDS one.

22 DR. KATHY RACHER: Kathy Racher, for
23 the Board. Okay, just one (1) more question, and I'm
24 sure it's easy one. We've -- we've heard a lot of
25 numbers, six eighty-four (684), and you've got some new

1 numbers, numbers you're not allowed to talk about,
2 numbers you are allowed to talk about, a lot of
3 numbers.

4 And we've had a number in the past EA,
5 and there's some discussion whether it's a good idea to
6 have another number in this EA. And I'm just
7 wondering, if the Board wanted to set a narrative water
8 quality objective, do you have an opinion as to what
9 that would sound like based on the work that you've
10 done on TDS toxicity in -- in Snap Lake?

11

12 (BRIEF PAUSE)

13

14 MS. ERICA BONHOMME: Erica Bonhomme. I
15 just wanted to first add to the other comment that Dr.
16 Chapman made just now, and that's that all the work
17 that we've presented shows that nitrate will not exceed
18 the drinking water quality guideline at the drinking
19 water intake in Snap Lake at any point in mine life.
20 And obviously, as we've pointed out before, after
21 mining stops, it will very quickly decrease, so we have
22 high confidence that the -- that the water will remain
23 safe to drink. On -- on this one ...

24

25 (BRIEF PAUSE)

1 MS. ERICA BONHOMME: One moment,
2 please.

3

4 (BRIEF PAUSE)

5

6 MS. ERICA BONHOMME: What we are
7 proposing is that we remove the current whole lake
8 objective -- whole -- whole lake limit for TDS of 350
9 milligrams per litre, and that the Mackenzie Valley
10 Land and Water Board enist -- establish an appropriate
11 and achievable site-specific water quality objective
12 that's based on toxic -- toxicity testing that will
13 ensure that the water remains safe to drink and that
14 the fish remain safe to eat.

15

16 (BRIEF PAUSE)

17

18 DR. KATHY RACHER: Kathy Racher, for
19 the Board. Okay. I think we understand your opinion
20 on that, and I'm going to direct it to Alan, if that's
21 okay.

22 MR. ALAN EHRLICH: With your
23 permission, Madam Chair.

24 The question that I have for De Beers --
25 it's Alan Ehrlich for the Review Board -- is that you -

1 - you've made it clear the -- the importance of the
2 ameliorating effect of water hardness on toxicity,
3 that's obviously relevant to what we're looking at
4 here, and put some effort into predicting, as you have,
5 that water hardness will stay proportionate to the
6 contaminants that it's ameliorating the effects of. In
7 other words, that water hardness will not reduce while
8 levels of contaminants are still high.

9 Now, that's a prediction. And, of
10 course, every prediction has some uncertainty. I
11 vividly remember the last environmental assessment set
12 of hearings, and you know, the best prediction we could
13 make had certain uncertainties in terms of TDS. There
14 were different kinds of uncertainties. One (1) of them
15 had to do with the amount of groundwater, one (1) had
16 to do with the effectiveness of mitigation, one (1) had
17 to do with the concentration of salt in the
18 groundwater.

19 To build on the question that my
20 colleague asked earlier, I'm interested in what kinds
21 of uncertainties are inherent in the prediction that
22 you have that hardness levels will stay consistent with
23 toxicity levels. I'm not asking the question that you
24 answered earlier, which was to quantify that
25 uncertainty.

1 I'd like to know what sort of things in
2 the real world were uncertainties that you had to
3 consider inherent in that prediction. Thank you.

4 MS. ERICA BONHOMME: Erica Bonhomme.
5 We're just going to take a moment here.

6

7 (BRIEF PAUSE)

8

9 MS. JULIE L'HEUREUX: Julie L'Heureux,
10 from De Beers. So to answer your question, What are
11 the real different thing that could happen, it's -- if
12 we would change our footprint of the mine, because you
13 have to understand that the output of the groundwater
14 models becomes the input for the hydrodynamic models.
15 So the -- the things that could change the footprint of
16 the mine, meaning the percentage of mining under the
17 lake, under the permafrost, the different structures
18 that we could intercept in the future.

19 So that will decate -- dedicate what
20 could change in the real life.

21 MR. ALAN EHRLICH: Thank you. My next
22 point is a request for an undertaking. So it's -- it's
23 not a question, although staff do have two (2) more
24 questions. We haven't yet had any compilation of the
25 commitments that De Beers has made in this

1 environmental assessment. In this environmental
2 assessment. I'm not talking about rehashing historical
3 ones.

4 But, you know, I've seen some relevant
5 stuff in your presentation today, and I'd like to
6 request that De Beers provide as undertaking, which, if
7 it's all right with the Chair, we call Undertaking
8 number 2, provide a -- a complete list of the
9 commitments that you have made on the record regarding
10 the proposed development.

11 MS. ERICA BONHOMME: Erica Bonhomme.
12 Yes, although I would like some clarification as to
13 some of the due dates for these undertakings, vis-a-vis
14 the schedule we have.

15 MR. MARK CLIFFE-PHILLIPS: Madam Chair,
16 Mark Cliffe-Phillips, here with the Review Board. June
17 13th is the date that we have set for the -- the
18 deadline for the undertakings.

19 MS. ERICA BONHOMME: Erica Bonhomme.
20 Thank you.

21

22 --- UNDERTAKING NO. 2: De Beers to provide the
23 Review Board with a
24 complete list of
25 commitments made by De

1 Beers during this
2 environmental assessment
3

4 MR. ALAN EHRLICH: Thank you. And
5 Madam Chair, with your permission, I'd like to turn it
6 over to Environmental Assessment Officer Simon Toogood
7 for the last questions from staff.

8 MR. SIMON TOOGOOD: Hello, it's Simon
9 Toogood, with the Review Board. I just had one (1)
10 question with respect to drinking water and traditional
11 use of Snap Lake and downstream.

12 It seems very clear that De Beers is
13 considering the -- that the water will be safe to
14 drink. I'm wondering how De Beers is considering the
15 aesthetic values of traditional users, or if they are
16 considering aesthetic values of traditional users when
17 considering drinking water standards for Snap Lake and
18 down the stream?

19

20 (BRIEF PAUSE)

21

22 MS. ERICA BONHOMME: Erica Bonhomme.
23 We have addressed that in various submissions. We do
24 acknowledge that throughout mine operations, there
25 could be a perceived change in the taste of the water

1 at Snap Lake, primarily during operations. That's till
2 2028.

3 It would -- that taste of that water
4 would very quickly improve post-closure, so that within
5 four (4) years, it would be below the drinking water
6 guideline of 500 milligrams per litre in Snap Lake.

7

8 (BRIEF PAUSE)

9

10 MR. SIMON TOOGOOD: Simon Toogood, with
11 the Review Board.

12 So to be clear, the standards for -- the
13 water quality objectives within Snap Lake and down the
14 stream will not be affected by aesthetic values? De
15 Beers will not adjust those for aesthetic values? That
16 -- you know, there may be guidelines out there, for
17 instance, CCME, and those will not affect the water
18 quality objectives that De Beers is proposing?

19 Is that a true statement?

20 MS. ERICA BONHOMME: Erica Bonhomme. I
21 -- I just -- I'll -- I think I'll -- I may respond to
22 your answer by pointing again to the figure which is
23 currently on the screen, I can't recall which page
24 number that is, which shows the extent that the Snap
25 Lake effluent will be measurable downstream from Snap

1 Lake.

2 Snap Lake effluent will not be
3 measurable at Lady of the Falls. Snap Lake effluent
4 will be measurable at MacKay Lake, which is 44
5 kilometres downstream from Snap Lake. Because it's
6 measurable, it will not be within the range of what
7 would be considered above the drinking water quality
8 guideline. We expect those effects to be very
9 localized to this immediate Snap Lake area.

10 So as a result, not only do we confirm
11 that the water will remain safe to drink, it will also
12 not affect the perceived enjoyment of users in the Snap
13 Lake area for much beyond the operations, which will
14 extend to 2028.

15 MR. SIMON TOOGOOD: All right. Thank
16 you. Just one (1) follow-up question to that.

17 There's been some material provided
18 which shows the reduction in TDS after mine closure,
19 but I believe we only have that for the unmitigated
20 scenario, and some of the statements you've made about
21 time for reduction to meet -- to meet drinking water
22 quality guidelines within Snap Lake are provided at a
23 mitigated scenario.

24 Are you able to provide the graphs or
25 the models to show how TDS and its constituents will

1 decrease over time in post-closure for the mitigated
2 scenario?

3 MS. ERICA BONHOMME: Erica Bonhomme.
4 You're correct. We did provide that graph, that model,
5 for an unmitigated scenario. We will provide it to you
6 for a -- a mitigated scenario, as well.

7 MR. SIMON TOOGOOD: Is it all right if
8 we call that Undertaking number 3, or will you be able
9 to get that to us earlier, like today? Is -- okay,
10 we'll take that as Undertaking number 3.

11 MS. ERICA BONHOMME: Yeah, Erica
12 Bonhomme. No, we would be able to provide that as an
13 undertaking by June 13th.

14
15 --- UNDERTAKING NO. 3: De Beers to provide the
16 Review Board with a graph
17 of Total Dissolved Solids
18 (TDS) in Snap Lake for
19 closure and post closure
20 for the scenario that the
21 WQO objective is set at 684
22 mg/L (the mitigated case)

23
24 THE CHAIRPERSON: Okay, questions from
25 counsel?

1 MR. JOHN DONIHEE: Thank you, Madam

2 Chair. It's John Donihee. I have no questions.

3 THE CHAIRPERSON: Thank you. Questions
4 from Board members? Yvonne...? Kirby...? Sunny...?

5 MS. SUNNY MUNROE: No, thank you, Madam
6 Chair, no questions.

7 THE CHAIRPERSON: James, questions?

8 MR. JAMES WAH-SHEE: Thank you, Madam
9 Chair. I -- I'd just like to thank the presentation
10 from De Beers and all the questions from the parties,
11 but I have no questions. Thank you.

12 THE CHAIRPERSON: Questions from
13 Michael? Questions from John Curran?

14 MR. JOHN CURRAN: Thank you, Madam
15 Chair. No questions at this time.

16 THE CHAIRPERSON: Okay, with that, I
17 would like to call a break, and right after the break,
18 we'll have the EcoMetrix presentation. So I'll break
19 for fifteen (15) minutes, please.

20

21 --- Upon recessing at 2:50 p.m.

22 --- Upon resuming at 3:13 p.m.

23

24 THE CHAIRPERSON: Our next presentation
25 is going to be from EcoMetrix, an independent

1 consultant presentation. We're going to be hearing
2 that now. We have a presenter's table so if I can ask
3 EcoMetrix to get comfortable at the table and present
4 the presentation, please.

5

6 (BRIEF PAUSE)

7

8 PRESENTATION BY ECOMETRIX:

9 DR. DON HART: All right. I'm Don
10 Hart, from EcoMetrix. I made my introductory remarks
11 this morning about who I am and why I'm here. I don't
12 think I'll go through all that again.

13 So on the first slide, you can see my --
14 my colleagues on this review: Ian Collins, who looked
15 at the -- the modelling work; Mike Venhuis, the
16 geoscientist who looked at the -- the groundwater work;
17 and I've looked at the toxicology and the proposed
18 water quality objectives.

19 I -- I guess I'll just run through these
20 briefly again. I mentioned this morning the questions
21 that were posed to me as part of the review assessment
22 of the proposed water quality objectives, or the
23 appropriate assessment of the predictions for Snap
24 Lake. Do we have confidence in them, and based on that
25 what's likely to exceed the proposed water quality

1 objectives? And if we -- if those proposed objectives
2 are, in fact, exceeded without mitigation, what would
3 be the -- the potential effects?

4 I was also asked to comment briefly on
5 mitigation measures, so I'll make a brief comment. We
6 also looked at the EQC calculations. We checked those.
7 I -- I understand those are not the -- the subject of
8 the hearing today, so I've actually removed those from
9 the presentation. This is just a list of the documents
10 reviewed, and again I won't go through that list.

11 So I'll jump into the assessment of
12 proposed water quality objectives. First and foremost,
13 the total dissolved solids objectives, TDS. This --
14 this slide has an error on it. I'm sorry, the -- I'm
15 enumerating the toxicity tests that were done. Site-
16 specific toxicity tests mention six (6) species here.
17 In fact, there were eight (8) -- eight (8) species I
18 was aware of, and this morning we heard about
19 copepods, which makes nine (9).

20 The -- and those species were -- were
21 two (2) alga, which I'm using in a general sense to
22 include the one diatom species; a rotifer; two (2)
23 daphnias; a midge; actually two (2) fish, the lake
24 trout, and I couldn't fit the -- the Arctic grayling in
25 there, but both fish species were looked at.

1 So this was site-specific toxicity
2 testing using an ion mixture that matches what we --
3 what we see now and seems to be pretty steady in terms
4 of the dissolved solids mix that's being released into
5 Snap Lake. A good dose response was seen only for the
6 two (2) daphnid species. The lowest IC20, this is the
7 concentration that reduced the reproduction of -- in
8 these species by 20 percent was 684 milligrams per
9 litre. And this was the number selected as the
10 proposed site-specific water quality objective.

11 The TDS now approaches 300 milligrams
12 per litre in the diffuser area and is predicted to
13 increase. The EAR predicted a maximum whole lake
14 average of 350 milligrams per litre. Current
15 predictions for the lake are as high as 1,700
16 milligrams per litre for the upper-bound scenario. So
17 that -- that's the -- the background.

18 Our opinion on this is that selection of
19 the -- the lowest IC20 value among the various site-
20 specific toxicity tests is -- is a reasonable approach.
21 As we heard this morning, we're really trying for a --
22 a species sensitivity distribution, but most of those
23 species are in fact not responding to TDS within this -
24 - within this test range.

25 So we have only the -- the two (2)

1 daphnid species responding. It makes sense to pick the
2 lowest one (1) of those. So -- and we note also that
3 the value of 684 milligrams per litre is in the -- in
4 the range of five hundred (500) to a thousand that has
5 been used for TDS by the State of Alaska for permitting
6 purposes.

7 Chloride is another important
8 constituent, probably the most important constituent of
9 TDS. It accounts for 45 percent of the -- the TDS in
10 Snap Lake. It's mainly in the form of calcium
11 chloride. The proposed water quality objective for
12 chloride is a hardness-dependent equation. It comes
13 from a publication by Elphick in 2011. And that value
14 is 388 milligrams per litre based on the upper bound of
15 -- of hardness that was investigated by Elphick.

16 We seem to -- generally, there's a
17 beneficial effect of -- of hardness. It reduces the
18 effect of the chloride, but we see little benefit
19 beyond about 160 milligrams per litre in the Elphick
20 studies. So the chloride effect level at that hardness
21 level was selected.

22 So 45 percent of the 684 milligrams per
23 litre of TDS comes out to be about 308 milligrams per
24 litre of chloride. What I'm -- what I'm trying to
25 point out here is that the water quality objective for

1 TDS, the proposed value, will in fact be limiting for
2 chloride.

3 The chloride water quality objective
4 equation is -- is based on a -- a daphnid effect level
5 versus hardness relationship from Elphick. And this
6 relationship was adjusted down slightly to match the
7 5th percentile of Elphick's species sensitivity
8 distribution.

9 So this was accepted as the site-
10 specific water quality objective for the Ekati Mine
11 site in 2013. The CCME water quality guideline is 120
12 milligrams per litre, so it's a lower number. This was
13 derived also using a species sensitivity distribution
14 approach. The key differences were CCME chose not to
15 do a hardness adjustment. Also, CCME used some species
16 that were quite sensitive, but not in Snap Lake,
17 mussels in particular. So between those two (2)
18 things, it -- these -- a lower national water quality
19 guideline than -- than what's being proposed as a site-
20 specific value for -- for Snap Lake.

21 Among those test species looked at by
22 CCME was the fingernail clam, with a lowest effect
23 level at 121 milligrams per litre when they used sodium
24 chloride but a much higher effect level, 756 milligrams
25 per litre, when they used calcium chloride. And I

1 think this again is -- is suggesting a hardness effect
2 for -- for this species. This -- this was a life cycle
3 test.

4 So to make a long story short, the
5 proposed water quality objective for chloride will
6 likely be protective under Snap Lake conditions, and
7 particularly the -- the hardness conditions that obtain
8 in -- in Snap Lake. So we're relying on that hardness
9 effect.

10 Fluoride is a minor component of TDS in
11 Snap Lake. The proposed water quality objective is
12 2.46 milligrams per litre. This is the 5th percentile
13 or the low end of a species sensitivity distribution.
14 It's -- it's a value that -- that protects most
15 species.

16 The CCME water quality guideline, this
17 is an interim guideline, for fluoride is .12 milligrams
18 per litre. It's a much lower value. It was derived
19 from a six (6) day LC50 concentration that kills 50
20 percent for the caddisfly, so an acute study. And this
21 was divided by a hundredfold safety factor.

22 So this is a rather crude estimate
23 method. The SSV approach is, in my view, preferred.
24 So the CCME method produces a number which is well
25 below the -- the range of known effect levels.

1 There are a few effect levels in the
2 literature below the proposed water quality objective.
3 The fingernail clam is a maximum acceptable toxicant
4 concentration calculated as 2.25 milligrams per litre.
5 There was a rainbow trout ten (10) day LC50 in the
6 literature at 2.2 milligrams per litre.

7 The current prediction for the lake is
8 that it will not exceed 0.5 milligrams per litre, so
9 the current prediction is -- is well below what's being
10 proposed as a water quality objective.

11 The -- our conclusion here is that the
12 proposed water quality objective is likely protective
13 of -- of aquatic life, at least most species. It's
14 based on a 5th percentile of the species sensitivity
15 distribution. But we know, based on the predictions
16 for the lake, one could easily define a lower target
17 value as a value that could be achieved in order to
18 drive effluent quality criteria.

19 Now, that's all relative to aquatic
20 life. The maximum accepta -- acceptable concentration
21 for drinking water is 1.5 milligrams per litre. This
22 is the Canadian drinking water guideline. That is
23 based on dental fluorosis. This is a cosmetic effect
24 that we've heard about this morning. It basically
25 affects -- it's a developmental thing. It -- it

1 happens in -- over the developmental period, young
2 children less than about eight (8) years old, and it
3 results in sort of a white spotting on the enamel of
4 the teeth.

5 So this is the drinking water guideline.
6 Our suggestion is that it seems quite possible to meet
7 this drinking water guideline in the lake based on
8 current predictions. So it might be reasonable to --
9 to let achievement of that drinking water objective
10 drive EQCs. In particular, that drinking water
11 objective should be met at -- at -- I would say at any
12 location that's regularly used for drinking water
13 intake.

14 This -- the -- there was a proposed
15 water quality objective for nitrate. Nitrogen is
16 released in the form of ammonium ion and -- and
17 nitrate, oxidized form. Both of these nitrogen species
18 are derived from explosives residue. The proposed
19 water quality objective for nitrate nitrogen is a
20 hardness dependent equation. This comes from work done
21 by Rescan in 2012.

22 The maximum value from that equation is
23 16.4 milligrams per litre and this was -- this comes
24 out of the equation at a hardness level of -- of 160
25 milligrams per litre, which was the -- the highest

1 level where we were seeing protective beneficial
2 effects of -- of hardness.

3 The nitrate nitrogen equation is based
4 on a 5th percentile of a species sensitivity
5 distribution. And this was adjusted for hardness using
6 a multi-species hardness relationship. This equation
7 was accepted as the site-specific water quality
8 objective for the Ekati Mine site in 2013.

9 De Beers performed some site-specific
10 toxicity tests on a sensitive species from the Rescan
11 SSDs, species sensitivity distribution, using synthetic
12 Snap Lake water. And they -- they do this at two (2)
13 hardness levels, a hardness of 140 milligrams per litre
14 and a hardness of 350 milligrams per litre in order to
15 confirm that effects -- effect levels being seen using
16 Snap Lake water were above -- at or above the proposed
17 water quality objective.

18 So in those -- in those tests we saw a
19 lowest effect level of 16.7 milligrams per litre. This
20 was for a daphnid species. The -- so that's just above
21 the proposed water quality objective.

22 The interesting thing about that is that
23 as we went from 140 milligrams per litre hardness down
24 to 350, we saw the effect level for the sensitive
25 daphnid species declining. And the question I would

1 have is: What happens at higher levels of hardness?

2 And we -- we do have the prediction that hardness
3 levels in Snap Lake could get considerably higher than
4 350 milligrams per litre.

5 So the -- and -- and, you know, that --
6 that question could be resolved by additional toxicity
7 testing at a higher level of hardness to come up with
8 the nitrogen effect level at that higher hardness. In
9 summary, the proposed water quality objective seems to
10 be protective, but we have some uncertainty at the
11 highest hardness levels.

12 Again, the prediction for Snap Lake is
13 that nitrate may get up to as high as 9 milligrams per
14 litre. So there's -- there's a fair difference between
15 the proposed sixteen point four (16.4) and the
16 predicted nine (9). One could set a -- a lower target
17 level and the like as a -- as a driver for effluent
18 quality criteria. It seems like there would be room to
19 do so.

20 Again, there is a drinking water
21 criterion, maximum acceptable concentration of 10
22 milligrams per litre for nitrate nitrogen. This is the
23 Canadian Drinking Water Guideline, and I would say that
24 that guideline ought to be met at any location of
25 drinking water intake. I -- I believe it -- it would

1 be met at the location of the water intake for the Snap
2 Lake Mine. I'm not sure whether there may be other
3 drinking water intakes to be concerned about.

4 But -- so one could consider, you know,
5 setting a level at -- at 10 milligrams per litre, or --
6 and -- and below the proposed one and -- and letting
7 that drive the EQCs.

8 A -- a guideline was proposed for total
9 ammonia. Total ammonia includes the ionized species
10 and the unionized species of ammonia. The unionized
11 forms are more toxic. The proposed water quality
12 objective for total ammonia nitrogen is actually the
13 CCME equation for total ammonia. This depends on the
14 pH and the temperature of the water. It's intended to
15 achieve a level of .019 milligrams per litre of
16 unionized ammonia, NH_3 . So the water quality objective
17 is -- is lower at high pH and high temperature.

18 The proposal was to evaluate the CCME
19 equation at the 85th percentile of pH and temperature
20 in Snap Lake, so that was a pH of 7.14 and a
21 temperature of 13.7 degrees Celsius. The water quality
22 objective that was proposed was 5.21 milligrams per
23 litre. We checked that calculation using the CCME
24 equation, and using the stated values of pH and
25 temperature. We got a value of 4.6 milligrams per

1 litre as nitrogen.

2 So as far as I can see, that should be
3 the -- the correct number, but in summary, a -- a
4 proposed water quality objective that equals the -- the
5 CCME equation should be protective of aquatic life.

6 Again, we can ask the question of what
7 has been predicted for Snap Lake? The maximum
8 predicted is about 2.5 milligrams per litre in the --
9 the diffuser area, so it should be quite feasible to
10 achieve the CCME guideline for ammonia.

11 We looked at strontium. This is a -- a
12 very soluble constituent in water. It's chemically
13 similar to calcium. CCME has not defined a water
14 quality guideline for strontium, but one was proposed
15 by De Beers. There are -- there are two (2) reported
16 values in the literature that have been somewhat
17 problematic, which are well below most other values.
18 One was from Birge et al back in 1980, and -- and other
19 was from a study by Borgmann, more recently, using
20 amphipods. The issue with this was that he didn't have
21 a full -- he didn't have a full dose response data set
22 to work with, so his -- his suggested value was greater
23 than something. It was kind of open ended.

24 So what De Beers did is repeated those
25 two (2) studies in order to obtain more accurate and --

1 and more complete effect concentrations for those --
2 for those two (2) species. Those results were combined
3 with other values from the literature, other effect
4 levels, to create a species sensitivity distribution,
5 and again, the -- the low end or the 5th percentile of
6 that distribution was -- was selected as a proposed
7 water quality objective.

8 Initially, that proposed value was 14.1
9 milligrams per litre of strontium. However, it seems
10 there were two (2) studies in that data set which were
11 best considered acute studies, according to CCME
12 criteria. Really, what we want is so protect under
13 chronic exposure conditions, so those two (2) studies
14 were removed from the data set. There was a technical
15 memorandum showing the revised proposal, and that
16 revised water quality objective, again, as a 5th
17 percentile of the species sensitivity distribution was
18 10.7 milligrams per litre.

19 In -- in our opinion, this water quality
20 objective should -- should be protective of aquatic
21 life. We note that a -- a lower target value in Snap
22 Lake would be possible, and the predicted maximum value
23 is -- is 4 milligrams per litre. So -- and there's a
24 fair bit of room between that and the proposed
25 objective. One could set a lower target.

1 We looked at -- or a -- an objective was
2 proposed for sulphate. This accounts for 9 percent of
3 the -- of the total dissolved solids in Snap Lake.
4 CCME has not defined a water quality guideline for
5 sulphate. The -- so the proposed water quality
6 objective was taken from the BC Ministry of
7 Environment. BC expressed that guideline as a -- as a
8 step function of hardness. Again, we have a situation
9 where hardness is protective against sulphate effects.

10 The -- the value for the highest
11 hardness level from BC MOE is two hundred (200) -- 429
12 milligrams per litre of sulphate, and this work was
13 based on -- on testing done with a rainbow trout embryo
14 model test, and it was selected as a -- a species that
15 was quite sensitive -- a test that was quite sensitive
16 to sulphate effects.

17 The BC MOE has expressed concern about
18 possible combined effects of hardness and sulphate
19 above the 250 milligram per litre level. MOE has
20 recommended site-specific toxicity testing, testing
21 with site water to determine sulphate effect level in
22 site water if your hardness values are -- are going to
23 be greater than 250 milligrams per litre.

24 In -- in the case of Snap Lake, the
25 highest hardness levels are, in fact, predicted to be

1 higher than -- than that, and to the best of my
2 knowledge, we haven't seen site-specific toxicity
3 testing specifically focussed on -- on the sulphate
4 effect levels. So again, that -- that could be done.

5 MOE also made comment about a -- a --
6 possibly a more sensitive test. Fertilization in pre-
7 eye -- pre-eyed embryos of salmonids may be more
8 sensitive. They -- they expressed that -- that
9 concern. They recommended more research in that area,
10 but generally, they've got a guideline that's based on
11 -- on a -- a sensitive -- a sensitive test. It -- the
12 proposed objective adopting the guideline seems to be
13 protective, but we do have uncertainty about what might
14 go on there for the highest future levels of hardness
15 in Snap Lake.

16 I'll move on now to talk about the
17 review we did of some of the models that were used
18 ultimately to protect -- to predict substance
19 concentrations in Snap Lake. I'll start with the
20 groundwater flow model, and this was reviewed by Mike
21 Venhuis, who's the geoscientist on our team.

22 Unanticipated increases in groundwater
23 flows have occurred, and this has prompted a -- an
24 updated flow model to predict future flows through the
25 -- the Snap Lake Mine. This work was done by Itasca,

1 and -- and it's one (1) of the submitted documents.

2 It used new data -- what am I doing
3 here? It used new data on -- on structure zones and
4 faults on hydraulic conductivity, the measured inflows,
5 and TDS concentrations, and it also used an updated
6 mine plan to build this -- this model. The model was
7 calibrated using measured total dissolved solids and --
8 and flows.

9 Our finding was that the model appears
10 to be an appropriate model. There are some limitations
11 with the -- with the -- the data, and I'll highlight a
12 few of those. A full delineation of the Snap and
13 Crackle faults has not been completed. For the
14 modelling, they were assumed to extend to the model
15 boundaries.

16 Hydraulic conductivities were assigned
17 to different geological layers through calibration to
18 match the measured flows. They're assumed to decrease
19 with depth. My -- my colleague, Mike's, comment here
20 is that no correlation was shown with actual measured
21 hydraulic conductivity, so -- or the assigned con --
22 conductivities matching with measured values.

23 The footwall TDS concentrations were
24 assumed to be constant, but measured values seemed to
25 show an increase from 2012 to 2013. We didn't see a --

1 a comprehensive assessment of trend in -- in this, what
2 would be the -- you know, Is this a real trend, will --
3 will it extend into the future? So that's an
4 uncertainty.

5 We note that the final model used an
6 arithmetic mean dissolved solids input, but the
7 geometric mean inputs seemed to give a better
8 correlation of predicted TDS with the recent data. The
9 arithmetic mean would be higher values, so it may have
10 some tendency to overestimate TDS. But overall, the
11 groundwater model appears to accurately represent the
12 current and historical inflows, and to approximate the
13 current and historical TDS concentrations.

14 Uncertainties associated with the
15 hydraulic parameters of the future mining areas are --
16 are a -- a data limitation. We -- we don't know these
17 parameters for the future, and measured TDS
18 concentrations for -- for the future are also
19 limitations.

20 Itasca recommends some further
21 delineation of the Snap and Crackle faults, additional
22 boreholes and hydraulic testing to try and resolve some
23 of those uncertainties as we go along, increased TDS
24 monitoring, and I think the -- the idea is that by
25 collecting data as we go, we'll -- we'll get a -- a

1 good idea of model performance and -- and how well the
2 -- the model is doing and whether it needs any
3 refinement.

4 I'll next talk about two (2) -- two (2)
5 models that were used to predict concentrations in --
6 in Snap Lake. First is the -- the mine site model.
7 This collects inputs from various mine sources,
8 including the -- the mine itself in the north pile and
9 the mine site, the -- the water treatment plant, and
10 the water management pond. The mine site model links
11 to the Snap Lake model via inflow of lake water to the
12 mine, and then subsequent effluent discharge of that
13 water back to the lake.

14 So the -- the two (2) models are run
15 iteratively to allow a mass and flow balance. Key
16 answer, these -- those are mostly related to possible
17 future deviations from the mine plan. If that changes,
18 loadings will change, uncertainties around those
19 groundwater flows that we talked about a few moments
20 ago with respect to the groundwater flow model.

21 And to me, uncertainty is associated
22 with the -- the model simplification of -- of a -- a
23 rather complex system. In terms of performance in --
24 in comparing the predictions to recent discharge data,
25 some contaminants were slightly over-predicted in the

1 final discharge, including fluoride, iron, ammonia, and
2 TDS, but overall, there's reasonably good calibration,
3 and the predictions are considered to be either
4 realistic or slightly conservative.

5 And then the Snap Lake model, this takes
6 the inputs from the mine site model, calculates
7 concentrations in the -- in the -- the lake. It's a --
8 a three (3) dimensional hydrodynamic model. The input
9 data are meteorological and winds, et cetera,
10 hydrological flows, and chemical inputs the site
11 monitoring data.

12 The model was calibrated to measure data
13 from 2004 through 2012. After -- after calibrations
14 were -- some over-predictions, including some metals
15 and -- and fluoride, or -- or slight under-predictions.
16 A case -- one (1) case was magnesium.

17 Again, key uncertainties relate to the
18 upstream models, the future groundwater flows, and --
19 and possible future deviations from the -- from the
20 mine plan. So overall, a reasonably good calibration
21 in this model. No large under-predictions or over-
22 predictions, at least for the contaminants that will
23 approach or exceed WQOs.

24 Subject to the key uncertainties
25 mentioned here, we have confidence in the -- the model

1 predictions, in particular, the predictions of TDS and
2 chloride are expected to exceed proposed WQOs in the
3 absence of -- of mitigation.

4 So without mitigation, the TDS and
5 chloride, as I mentioned, are -- are predicted to
6 exceed proposed water quality objectives as early as
7 2015 to 2016. What are the likely effects of this in -
8 - in Snap Lake? Excuse me.

9

10 (BRIEF PAUSE)

11

12 DR. DON HART: The predicted peak
13 concentrations of total dissolved solids are about
14 1,700 milligrams per litre in Snap Lake for the worst-
15 case scenario. I think there were 820 milligrams per
16 litre, or thereabouts, for the best-case scenario.

17 For the sensitive daphnids, the
18 Ceriodaphnia dubia in particular, at 1,700 milligrams
19 per litre we would expect more than 50 percent
20 inhibition of -- of reproduction because the IC50 and
21 site-specific toxicity testing was 1,368 milligrams per
22 litre. The predicted peak will exceed that.

23 So it's likely that there would be, you
24 know, reduced abundance or possibly loss of such
25 sensitive species in Snap Lake, and likely in the

1 downstream Lakes 1 and 2. However, these sensitive
2 daphnids, as -- as noted, have -- have always been a
3 minor component of the invertebrate community. For the
4 other invertebrates tested, the rotifer and midge, we
5 heard or -- or didn't hear this morning was about
6 copepods. The -- and for the fish tested, the lake
7 trout and the -- and -- and the grayling, no effects in
8 tests up to about 1,500 milligrams per litre.

9 So we're looking at changes in sensitive
10 elements of the zooplankton community. The EAR
11 predicted minor changes in the zooplankton community.
12 I guess the bottom -- bottom line is that we have no
13 evidence at this point to suggest that there would be
14 major community changes. There is some uncertainty in
15 forecasting of community changes. There are species in
16 the lake that have not been subjected to toxicity
17 testing. That's always the case. It's always an
18 uncertainty with this kind of assessment. But the --
19 it appears that the -- the likely changes would be
20 consistent with those predicted in the EAR.

21 This slide goes through the same
22 evaluation for chloride. It's really very similar
23 because chloride is -- is one of the main constituents
24 of TDS. Predicted peak concentrations are about 800
25 milligrams per litre in Snap Lake for the worst-case

1 scenario.

2 For the -- for sensitive zooplankton
3 species at 800 milligrams per litre, and this is based
4 on -- on Elphick's work and the species sensitivity
5 distribution that -- that he developed, we would expect
6 at least 25 percent of inhibition of -- of
7 reproduction. Probably more, just based on the -- the
8 5th percentile of Elphick's species sensitivity
9 distribution being 388 milligrams per litre. The --
10 the eight hundred (800), if -- if realized, would
11 substantially exceed this level.

12 So what are we looking at? Likely
13 reduced abundance or possibly loss of such sensitive
14 zooplankton species in -- in Snap Lake or in downstream
15 Lakes 1 and 2. Again, these sensitive species are --
16 are not and have not been dominant elements of the
17 community.

18 For other taxa it seems like there would
19 be little or no adverse effect. The -- again the EA
20 predicted that there would be minor changes in the
21 zooplankton community, and that -- the evidence we're
22 looking at here seems to be consistent with that as for
23 TDS. We -- we have no evidence to suggest there are
24 more wholesale changes in the -- in the invertebrate
25 community. Again subject to the uncertainties that are

1 always associated with community forecasting, and not
2 all species out there are being tested.

3 We looked very briefly at the mitigation
4 measures. A mitigation strategy was proposed by De
5 Beers for both TDS and chloride. They included water
6 treatment plant expansion; they included initially
7 segregation of water into sort of clean -- clean and
8 dirty streams, sort of focussed treatment on the -- the
9 dirtier streams. I think we heard in the technical
10 session that -- that this was not going to be feasible
11 most likely.

12 A mitigation strategy was also proposed
13 for nitrate, including review of blasting pra --
14 practices, explosives loading and storage practices,
15 and consideration of treatment. So these mitigations
16 are -- as described are quite conceptual. It seems
17 like we're at an early stage in the mitigation
18 planning. They're not described or evaluated really in
19 sufficient detail at this point to judge their
20 effectiveness. Pilot studies are planned and -- and
21 those will hopefully support development of more
22 definite mitigation plans.

23 We do note that in the alternatives
24 evaluation -- treatment alternatives evaluation report,
25 CH2M Hill suggests that removal effici -- efficiencies

1 greater than 90 percent are possible using reverse
2 osmosis. So based on this, in theory, mitigations to
3 achieve the proposed EQCs should be technically
4 feasible. This doesn't speak to any of the site-
5 specific factors or the economic constraints that --
6 that may exist in -- in implementing these -- these
7 mitigations. So this is a conceptual assessment really
8 of a conceptual mitigation plan. And that -- that ends
9 my presentation. I'll be happy to address any
10 questions.

11 THE CHAIRPERSON: Okay. Thank you.
12 We'll now take questions from the GNWT.

13

14 QUESTION PERIOD:

15 MR. DON MACDONALD: Thank you, Madam
16 Chair. Don MacDonald, MESL on behalf of GNWT. We've
17 got a series of questions to pose to Dr. Hart. And I
18 jump around a little bit and probably I go back and
19 look at some of the slides that were presented just so
20 that we'll have some visual perspective on what we're
21 going to talk about. So I -- I just wanted to start
22 with a couple of questions, though, for context.

23 And the first one (1) is, we had a -- a
24 question that was directed at De Beers a few minutes
25 ago. It related to, you know, whether what we're

1 trying to achieve here relative to the development of a
2 -- a number for TDS was a national water quality
3 guideline or a -- a site-specific objective.

4 And -- and I just wanted to -- to get
5 clarity also from Dr. Hart about what he thought we
6 were trying to achieve here relative to the number for
7 TDS, or an understanding of the effects of TDS at
8 least.

9 DR. DON HART: Don Hart, for EcoMetrix.
10 It -- it's my -- my understanding that what we're
11 trying to achieve here is not a national guideline.
12 What we're trying to achieve here is a -- a site-
13 specific objective that will be protective or likely
14 protective of the species that are present in Snap
15 Lake.

16 MR. DON MACDONALD: Thank you, Madam
17 Chair. Don MacDonald, on behalf of GNWT. So the --
18 the next question is about CCME recognized that water
19 quality guidelines would not be directly applicable at
20 all sites and there are a certain number of situations
21 that were identified explicitly where water quality
22 objectives were appropriate. And they included such
23 things as for those substances for which water quality
24 guidelines were not yet available from the CCME. They
25 included those situations where water quality

1 objectives could not be achieved for some reason at a
2 site, or those situations where water quality
3 objectives were thought to not be applicable due to
4 unique conditions at the site under consideration.

5 And so in addition to protocols for the
6 development of national water quality guidelines, the
7 CCME also developed protocols for the development of
8 site-specific water quality objectives. And -- and
9 specifically in 2003 the CCME published the -- what
10 they call the Canadian Water Quality Guidelines For the
11 Protection of Aquatic Life, guidance on site-specific
12 application of water quality guidelines in Canada,
13 procedures for deriving numerical water quality
14 objectives.

15 And I just wanted to see if Dr. Hart was
16 aware that the CCME had developed nationally applicable
17 procedures for developing water quality objectives.

18 DR. DON HART: Don Hart, EcoMetrix. I
19 -- I was aware of that document. I -- I have to say I
20 haven't compared what's been done closely with that
21 document, but -- but, yes, I'm aware of it.

22 MR. DON MACDONALD: Madam Chair, Don
23 MacDonald, on behalf of GNWT. So the follow-up
24 question to that is: This morning we heard De Beers
25 indicate that -- when asked about -- the question

1 about, What do they mean by protective of the
2 environment, they said, really, the water is safe to
3 drink and the fish are safe to eat. I think that was a
4 direct quote if you go back to the -- to the
5 transcripts.

6 And I think you might agree that those
7 are important considerations. But at least the CCME
8 has identified additional considerations beyond the
9 water being safe to drink and the fish safe to eat, and
10 that is the uses of the water should be protected. And
11 so those are such things as traditional water uses,
12 agricultural water uses, fish and aquatic life. And
13 the way that CCME has -- has established a narrative
14 for derivation of national water quality guidelines and
15 site-specific water quality objectives is that such
16 values should protect all forms of aquatic life and all
17 life stages of those species over long-term exposures.

18 Dr. Hart, would you agree that that's
19 the narrative intent of the Canadian water quality
20 guidelines? And I understand that you haven't examined
21 the procedures for deriving site-specific water quality
22 objectives so you may not be able to comment on that,
23 but would you agree that that's the narrative intent of
24 the Canadian water qual -- quality guidelines?

25 DR. DON HART: Don Hart, EcoMetrix. I

1 -- I believe the -- the intent would be to protect the
2 -- the resident life forms. I don't think that that
3 precludes possible minor effects on -- on some
4 sensitive species. I -- I think that that is inherent
5 in the SSD approach that CCME is now using to calculate
6 even national guidelines.

7 You can never, I -- I think, guarantee
8 that you've protected all -- all species and all life
9 forms because standard tests don't exist for all those
10 species and -- and life forms. But I think what --
11 what you can and should do is perform testing on -- on
12 a good selection of representative species in order to
13 -- in order to protect the community that does exist at
14 a particular site.

15 MR. DON MACDONALD: Madam Chair, thank
16 you. Don MacDonald, GNWT. Thank you for that answer,
17 but that really wasn't the question I asked, and so
18 I'll help you with this. And -- and I'm reading from a
19 document that was published by the Canadian Council of
20 Ministers of the Environment in 2007 entitled, A
21 Protocol for the Derivation of Water Quality Guidelines
22 for the Protection of Aquatic Life, 2007.

23 And under the CCME guiding principles --
24 and -- and I'm bringing this to your attention because
25 that's what the question was about -- it states that:

1 "The guiding principles for the
2 Canada Water Quality Guidelines,
3 freshwater and marine, are as
4 follows.
5 Guideline are meant to protect all
6 forms of aquatic life and all aspects
7 of aquatic life cycles including the
8 most sensitive life stage of the most
9 sensitive species over long-term --
10 over the long term from negative
11 effects of anthropogenically altered
12 environmental parameters, for
13 example, pH, temperature, dissolved
14 oxygen, or exposure to substances via
15 the water column."

16 So that's -- that's a direct quote from
17 the CCME. When I -- when I provide that supplemental
18 information, does that help you remember what the --
19 the objectives, the narrative objectives of the
20 Canadian Water Quality Guidelines, and the -- by
21 extension, by the way that the protocols for driving
22 site-specific objectives are written, that that is in
23 fact the narrative intent of both water quality
24 guidelines and site-specific water quality objectives
25 in Canada?

1 DR. DON HART: Don Hart, EcoMetrix.
2 I'll -- I don't have the document in front of me but
3 I'll take your word for it, that -- that those words
4 are in the -- the CCME document, and that that -- that
5 is the -- the intent. The -- I still have to marry
6 that with the -- with the procedure that -- that talks
7 about finding a -- the low end or the 5th percentile of
8 a specie sensitivity distribution.

9 Using -- using this approach, it's
10 possible that there would be species out there that
11 could show some -- some minor effects, notwithstanding
12 the intent, if we follow CCME procedures.

13 MR. DON MACDONALD: Madam Chair, Don
14 MacDonald on behalf of GNWT. I'd like now to flip back
15 if we could to the slide -- first slide on nitrate,
16 please, if we could. It should be slide 3 or 4. Yes,
17 good.

18 Okay. There was something that
19 intrigued me when -- during your presentation as you
20 were talking about the mitigating effect of water
21 hardness on the toxicity of nitrate. And I think many
22 people in this room might understand that as you get
23 more hardness or calcium you get more mitigation of
24 toxicity, but what I heard you say was that is true up
25 to a certain extent, and at some point you get to a

1 level of water hardness above which there is no
2 mitigating effect of hardness on the toxicity of
3 nitrate.

4 Is that not correct?

5 DR. DON HART: Don Hart, EcoMetrix.

6 Yes, if you look at the -- the Rescan data, it suggests
7 a levelling off of that ameliorating effect of -- of
8 hardness. And they chose to define that as the maximum
9 hardness level for purposes of -- of accommodating the
10 -- the beneficial effects of hardness.

11 MR. DON MACDONALD: Madam Chair, Don
12 MacDonald on behalf of GNWT. So if we could -- thank
13 you for that. If we could flip now to the chloride
14 slide, which is I think one (1) back, or one (1)
15 forward. There we go. Thank you.

16 And -- and I think you've reviewed the
17 underlying data that were used to develop this
18 relationship between water hardness and -- and chloride
19 toxicity.

20 Is -- is that correct, that -- in part
21 that forms the basis of your conclusion that the
22 proposed water quality objective is likely to be
23 protective of Snap Lake conditions?

24 DR. DON HART: Don Hart, EcoMetrix.

25 Yes, that's correct.

1 MR. DON MACDONALD: Thank you. Don
2 MacDonald, on behalf of GNWT. And then what you would
3 have seen then in the Elphick data is -- at least in
4 the public's forum you would have seen three (3)
5 hardness relationships that were presented for
6 different life stages with a single species. But
7 probably you also looked at the underlying data as well
8 in the Resca -- Rescan -- sorry, just in the Elphick
9 report, that showed a fourth data point that also
10 showed either a levelling off or an increasing level of
11 toxicity as water hardness increased.

12 Is that correct?

13 DR. DON HART: Don Hart, EcoMetrix.
14 Without having the paper in front of me I -- I'm not
15 sure. It -- it seems to me that -- that Elphick did
16 have some testing done at an even higher level, at 320
17 milligrams per litre, and that there was some
18 suggestion of the -- the hardness effects of actually
19 lower chloride effect levels at that higher value, yes.

20 MR. DON MACDONALD: Don MacDonald, on
21 behalf of GNWT. Thank you for that. And so just to
22 refresh your memory, the -- yes, the -- the toxicity
23 did increase and those data were not reported in the
24 final publication, but were -- reported it in the
25 underlying data.

1 And so what I'm hearing you say, based
2 on this, is that there is a -- a level at which the
3 mitigating effects of calcium, or hardness, on the
4 toxicity of at least nitrate and -- and chloride,
5 there's a -- there's a limit to the extent to which
6 those -- that hardness mitigating factor is actually
7 applicable.

8 And -- and the fact that there is that
9 limit creates uncertainty in the -- in the associated
10 under -- our understanding of the relationship between
11 the concentrations of these variables, nitrate and
12 chloride, and how -- and the water hardness that we
13 could see over the broad range of conditions without
14 mitigation?

15 DR. DON HART: Don Hart, EcoMetrix.
16 Was there a question there?

17 MR. DON MACDONALD: Yeah, I was --
18 meant to say, And don't you agree with that? And this
19 is Don MacDonald again.

20 DR. DON HART: Don Hart, EcoMetrix.
21 Yes, I think I -- I would agree that for the high
22 hardness levels there is -- there is some uncertainty
23 about -- about what goes on there and the interplay
24 between -- between the hardness and the -- the toxicant
25 effect.

1 MR. DON MACDONALD: Thank you. Don
2 MacDonald, on behalf of GNWT. I'm -- I'd like to now
3 move onto the slide for fluoride. So here we see a
4 proposed -- here I'm perplexed, honestly, about this
5 slide. And so I'm -- I'm hoping you're going to help
6 me understand what's on here.

7 So what I think I see is a proposed
8 water quality objective of 2.46 milligrams per litre of
9 fluoride that was calculated using species sensitivity
10 distribution. And then I see towards the end a
11 statement that:

12 "The proposed water quality objective
13 is likely protective of aquatic
14 life."

15 But then in the fourth bullet I'm
16 looking at these data for rainbow trout which show a
17 ten (10) day lethal concentration of -- it's an LC50
18 there of two point two (2.2) which is below the
19 proposed water quality objective. And -- and for --
20 for me, that -- that's a -- well, an LC50 is the
21 concentration of fluoride that would be associated with
22 a 50 percent mortality of rainbow trout in a ten (10)
23 day toxicity test.

24 First of all, can I -- can I confirm
25 that that's what that means?

1 DR. DON HART: Don Hart, EcoMetrix.

2 Yes, ten (10) day -- ten (10) day LC50 is a -- a
3 concentration lethal to 50 percent of organisms over a
4 ten (10) day exposure period.

5 MR. DON MACDONALD: And this is Don
6 MacDonald again on behalf of GNWT. And -- and my
7 understanding is that Snap Lake has resident salmonid
8 species present.

9 Isn't that correct?

10 DR. DON HART: Don Hart, EcoMetrix.
11 That's correct.

12 MR. DON MACDONALD: Thank you for that
13 answer. Don MacDonald, on behalf of GNWT. So what I'm
14 really struggling with here is trying to understand how
15 a water quality objective of two point four-six (2.46),
16 which is higher than a ten (10) day LC50 of 2.2
17 milligrams per litre, would be protective of aquatic
18 life in Snap Lake.

19 I'm wondering if you could explain that
20 to us.

21 DR. DON HART: Don Hart, EcoMetrix. As
22 -- as I recall, this particular value, the rainbow
23 trout value, was deemed -- deemed a sub-chronic study
24 and not included in the -- in the SSD. I think what --
25 what I'm trying to point out here is that right around

1 this proposed level of two point four-six (2.46) we --
2 we do have some uncertainty and some reported effect
3 levels, anyway, that are slightly lower.

4 And to me, this -- this suggests that we
5 may not wish to go with exactly two point four-six
6 (2.46), but -- but something lower. And it -- it's --
7 it's clear from the predictions for Snap Lake that
8 there's -- there's room to go somewhat lower.

9 MR. DON MACDONALD: Thank you for that.
10 Don MacDonald, on behalf of GNWT. I appreciate you
11 helping us to try to understand that recommendation.
12 So in your -- and -- and in a number of places, you've
13 indicated that -- that there are a number -- and this
14 is a paraphrase and you'll fix it if -- I'm sure, if
15 it's wrong.

16 But the way I understood your comment
17 was that there are -- it was in Snap Lake, there are a
18 large number of species that could be adversely
19 affected by changes in water quality conditions. We
20 have a limited number of tests for which we have
21 generated toxicity data. And so we're left with some
22 unresolved level of uncertainty about what the
23 potential effects of changes in water quality could be.

24 Is -- is that not close to what I think
25 I heard you say?

1 DR. DON HART: Don Hart, EcoMetrix. Ye
2 -- yes, I think that's -- that's the -- the essence of
3 the answer, indeed, that I was trying to point out. We
4 -- we always have this kind of uncertainty in trying to
5 predict effects in -- in communities. You very seldom
6 have toxicity test data for all of the resident
7 species, in -- in particular because test protocols for
8 all those species don't exist. So you try to pick a
9 collection of surrogate species that you feel are
10 representative of the community that -- as a whole
11 that's out there.

12 MR. DON MACDONALD: Thank you. Don
13 MacDonald, GNWT. I think that's -- that's really
14 helpful. And I think what -- what I get from that is
15 that -- that there is residual uncertainty in our
16 understanding of what the effects of changes in water
17 quality are likely to be.

18 And -- and I think you've really hit on
19 the reason why the CCME has established these
20 nationally applicable protocols and procedures for
21 driving, not just water quality guidelines, but site-
22 specific water quality objectives. It's really to make
23 sure that we have minimum data requirements as we move
24 through this process so that we can -- minimum data
25 requirements so as we move through the process, we have

1 at least a minimum understanding of the -- the types
2 and level of effects that can be expected at certain
3 kinds of concentrations.

4 But also, the CCME has established their
5 -- in their procedures for use of safety factors to
6 explicitly account for this uncertainty that we have.
7 And -- and that's what's really missing from the work
8 that's been done by De Beers here.

9 Now, I know my colleagues in the back
10 have only two (2) additional questions. And so I would
11 pass it to...

12 THE CHAIRPERSON: I would like just to
13 remind the GNWT that if we could be question specific,
14 please, so we could try to stay on track. Thank you.

15 MR. RICK WALBOURNE: Thank you, Madam
16 Chair. It's Rick Walbourne, with ENR. Dr. Hart, you
17 referenced De Beers's default value of 500 to 1,000
18 milligrams a litre of TDS based on guidelines that were
19 developed in Alaska.

20 Can you clarify if Alaska's guidelines
21 were developed with the water of a similar ionic
22 composition to that of Snap Lake, and by that I mean
23 chloride-dominated water that we see in Snap Lake?
24 Thank you.

25 DR. DON HART: Don Hart, EcoMetrix.

1 What Alaska has defined is a range within which they
2 will make site-specific determinations about an
3 appropriate level of -- of TDS. So below five hundred
4 (500), they're -- they're pretty comfortable. Above
5 five (500) they want to see some site-specific
6 information. So they would be considering site-
7 specific factors when they're within that five hundred
8 (500) to a thousand range.

9 MR. RICK WALBOURNE: Thanks for that.
10 Rick Walbourne, ENR. Just to clarify on that, I note
11 the studies that were conducted to determine -- to
12 arrive at the 500 milligrams a litre, the studies that
13 were done in Alaska, can you confirm that those studies
14 were done on waters that were similar in nature to the
15 waters at Snap Lake in ionic composition?

16 And by that, I mean were chloride-
17 dominated waters used in the studies that were used to
18 develop the Alaskan guidelines?

19 DR. DON HART: Don Hart, EcoMetrix. I
20 -- I don't think I can speak at this time to the
21 details of the development of the -- of the Alaska
22 guidelines. What I'm giving you is my -- my
23 interpretation of how those guidelines are -- are
24 applied.

25 MR. RICK WALBOURNE: Thanks for that.

1 One (1) follow-up question. It's our understanding
2 that actually calcium-dominated waters were used in
3 Alaska to develop those guidelines.

4 Can you comment then on the relevance of
5 those Alaskan guidelines to the Snap Lake site based on
6 those differences in ionic composition, specifically, a
7 chloride-dominated Snap Lake situation versus a
8 calcium-dominated water used in developing the Alaskan
9 guidelines? Thanks.

10 DR. DON HART: Don Hart, EcoMetrix.
11 From what you told me, I'm not sure what the anion was
12 associated with calcium. It seems like that would be
13 important. So I'm not sure if I understand your --
14 your question. But would they have been looking
15 at data sets with the exact ionic composition of Snap
16 Lake? Most likely not.

17 MR. RICK WALBOURNE: Thanks for that.
18 Rick Walbourne, ENR. Yeah, thanks for that, Dr. Hart.
19 Just to clarify, I guess, it's that it's known that TD -
20 - the driving toxicity factor in TDS is usually based
21 on the constituents that make up the TDS. And in the
22 Snap Lake situation, we feel that chlorides may be the
23 -- the driving factor in toxicity as opposed to, I
24 think, calcium and sulfates, is my understanding, for
25 the Alaskan guidelines.

1 I just want to -- your thoughts on this,
2 if there could be any certainty in using those Alaskan
3 guidelines at Snap Lake based on that information?

4 DR. DON HART: Don Hart, EcoMetrix. It
5 seems to me that -- that the -- the range within which
6 Alaska decided that they were comfortable with less
7 than five hundred (500) and wanting to look at site-
8 specific factors in the five hundred (500) to a
9 thousand range, that principle seems to me to be -- to
10 be applicable. I -- I -- it's -- it's been a long time
11 since I've looked at the Alaska guideline. I can't
12 recall exactly what data they were looking at and how
13 that evolved into their -- into their procedure.

14 But if you're asking what -- could there
15 be differences between a calcium sulphate dominated
16 system, calcium chloride dominated system, yes, there
17 could be.

18 MR. RICK WALBOURNE: Thanks for that.
19 Rick Walbourne, ENR. I'm going to pass it over to my
20 colleague, Sean Whitaker, for I think one (1) final
21 question, if that's okay?

22 MR. SEAN WHITAKER: Thank you, Madam
23 Chair. This is -- one (1) final question. Sean
24 Whitaker, from ENR. Dr. Hart, I have a question
25 regarding the modelling -- the forward predicted

1 modelling for closure.

2 As was stated earlier today by De Beers,
3 they did not include conservative parameters that may
4 remain in the system at closure and that if hardness
5 were to be reduced at an accelerated rate, is there a
6 concern that the ameliorating factor up to a certain
7 level of hardness that we've just previously indicated,
8 once that drops, is there potential for a condition
9 that may affect the future population of Snap Lake in
10 the post closure period?

11 DR. DON HART: Don Hart, EcoMetrix. In
12 -- in general, if you are to leave toxicants in the
13 system after the hard -- the hardness goes away that
14 was having a protective effect, then, yes, that's --
15 that's an issue and it obviously negates your
16 dependence on -- on that protective effect of -- of
17 hardness.

18 In the case of the TDS constituents
19 that we've been talking about today, I don't see that
20 that's the case. I -- I would -- I don't see how they
21 would remain in the system after the hardness goes
22 away.

23 MR. SEAN WHITAKER: Thank you, Madam
24 Chair. Sean Whitaker, with ENR. Just one (1) final
25 follow-up. Dr. Hart, if it was metalloids and nitrate

1 that remained cycling in the system, not specifically
2 the TDS concentration, because the TDS is what's
3 allowing the hardness to increase, but if the
4 metalloids and nitrates were remaining in the system in
5 the post-closure period, would that be an issue?

6 DR. DON HART: Don Hart, EcoMetrix.
7 Let's deal with them one at a time. The -- if you were
8 to leave the nitrates in the system after the hardness
9 goes away, then that could be an issue with -- with
10 application of a guideline that depends on that
11 hardness, the protective effect of hardness.

12 I'm not sure what metalloids you're
13 talking about there, but my impression is that in
14 general the metals and -- and metalloids are not really
15 issues at -- at this site. They don't seem to be
16 approaching CCME water quality guidelines, for example.

17 THE CHAIRPERSON: We'll ask for
18 questions then from Environment Canada.

19 MS. SARAH-LACEY MCMILLAN: It's Sarah-
20 Lacey with Environment Canada, and Anita's on the phone
21 and she has some questions.

22 MS. ANITA LI (BY PHONE): With the --
23 the slide on chloride, Dr. Hart, you mentioned that
24 there was low benefit beyond the hardness of 160
25 milligrams per litre.

1 What do you mean by that?

2 DR. DON HART: Don Hart, EcoMetrix.

3 When you look at Elphick's data, he tested at a number
4 of different hardness levels. And beyond a 160
5 milligrams per litre, I think his next highest level
6 was three hundred and twenty (320). He really wasn't
7 seeing a -- a beneficial effect of hardness. In fact,
8 he was sometimes seeing a -- a lower chloride value
9 than at -- at the one-sixty (160). So his feeling was
10 that -- that he shouldn't be claiming a hardness
11 benefit at levels higher than one-sixty (160). That --
12 that the benefit would -- would stop there.

13 MS. ANITA LI (BY PHONE): Anita Li,
14 from Environment Canada. Thank you. The next question
15 I have is when you talked about fluoride you mentioned
16 that the SSD method was preferred by EcoMetrix and that
17 divided by a safety factor is a crude method.

18 So I'm wondering if you have seen other
19 clients who have developed site-specific water quality
20 objectives using a -- a safety factor.

21 DR. DON HART: Don Hart, EcoMetrix. I
22 don't know if I want to talk about other clients, but -
23 - but certainly water quality guidelines with -- have
24 been developed with safety factors. The CCME values
25 used to be mostly of that nature. In -- in their 2007

1 protocol they -- they've indicated that they prefer the
2 -- the SSD method. But certainly the low effect level
3 times the safety factor approach has been used and --
4 and is still sometimes used in cases where there's
5 insufficient data for an SSD approach.

6 MS. ANITA LI (BY PHONE): De Beers is
7 proposing to use a safety factor of one point zero
8 (1.0). I was wondering if you could comment on that.

9 It's -- I guess I'm wondering is that
10 commonly used, a safety factor of one point zero (1.0)?
11 And I guess is it useful?

12 DR. DON HART: Don Hart, EcoMetrix.
13 Well, a -- a safety factor one point zero (1.0)
14 obviously doesn't do anything. I -- I think what use
15 of a factor like that is really saying is that -- that
16 we don't have any uncertainty that we feel needs to be
17 compensated by use of a -- of a safety factor. I take
18 it you're referring to the -- the use of a -- well, to
19 -- to the lack of a safety factor in the -- the
20 derivation of the proposed value for -- for TDS.

21 I -- I guess my view on -- on that would
22 be if we only had the two (2) pieces of data from the
23 two (2) daphnid species that gave us EC20
24 concentrations then we would have a limited data set
25 that would certainly warrant use of a safety factor.

1 In this case we have eight (8), or nine (9) if you
2 include the copepod species that -- that were tested,
3 really with the intent of a -- an SSD approach.

4 I guess I'd suggest that -- that that
5 testing, even though the organisms gave no response,
6 that's information. And that -- it helps us understand
7 that what we're looking at in the two (2) responsive
8 species are -- are two (2) rather sensitive organisms.
9 And it seems to me reasonable under that condition to
10 sort of choose the lowest -- the lowest of those
11 species values with -- without a safety factor.
12 Because you have this other set of data where adverse
13 effects were not seen that is telling you something.

14 MS. ANITA LI (BY PHONE): Thank you
15 very much. I have one (1) final question, and that is
16 the slide on sulphate. You -- in one (1) of the
17 bullets, it said: "Concern about
18 combined effects at
19 hardness above two-
20 fifty (250) MO -- MOE
21 -- [BC MOE, I guess]
22 -- recommends
23 toxicity testing with
24 site water if
25 hardness is greater

1 than two-fifty
2 (250) ."

3 So I was wondering, what was the concern
4 that the MOE was talking about to sulphate?

5 DR. DON HART: Don Hart, EcoMetrix.
6 They seem to be concerned about the combined effects of
7 the hardness and the sulphate, and I believe they
8 talked about possible osmotic effects. That was --
9 that was their concern.

10 MS. ANITA LI (BY PHONE): All right.
11 Thank you very much. Anita Li, from Environment
12 Canada. That's all the questions I have.

13 THE CHAIRPERSON: Thank you. We'll now
14 ask questions from Yellowknives Dene First Nation.

15 MR. TODD SLACK: Thank you, Madam
16 Chair. Todd Slack, on behalf of the Yellowknives. I
17 just have one (1) question.

18 When I reviewed the Health Canada
19 guideline for -- the aesthetic guideline of 500
20 milligrams per litre, it was my sense that that was
21 based on the TDS issue of -- that was -- in which the
22 TDS, which we know is complex, was principally composed
23 of carbonates.

24 So in this case where we have a
25 principal component that's chlorides, I'm wondering if

1 you have any experience or any knowledge that you can
2 provide that would help us understand whether we can
3 expect to see a better or worse case, or if there's any
4 information that you can provide for the -- the Board
5 here?

6 DR. DON HART: Don Hart, EcoMetrix.
7 No, I really haven't looked into that. I don't think I
8 could give you information that would resolve that for
9 you.

10 MR. TODD SLACK: Todd Slack, with the
11 Yellowknives. No questions. Thank you.

12 THE CHAIRPERSON: We'll ask Lutsel K'e
13 Dene First Nation for questions.

14 MR. MIKE TOLLIS: Thank you, Madam
15 Chair. Mike Tollis, from Lutsel K'e Dene First Nation.
16 I want to thank Dr. Hart for that presentation, but we
17 have no questions. Thanks.

18 THE CHAIRPERSON: Questions from North
19 Slave Metis Alliance?

20 MR. MATT HOOVER: Thank you, Madam
21 Chair. Matt Hoover, North Slave Metis Alliance. Thank
22 you for your presentation, Dr. Hart. I just have a
23 couple quick questions.

24 You recognize that there is uncertainty
25 with predicting TDS and the water quality objectives

1 for TDS of six eighty-four (684) will be limiting for
2 chloride, so forgive me if this is something that's
3 already understood by most people, but this assumes
4 that chloride is 45 percent of the TDS.

5 However, did you consider the potential
6 for connate water to vary in this composition, and can
7 you elaborate on this for me, please?

8 DR. DON HART: Don Hart, EcoMetrix. In
9 -- in doing that calculation, obviously I used the 45
10 percent. If the connate water were -- were to change
11 resulting in a different composition of TDS being
12 released to Snap Lake, then the situation as regards to
13 TDS and chloride might, in fact, change. It -- it
14 seems, from the data presented by De Beers, that the
15 ion composition has been pretty steady for the last
16 number of years.

17 But yes, if it changes, then it's a new
18 ball game.

19 MR. MATT HOOVER: Thank you. Thank
20 you. Sorry, I'm having some issues with this
21 microphone. This is Matt Hoover, North Slave Metis
22 Alliance.

23 Related to that, I have another question
24 is that as of the technical working group for Snap Lake
25 that just occurred this past week, De Beers made it

1 aware that they do not have a calibrated chloride meter
2 on the discharge pipe that's been -- the chloride meter
3 has been installed since 2013.

4 Would you say this is a concern for
5 monitoring and mitigation at site? Thank you.

6 MR. DON HART: Don Hart, EcoMetrix. I
7 -- I would say that if you're using a -- a meter of any
8 kind, it should be calibrated, yes.

9

10 (BRIEF PAUSE)

11

12 MR. MATT HOOVER: Thank you. Sorry, I
13 just have one (1) more question. I'm just finding it,
14 here.

15

16 (BRIEF PAUSE)

17

18 MR. MATT HOOVER: You noted in your
19 presentation that mitigations are not described or
20 evaluated in sufficient detail to judge their
21 effectiveness.

22 Was this not concerning to you, and
23 would you identify this as a gap, perhaps, that needs
24 to be addressed? Thank you.

25 DR. DON HART: Don Hart, EcoMetrix. I

1 -- I think we'd all have been happy if we could see a -
2 - a detailed plan for mitigation and -- and better
3 judge its effectiveness at this -- at the -- this point
4 in time. So is it of -- of concern?

5 Yes, but I imagine that the -- as the
6 pilot studies progress, hopefully quickly, that issue
7 will be resolved. I know it does create a bit of a --
8 a bit of dilemma not -- not knowing the answer at this
9 point in time.

10 Does that answer your question?

11 MR. MATT HOOVER: Matt Hoover, North
12 Slave Metis Alliance. Yes, that answers my question.
13 Thank you very much. That's the end of my questions.
14 Thank you, Madam Chair.

15 THE CHAIRPERSON: Questions from Deninu
16 K'ue First Nations?

17 MR. MARC D'ENTREMONT: Thank you, Madam
18 Chair. It's Marc d'Entremont, with the DKFN. Thank
19 you, Dr. Hart, for that presentation. I just have one
20 (1) question. So in your presentation, you mentioned
21 uncertainty a number of times regarding the total
22 dissolved solid components as well as the -- the
23 various models that were used.

24 So this is one (1) example. Under the
25 mine site model slide, you mentioned uncertainty

1 related to the factor -- the fact that it was
2 simplified model used on a complex system.

3 So in the interests of adaptive
4 management, which is essentially in place to address
5 kind of uncertainty, what would you recommend in terms
6 of, I guess, future modifications to the model that
7 would lower the level of uncertainty in this case?
8 Thanks.

9 DR. DON HART: Don Hart, EcoMetrix. I
10 think in most models, we're -- we're taking a -- a
11 complex system and making it simpler for the purposes
12 of modelling. I'm not suggesting that there's anything
13 wrong in that, or that it needs to -- to be fixed. I
14 think our -- our feeling with respect to the mine site
15 model that -- is that it was pretty well done, and it's
16 the -- the big uncertainties are the upstream models,
17 the groundwater flows. And -- and, of course, anything
18 changing in the mine plan could -- could substantially
19 change loadings.

20 MR. MARC D'ENTREMONT: Marc
21 d'Entremont, for the DKFN. All right, thank you for
22 that answer. We have no more further questions.

23 THE CHAIRPERSON: Questions from De
24 Beers?

25 MS. ERICA BONHOMME: Erica Bonhomme.

1 We do have a few questions. We'll start with Dr.
2 Chapman.

3 DR. PETER CHAPMAN: Peter Chapman.

4 Don, I'd just like to take you back to some discussion
5 you had with the GNWT, where you talked about the
6 Alaska TDS, total dissolved solid range from five
7 hundred (500) to a thousand, and they pointed out to
8 you that this -- the Alaska one was dominated by
9 calcium. You noted in your reply that calcium is a
10 cation.

11 Why is that important?

12 DR. DON HART: Don Hart, EcoMetrix. I
13 guess in my reply, I was trying to elicit or recall
14 what -- what the anion was in the -- in the Alaska
15 work. Why is the cation important? The -- the calcium
16 cation is a -- a major constituent of hardness. The --
17 the -- so the -- you know, calcium as opposed to
18 sodium, for example, would likely give you -- give you
19 different -- different results.

20 It -- I'm not sure if I'm answering your
21 question.

22 DR. PETER CHAPMAN: It's Peter Chapman.
23 Let me try it another way.

24 Would you agree that total dissolved
25 solids is made up of cations and anions? And that

1 chloride, in fact, is an anion. So you can't say --
2 calcium is not the same as chloride. It's an anion.

3 Is that correct?

4 DR. DON HART: Don Hart, EcoMetrix.
5 I'm getting a bit confused here. Of -- of course
6 calcium is not the same as chloride. Chloride is your
7 anion and calcium is -- is the cation.

8 DR. PETER CHAPMAN: Okay. Peter
9 Chapman. I apologize if I'm being confusing.

10 I'm just wondering then, just to finally
11 do this, if you had a chance to look at slide 18 of the
12 GNWT presentation, which we still have to see but it
13 was sent out, 'cause it's interesting, on that slide it
14 quotes Wetzel 1993 talking about salinity TDS, in other
15 words, in fresh water lake, being dominated by both
16 cations. And it mentioned calcium, magnesium,
17 potassium, and sodium, and also anions. And it
18 specifically mentions freshwater lakes as being
19 dominated by anions, including chloride.

20 THE CHAIRPERSON: Again, could I just
21 ask members to be question specific.

22 DR. DON HART: I'm not sure what the
23 question was.

24 DR. PETER CHAPMAN: Peter Chapman here.
25 What I'm trying to get at is basically the TDS is

1 composed of both anions and cations, and we want to
2 make sure we don't confuse apples and oranges. So I
3 apologize, I probably was asking the questions in the
4 totally wrong way, and I apologize for that.

5 All I want to get on the record is that
6 we need to look at both forms because there's both the
7 positive and the negative charged ions in there, and I
8 wanted to point out that, you know, when we're talking
9 about the Alaska ones we can't just look at one (1)
10 side of the equation, the positive. We have to look at
11 the negative as well.

12 Would you -- would you agree with that,
13 Don?

14 DR. DON HART: Don Hart, EcoMetrix.
15 Now that I understand the question, yes, I'd agree.

16 DR. PETER CHAPMAN: I do -- Peter
17 Chapman. I do apologize. I have some very simple
18 questions now, I promise you.

19 Do we have any evidence that very high
20 water hardness for nitrate and chloride is not
21 protective?

22 DR. DON HART: Don Hart, EcoMetrix.
23 No, I don't think we -- we have that evidence. The --
24 in the Elphick studies there was -- there -- some
25 indication of lower effect levels at three twenty (320)

1 versus one sixty (160).

2 But really in terms of the -- the
3 highest hardness levels that are predicted for Snap
4 Lake, no, I don't think we have evidence that they're
5 not protective. I -- I guess what I was trying to put
6 on the table is -- is some uncertainty at that end of
7 the hardness spectrum.

8 DR. PETER CHAPMAN: Peter Chapman.
9 Thank you for that answer. Two (2) last questions.

10 I just wanted to confirm that the
11 Elphick et al 2011 paper on chloride and hardness
12 relationship that Ekati and ourselves have used as the
13 basis for developing site-specific water quality
14 objectives for chloride was published in a peer-
15 reviewed international journal?

16 DR. DON HART: Don Hart, EcoMetrix.
17 Yes, it was.

18 DR. PETER CHAPMAN: Peter Chapman. One
19 (1) last question and I'll turn it over to Erica.

20 Don, are you aware whether the Mackenzie
21 Valley Land and Water Board water and effluent quality
22 management policy specifically requires the use of CCME
23 guidelines to develop site-specific water quality
24 objectives?

25 DR. DON HART: Don Hart, EcoMetrix. My

1 recollection is that, no, it does not.

2 DR. PETER CHAPMAN: Peter Chapman.

3 Thank you very much. Masi. I'll turn it over to

4 Erica.

5 MS. ERICA BONHOMME: Erica Bonhomme.

6 This follows on a question that Mr. Hoover posted to

7 you.

8 In your view, is the identification of
9 mitigation a necessary part of the process to establish
10 a site-specific water quality objective?

11 DR. DON HART: Don Hart, EcoMetrix.

12 No, understanding the mitigation is not really part of
13 deriving the site-specific water quality objective. I
14 -- I think what we all want to have a comfort level
15 with is whether there's going to be mitigation feasible
16 to achieve the water quality objective that has been
17 derived.

18 MS. ERICA BONHOMME: No further
19 questions.

20 THE CHAIRPERSON: Okay. Thank you.
21 Questions from Board staff?

22 DR. KATHY RACHER: Kathy Racher, for
23 the Board. I just have two (2) questions, you'll be
24 happy to know.

25 One (1) is a -- a clarification on the

1 question asked by the GNWT. They asked you -- it was
2 about the conservative -- which -- which ions are
3 conservative in terms of will they dilute at the same
4 rate as hardness would dilute post-closure for example.

5 And the way the question was -- the
6 second question on that was posed was: If you were to
7 leave nitrate or metals in the system then would you
8 still have the amelior -- you know, a different -- the
9 amel -- and but the hardness went down, would that be a
10 problem. And I think in your answer you said, No, if
11 you were to leave nitrate in the system, that would be
12 a problem. But I'm not -- I don't know if it -- it was
13 meant to be said that way. I don't know if there's any
14 evidence that nitrate would -- would stick around for
15 some reason.

16 Is -- is that what you're saying, that
17 it would stick around or -- or were you -- were you not
18 clear on the question?

19 DR. DON HART: Don Hart, EcoMetrix. I
20 -- I think the notion that it might stay around was
21 inherent in the question that I was trying to answer.
22 I'm not aware that -- that it would. I would expect it
23 to go away in the same time scale as the hardness.

24 DR. KATHY RACHER: Kathy Racher, for
25 the Board. Thank you for that clarification.

1 My only other question is the analysis
2 that you did for the Board on the potential effects of
3 the exceedances of water quality objectives for TDS and
4 -- and chloride were sort of based on the unmitigated
5 case which was good to -- to know how you thought that
6 shook out.

7 And I guess I just -- I just wanted to -
8 - I don't know how much you can say about it, but if
9 you can tell us what can we expect for changes in Snap
10 Lake if, for example, this value of six eighty-four
11 (684) is a -- is an acc -- is an accurate as value for
12 a lowest effect level for -- for the most sensitive
13 species in Snap Lake.

14 What could we expect in terms of effects
15 overall to Snap Lake or the ecology of Snap Lake?

16 DR. DON HART: Don Hart, EcoMetrix.
17 Sorry, are you asking me to imagine if we achieved the
18 six eighty-four (684) and the six eighty-four (684) is
19 accurate? Or did you say inaccurate?

20 DR. KATHY RACHER: Kathy Racher, for
21 the Board. I -- I'm just at the end of the day and I'm
22 poorly wording everything.

23 What I meant was, let's assume that it's
24 accurate in terms of the lowest effect level measured
25 at this time and Snap Lake goes up to that value. And

1 I just want to know -- like because at that value
2 there's some measured effect on a species. And -- and
3 I think the GNWT has -- has pointed out that there are
4 -- are -- there are potential effects to other species
5 as well, lower effects at that level as well.

6 So I'm wondering if the lake was to go
7 that level of six eighty-four (684) what -- what would
8 we expect in terms of effects to the overall ecology or
9 to zooplankton? Because you gave us -- you gave us a
10 case of what would be the effects if the unmitigated
11 case so I just wanted to -- to know what it was at the
12 mitigated case. And I understand that in your answer
13 here you can only speak to the effects of TDS and not
14 everything else in the whole world, so.

15 DR. DON HART: Okay. Don Hart,
16 EcoMetrix. Yeah, so if -- if we achieve the proposed
17 objective level of six eighty-four (684) and based on
18 the toxicity test information that's been put in front
19 of us that would correspond to a level that has a low
20 level of effect on a sensitive zooplankton species, in
21 particular Daphnia magna. So it would have been a 20
22 percent reduction in reproduction for that species.

23 So what would be the outcome of that?
24 This is -- this is a -- a marginal effect. A 20
25 percent response level is typically just at the

1 threshold of what you can significantly measure. It --
2 it may or may not, but it could have the potential to
3 lead to reduced populations as a result of the reduced
4 reproductive output.

5 As I said, 20 percent is -- is a pretty
6 low level of effect, so any species can compensate for
7 that level of effect.

8

9 (BRIEF PAUSE)

10

11 THE CHAIRPERSON: Questions from
12 counsel? Questions from Board members? Yvonne...?

13 MS. YVONNE DOOLITTLE: Yes, hello.
14 This is Yvonne Doolittle, Board member.

15 One (1) of your -- I guess just to sum
16 it up, because it has been a long day, so you -- your
17 assessment of the EQC calculations, are -- are the
18 appropriate?

19 After all of what has been said and
20 asked and answered, can you give me a simplified: Is it
21 appropriate? Because you've suggested that the -- they
22 can be min -- lower, so in general, what -- what is
23 your take on are they appropriate or not?

24 DR. DON HART: Don Hart, EcoMetrix. I
25 just want to be clear. What -- are you talking about

1 the EQC calculations or the proposed guidelines? I
2 didn't actually show any slides on -- about EQC
3 calculations.

4 MS. YVONNE DOOLITTLE: Yes, the water
5 quality objectives. Sorry, wrong acronym. I'm still
6 learning all of them; pages and pages of them I
7 received last night.

8 DR. DON HART: Okay. Don Hart,
9 EcoMetrix. Now that we've sorted that out, could you
10 repeat the question?

11 MS. YVONNE DOOLITTLE: Well, one (1) of
12 the -- when you started off your presentation you were
13 -- you were hoping to determine and respond to us if
14 your assessment of the water quality objectives were
15 appropriate. So, based on the fact that throughout the
16 presentations you recommended that they could be lower,
17 are they appropriate -- what -- in your opinion?

18 DR. DON HART: Okay. Don Hart,
19 EcoMetrix.

20 I guess my overall assessment is that
21 they are reasonably protective. That in the cases I
22 pointed out, where the proposed objective is
23 considerably higher than -- than the predicted maximum,
24 there -- there is certainly room to set a lower target
25 in the lake and -- and use that to drive EQCs, the

1 effluent criteria.

2 THE CHAIRPERSON: Questions from Board
3 members?

4 What we'd like to do right now then is
5 move down to Environment Canada. And they have a
6 presentation. If they could do that now, please.

7

8 (BRIEF PAUSE)

9

10 PRESENTATION BY ENVIRONMENT CANADA:

11 MR. CAREY OGLIVIE: Thank you, Madam
12 Chair. It's Carey Oglivie. I'm head of Environmental
13 Assessment and Marine Programs for Northwest
14 Territories and Nunavut, on behalf of Environment
15 Canada. With me is Sarah-Lacey McMillan, our -- one
16 (1) of our senior EA coordinators and is the lead on
17 coordinating our expert review team.

18 And I don't know if Anita is still on --
19 she is still, okay. Anita Li, she's part of our expert
20 support group calling in from our Downsview office. So
21 I'll turn it over to Sarah-Lacey.

22

23 (BRIEF PAUSE)

24

25 MS. SARAH-LACEY MCMILLAN: Sarah-Lacey

1 McMillan, with Environment Canada.

2 So to set out the context of our
3 presentation, in general, Environment Canada agrees
4 with the conclusions presented and the materials
5 submitted to support the water licence amendment
6 request. EC is of the opinion that the conclusions
7 drawn by De Beers are supported by the analysis.

8 However, there are uncertainties in the
9 impacts to the receiving environment that should be
10 addressed. The specifics of Environment Canada's
11 issues are outlined in this presentation. They relate
12 to the proposed site-specific water quality objectives
13 and effluent quality criteria for total dissolved
14 solids, the outcomes of the TDS treatment system pilot
15 testing programs, seepages from the north pile and
16 water management pond, as well as the potential for
17 stratification of Snap Lake.

18 Sorry. De Beers has proposed to change
19 the site-specific water quality objectives and effluent
20 quality criteria for total dissolved solids at the Snap
21 Lake Mine. EC is concerned with some of the effluent
22 parameters that are already above the Canadian
23 environmental quality guidelines recommended by the
24 Canadian Council of Ministers of the Environment, and
25 that the long-term effects of increasing TDS

1 concentrations and the concentrations of other
2 parameters in Snap Lake is not clearly understood at
3 this time.

4 As a result, Environment Canada made the
5 following recommendation. If there is the potential
6 for a deleterious substance to be deposited, best
7 available technology that is economically achievable be
8 applied to achieve the end-of-pipe concentrations that
9 will not result in harm to the aquatic life in the
10 receiving environment. De Beers, in their response to
11 interventions and presented today, has agreed with this
12 recommendation.

13 De Beers is currently undergoing a pilot
14 testing program to confirm the best option for TDS
15 treatment. Environment Canada remains concerned that
16 the long-term effects of increasing TDS concentrations
17 and the other parameters in Snap Lake is not clearly
18 understood. Sharing the knowledge of the capability of
19 the pilot testing treatment processes to reduce the
20 concentrations of TDS and other parameters of concern
21 is important for the continuing protection of the
22 health of the lake.

23 Environment Canada made the
24 recommendation that De Beers provide regular updates to
25 the Boards on their pilot testing programs in order

1 that the Board can understand what end-of-pipe limits
2 could be achieved by treating a given volume of
3 effluent.

4 As you heard earlier, De Beers has
5 agreed with Environment Canada's recommendation, and
6 will provide regular updates regarding progress on
7 source control and treatment to the Land and Water
8 Boards. Environment Canada would like to see this
9 commitment reflected in the final commitments table.

10 Environment Canada acknowledges that the
11 main contri -- contribution to the high TDS appears to
12 be from the development of the footwall underground,
13 and that targeted treatment is not practical under the
14 current mine operating conditions.

15 In addition to water from the
16 underground, both the north pile and the water
17 management pond has seepages going to Snap Lake.
18 Environment is concerned that these seepages are adding
19 to the increased TDS in the lake.

20 Environment Canada made the
21 recommendation that De Beers assess the seepage from
22 the north pile and the water management ponds and
23 quantify the amount of TDS and chloride that are
24 entering the Snap Lake from these seepages. De Beers
25 has responded to this recommendation and provided

1 further detail as to the volumes of seepage from the
2 north pile and water management ponds. EC is satisfied
3 with the response from De Beers.

4 According to the Canadian Council of
5 Ministers of the Environments chloride fact sheet,
6 increased chloride in surface water has been linked to
7 reducing the vertical mixing of surface waters by way
8 of changing the density gradients of the lake. This is
9 where the layers of water within the lake form, and do
10 not experience vertical mixing, and the phenomenon is
11 referred to as meromixis.

12 One (1) of the outcomes of
13 stratification of the water layer is that the deeper
14 layer can become quite depleted in oxygen and can limit
15 the survival of aquatic life in this area.

16 Since TDS, including chloride, in Snap
17 Lake is increasing at a faster rate than what was
18 predicted in the environmental assessment report, EC is
19 concerned that these potential -- there is a potential
20 for stratification in Snap Lake as a result of the
21 increased TDS.

22 As such, EC made the recommendation that
23 De Beers monitor the water quality parameters such as
24 temperature, pH, specific conductants, dissolved
25 oxygen, and other parameters that would help the iden -

1 - would help identify the water quality conditions
2 related to the potential for stratification of Snap
3 Lake, and that De Beers develop contingency mitigation
4 measures which can implement in the event this is
5 observed.

6 So this includes EC's recommendations.
7 Environment Canada would like to thank the Review Board
8 for the opportunity to comment on De Beers-Snap Lake's
9 mine water licence application, and hopes that these
10 technical comments and recommendations will assist the
11 Review Board in making their environmental assessment
12 decision in the proposed project.

13

14 QUESTION PERIOD:

15 THE CHAIRPERSON: Thank you. The Board
16 will now take questions from the GNWT.

17 MR. ROBERT JENKINS: Thank you, Madam
18 Chair. It's Robert Jenkins with the GNWT. We have no
19 questions for Environment Canada.

20 THE CHAIRPERSON: Questions from the
21 Yellowknives Dene First Nations?

22 MR. TODD SLACK: Todd Slack with the
23 Yellowknives. We don't have any questions.

24 THE CHAIRPERSON: Questions from Lutsel
25 K'e Dene First Nations?

1 MR. MIKE TOLLIS: Mike Tollis from
2 Lutsel K'e Dene First Nation. I just have one (1)
3 question for Environment Canada. You mentioned that
4 the best available technology that is economically
5 achievable.

6 Can you elaborate on what you mean by
7 economically achievable?

8 MS. SARAH-LACEY MCMILLAN: It's Sarah-
9 Lacey with Environment Canada. I'm going to defer to
10 Anita with that one, please.

11 MS. ANITA LI (BY PHONE): It's required
12 for that to treat that effluent, so that we can get a
13 sense of what it's -- I guess there's a balance
14 whether, you know, the mine closes or it stays open.
15 So that balance has to be looked at, and in most
16 jurisdictions we ask for best available technology
17 economically achievable.

18 And in the case of -- in this case our
19 headquarter people are looking at this BATEA report.
20 Unfortunately I have no access to that report. It's
21 being reviewed by headquarters. So right now I do not
22 know what is coming out of that report.

23 MR. MIKE TOLLIS: Thank you. Mike
24 Tollis from the Lutsel K'e Dene First Nation. That
25 helps a little bit. And I don't have any more

1 questions. Thanks.

2 THE CHAIRPERSON: Questions from North
3 Slave Metis Alliance?

4 MR. MATT HOOVER: Thank you, Madam
5 Chair. Matt Hoover, North Slave Metis Alliance. We
6 have no questions.

7 THE CHAIRPERSON: Questions from Deninu
8 K'ue First Nations?

9 MR. MARC D'ENTREMONT: Thank you, Madam
10 Chair. Marc d'Entremont for the DKFN. We have no
11 questions for Environment Canada. Thanks.

12 THE CHAIRPERSON: Questions from De
13 Beers?

14 MS. ERICA BONHOMME: Erica Bonhomme, De
15 Beers. No questions.

16 THE CHAIRPERSON: Questions from Board
17 staff? Questions from counsel?

18 MR. JOHN DONIHEE: Yes, thank you,
19 Madam Chair. It's John Donihee, Board counsel. I
20 wonder if you'd just confirm for me my understanding
21 that Environment Canada is not a regulator in -- in
22 this instance and that you're here as a -- an advisor
23 providing scientific advice to the Review Board?

24 MS. SARAH-LACEY MCMILLAN: Sarah-Lacey
25 McMillan with Environment Canada. That is correct.

1 MR. JOHN DONIHEE: Thank you, Madam
2 Chair. It's John Donihee. Then I wonder if you would
3 advise the Board whether in the opinion of Environment
4 Canada the proposal advanced by De Beers will cause a
5 significant impact on the environment, or whether, in
6 Environment Canada's view, it might generate
7 significant public concern?

8 MR. CAREY OGILVIE: Madam Chair, it's
9 Carey Ogilvie with Environment Canada. I think that's
10 a decision for the Board, not necessarily for
11 Environment Canada to make. Thank you.

12 MR. JOHN DONIHEE: Thank you, Madam
13 Chair. I asked whether in Environment Canada's opinion
14 you could answer those questions. I do understand what
15 the Board's role is. I'm just curious about
16 Environment Canada's role here.

17 Does Environment Canada have an opinion
18 on those questions?

19 MR. CAREY OGILVIE: Thank you, Madam
20 Chair. I think with current mitigated mea --
21 technology it can be managed appropriately.

22 MR. JOHN DONIHEE: Thank you, Madam
23 Chair. Those are my questions.

24 THE CHAIRPERSON: Thank you. Questions
25 from Board members? Questions from Board members?

1 Okay. What we'd like to do now then is
2 take a break for supper, and we'll reconvene here at
3 6:30. And thank you to the presenters that presented
4 today so far. Thank you.

5

6 --- Upon recessing at 5:13 p.m.

7 --- Upon resuming at 6:41 p.m.

8

9 THE CHAIRPERSON: Okay, if we could
10 reconvene the hearing, please. We would like to open
11 the floor now to public comments.

12 If you could please introduce yourself.

13 MR. ZHONG LIU: My name is Zhong Liu
14 from Snap Lake Environmental Monitoring Agency. We
15 monitor the mine and also the government agencies
16 related to this mine.

17 THE CHAIRPERSON: Okay, thank you. And
18 do you have questions?

19 MR. ZHONG LIU: Yes, Madam Chair --
20 Chair. So I have a -- I guess I'm -- I'm allowed to
21 ask two (2) questions, or -- or three (3), or...?

22 THE CHAIRPERSON: Two (2) questions. I
23 think you -- those questions were put forward before.
24 So if you could ask those questions, please. Thank
25 you.

1 MR. ZHONG LIU: Zhong Liu, SLEMA. So
2 many of you might be aware that current situation at
3 the mine site for TDS issue and chloride issue.
4 Currently total dissolved solid levels and -- the edge
5 of the mixing zone in Snap Lake already above 350
6 milligram per litres, especially the SNP zero two
7 twenty (020) number is 360 milligram per litre based on
8 the past year -- past few years data. And the whole
9 lake average number will be very close to this one. It
10 should be lower, but be close to the mixing zone level,
11 because it's a well mixed lake.

12 So here is the -- is the -- the
13 question, because the whole lake average -- this water
14 license limit is for whole lake average is three
15 hundred and fifty (350) so right now it's in -- in --
16 I'm not sure whether is -- is already above that lem --
17 limit.

18 So I -- my first question is: Because
19 De Beers just finished their AEMP monitoring for the
20 winter season, for the past winter season, so I'm
21 wondering whether this -- they are AEMP data, pre --
22 preliminary data available to calculate whole lake
23 average?

24 THE CHAIRPERSON: And --

25 MS. ERICA BONHOMME: Erica Bonhomme.

1 No, we don't have that data yet.

2 MR. ZHONG LIU: Zhong Liu, SLEMA. So
3 many of you might also be aware that in -- in April and
4 May, in there was another exceedance for chloride at --
5 in their mine-treated effluent. So that's -- that's
6 not the first one. And last year there -- was another
7 one. September/October 2013 there's a -- there was
8 another exceedance of chloride, about the loading
9 average of water license limit for chloride. So that's
10 the -- no, that's a -- a concern. Right now, I guess,
11 the land department has been taking legal samples to
12 make sure compliance and not -- it will not happen or -
13 - again.

14 But the issue is -- so this is my
15 comment here -- so the issue is there's no effective
16 mitigation measures in place to prevent that exceedance
17 from recurring. So this is my -- my -- because for the
18 past years, the level of chloride has been up and very
19 close to the loading average number for -- for water
20 license limit, so three hundred and ten (310). So
21 that's very, very, kind of, risky institution (sic) for
22 De Beers.

23 So here -- so I -- I think -- right now,
24 their approach to mana -- to pur -- to managing
25 chloride at the mine site is kind of walk in the -- in

1 the tightrope. So that's kind of always will be kind
2 of maybe -- maybe above that water license limit.

3 That's my follow-up comments for -- for
4 the chloride level discharge from Snap Lake mine.

5 THE CHAIRPERSON: Can I just ask if
6 your comments are leading towards a question?

7 MR. ZHONG LIU: Yes. So now I'll ask
8 my second question. De Beer (sic) proposed a -- a
9 site-specific water quality objective of 684 milligram
10 per litre for TDS, and also they are doing some other
11 study for -- for some treatment technology. They ba --
12 I guess they assumed they will -- the -- the discharge
13 level will be lower than six hundred and eighty-four
14 (684) as they are -- because that -- they're -- they
15 also propose a EQC that's also the same number, 684
16 milligram per litre of TDS.

17 The issue is right now you don't have
18 the Yellowknives -- you don't have the Denes -- Lutsel
19 K'e Denes -- the -- and also GNWT also proposed another
20 set of specific water quality object -- objective.
21 They propose a 500 milligram per litre.

22 My question is: What is the bottom line
23 for De Beers to consider how much water will be treated
24 if De Beers -- you -- De Beers proposed a -- a set --
25 set EQC or a site-specific water quality objective was

1 not approved by the Board but instead the Board
2 approved 500 milligram per litre of TDS as their -- as
3 the site-specific water quality objective?

4

5 (BRIEF PAUSE)

6

7 MS. ERICA BONHOMME: Yeah. Erica
8 Bonhomme, De Beers. I think your -- your question, Mr.
9 Lui is a -- a bit hypothetical. We've -- we've
10 indicated that we will meet an appropriate and
11 achievable site specific water quality objective. What
12 we have proposed is six hundred (600) and -- six (6) --
13 684, thank you, milligrams per litre TDS. And we have
14 also indicated that we will meet an appropriate site
15 specific water quality objective.

16 So I think that to ask us how we will
17 meet a site specific water quality objective of five
18 hundred (500) is not something we have contemplated.

19 THE CHAIRPERSON: Do you have a final
20 comment?

21 MR. ZHONG LUI: Thank you, Madam Chair.
22 So my final comment will be here.

23 So De Beer has been claiming they are
24 pro-actively manage the water at the mine site, but
25 based on my observation for the past few years, they

1 met -- they did have lots of improvements in managing
2 water at the mine site but their approach for -- me --
3 for -- for long-term -- for long time they -- they kind
4 of not proactive; is reactive.

5 In 2009, SLEMA already show letter of
6 potential exceedance of water licence limit. And the
7 next year 2010 SLEMA in -- issue another letter and the
8 ve -- and to confirm just kind of potential exceedance
9 via modelling work. And then the following year for
10 the water lic -- during water licen -- water licence
11 renewal process and De Beer present some modelling
12 result.

13 In their -- De Beers has -- has TDS,
14 calcium and chloride sampling plan. In that plan they
15 should have been -- provide modelling update every
16 year, but I didn't see any result before 2010. So they
17 are not pro -- proactively manage water via modelling
18 work.

19 So -- and also because of this situation
20 -- because right now we only one (1) reading -- in one
21 (1) year we have to finish two (2) public hearing for
22 environmental assessment and water licence amendment.
23 This situation De Beer (sic) could -- could have done
24 better to schedule this -- this issue -- to man -- to
25 manage this -- this issue.

1 And also -- I also encourage De Beers to
2 really take proactive approach to manage the
3 environmental and water at the mine site. And also I
4 encourage Review Board and the Water Board also
5 proactively manage the file. That's my final comment.
6 Thank you, Ms. -- Madam Chair.

7 THE CHAIRPERSON: Thank you. We have
8 come to the end of the day for our hearing and we would
9 like to adjourn our hearing until tomorrow morning at
10 nine o'clock. Thank you.

11

12 --- Upon adjourning at 6:52 p.m.

13

14

15 Certified Correct,

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19 _____

20 Bob Keelaghan, Mr.

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